

# CA CloudMinder™

## CA SiteMinder Policy Server Configuration Guide

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## CA Technologies Product References

This document references the following CA Technologies products:

- CA CloudMinder™ Identity Management
- CA CloudMinder™ Advanced Authentication
- CA CloudMinder™ Single Sign-On
- CA Directory
- CA IdentityMinder™
- CA AuthMinder™
- CA RiskMinder™
- CA SiteMinder®
- CA SiteMinder® for Secure Proxy Server
- CA Layer 7

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# Chapter 1: SiteMinder Overview

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This section contains the following topics:

[SiteMinder Components](#) (see page 27)

[Policy Server Overview](#) (see page 27)

[Policy Server Management Console Overview](#) (see page 29)

## SiteMinder Components

CA SiteMinder consists of two core components:

### **Policy Server**

The Policy Server provides policy management, authentication, authorization, and accounting.

### **CA SiteMinder Agents**

Integrated with a standard Web server or application server, CA SiteMinder Agents enable CA SiteMinder to manage access to Web applications and content according to predefined security policies. Other types of CA SiteMinder Agents allow CA SiteMinder to control access to non-Web entities. For example, a CA SiteMinder RADIUS Agent manages access to RADIUS devices, while a CA SiteMinder Affiliate Agent manages information passed to an affiliate's Web site from a portal site.

## Policy Server Overview

The Policy Server typically runs on a separate Windows or Solaris system to perform CA SiteMinder's key security operations. The Policy Server provides the following:

### **Authentication**

The Policy Server supports a range of authentication methods. It can authenticate users based on user names and passwords, via tokens, using forms based authentication, and through public-key certificates.

### **Authorization**

The Policy Server is responsible for managing and enforcing access control rules established by the Policy Server administrator. These rules define the operations that are allowed for each protected resource.

### **Administration**

The Policy Server can be configured using the CA SiteMinder Administrative UI. The Administration service of the Policy Server is what allows the Administrative UI to record configuration information in the Policy Store.

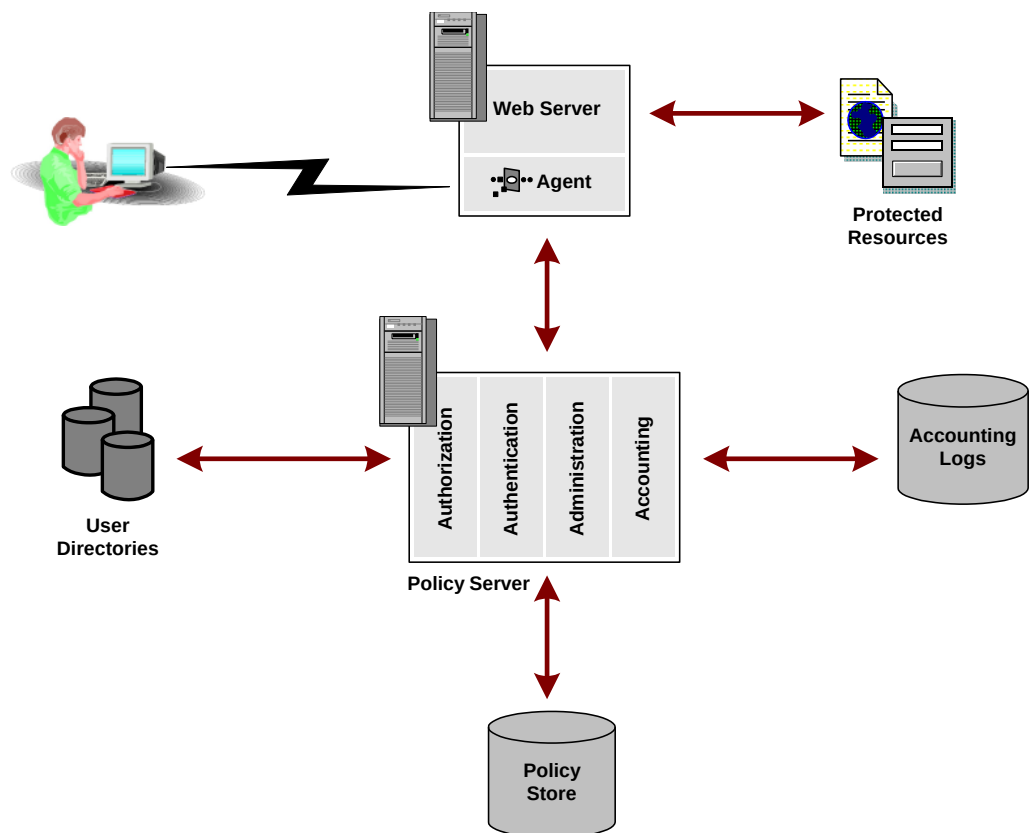
### Accounting

The Policy Server generates log files that contain auditing information about the events that occur within the system. These logs can be printed in the form of predefined reports, so that security events or anomalies can be analyzed.

### Health Monitoring

The Policy Server provides features for monitoring activity throughout a CA SiteMinder deployment.

The following figure illustrates a simple CA SiteMinder environment.



In a Web implementation, a user requests a resource through a browser. That request is received by the Web Server and intercepted by the CA SiteMinder Web Agent. The Web Agent determines whether or not the resource is protected, and if so, gathers the user's credentials and passes them to the Policy Server. The Policy Server authenticates the user against native user directories, then verifies if the authenticated user is authorized for the requested resource based on rules and policies contained in the Policy Store. Once a user is authenticated and authorized, the Policy Server grants access to protected resources and delivers privilege and entitlement information.

**Note:** Other types of Agents can be created using the Agent API.

**More information:**

[Custom Agents](#) (see page 144)

## Policy Server Management Console Overview

The majority of Policy Server configuration tasks are performed using the Administrative UI. However, there are some Policy Server management tasks that you perform using the Policy Server Management Console.

The management tasks controlled by the Policy Server Management Console include the following:

- Starting and stopping Policy Server processes
- Configuring Policy Server Executives
- Cache Management
- Key Management
- Global Settings
- User Management

**Note:** More information on the Policy Server Management Console exists in the *Policy Server Administration Guide*.



# Chapter 2: Policy Server Object Overview

---

This section contains the following topics:

[Policy Server Object Types](#) (see page 31)

[Configuration Order](#) (see page 35)

## Policy Server Object Types

There are three main categories of objects that the policy server uses:

- Infrastructure Objects
- Policy Domain Objects
- [Global Objects](#) (see page 34)

### Infrastructure Objects

You use infrastructure objects throughout a CA SiteMinder deployment. Infrastructure objects include connections to existing user directories, administrators, Agents, authentication schemes, registration schemes, and password policies.

Infrastructure objects include:

#### **Agents**

An Agent is installed on web servers, application servers, or other network entities to secure access to resources. Once an Agent is installed on a server, configure a CA SiteMinder object for the Agent in the Administrative UI.

#### **Agent Groups**

An Agent group is a Policy Server object that points to a group of Agents. The Agents in the group can be installed on different servers, but all of the Agents protect the same resources. Typically Agent groups are configured in CA SiteMinder for groups of servers that distribute the workload for access to a common set of resources.

#### **Agent Configuration Objects**

An Agent Configuration Object holds configuration parameters for one or more Web Agents.

#### **Host Configuration Objects**

A Host Configuration Object holds configuration parameters for the Trusted host.

### User Directories

A user directory in CA SiteMinder is an object that contains details for connecting to an existing user directory that is external to CA SiteMinder. User directory connections let you configure a connection to an existing user directory, instead of replicating user information within CA SiteMinder.

### Policy Domains

A policy domain is a logical grouping of one or more user directories, administrators, and realms. This Policy Server object is the basis for entitlement data. By creating policy domains, an administrator creates a container for entitlements that surround a particular group of resources (realm), and the users who can access the resources, and the administrator who sets up entitlements.

### Affiliate Domains

Affiliate domains are only for eTrust SiteMinder FSS. An affiliate domain is a logical grouping of SAML affiliates that is associated with one or more user directories and administrators.

**Note:** For more information about affiliate domains, see the *CA SiteMinder® Federation Legacy Federation Guide*.

### Administrators

An administrator is an object that contains profile information for a CA SiteMinder administrator account. Everyone who logs in to CA SiteMinder is considered an administrator. The privileges and activities of an administrator account vary by administrative role.

### Authentication Schemes

An authentication scheme is a Policy Server object that determines the credentials that a user requires to access a protected resource. Authentication schemes are assigned to realms or [Applications](#) (see page 421). When a user tries to access a resource in a realm or Application, the assigned authentication scheme determines the credentials that a user must supply to access the resource.

### Registration Schemes

A registration scheme is a Policy Server object that allows users to register themselves for access to a group of resources on a network and administrators to manage registered users. Registration schemes simplify the task of managing a large user database.

### Agent Types

An Agent Type is a Policy Server object that defines the actions and response attributes that a type of Agent supports. For example, Web, Affiliate, RADIUS, or custom.



### SQL Query Schemes

A SQL Query Scheme is an object that stores CA SiteMinder SQL queries. These queries are used to retrieve information, such as a list of user groups, from relational databases that are used as CA SiteMinder user directories.

### Password Policies

Password policies are Policy Server objects that contain rules for passwords, including expiration dates, constraints, and composition requirements.

### SAML Affiliations

SAML affiliations are only for eTrust SiteMinder FSS. A SAML affiliation is a group of SAML 2.0 entities that share a name identifier for a single principal.

**Note:** Note: For more information about SAML affiliations, see the *CA SiteMinder® Federation Legacy Federation Guide*.

### Trusted Hosts

A Trusted Host object represents the client component that connects to the Policy Server.

## Policy Domain Objects

A policy domain is a group of objects that deal with a specific domain of resources. For example, a company may divide its network resources by business unit, creating one policy domain for marketing, another policy domain for engineering, and so on. Policy domain objects are those objects that pertain to a specific policy domain. These objects include rules and policies for controlling access to resources.

Policy domain objects include:

### Realms

A realm is a Policy Server object that identifies a group of resources. Realms typically define a directory or folder and possibly its subdirectories.

### Rules

A rule is a Policy Server object that identifies a resource and the actions that are allowed or denied for the resource. Rules can also include actions that are associated with specific events. For example, what to do if a user fails to authenticate correctly when asked for their credentials.

### Rule Groups

A rule group is a Policy Server object that contains multiple rules. Rule groups are used to tie together different rules that are used in a single policy.

### Responses

A response is a Policy Server object that determines a reaction to a rule. Responses are included in policies, and take place when a rule is triggered.

### Response Groups

A response group is a Policy Server object that contains a logical grouping of responses. Response groups are most often used when many responses are included in a policy.

### Policies

A policy is a Policy Server object that binds users, rules, responses, and optionally, time restrictions and IP address restrictions together. Policies establish entitlements for a CA SiteMinder protected entity. The policy is what CA SiteMinder ultimately uses to resolve the request when a user attempts to access a resource.

### Variables

A variable is an object that can be resolved to a value which you can incorporate into the authorization phase of a request. The value of a variable object is the result of dynamic data and is evaluated at runtime.

### Affiliates

Affiliate objects are only for eTrust SiteMinder FSS. An affiliate object binds users, and optionally, time restrictions and IP address restrictions together. An affiliate object also contains configuration data and a list of user entitlement attributes to be passed to an affiliate after a user is authenticated.

**Note:** For more information about affiliates, see the *Federation Manager Guide: Legacy Federation*.

## Global Objects

In addition to configuring policies for specific resources in a domain, you can also configure global policy objects that apply to all resources.

Global objects include:

### Global Rules

A global rule is a Policy Server object that specifies a filter used to apply a global policy to a large group of resources.

### Global Responses

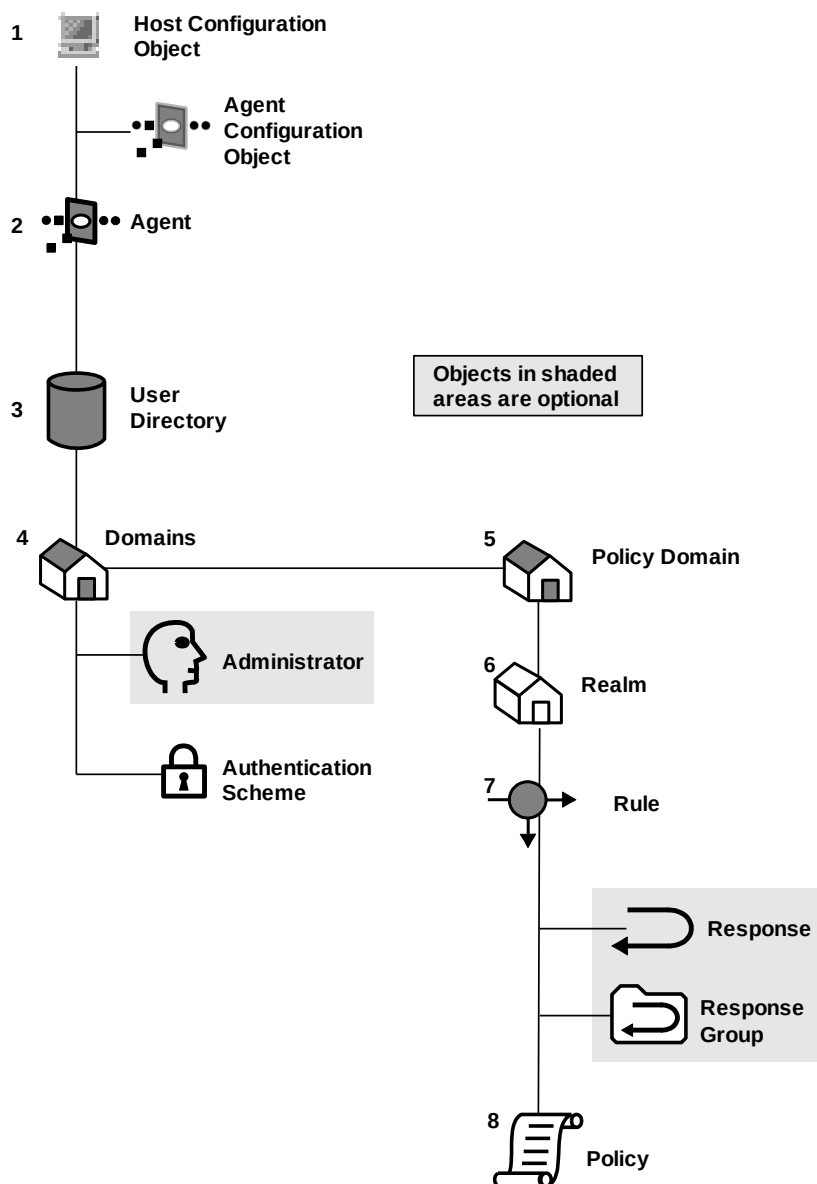
A global response is a Policy Server object that determines a reaction to a global rule. Global responses are included in global policies, and take place when a global rule is triggered.

### Global Policies

A global policy is a Policy Server object that binds users, global rules, global responses, and optionally, time restrictions and IP address restrictions together. When a user attempts to access a resource, the global policy is what CA SiteMinder ultimately uses to resolve the request.

## Configuration Order

A CA SiteMinder deployment requires that you configure core CA SiteMinder objects in a specific order. The following figure illustrates the configuration order for the core CA SiteMinder objects:





# Chapter 3: Implementing Policy-based Security

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This section contains the following topics:

[Policy-based Security Overview](#) (see page 37)

[Strategies for Managing Security and Users](#) (see page 37)

[Security Model Implementation](#) (see page 44)

[SiteMinder Application Roles](#) (see page 49)

[Identity Management Roles and Access Control](#) (see page 50)

## Policy-based Security Overview

Managing users and securing resources successfully are critical aspects of administering an application, a Web site, or a portal. To manage users and secure resources effectively, you must:

- Provide users with easy and fast access to appropriate information.
- Provide security users can trust.
- Protect resources from users who are not allowed access.

Failing to manage users and secure resources effectively can have negative effects on you and your clients, such as:

- Jeopardizing resources if security is inadequate.
- Losing sales if potential customers lack confidence in the security of your site and avoid the site.
- Frustrating customers if the process of accessing resources is cumbersome.
- Losing consumer data if you do not track users adequately.

Developing and implementing a strategy that secures your resources and also manages your user base is critical when you build a Web site or Web application.

## Strategies for Managing Security and Users

A complete security solution should answer the following questions:

- Where is security needed and how much security is needed?
- What kind of tasks will be performed? Security-related tasks?
- What resources need to be protected and what level of protection is required?

- Who has access to the resource and what are they authorized to do?
- How is control over user access to protected resources enforced?

Two of the most common methods for managing users and securing resources are access control lists (ACLs) and security policies.

Security policies provide the most complete security solution by defining not only the type of access a user or user group has to a resource but also what happens when a user or user group accesses the resource. Security policies go beyond the capabilities of ACLs by enabling you to manage the user experience. The CA SiteMinder authorization model is based on security policies.

## Access Control Lists

An access control list is an object associated with a resource that defines access privileges for individual users or groups of users. ACLs are associated with resources to establish:

- Who can access a resource
- What type of access the user has

ACLs provide a straightforward way of granting or denying a specified user or groups of users access to a resource. For example:

`{Manager:ALL, Clerk:READ, Others:NONE}`

The access control list above assigns users in the manager group complete access, users in the clerk group read-only access, and users in all other groups no access to the resource.

Several drawbacks are associated with ACLs:

- Controlling a user's interaction with a resource once the user is authorized and authenticated is difficult. For example, you cannot use ACLs to define session timeouts.
- Managing ACLs for large numbers of resources can be prohibitively time consuming and costly. ACLs create a significant administrative burden.
- Profiling user information is difficult. Users are added to ACLs, which are then associated with resources, making it difficult to determine all of the resources a user has access to at any given moment.

- Qualifying access rights is difficult. It's virtually impossible to restrict access based on a time or a location.
- Personalizing content and defining responses is difficult. If a user has access to a resource, it's difficult to personalize the content or define what happens when the user is allowed or denied access. For instance, you can't use an ACL to display or hide a set of buttons when the user accesses the resource.

ACLs are an effective way to protect a resource but an ineffective way to manage the user experience.

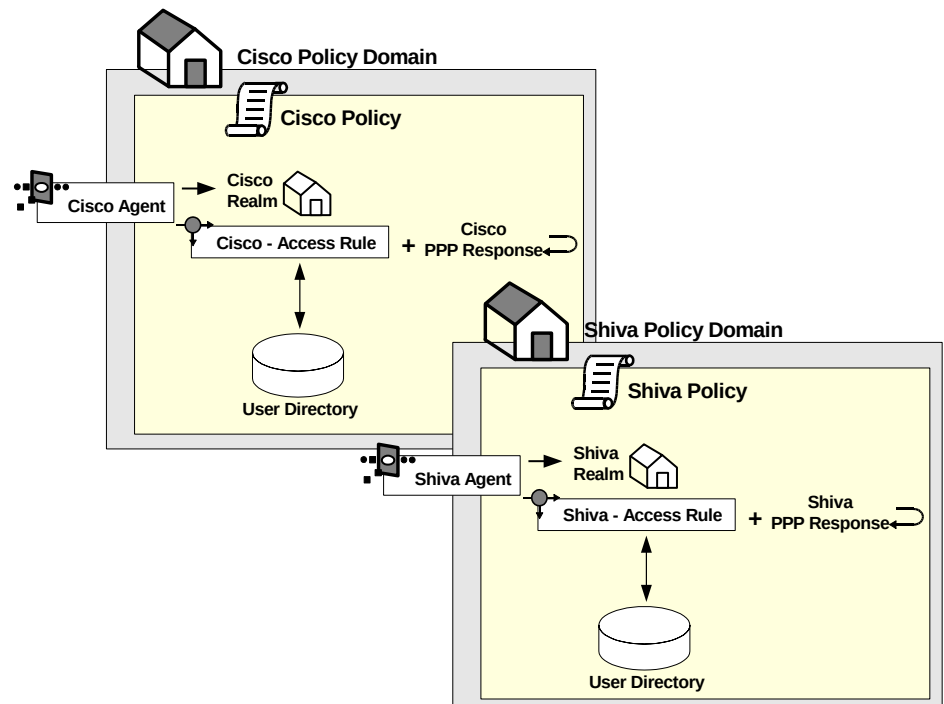
## SiteMinder Security Policies

Unlike ACLs, policies serve a dual purpose: policies provide security and manage the user experience. Policies are user-centric: policies are constructed around the user group rather than the resource.

Policies define access permissions using rules, responses, and time/location constraints. Policies are then associated with users or user groups to establish:

- Where the resource is located
- Who can access a resource
- What type of access the user has
- When they can access a resource
- What happens when they access the resource
- What happens if they can't access the resource

The following graphic provides a definition of a CA SiteMinder security policy.



Policies provide an effective means of managing users and securing resources for the following reasons:

- Policies provide more granularity and the ability to personalize content. Responses enable you to define what happens when a user is allowed or denied access, such as which graphics are shown if a user is allowed access or where to redirect the user if the user is denied access.
- Policies are easy to maintain. When a user is modified, added to the group, or deleted from a group, all policy definitions that include the user are automatically updated.
- Policies provide fine-grained security. Policy definitions can include time restrictions and location (I.P.) restrictions.

Because of the power and flexibility of policies, authorization models based on security policies are more efficient and effective than models based on ACLs.



## Manage the End-user Experience

In addition to securing resources, policies in CA SiteMinder can be used to manage the end-user experience by:

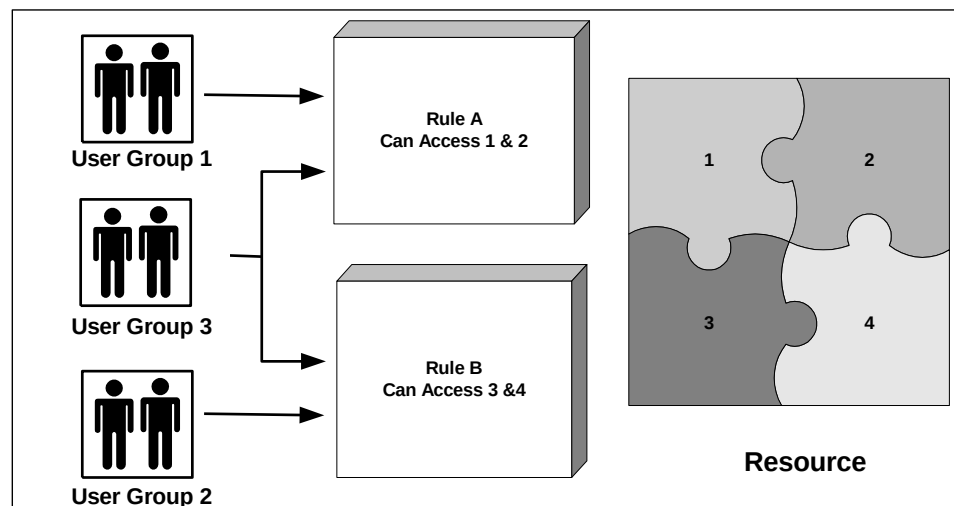
- [How Privileges Are Established](#) (see page 41)
- [How Content Is Personalized](#) (see page 41)
- [How Sessions Are Managed](#) (see page 42)

### How Privileges Are Established

In a policy, the privilege to access a resource is established by adding a rule to a policy. Rules identify specific resources and either allow or deny the user access to the resources. A single policy can establish privileges for many users: policies can be associated with an individual user, a user group, or the members of an entire user directory.

For example, in the following graphic:

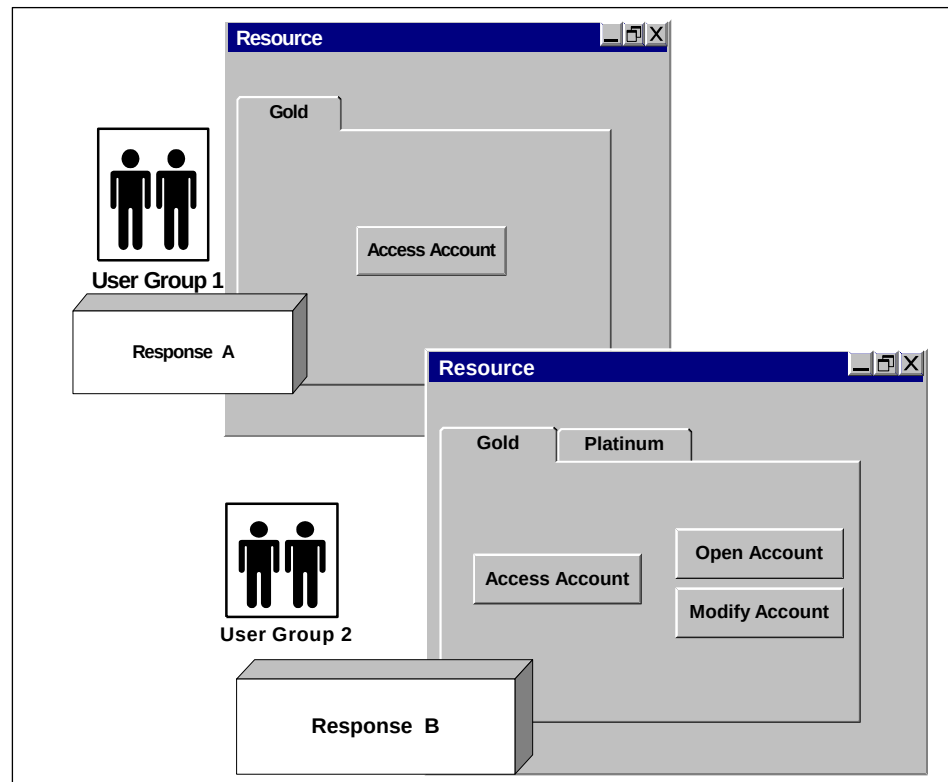
- Group 1 has been assigned Rule A and can access resources 1 & 2,
- Group 2 has been assigned Rule B and can access resources 3 & 4, and
- Group 3 has been assigned both rules and can access all resources.



### How Content Is Personalized

Once a user has been granted access to a resource, the policy can then personalize the user's view of the resource. Policies can customize the view of a resource through the use of responses. Responses are paired with rules and are triggered when a rule fires.

For example, in the following graphic, both Group 1 and Group 2 can access the Resource dialog. However, the view each group has of the dialog differs. The policy for Group 1 uses Response A, which does not provide two buttons (Open Account and Modify Account) or the Platinum tab that Response B makes available.



## How Sessions Are Managed

By managing sessions, you control how long an authenticated and authorized user can access the resource. You can control sessions by:

- Specifying the amount of time a user can remain idle, without interacting with the resource.

Idle timeouts protect against unauthorized use of the resource by limiting the amount of time the session remains active if it is not being used. The idle timeout is particularly useful in cases where users leave their computer without logging out of their session. When the idle timeout limit is reached, the session automatically ends.

- Specifying the maximum amount of time a user can access a resource before they must re-authenticate.

Maximum timeouts protect against unauthorized use of a resource by forcing an authenticated user to re-authenticate after a specified time. This safeguard ensures that if an authenticated user leaves the computer without logging out and someone else uses the open session, the session will end after a specified amount of time, and the user must re-authenticate to continue using the resource.

- Revoking a user's access to a resource at any time.

In addition to managing how long a session can remain active, you can also end a session immediately if you suspect the integrity of a resource has been compromised. Once a user session has been revoked, the user is disabled in the user directory until you have re-enabled the user using the Administrative UI.

**Note:** More information about managing sessions exists in the *Administration Guide*.

- Enabling persistent sessions.

You can also implement persistent sessions to provide Windows security context functionality and support for Federated Web Services.

**More information:**

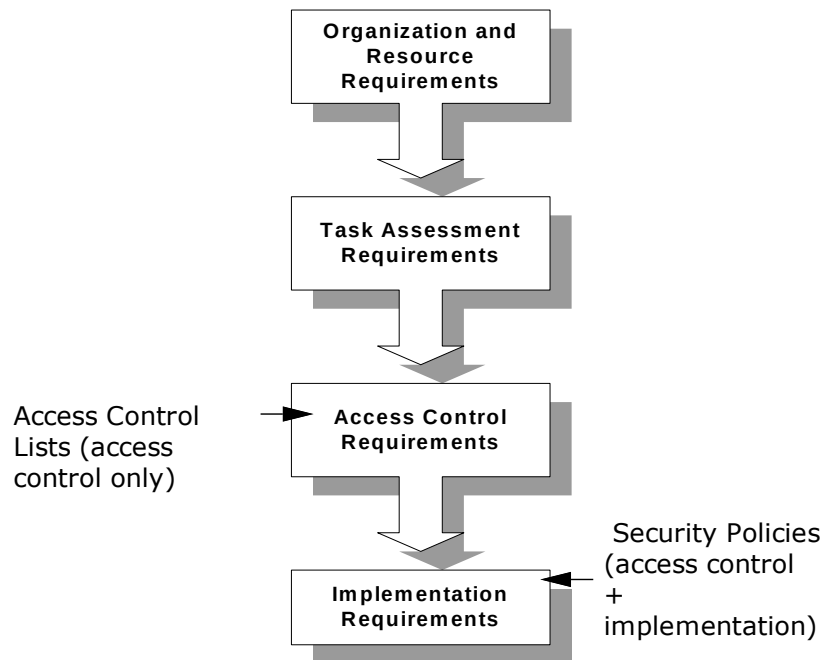
[How Privileges Are Established](#) (see page 41)

[How Content Is Personalized](#) (see page 41)

[How Persistent Sessions for User Security Contexts Are Maintained](#) (see page 108)

## Security Model Implementation

To implement a security model that best meets the needs of your organization, you may create security policies using information gathered in the design phases shown and described below.



1. Organization and resource requirements—set the basic objective of the security model and identify the resources.
2. Task assessment requirements—identify users and roles, and link the roles to tasks.
3. Access control requirements—establish access requirements for users based on their role requirements.

Authorization models based only on access control lists (ACLs) end at this point.

4. Implementation requirements—define how the access is implemented (in terms of how users are tracked and how content is personalized for users) and how user sessions are managed.

Authorization models based on CA SiteMinder security policies incorporate both access control and implementation models.

### More information:

[Define Task-Assessment Requirements](#) (see page 47)

[Organization and Resource Requirement Considerations](#) (see page 45)

## Organize Security Model Requirements

When completing each phase of the security model design methodology, use a table similar to the one shown below to organize your information. Once you have completed the columns in this table, you can use the information to build CA SiteMinder security policies.

| Resource | Role | Task | Access | Implementation |
|----------|------|------|--------|----------------|
|          |      |      |        |                |
|          |      |      |        |                |
|          |      |      |        |                |
|          |      |      |        |                |

## Organization and Resource Requirement Considerations

Before you can setup a security model, you must establish the organization and resource needs of your organization. Some general issues to consider include:

- Are there security guidelines, regulations, or laws your organization is required to meet?
- If security needs conflict with business requirements, which requirements take precedence?
- Has a lack of security affected the reputation of your organization?
- Have security incidents in the past caused financial loss or taken down the site?
- Once you have established the overall security requirements and concerns, you are ready to define the more specific security requirements outlined below.

## How Organization Security Requirements Are Defined

To determine the more specific security needs, consider the following issues:

| <b>These organization requirements:</b>                                                                                                                                                                                                                                                                                       | <b>Affect these tasks:</b>                                     |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------|
| <ul style="list-style-type: none"><li>■ Who requires access to the resources?</li><li>■ How much access do they require?</li><li>■ Can you categorize users with similar access requirements into groups?</li></ul>                                                                                                           | Configuring user directory connections                         |
| <ul style="list-style-type: none"><li>■ Which resources require protection?</li><li>■ Do different resources require different levels of protection?</li></ul>                                                                                                                                                                | Creating policy domains and realms                             |
| <ul style="list-style-type: none"><li>■ How sensitive and valuable is the information?</li><li>■ How much do you trust your users?</li><li>■ Are your users local or remote?</li><li>■ What type of security do your users expect?</li><li>■ Will you lose customers if security does not match their expectations?</li></ul> | Creating authentication schemes using authentication templates |
| <ul style="list-style-type: none"><li>■ Are there security guidelines, regulations, or laws your organization is required to meet?</li><li>■ Do different objects require fine-grained protection or personalization?</li><li>■ What type of actions do you want to control?</li></ul>                                        | Defining rules                                                 |
| <ul style="list-style-type: none"><li>■ What type of security and controls do your users and customers expect?</li><li>■ Do different groups of users require different views of the resource?</li><li>■ What events should take place when a user is authenticated or authorized?</li></ul>                                  | Defining responses                                             |
| <ul style="list-style-type: none"><li>■ How will you implement your requirements?</li></ul>                                                                                                                                                                                                                                   | Defining policies                                              |

## Identify Resources and Roles

The second part of establishing organization requirements is to identify resources and map resources to roles.

The purpose of this step is to link resources with roles. By linking these two components, you will have a better understanding of what needs protection and what type of protection is required.

When identifying resources:

- Identify all known resources, including resources that are planned but do not yet exist. Planning security for all known resources at once, whether they currently exist or not, will save you time.
- Create a site map for Web sites to better understand the structure of the resources.

How this applies to policies:

Resources are defined in realms and rules. Roles of users are implied based on the user group to which they belong or based on their user attributes. In an airline application, for example, a user belonging to the Pilot user group would perform tasks associated with the Pilot role.

#### **To identify resources and roles**

1. Using a table or chart similar to the security model table described earlier in this chapter, list the resources in the Resources column.
2. Identify all subdivisions of a single resource. For example, if a directory called /bidding had two subdirectories below, such as /bidding/flights and /bidding/standby, both subdirectories would be listed as resources. By treating each subdirectory as a separate resource, it will be easier to determine if each resource requires separate security.
3. Next to each resource, list the roles that will need access to the resource.

## **Define Task-Assessment Requirements**

Task assessment requirements bridge the gap between roles and access-control requirements. When you identify task-assessment requirements, you define the tasks each role performs using the resource.

How this applies to policies:

Although tasks are not specifically defined in policies, you will use this information when assessing access rights for each resource-role pairing in the next section.

#### **To define task-assessment requirements**

1. For each role, identify the tasks the role must perform using the resource.
2. Enter the task in the Task column, next to the associated resource and role.

**More information:**

[Define Access Control Requirements](#) (see page 48)

[Organize Security Model Requirements](#) (see page 45)

[Organization and Resource Requirement Considerations](#) (see page 45)

[Define Implementation Requirements](#) (see page 48)

## Define Access Control Requirements

Access control requirements establish whether or not a role requires access to a resource, and if so, the type of access they require. Two roles that access the same resource may not require the same access to the resource.

For example, two groups of users might perform tasks in the same directory. Group A might use this resource to view and modify the resource, while Group B members would view the resource. Because each user group uses the resource in a different way, access rights would differ:

- Group A: Get, Post
- Group B: Get

How this applies to policies:

Access rights are defined in rules.

**To define access control requirements**

1. For each task, identify the type of access that is required to perform the associated task.
2. Enter the access requirement in the Access column.

## Define Implementation Requirements

Implementation requirements define how the resource is used. How a resource is used can be configured by many variables, including:

- Personalization
- Time limitations for using the resource
- Redirections

How this applies to policies:

Implementation requirements are defined in responses.



**To define implementation requirements**

1. For each task, identify how access should be implemented.
2. Enter the implementation requirement in the Implementation column.

With the security model information complete, you can begin constructing policies that are appropriate for your site.

**More information:**

[Organize Security Model Requirements](#) (see page 45)

[Organization and Resource Requirement Considerations](#) (see page 45)

[Define Task-Assessment Requirements](#) (see page 47)

## SiteMinder Application Roles

Application roles let you specify a group of users for access control based on your organization's business requirements.

CA SiteMinder Administrators create and assign roles that determine access to a protected application. For example, a business rule may require that only employees with the title "accountant" use a financial application. A CA SiteMinder Administrator creates a role whose membership is to include employees with the "accountant" title. The administrator then creates an application security policy to protect the application, associating the role with the policy. The policy protects the financial application and only authorizes users with the "accountant" title.

Unlike adding users and user groups to a policy, the scope of roles is not limited to a single directory nor is it limited to a specific directory type. A CA SiteMinder administrator expresses business requirements in the Administrative UI by creating membership expressions. Membership expressions map to specific LDAP and ODBC user directory attributes. The CA SiteMinder administrator then defines the role using the membership expressions. As a result, roles are not dependent on user directory-specific attributes and can span across multiple user directories.

**Note:** More information on application roles exists in Enterprise Policy Management.

## Identity Management Roles and Access Control

Integrating with Identity Management lets you can implement policy-based access control using Identity Management roles. These roles enable centralized management of user privileges in external applications.

**Note:** For more information about configuring the integration, see the CA Identity Manager documentation.

The integration requires:

- The Policy Server installation includes the required data definitions for the CA Identity Manager integration at the following location.

`siteminder_home\mps\dd`

**siteminder\_home**

Specifies the Policy Server installation path.

- The name of the file is:

`IdmSmObjects.xdd`

**Important!** Do not import this file in to the policy store until you have completed the Identity Management integration. If you import the data definitions before completing the integration, the Policy Server can reach an indeterminate state. Coordinate the integration with your Identity Management administrator.

- Identity Management administrators manage environments and roles in Identity Management to determine user access to the applications that CA SiteMinder secures. The CA SiteMinder Administrative UI refers to these environments as an IDM environment.

**Note:** For more information about environments and roles, see the Identity Management documentation.

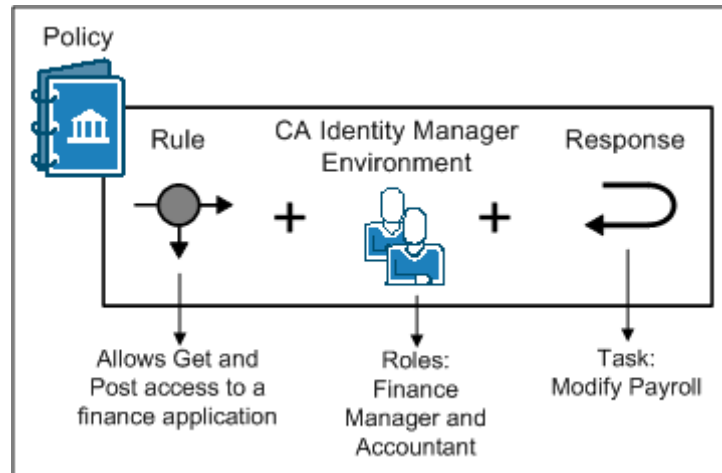
- CA SiteMinder administrators use the Administrative UI to associate one or more IDM environments to a policy domain and user directory. A CA SiteMinder administrator cannot create or manage an IDM environment.
- CA SiteMinder administrators use the Administrative UI to create a policy and associate one or more roles that are available to the IDM environments. A CA SiteMinder administrator cannot create or manage a CA Identity Manager role.

**Note:** You cannot apply a Identity Management role to an enterprise management application.

CA SiteMinder can also provide details about entitlements that a Identity Management user has in protected applications. As the following figure illustrates, a CA SiteMinder administrator associates a response with an access rule in the policy. The response contains a response attribute that specifies a CA SiteMinder-generated user attribute.

The CA SiteMinder-generated user attribute retrieves task information from Identity Management. The Policy Server passes this information to the web agent as an HTTP header variable or a cookie. The web agent makes the header variable or cookie available to the protected application for fine-grained access control.

Figure 1: CA Identity Manager and fine-grained access control





# Chapter 4: Administrative User Interface Management

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The Policy Server is managed through a user interface that is generated dynamically based on the administrative privileges of the user.

**Important!** When working on the task pane on the right, always save your changes before opening or closing the menu pane on the left or navigating to another task.

Do not use the Refresh or Back buttons of the browser while using the Administrative UI. Using these buttons resubmits the form, repeats the action that was initiated by clicking a button in the form, and creates an invalid state.

## Administrative UI Overview

The Policy Server is managed through a graphical user interface. The interface is generated dynamically based on the administrative privileges of the user. This chapter discusses how to log in to the Administrative UI and the common procedures that you use while configuring and managing Policy Server objects.

The Administrative UI contains two panes:

- Menu pane - a menu of tasks on the left
- Task pane - the current task on the right

The menu of tasks on the left can be open or closed. If the menu is closed, you can open it by clicking the right-facing arrow. Likewise, if the menu is open, you can close it by clicking the left-facing arrow.

**Important!** When working on the task pane on the right, always save your changes before opening or closing the menu pane on the left or navigating to another task.

Do not use the Refresh or Back buttons of the browser while using the Administrative UI. Using these buttons resubmits the form, repeats the action that was initiated by clicking a button in the form, and creates an invalid state.

## Start the Administrative UI

### Follow these steps:

1. Open a web browser:
  - If you installed the Administrative UI using the stand-alone option and you registered it over SSL, go to the following location:  
`https://host.domain:8443/iam/siteminder/adminui`
  - If you installed the Administrative UI using the stand-alone option and you did not register it over SSL, go to the following location:  
`http://host.domain:8080/iam/siteminder/adminui`
  - If you installed the Administrative UI to an existing application server infrastructure, go to one of the following locations:  
`http://host.domain:port/iam/siteminder/adminui`  
`https://host.domain:port/iam/siteminder/adminui`

**host**  
Specifies the name of the Administrative UI host system.

**domain**  
Specifies the fully qualified domain name of the Administrative UI host system.

**port**  
Specifies the port on which the application server listens for requests.
2. Enter the credentials of a CA SiteMinder administrator.
3. Click Login.

The system displays the relevant tabs for your administrator privileges. The contents of this window differ based on the privileges of the administrator account you use to log in to the Administrative UI.

## Manage Policy Server Objects

The Administrative UI lets you view, modify, and delete Policy Server objects. Although the details of each task differ by object, the general methods are similar. For example, the procedure for deleting an agent is similar to the procedure for deleting a response.

## Copy Policy Server Objects

The easiest way to create a Policy Server object is to copy an existing object and modify its properties. You can use the properties of the existing object as a template, only changing the information that is different for the new object. The copy option is not available for all objects.

**Note:** Your administrative privileges determine the objects you can access.

**Follow these steps:**

1. Navigate to the subcomponent type that contains the object you want to duplicate.  
**Example:** Click Infrastructure, Agent.
2. Select the type of object you want to duplicate.  
**Example:** Agent
3. Click Create.
4. Select Create a copy of an object, specify search criteria, and click Search.
5. Select an object from the list and click OK.
6. Enter a new name and description.
7. Modify the properties that are different for the new object and click Submit.  
The object is created.

## View Policy Server Object Properties

You can view the properties of a Policy Server object.

**Note:** Your administrative privileges determine the objects you can access.

**Follow these steps:**

1. Select the subcomponent of object you want to view.  
**Example:** Select Policies, Domain.
2. Click the type of object.  
**Example:** Domain
3. Specify search criteria and click Search.
4. Click the name of the object that you want to view.

The View screen appears with information about the object you selected.

## Modify an Existing Policy Server Object

The Administrative UI lets you modify the properties of existing Policy Server objects.

**Note:** Your administrative privileges determine the objects you can access.

**Follow these steps:**

1. Navigate to the subcomponent of object you want to modify.

**Example:** Click Policies, Domain.

2. Click the object that you want to modify.

**Example:** Realms

3. Specify search criteria and click Search.
4. Click the name of the object that you want to modify.
5. Scroll to the bottom of the page and click Modify.
6. Make the required changes and click Submit.

The object is modified.

## Delete a Policy Server Object

You can delete a Policy Server object that is no longer needed.

**Note:** Your administrative privileges determine the objects you can access.

**Follow these steps:**

1. Select the subcomponent of the object that you want to delete.

**Example:** Click Infrastructure, Authentication.

2. Click the type of object.

**Example:** Authentication Schemes

3. Specify search criteria and click Search.
4. Select the object that you want to delete.
5. Click Delete.
6. Confirm that you want to delete the object.

The Policy Server object is deleted.



## Manage Task-persistence Database

Every Administrative UI task stays in the task-persistence database indefinitely or until removed by a CA SiteMinder administrator. You can remove tasks from the database and free up disk space by scheduling cleanup tasks. Cleanup tasks allow you to manage the size of the task-persistence database and improve runtime performance.

Every task exists in the task-persistence database in one of the following states:

- **Audit State**

A task in the audit state has been initiated in the Administrative UI, but not submitted. For example, View tasks are initiated in the Administrative UI, but are never submitted.

- **Submitted State**

Submitted tasks are tasks that have been submitted for processing in the Administrative UI, but that are not yet complete.

- **Completed State**

Completed tasks are submitted tasks that completed processing. Completed tasks include tasks that completed processing successfully and tasks that failed to complete processing successfully, but are nonetheless complete.

Cleanup tasks can remove tasks in the audit state and completed state from the task-persistence database. Cleanup tasks cannot remove submitted tasks that are still pending.

You can schedule, modify, and delete cleanup tasks through the following two options:

### **Clean Up Submitted Tasks**

Use this option to schedule new cleanup tasks or modify existing ones.

### **Delete Recurring Tasks**

Use this option to delete scheduled cleanup tasks.

## Cleanup Submitted Tasks

You configure cleanup tasks to remove tasks in the completed state and the audit state from the database. You can also configure limits for the cleanup task itself.

**Note:** You can only run scheduled jobs for cleaning up the submitted tasks when you log in as the System Manager. The System Manager account is defined using the Configure Administrative Authentication option. This account that is used during the initial registration of the Administrative UI and can be from an external administrator store. The cleanup submitted task functionality is not available to any other administrators, including administrator accounts with super user permissions.

**Follow these steps:**

1. Click Administration, Admin UI, Clean Up Submitted Tasks.
2. Select one of the follow option buttons:
  - Execute now  
Select this option and click Next to skip the scheduling step and go directly to the Clean Up Submitted Tasks pane.
  - Schedule new job
  - Modify existing job
3. Specify the name of the cleanup task in the Job Name field, the type of schedule, and the scheduling details on the scheduling sections. Click Next.
4. Complete the following fields:

**Minimum Age**

Specifies the minimum age in Months, Weeks, Days, Hours, or Minutes of the completed tasks that must be removed.

**Note:** Task age is measured from the time that tasks are completed.

**Audit Timeout**

(Optional) Specifies the maximum number of days to keep tasks in the audit state in the task-persistence database.

**Limits:** one or greater

**Default:** one

**Time Limit**

(Optional) Specifies a time limit in minutes for the cleanup task.

**Task Limit**

(Optional) Specifies a task limit for the cleanup task.

5. Click Finish.

The Cleanup task is submitted for processing.

## Delete Recurring Tasks

You can delete scheduled cleanup tasks that are no longer needed.

**Follow these steps:**

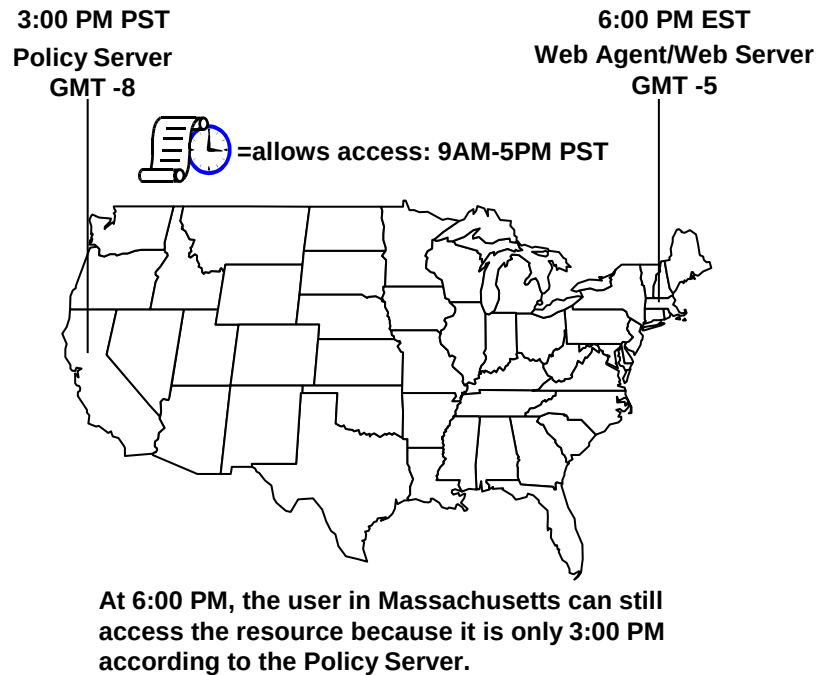
1. Click Administration, Admin UI, Delete Recurring Tasks.
2. Select one or more of scheduled cleanup tasks that must be deleted.
3. Click Submit.

The delete task is submitted for processing.

## How the Web Agent and Policy Server Calculate Time

For each system that has a Policy Server or Web Agent installed, you must set the system clock for the time zone appropriate to that system's geographical location. Policy Servers and Web Agents use the time zones to calculate time relative to Greenwich Mean Time (GMT).

The following figure shows how the Policy Server executes a policy relative to time. A resource is stored on a Web Server in Massachusetts and is protected by a Policy Server in California. The policy allows access to the resource between 9:00 a.m. and 5:00 p.m. However, the user in Massachusetts can still access the resource at 6:00 p.m. because the policy is based on the Policy Server's time zone, Pacific Standard Time (PST), which is 3 hours behind the Web Agent's time zone, Eastern Standard Time (EST).



**Note:** For Windows systems, the time zone and the time of day that you set in the Date/Time control panel must agree. For example, to reset a system in the USA from Eastern Standard Time to Pacific Time, you must set the system's clock back three hours and change the time zone to Pacific Standard Time. If these two settings do not match, single sign-on across multiple domains and agent key management will not work properly.

## Protecting the Administrative UI with SiteMinder

Protecting the Administrative UI with CA SiteMinder requires that you configure an agent to function with a reverse proxy server and configure an external administrator store. Rather than accessing the Administrative UI directly on the application server, you access the Administrative UI through the reverse proxy server.

Consider the following:

- If you have more than one Administrative UI to protect, we recommend protecting each instance with a separate agent functioning with a reverse proxy server.
- If the Administrative UI is installed to WebSphere, the application server host system requires at least 500 MB of free memory to enable CA SiteMinder authentication.

## How to Protect the Administrative UI with SiteMinder

You can protect the Administrative UI with CA SiteMinder:

### Follow these steps:

1. Configure an agent to operate with a reverse proxy server.

Certain types of web servers, such as Apache, that support CA SiteMinder Web agents can also function as reverse proxy servers. See the support matrix for the supported servers.

**Note:** Update the configuration file of Apache web server to make the Apache web server function as a reverse proxy server. For more information about configuring a reverse proxy server and updating the configuration file, see information about configuring the Web Agent configuration material.

**Important!** The URL used in the rules that are set for the proxy server must be the same URL used to register the Administrative UI initially.

**Example:**

If the Administrative UI was initially registered with the following URL, specify the same URL in the proxy server rules.

`http://host_name:8080/iam/siteminder/adminui`

- 
2. In your agent configuration object (ACO), set the value of the LogOffUri parameter as shown in the following example:

`/iam/siteminder/logout.jsp`

- 
- 
3. Configure an external administrator store.

**Note:** The application server restarts automatically after you configure the external administrator store. The Administrative UI is protected with CA SiteMinder only after the restart.

**More information:**

[How to Configure an External Administrator Store](#) (see page 66)

## Change the Authentication Scheme

The default CA SiteMinder authentication scheme used to protect the Administrative UI is basic user name and password. You can change the default authentication scheme to any CA SiteMinder supported authentication scheme, except SAML and WS-Fed authentication.

**Follow these steps:**

1. Click Policies, Domain.
2. Click Realms.
3. Search for the following realm and click the name to open it:

`SiteMinder_ims_realm`

**Note:** This realm is associated with a domain named SiteMinderDomain.

- 
- 
- 
4. Click Modify to enable the settings.
5. Select the authentication scheme you want from the Authentication Scheme list .
6. Enter additional settings, if required.
7. Click Submit.

The Administrative UI is protected using the selected authentication scheme.

**More information:**

[Authentication Schemes](#) (see page 269)

## Disable SiteMinder Authentication for the Administrative UI

If you do not want to protect the Administrative UI with CA SiteMinder, you can disable CA SiteMinder authentication. You can access the Administrative UI through the reverse proxy server only even after you remove CA SiteMinder protection for the Administrative UI.

To access the Administrative UI directly on an application server, delete the data directory and reregister the Administrative UI with the Policy Server.

**Follow these steps:**

1. Log in to the Administrative UI.
2. Run the Administrative Authentication wizard to specify that you no longer want to protect the Administrative UI using CA SiteMinder authentication.  
**Note:** Leave the existing directory server or database connection information to continue using the external administrator store.
3. Log in to the Administrative UI host system.
4. Delete the Administrative UI data directory. The type of application server to which you deployed the Administrative UI determines where the data directory is located:
  - If you installed the Administrative UI using the stand-alone option, the data directory is located at the following location:  
install\_dir/adminui/server/default/data
  - If you installed the Administrative UI to an existing application server, the default location for the data directory is:
    - (JBoss): <JBoss Install>/server/default/data
    - (WebSphere): <WebSphere>\AppServer\profiles\<your\_profile>\data
    - (WebLogic): <weblogic install>\user\_projects\domains\<user\_domain>\data
5. Log in to the Policy Server host system and reset the Administrative UI registration window using the XPSRegClient utility.
6. Register the Administrative UI with the Policy Server.

# Chapter 5: SiteMinder Administrators

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This section contains the following topics:

[CA SiteMinder Administrators Overview](#) (see page 63)

[How to Configure an External Administrator Store](#) (see page 66)

[How to Create an Administrator](#) (see page 78)

[Limit Administrator Account Scope Using Workspaces Overview](#) (see page 81)

[How to Create a Scoped Administrator](#) (see page 82)

[Administrator Use Cases](#) (see page 87)

[How to Create a Legacy Administrator](#) (see page 91)

[Disable an Administrator](#) (see page 95)

[Disable a Legacy Administrator](#) (see page 96)

[Restoring Administrator Access](#) (see page 96)

## CA SiteMinder Administrators Overview

An administrator is someone who can access Policy Server objects and tools.

You can create multiple administrator accounts so that different administrators have privileges according to their roles in an organization.

This model allows you to delegate the management of Policy Server objects and tools to others.

A default CA SiteMinder superuser account with full system privileges is created when you configure the policy store, which is the default source of administrator identities. This default configuration lets you manage the environment immediately after installing the software.

We recommend configuring an external administrator user store.

## Default Superuser Administrator

When you configure the policy store, a default superuser account is created. This account has the maximum system privileges, which permit the following operations:

- Registering the Administrative UI with a Policy Server.
- Creating any Policy Server object, including other administrator accounts.
- Using the Policy Server tools.
- Trusted Host administration.
- Managing the Policy Management API.

The default superuser account has the following credentials:

**User Name**

siteminder

**Password**

The password that you specified when configuring the policy store.

## Administrator Accounts

Administrator accounts can be used to perform the following CA SiteMinder administration tasks:

- Manage Policy Server objects using the Administrative UI
- Use Policy Server tools

To delegate privileges to other administrators, create more administrator accounts. Administrator accounts define the following properties:

**Scope**

Specifies whether the Administrator can access all CA SiteMinder data or only those objects that are defined in an assigned administrative *Workspace*.

**Access methods**

Specifies what methods the Administrator can use to access and manage the CA SiteMinder data.

**Rights**

Specifies what categories of CA SiteMinder objects the Administrator can access, and whether they can only view or modify those objects.

These properties let you create administrators and assign privileges to match the administrative roles in your organization.

**Note:** You can only create more Administrator accounts that are associated with administrative users in an external administrator store. However, these Administrator accounts are automatically generated for Legacy Administrator records stored in the policy store to allow those administrators to access the Administrative UI.

**More information:**

[How to Configure an External Administrator Store](#) (see page 66)

[Limit Administrator Account Scope Using Workspaces Overview](#) (see page 81)

[Administrator Use Cases](#) (see page 87)

[How to Create a Scoped Administrator](#) (see page 82)

[How to Create an Administrator](#) (see page 78)



## Legacy Administrator Accounts

Legacy Administrators perform the following tasks:

- Use Policy Server tools, such as smobjimport and smobjexport.
- Administer Trusted Hosts. Trusted Host Administrators can run the host registration process from the CA SiteMinder agent host system. The registration process configures Agent to Policy Server connections.
- Use the Policy Management API.

**Note:** A Legacy Administrator account is required when your environment includes a script or program that uses the Policy Management API. Create a Legacy Administrator with authentication privileges for executing those functions using the Policy Management API.

**Note:** Legacy Administrators can also access the Administrative UI when the policy store is configured as the source of administrator identities (the default). Once an external administrator store is configured, Legacy Administrator accounts *cannot* access the Administrative UI.

### More information:

[Administrator Store Options](#) (see page 65)

## Administrator Store Options

By default, the Administrative UI uses the policy store as its source of administrator identities. However, we recommend that you use an external administrator user store, such as a corporate directory, for further administrator accounts.

Consider the following factors when deciding where to store administrator identities:

- If you are configuring the Administrative UI with a single Policy Server, you can use the policy store to store administrator identities.
- If you are configuring the Administrative UI with multiple Policy Servers, use an external administrator store.
- If you store administrator identities in the policy store, establish a new administrator record in the policy store by creating a Legacy Administrator.
- If you store administrator identities in an external store, you create Administrator accounts to locate administrator records in the external store.

**Note:** Once an external administrator store is configured, creating new Legacy Administrators or associating any Administrator accounts with Legacy Administrators is prohibited.

- An external administrator store ensures that multiple Administrative UI instances share a set of administrators. By default, the Administrative UI uses the policy store that is configured with the registered Policy Server.

## How to Configure an External Administrator Store

Configure a connection to an external administrator store.

1. (Optional) If you want to protect the Administrative UI with CA SiteMinder, configure an agent to function with a reverse proxy server.
2. [Review the external administrator store guidelines](#) (see page 66).
3. [Review the SSL guidelines](#) (see page 68).
4. Depending on your store type, do *one* of the following tasks:
  - [\(LDAP\) Gather directory server connection information](#) (see page 68).
  - [\(RDB\) Gather database connection information](#) (see page 69).
5. [\(RDB\) Deploy a Java Database Connectivity \(JDBC\) data source to the application server](#) (see page 69).
6. Depending on your store type, do *one* of the following tasks:
  - [Configure an LDAP administrator store connection](#) (see page 71).
  - [Configure an RDB administrator store connection](#) (see page 73).
7. [\(Optional\) Migrate Legacy Administrator Administrative UI permissions](#) (see page 74).

## External Administrator Store Guidelines

Before you configure an external administrator store connection, consider the following items:

**Important!** Discontinuing the use of the policy store as the source of administrator identities is permanent. Configuring an external administrator store only affects the Administrative UI that is configured to use the external store. Any other Administrative UI not yet configured to use the external store continues to use the policy store to identify administrators.

- Legacy Administrators, including the default super user account, can continue to perform the following actions:
  - Manage the Policy Management API
  - Function as a Trusted Host administrator
  - Use Policy Server tools

- Legacy Administrators, including the default super user account, can no longer manage objects with the Administrative UI.
- For Legacy Administrators who must continue using the Administrative UI, add these users to the external store (with your vendor-specific tools). Once the users reside in the external store, map the existing user paths from the policy store to the external store to reinstate these privileges.

**Important!** External administrator authentication does not let a single Legacy Administrator account retain rights to the Administrative UI, the Policy Management API, and Trusted Host privileges simultaneously. If a Legacy Administrator must continue functioning in these roles, leave the Legacy Administrator unchanged. Be sure that the user is present in the external store and separately configure a new Administrator using the external user identity.

- A super user that you identify when configuring the connection to the external store replaces the default super user account. The external user becomes the super user and has maximum permissions in the Administrative UI and access to all Policy Server tools.

Delegate permissions to new Administrators with external super user.

- If multiple Administrative UI instances are to use the same administrator authentication store, be sure to configure each connection using the same network identifier. Mixing network identifiers for multiple Administrative UI connections to the same external administrator authentication store is not supported.

**Example:** If you configured the first connection with 172.16.0.0, create subsequent connections with 172.16.0.0. If you configured the first connection with comp001@example.com, create subsequent connections with comp001@example.com.

## SSL Guidelines

If you are configuring the external administrator store connection over SSL, consider the following items:

- The directory server must be configured to communicate over SSL.  
**Note:** For more information about configuring the directory server for SSL, see your vendor-specific documentation.
- If you installed the Administrative UI using the stand-alone option, the Administrative UI is installed with an embedded certificate database.
- If you installed the Administrative UI to an existing application server infrastructure, implement a certificate database as required by your application server.  
**Note:** For more information about implementing a certificate database, see your vendor-specific documentation.
- Enter an SSL-enabled port when entering directory connection information. If you do not enter an SSL-enabled port, the Administrative Authentication wizard becomes unresponsive.

## Gather Directory Server Information

If you are configuring a connection to a directory server, gather the following information:

- **Host name**—Identify the IP address or fully qualified domain name of the directory server host system.
- **Port**—Identify the port on which the directory server is listening.
- **Directory server user credentials**—Identify the user name and password of an account that has read/write permissions to the directory server.
- **Search root**—Identify the base DN of the directory server.
- **SSL certificate**—If the directory server is configured to communicate over an SSL connection, obtain the SSL certificate.

## Gather Database Information

If you are configuring a connection to a database, gather the following information:

- **Host name**—Identify the name of the database host system.
- **Port**—Identify the port on which the database is listening.
- (Microsoft SQL Server) **Database name**—Identify the name of database.
- (Oracle) **Service name**—Identify the service name of the database.
- **Database user credentials**—Identify the credentials of a user account that has read/write permissions to the database.

**Important!** If you are configuring a connection to Oracle, be sure to set the default schema for this user. The default schema must be the schema that is associated with the table that contains the administrative users. If you do not set the default schema for this user, the Administrative Authentication wizard cannot locate users in the database.

## Deploy a JDBC Data Source

If you are configuring a connection to a relational database, the Administrative UI requires a JDBC data source to communicate with the administrator store. A utility is required to create the data source. If you installed the Administrative UI using the stand-alone option, the `smjdbcsetup` utility is provided for you.

**Note:** If you installed the Administrative UI to an existing application server, see your vendor-specific documentation for information about deploying a JDBC data source. If you are deploying a data source to WebSphere, verify that the JNDI name (under the `datasource` properties) begins with the following characters:

`jdbc/`

**Example:** If the `datasource` name is `abc`, then the JNDI name is `jdbc/abc`.

**Follow these steps:**

1. Log in to the Administrative UI host system.
2. (UNIX) Stop the CA SiteMinder Administrative UI service.
3. Navigate to `administrative_ui_home\CA\SiteMinder\adminui\bin`.

***administrative\_ui\_home***

Specifies the Administrative UI installation path.

4. Run one of the following commands:

- (Windows)

`smjdbcsetup.bat`

**Important!** Before running a CA SiteMinder utility or executable on Windows Server 2008, open the command-line window with administrator permissions. Open the command-line window this way, even if your account has administrator privileges.

- (UNIX)

`smjdbcsetup.sh`

The utility prompts you for a unique identifier. The utility appends the identifier to the data source.

5. Type a value and press Enter.

The utility prompts you for a database driver type. The driver types are prefixed with a number.

6. Type a number to select a driver type and press Enter.

The utility prompts you for the name of the database host system.

7. Type the database host name and press Enter.

The utility prompts you for the port on which the database is listening.

8. Type the database port and press Enter.

- If you are configuring a connection to Microsoft SQL Server, the utility prompts you for the database name.
- If you are configuring a connection to Oracle, the utility prompts you for the service name.

9. Type the database name or the service name and press Enter.

The utility prompts you for the database user account name.

10. Type the database user account name and press Enter.

**Note:** This user account must have read/write permissions to the database.

The utility prompts you for the password of the database user.

11. Type the password and press Enter.

The connection details appear.

12. Review the details and do one of the following steps:

- To configure and deploy the data source, type y and press Enter.

The utility deploys the data source to *admin\_ui\_home\CA\SiteMinder\adminui\server\default\deploy* and prompts you to restart the CA SiteMinder Administrative UI service.

*admin\_ui\_home*

Specifies the Administrative UI installation path.

**Note:** Restarting the CA SiteMinder Administrative UI service is required before you can use the data source to create the connection.

13. Start the service with one of the following steps:

- (Windows) Type y and press Enter.
- (UNIX) Type n and press Enter to start the service manually (automatic starts are not supported).

The data source is configured and the utility exits.

## Configure an LDAP Administrator Store Connection

Change the source of administrator identities from the policy store to the external store by configuring a connection.

**Follow these steps:**

1. Click Administration, Admin UI, Configure Administrative Authentication.
  - If you are configuring an external administrator store for the first-time, the Configure Administrative Authentication wizard appears.
  - If the Administrative UI is configured with an external administrator store, the connection details appear. Click OK to start the Configure Administrative Authentication wizard.
2. (Optional) To protect the Administrative UI with the product, pick an agent from the drop-down list and click Next.

Be sure to select an agent that is configured to function with a reverse proxy server.
3. Select a directory server vendor from the Directory type list and click Next.

The wizard prompts you for connection details.

4. Do the following tasks:

- a. Type the IP address or the fully qualified domain name of the directory server host system in the Host field.

**Important!** If multiple Administrative UI instances are to use the same administrator authentication store, take note of the network identifier you enter. Mixing network identifiers for multiple Administrative UI connections to the same external administrator authentication store is not supported.

**Example:** If you configure the first connection with 172.16.0.0, create subsequent connections with 172.16.0.0. If you configure the first connection with comp001@example.com, create subsequent connections with comp001@example.com.

- b. Type the port on which the directory server is listening in the Port field.

**Important!** If you are configuring the connection over SSL, enter an SSL-enabled port. If you do not, the Administrative Authentication wizard becomes unresponsive.

- c. (Optional) Select Use SSL and upload a Certificate Authority (CA) certificate to enable SSL communication between the Administrative UI and the administrator store.

**Note:** The directory server must communicate over SSL. For more information about configuring the directory server for SSL, see your vendor-specific documentation.

- d. Type the common name and password of a directory server user in the respective fields.

**Note:** This user must have read/write permissions to the directory server.

- e. Click Next.

5. Do the following tasks:

- a. Type the directory server search root in the Search Root field.
- b. Use the shuttle controls to add and remove the object classes that apply to the CA SiteMinder administrators.
- c. Click Next.

6. Select the mnemonic attribute string that maps to each of the required attributes and click Next.

The wizard prompts you to search for a user.

**Important!** Do not point to *any* attribute that is used or written to by the LDAP or any other applications. If this situation happens, you are redirected to the /logout.jsp page and unable to log in to the Administrative UI.

7. Enter all or part of the user name in the Keywords field.



8. Select one user and click Next.

**Note:** You can only select one user. This user becomes the superuser when the connection is configured.

9. Confirm the connection details and click Finish.

**Important!** Restart the application server manually *before* you log in with the new credentials of administrator.

## Configure an RDB Administrator Store Connection

Change the source of administrator identities from the policy store to the external store by configuring the connection.

### Follow these steps:

1. Click Administration, Admin UI, Configure Administrative Authentication.
  - If you are configuring an external administrator store for the first-time, the Configure Administrative Authentication wizard appears.
  - If the Administrative UI is configured with an external administrator store, the connection details appear. Click OK to start the Configure Administrative Authentication wizard.
2. (Optional) To protect the Administrative UI with the product, pick an agent from the drop-down list, and click Next.

Pick an agent that is configured to function with a reverse proxy server.
3. Select *one* of the following items from the Directory type list:
  - If your user schema includes a column that identifies the full-name of users select the Relational Database (with full name column) template.
  - If the full-name of users must be calculated, select the Relational Database (without full name column) template.
4. Click Next.

**Note:** If data sources do not appear, click Cancel and deploy a JDBC data source to the application server. You cannot create the connection without a deployed data source.
5. Select the data source and click Next.
6. Select the user table and click Next.

7. Do *one* of the following tasks:

- If you selected the Relational Database (with full name column) template, pick the column name that maps to each of the required user attributes. Click Next.
- If you selected the Relational database Database (no full name) template:
  - a. Select the column name that maps to each of the required user attributes.
  - b. Build the Get Full Name Query. Replace ##FIRST\_NAME, ##LAST\_NAME, and ##PRIMARY\_KEY with the column name that maps to the respective user attribute.

**Note:** Leave the question mark (?) at the end of the query.

Example: select SmUser.FirstName + ' ' + SmUser.LastName from SmUser where SmUser.UserID = ?

c. Click Next

8. Enter all or part of the user name in the User Keywords field.

9. Select a user and click Next.

**Note:** This user becomes the super user.

10. Confirm the connection details and click Finish.

**Important!** After you configure an external administrator store, restart the application server manually *before* you log in with the new credentials of administrator.

## Migrate Legacy Administrator Permissions

If a Legacy Administrator must continue using the Administrative UI or Policy Server tools after configuring a connection to an external administrator store, migrate the permissions.

**Important!** External administrator authentication does not let a single Legacy Administrator account retain rights to the following items simultaneously:

- The Administrative UI
- The Policy Server tools, the Policy Management API
- The Trusted Host privileges

If a Legacy Administrator must continue functioning in one or more of these roles, leave the Legacy Administrator unchanged. Verify that the user is present in the external store and separately configure a new Administrator using the external user identity.

**Follow these steps:**

**Note:** Verify that the administrator is present in the external store. Log in to the Administrative UI using the external super user.

1. Click Administration, Administrator.
2. Click Administrators.
3. Specify search criteria using the full name of the user and click Search.
4. Click the name of the Administrator you want to modify.
5. Click Modify.
6. Click Lookup in General.
7. Specify search criteria and click Search.
8. Select the user that you want and click Select.
9. Click Submit.

The Administrative UI authenticates the administrator using the external store. The administrator has the same level of access to the Administrative UI when the policy store was being used to store administrator identities.

## Update External Administrator Store Credentials

When the credentials that the Administrative UI uses to connect to the external administrator store change, submit the new credentials to the Administrative UI. Otherwise the administrators lose access.

If you installed the Administrative UI using the stand-alone option, the following utilities are available:

- (LDAP) Use the smjndisetaup utility to update the directory server user account credentials.

**Note:** To update the directory server host system name or port information, use the Administrative UI to re-create the connection to the external administrator store. The smjndisetaup utility cannot update host or port information.

- (RDB) Use the smjdbcsetaup utility to update the database user account credentials.

**Note:** To update the database host system name or port information, use the smjdbcsetaup utility to re-deploy the JNDI data source.

If you installed the Administrative UI to an existing application server infrastructure, review the following items:

- (LDAP) Use the Administrative Authentication Wizard to update the credentials that the Administrative UI is to use to access the directory server.

**Important!** After you use the wizard to update the credentials, update the credentials on the directory server as soon as possible. Administrators cannot log in to the Administrative UI until the directory server credentials are updated to match the credentials you supplied using the wizard.

- (RDB) Use the database-specific tool to update the data source.

**More information:**

[Deploy a JDBC Data Source](#) (see page 69)

## Update Directory Server Credentials

Update directory manager credentials with the smjndissetup utility.

**Note:** The smjndissetup utility can only update connection details that were configured using the Administrative UI. You cannot use the smjndissetup utility to create the connection credentials.

**Follow these steps:**

1. Log in to the Administrative UI host system.
2. (UNIX) Stop the CA SiteMinder Administrative UI service.
3. Navigate to *administrative\_ui\_home*\CA\SiteMinder\adminui\bin.

***administrative\_ui\_home***

Specifies the Administrative UI installation path.

4. Run one of the following commands:

- (Windows)

```
smjndissetup.bat --reset-password
```

**Important!** Before running a CA SiteMinder utility or executable on Windows Server 2008, open the command-line window with administrator permissions. Open the command-line window this way, even if your account has administrator privileges.

- (UNIX)

```
smjndissetup.sh --reset-password
```

5. Do *one* of the following tasks:
  - Type the new directory user and press Enter.
  - Press Enter to accept the default user name.
6. Type the new password and press Enter.
7. Type y and press Enter.
  - If you ran the utility on Windows, the utility restarts the CA SiteMinder Administrative UI service. The utility also updates the new directory connection details.
  - If you ran the utility on UNIX, start the Administrative UI service to update the new directory connection details.

## Update Database Credentials

Use the smjdbcsetup utility to update database user credentials in the JNDI data source.

### To update database credentials

1. Log in to the Administrative UI host system.
2. (UNIX) Stop the CA SiteMinder Administrative UI service.
3. Navigate to *administrative\_ui\_home*\CA\SiteMinder\adminui\bin.

#### ***administrative\_ui\_home***

Specifies the Administrative UI installation path.

4. Run one of the following commands:

- (Windows)

```
smjdbcsetup.bat --reset-password
```

**Important!** Before running a CA SiteMinder utility or executable on Windows Server 2008, open the command-line window with administrator permissions. Open the command-line window this way, even if your account has administrator privileges.

- (UNIX)

```
smjdbcsetup.sh --reset-password
```

The utility prompts you to enter a unique identifier.

5. Enter the name of the deployed data source.

**Note:** If you do not know the data source name, you can locate all deployed data sources in *administrative\_ui\_home*\SiteMinder\adminui\server\default\deploy.

#### ***administrative\_ui\_home***

Specifies the Administrative UI installation path.

The utility prompts you for the database user name.

6. Enter the user name and press Enter.

The utility prompts you for the user password.

7. Enter the password and press Enter.

The utility prompts you to verify the new data source credentials and verify that they can be updated.

8. Type y and press Enter to confirm the new data source credentials.

The utility updates the data source.

- (Windows) The utility prompts you to restart the CA SiteMinder Administrative UI service.
- (UNIX) A message appears stating that the CA SiteMinder Administrative UI service must be manually started.

9. Do one of the following tasks:

- (Windows) Type y and press Enter to use the utility to restart the CA SiteMinder Administrative UI service and deploy the updated data source.
- (Windows) Type n and press Enter to start the CA SiteMinder Administrative UI service manually. The data source is deployed when the service is started.
- (UNIX) Manually start the CA SiteMinder Administrative UI service to deploy the data source.

**Note:** For more information about starting the CA SiteMinder Administrative UI service, see the *Policy Server Installation Guide*.

## Modify the External Administrator Store Connection

Run the Administrative Authentication wizard again to change the external store to which the Administrative UI connects for administrator authentication.

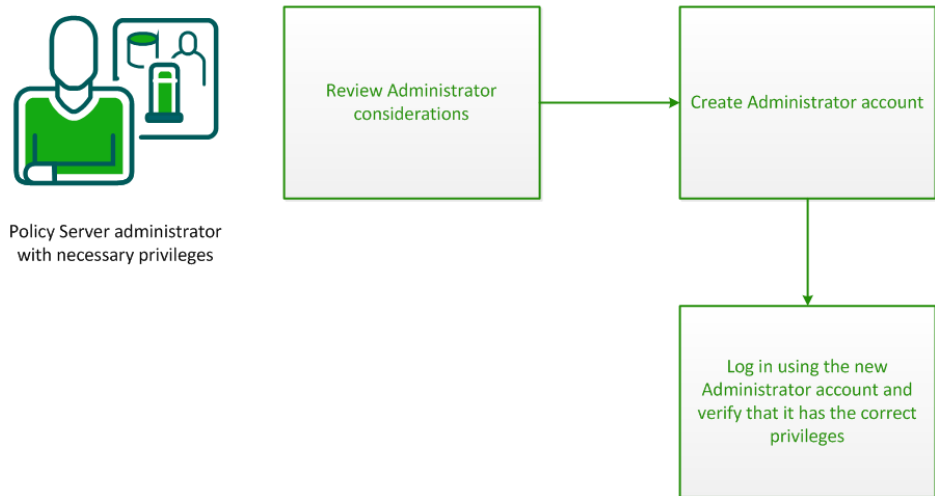
### More information:

[How to Configure an External Administrator Store](#) (see page 66)

## How to Create an Administrator

Administrator accounts can be configured with fine-grained privileges that determine the administrative capabilities available to that administrator.

Administrators are assigned rights to one or more security categories that define their administrative authority in the Administrative UI, such as managing authentication schemes. By default an administrator has access to every object related to an assigned security category.



1. [Review the Administrator considerations](#) (see page 79).
2. [Create an Administrator account](#) (see page 80).
3. [Verify the privileges of the new Administrator account](#) (see page 81).

## Administrator Considerations

Before you configure an Administrator, review the following guidelines:

- This process applies if the Administrative UI is using an *external store* as the source of administrator identities only. If you use the policy store as the source of administrator identities, create a Legacy Administrator.
- The rights that the Administrator requires to perform their job. Identifying these rights helps you delegate the appropriate security categories to the administrator.
- If the Administrators is responsible for application security policies.

**Important!** An Administrator can only create another Administrator with the same or lesser privileges. For example, if an Administrator has GUI and reports privileges, they can create another Administrator with those privileges, but *not* one with local API privileges. Similarly, an Administrator can only create an Administrator with the same or lesser scope (as defined by an assigned workspace).

## Create the Administrator Account

Create an Administrator by creating an Administrator account.

**Follow these steps:**

1. Log in to the Administrative UI using the superuser or other administrator account with appropriate privileges.
2. Click Administration, Administrator.
3. Click Administrators.
4. Click Create Administrator.
5. Click Lookup under General.
6. Specify search criteria and click Search.
7. Pick the administrator that you want and click Select.
8. Do *one* of the following tasks:
  - To delegate all rights, select Super User and click Submit.
  - To delegate fine-grained privileges, go to the next step.
9. Specify how the administrator is permitted to interact with the Policy Server in the Access Methods section. Select the methods that the administrator needs for their role.

**Example:** If an administrator is going to use the XPSImport and XPSEExport tools, select Import Allowed and Export Allowed.
10. Click Add in the Rights section.
11. Select the security categories that you want to grant to the administrator and click OK.

**Note:** Security categories comprise one or more tasks that correspond to specific CA SiteMinder objects.
12. Specify the permissions that you want to grant to the administrator for each security category in the Rights table.

**Note:** Only those permissions applicable for security categories in the table are available.
13. Click Submit.

The Administrator is created.

**More information:**

[Limit Administrator Account Scope Using Workspaces Overview](#) (see page 81)  
[Administrator Accounts](#) (see page 64)



## Verify that the Administrator has the Correct Privileges

Verify that the new Administrator account has the correct privileges.

**Follow these steps:**

1. Log in to the Administrative UI using the Administrator account.
2. Explore the Administrative UI. Verify that only the security categories for which the account has rights are visible.

## Limit Administrator Account Scope Using Workspaces Overview

Administrator accounts are assigned rights to one or more security categories that define their administrative authority in the Administrative UI, such as managing authentication schemes. By default an Administrator account has access to every policy store object related to an assigned security category.

*Workspaces* are subsets of policy store objects. Workspaces limit the objects which are available to an administrator account. Administrator accounts with such restrictions are named *scoped administrators*.

**Note:** You cannot assign workspaces to any Legacy Administrator accounts — administrative scoping using workspaces is not related to domain scope limitations for Legacy Administrators.

## Workspace Objects

Workspaces can contain any top-level policy object (for example, a domain, authentication scheme, or host configuration object).

**Note:** The actual content of the workspace consists of the top-level contents plus any child objects. Examples include realms under a domain, and any required objects (which are automatically included).

The contents of a workspace are dynamic:

- The contents of a workspace can be modified at any time. Any new objects are available immediately to all administrators assigned to the workspace. All removed objects are no longer available to administrators assigned to the workspace.
- If a scoped administrator has the right to modify an object type, that administrator can create objects in the workspace. These new objects are immediately available to all administrators assigned to the workspace.

**More information:**

[Create the Administrator Account](#) (see page 80)

## Scoped Administrators

A scoped administrator cannot manage all the objects in the policy store for which they have rights. The Administrative UI appears to contain only the objects in the assigned workspace.

If a scoped administrator adds a new top-level object, that object immediately becomes available to all other similarly scoped administrators.

Those scoped administrators that have the rights to create new administrators can only create administrators with the same or a more restrictive workspace than theirs. If they create new workspaces to further scope the new administrator, this new workspace object is added to their current workspace. The administrator can then assign their current workspace or the new workspace to the new administrator.

If the new administrator adds an object, the original administrator can also view it. The effective set of objects that the original administrator can view includes any new objects added to workspaces that they created.

**Note:** Only the Administrator accounts can be scoped using workspaces. Legacy Administrators cannot be scoped. However, Administrator accounts associated with any Legacy Administrator records in the policy store can be scoped.

**More information:**

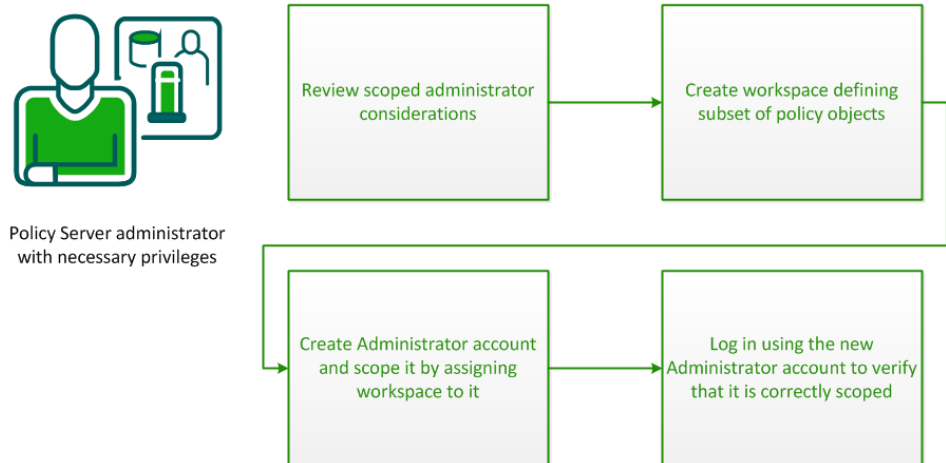
[Create the Administrator Account](#) (see page 80)

## How to Create a Scoped Administrator

Administrator accounts can be configured with fine-grained privileges that determine the administrative capabilities available to that administrator.

Administrator accounts are assigned rights to one or more security categories that define their administrative authority in the Administrative UI, such as managing authentication schemes. By default an Administrator account has access to every object related to an assigned security category.

*Workspaces* define a subset of objects. Assigning any workspaces to the Administrator accounts limits the objects that are available to them. This workspace controls the scope of their authority. These Administrator accounts are named *scoped administrators*.



1. [Review the scoped administrator considerations](#) (see page 83).
2. [Create a workspace defining a subset of objects](#) (see page 84).
3. [Create and scope an Administrator account](#) (see page 86).
4. [Verify the scope of the new Administrator account](#) (see page 87).

## Scoped Administrator Guidelines

A scoped administrator cannot manage all the objects in the policy store for which they have *rights*. The Administrative UI appears to contain only the objects that are defined in the assigned workspace.

If a scoped administrator adds a new top-level object, that object immediately becomes available to all other similarly scoped administrators.

Scoped administrators that have the rights to create new administrators can only create administrators with the same or a *more restrictive* workspace than theirs. If scoped administrators create new workspaces to further scope the new administrator, this new workspace object is added to their current workspace. The administrator can then assign their current workspace or the new workspace to the new administrator.

If the new administrator adds an object, the original administrator can also view it. The effective set of objects that the original administrator can view includes any new objects added to workspaces that they created.

A scoped administrator cannot manage all the objects in the policy store for which they have rights. The Administrative UI appears to contain only the objects in the assigned workspace.

If a scoped administrator adds a new top-level object, that object immediately becomes available to all other similarly scoped administrators.

**Important!** An Administrator can only create another Administrator with the same or lesser privileges. For example, if an Administrator has GUI and reports privileges, they can create another Administrator with those privileges, but *not* one with local API privileges. Similarly, an Administrator can only create an Administrator with the same or lesser scope (as defined by an assigned workspace).

If the new administrator adds an object, the original administrator can also view it. The effective set of objects that the original administrator can view includes any new objects added to workspaces that they created.

**Note:** Only *Administrator* accounts can be scoped using workspaces. Legacy Administrators cannot be scoped. However, Administrator accounts associated with any Legacy Administrator records in the policy store can be scoped.

When configuring a scoped administrator, consider the following attributes of that administrator:

- The scope of the Administrator. Whether the Administrator can manage all policy data or a subset of policy data that is defined in a workspace.
- The rights the Administrator requires to perform their job. Identifying these rights can help you delegate the appropriate security category to the administrator.
- Whether the Administrator is responsible for application security policies.

## Create a Workspace

You create a workspace to define a subset of top-level policy objects (for example, a domain or authentication scheme) for which a scoped administrator has administrative privileges.

**Note:** The actual content of the workspace consists of the top-level contents plus any child objects. Examples include realms under a domain, and any required objects (which are automatically included).

The contents of a workspace are dynamic:

- The contents of a workspace can be modified at any time. Any new objects are available immediately to all administrators assigned to the workspace. All removed objects are no longer available to administrators assigned to the workspace.
- If a scoped administrator has the right to modify an object type, that administrator can create objects in the workspace. These new objects are immediately available to all administrators assigned to the workspace.

**Follow these steps:**

1. Log in to the Administrative UI using the CA SiteMinder superuser or other administrator account with appropriate privileges.
2. Click Administration, Administrator, Workspaces, Create Workspaces.  
The Create Workspace page appears.
3. Type the name and a description of the workspace in the fields in the General section.
4. Add objects that define the required subset of policy data to the workspace in the Members section:

**Note:** Some commonly used objects are added to the workspace and appear in the Members list by default; you can remove them if necessary.

- a. Click Lookup.

The Select Workspace Contents page appears.

- b. Select the type of objects that you want to add to the workspace from the Search for objects of type drop-down menu. Optionally, narrow the search to specific objects by Name or Description (or both).

- c. Click Search.

A list of matching objects appears.

**Note:** If the administrator account with which you are logged in is itself scoped, the list of matching objects is limited to those objects available to you.

- d. Select the object or objects you want to add to your workspace and click Select.

The Create Workspace page reopens.

5. (Optional) Set administrator privileges for workspace members to read-only by setting the corresponding Read-Only check boxes.
6. Click Submit.

The Create Workspace task is submitted for processing. CA SiteMinder verifies that the workspace is consistent (all required objects that are related to objects in the workspace are present in the workspace). If not, the missing objects are added and an information dialog appears indicating that some objects were automatically added to make the workspace consistent.

**More information:**

[Limit Administrator Account Scope Using Workspaces Overview](#) (see page 81)

## Create an Administrator and Assign a Workspace

Create a scoped Administrator by creating an Administrator account and assigning a workspace that defines the scope of the objects that it can administer.

**Follow these steps:**

1. Log in to the Administrative UI using the superuser or other administrator account with appropriate privileges.
2. Click Administration, Administrator.
3. Click Administrators.
4. Click Create Administrator.
5. Click Lookup under General.
6. Specify search criteria and click Search.
7. Pick the administrator that you want and click Select.
8. Select a workspace that defines the subset of objects to which the Administrator is scoped from the Workspace drop-down list.
9. Do one of the following tasks:
  - To delegate all rights, select Super User and click Submit.
  - To delegate fine-grained privileges, go to the next step.
10. Specify how the administrator is permitted to interact with the Policy Server in the Access Methods section. Select the methods that administrator requires for their role.

**Example:** If an administrator is going to use the XPSImport and XPSExport tools, select Import Allowed and Export Allowed.
11. Click Add in the Rights section.
12. Select the security categories that you want for the administrator and click OK.

**Note:** Security categories comprise one or more tasks that correspond to specific objects.
13. Select the permissions (Read, Right, Modify, and Propagate) to apply to the security categories you added in the Rights section.
14. Click Submit.

The scoped Administrator is created.

**More information:**

[Limit Administrator Account Scope Using Workspaces Overview](#) (see page 81)  
[Administrator Accounts](#) (see page 64)

## Verify that the Administrator is Scoped

Verify that the new Administrator account only has access to the scoped subset of objects.

**Follow these steps:**

1. Log in to the Administrative UI using the scoped Administrator account.
2. Explore the Administrative UI. Verify that only the scoped subset of objects from the workspace appears in the Administrative UI.

## Administrator Use Cases

This administrator use case illustrates the following situations:

- Creating an administrator.
- How an existing administrator can create and grant privileges to a new administrator

This scenario involves three administrators.

- CA SiteMinder Default Administrator (Superuser)
- Manager Admin
- Junior Admin

Using the three administrators, the following scenarios are described:

- Superuser creates Manager Admin
- Superuser creates a workspace and assigns it to scope Manager Admin
- Manager Admin creates Junior Admin
- Manager Admin creates a workspace and assigns it to further scope Junior Admin

The following terms are used throughout the use case:

**Access Method**

Specifies how an administrator interacts with the Policy Server.

**Security Category**

Specifies a functional area in which an administrator can execute tasks to manage Policy Server objects or tools.

**Scope**

Indicates whether administrator privileges extend to all policy objects or a subset of objects that are defined in an assigned workspace.

### Permissions

Determines the tasks that an administrator performs relative to a security category. Such as read, manage, propagate, or execute tasks.

### Rights

Defines the complete set of privileges for the administrator. Rights are based on the security category, scope, and permissions.

## Superuser Creates Manager Admin

The superuser is the administrator that was delegated system privileges when the connection to the external administrator user store was configured. The superuser can assign all categories, rights, and scope to any other Administrator.

From the Administrative UI, the superuser creates an administrator that is named Manager Admin. Initially, Manager Admin has no privileges until the superuser assigns them.

The superuser assigns the following privileges to Manager Admin:

### Access Method

GUI Allowed

### Rights

| Security Category          | Permissions* |
|----------------------------|--------------|
| Agent Administration       | V, M         |
| Application Administration | V, M, P      |
| Policy Administration      | V, M, P      |

\* Permissions: View, Manage, Propagate, eXecute (only for executing reports)

**Note:** The Propagate permission allows one manager to assign the category to another administrator.

If Manager Admin logs in to the Administrative UI, they can view and modify all agents, applications, and domains in the policy store. If they create an administrator account, they can assign only Application Administration and Policy Administration security categories to that account.



## Superuser Creates a Workspace and Assigns it to Scope Manager Admin

The superuser wants to limit the scope of Manager Admin so that they can only manage a subset of policy data. The superuser first creates a workspace that is named Workspace1 with the following members:

| Type        | Name         |
|-------------|--------------|
| Agent       | Agent1       |
| Application | Application1 |
| Application | Application2 |
| Domain      | DomainB      |

The superuser then edits the Administrator record for Manager Admin to assign Workspace1.

At this stage, if Manager Admin logs in they can now only view and modify Agent1, Application1, Application2, and policies in DomainB. Other agents, applications, and domains in the policy store do not appear in the Administrative UI.

## Manager Admin Creates Junior Admin

The second part of this use case shows how an administrator with a specific set of privileges creates another administrator.

Manager Admin creates an administrator that is named Junior Admin. When Manager Admin goes to add security categories for Junior Admin, only the following items (for which Manager Admin has the propagate permission) are available:

- Application Administration
- Policy Administration

**Note:** The propagate permission lets one administrator assign the category to another administrator.

Manager Admin proceeds to assign access methods and rights to Junior Admin as follows:

**Access Method**

GUI Allowed

**Rights**

| Security Category          | Permissions* |
|----------------------------|--------------|
| Application Administration | V            |
| Policy Administration      | V, M         |

\* Permissions: View, Manage, Propagate, eXecute (only for executing reports)

At this stage, if Junior Admin logs in to the Administrative UI, they can view Application1 and Application2. They can view and modify DomainB (limited by default to the scope of Manager Admin).

## Manager Admin Creates a Workspace and Assigns it to Further Scope Junior Admin

Manager Admin wants to limit the scope of Junior Admin so that they can only manage a smaller subset of policy data. To do this, Manager Admin first creates a workspace that is named Workspace2 with the following members:

| Type        | Name         |
|-------------|--------------|
| Application | Application2 |
| Domain      | DomainB      |

Manager Admin then edits the Administrator record for Junior Admin to assign Workspace2.

At this stage, if Manager Admin logs in they can now only view Application2, and view and modify policies in DomainB. Other applications and domains in the policy store do not appear in the Administrative UI.

## How to Create a Legacy Administrator

Complete the following steps to create a Legacy Administrator:

1. [Review the Legacy Administrator considerations](#) (see page 91).
2. [Create the Legacy Administrator record](#) (see page 91).
3. [Delegate Administrative UI permissions](#) (see page 94).

### Legacy Administrator Considerations

This process applies if one or more of the following criteria are met:

- A Legacy Administrator is required to manage CA SiteMinder objects using the Policy Management API
- A Legacy Administrator is required to function as a Trusted Host administrator

**Note:** Legacy Administrators can also access the Administrative UI when the policy store is configured as the source of administrator identities (the default). Once an external administrator store is configured, Legacy Administrator accounts *cannot* access the Administrative UI.

### Create the Legacy Administrator Record

To store the Legacy Administrator identity in the policy store, create a Legacy Administrator record.

**Follow these steps:**

1. Click Administration, Administrator.
2. Click Legacy Administrators.
3. Click Create Legacy Administrator.
4. Click OK.

5. Do the following tasks in the General section:

a. Type a unique ID in the Name field.

Consider entering a unique ID that adheres to your corporate standards. Adhering to your corporate standards offers the following benefits:

- Prevents the administrator from having to remember a new set of credentials.
- Facilitates a transition to an external administrator store because the Legacy Administrator ID matches the unique ID in the external store.

b. Type the full name of the user in the Description field.

The value appears as the display name when a user logs in to the Administrative UI. The display name identifies who is logged in.

**Example:** If you enter Joe Smith, the Administrative UI display name appears in the following format:

Logged in as Joe Smith.

6. Leave the CA SiteMinder Database option button selected.

7. Enter the administrator password in the respective fields.

8. Do one of the following items:

- Click Submit if you are creating a Legacy Administrator with permissions for only the following tasks:
  - Use the Administrative UI
  - Use Policy Server toolsThe administrator record is created.
- Go to the next step if you are creating a Legacy Administrator with permissions for the previous tasks and any one of the following items:
  - Manage the Policy Management API
  - Function as a Trusted Host administrator

9. Select the System or Domain option from the Administrator Privileges section.

**Note:** You delegate privileges to the Administrative UI after creating the Legacy Administrator.

**System**

An administrator has access to all policy domains in the Policy Management API. If you select System, a Task section appears.

**Domain**

An administrator has access to a specific subset of policy domains in the Policy Management API. If you select Domain, the Tasks and Scope section appears. The Tasks section lists the administrative tasks that can be performed. The Scope section lists the available domains that can be managed.

**Note:** The Scope section on the Create Legacy Administrator screen is not related to Administrator account scoping using workspaces.

10. Select the tasks that the administrator can perform.

- For a system administrator, select one or more of the following tasks:
  - Manage System and Domain Objects
  - Manage Users
  - Manage Keys and Password Policies
  - Register Trusted Hosts
- For a domain administrator, do the following tasks:
  - a. Select one or more of the following tasks:
    - Manage Domain Objects
    - Manage Users
    - Manage Password Policies
  - b. Select the domains that the administrator must manage in the Scope section.

11. Click Submit.

You have created a Legacy Administrator.

**Note:** An Administrator account (that is associated with the Legacy Administrator record in the policy store) is also created to provide Administrative UI access.

## Delegate Administrative UI Permissions

When a Legacy Administrator is created, an Administrator account associated with the same record in the policy store is also generated. This Administrator account is configured with Administrative UI access privileges that correspond to the settings specified for the Legacy Administrator.

Changes to the Legacy Administrator settings that affect access privileges are automatically propagated to the associated Administrator account.

You can also directly modify the associated Administrator settings to take advantage of the fine-grained Administrative UI access privileges available to Administrator accounts.

**Note:** Changes to the associated Administrator account settings are *not* propagated back to the Legacy Administrator. Additionally, once changes are made to the associated Administrator, changes to the Legacy Administrator are no longer propagated to the Administrator account.

### More information:

[Limit Administrator Account Scope Using Workspaces Overview](#) (see page 81)

[How to Create a Scoped Administrator](#) (see page 82)

[How to Create an Administrator](#) (see page 78)

## Disable an Administrator

You can temporarily disable an Administrator without deleting the account. Disabling an account lets you reinstate the permissions without having to recreate the account.

**Follow these steps:**

1. Click Administration, Administrator.
2. Click Administrators.  
The Administrators page appears.
3. Specify search criteria and click Search.  
Users matching the criteria appear.
4. Click the name of the user you want to disable.  
The View Administrator page appears.
5. Click Modify.  
The settings and controls become active.
6. Select Disabled.
7. Click Submit.

The administrator is disabled.

Enable the administrator at any time by repeating this procedure, clearing the Disabled option, and submitting the change.

## Disable a Legacy Administrator

You can temporarily disable a Legacy Administrator without deleting the account. Disabling an account lets you reinstate the permissions without having to recreate the account.

**Follow these steps:**

1. Click Administration, Administrator.
2. Click Legacy Administrators.
3. Specify search criteria and click Search.
4. Click the name of the user you want to disable.
5. Click Modify to activate the settings.
6. Clear the tasks and click Submit.
7. (Optional) If the Legacy Administrator has privileges in the Administrative UI, do the following tasks:
  - a. Click Administration, Administrator.
  - b. Click Administrators.
  - c. Specify search criteria and click Search.
  - d. Click the name of the Legacy Administrator from whom you removed privileges.
  - e. Click Modify to activate the settings.
  - f. Select Disabled and click Submit.

## Restoring Administrator Access

An administrator with full access to the Policy Server can restore permissions when an administrator account becomes inadvertently modified or deleted. The two administrators with these permissions include the following accounts:

- The default CA SiteMinder super user account (siteminder). If you are using the policy store to store administrator identities, use the siteminder account to restore permissions.
- The super user account that is established when the external administrator store connection is configured. If you are using an external store to store administrator identities, use the external super user to restore permissions.



If you cannot access the default administrator accounts, do the following tasks:

- Change the password of the default CA SiteMinder super user account with the smreg utility.
- Make any user in the external administrator store a super user with the XPSSecurity utility.



# Chapter 6: User Sessions

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## User Session Overview

This product maintains and administers consistent user sessions across multi-tiered applications. Maintaining user session information is critical as applications and online businesses become location-independent and the environments and applications technology and security needs vary.

## Non-Persistent and Persistent Cookies

Standard CA SiteMinder session cookies are non-persistent. A non-persistent cookie is one that is maintained only in the memory of the web browser. When the users close their browsers, the session cookie is destroyed, effectively logging them out.

In addition to maintaining the cookie in the web browser, you can configure CA SiteMinder to use a cookie that is written to the hard disk. Maintaining a CA SiteMinder cookie on the hard disk is known as a persistent cookie. When using persistent cookies, users that close and reopen their browser remain logged in.

## Non-Persistent and Persistent Sessions

CA SiteMinder also provides the ability to configure a persistent session to provide Windows security context functionality and support for Federated Web Services. A persistent session is one in which a CA SiteMinder cookie is maintained in a CA SiteMinder session store, in the memory of the web browser, and optionally the hard disk.

Before you implement persistent sessions, consider the following:

- Persistent sessions are configured on a per realm basis.
- Persistent sessions should only be used where necessary. Using session services to maintain sessions has an impact on system performance.

**Note:** For more information about enabling and configuring session services, see the Policy Server Administration Guide.

## Session Tickets

CA SiteMinder implements session management using session tickets. A session ticket contains basic information about a user and the authentication information for that user. The session ticket identifies the session of the user across all sites in a single sign-on CA SiteMinder environment. Session tickets are encrypted and only the Policy Server can read/validate them. CA SiteMinder agents use session tickets to identify users and provide session information to the Policy Server.

The session ticket is handled differently depending upon whether the session is persistent or non-persistent.

**Note:** Non-persistent and persistent cookies are unrelated to the CA SiteMinder session of the user being non-persistent or persistent.

### Non-persistent session

The web agent places the session ticket in a cookie. The cookie contains the user session data; no user-specific data is kept in the cookie itself. The agent is responsible for validating the cookie and enforcing session timeouts.

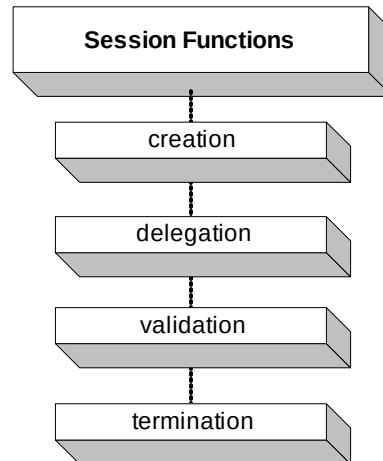
### Persistent Session

The agent places the session ticket in a session store database and, if possible, in an optional cookie on the client.

The session ticket data is used as an index into the cache of the web agent, which contains the user session data. If a cookie is written, no user-specific data is kept in the cookie itself. The agent is responsible for validating the session and enforcing the session timeouts.

## How SiteMinder Manages User Sessions

CA SiteMinder manages user sessions automatically, performing many functions during the lifecycle of a user session, as shown in the following graphic:



### Session creation

Establishing a session when a user successfully logs in to an application. If a user fails to authenticate, no session is established.

### Session delegation

Passing session information across an application environment. Delegating session information is necessary when the logic of an application crosses several application tiers.

### Session validation

Verifying the session ticket to verify that the user session is still active, that is, it has not expired or been terminated.

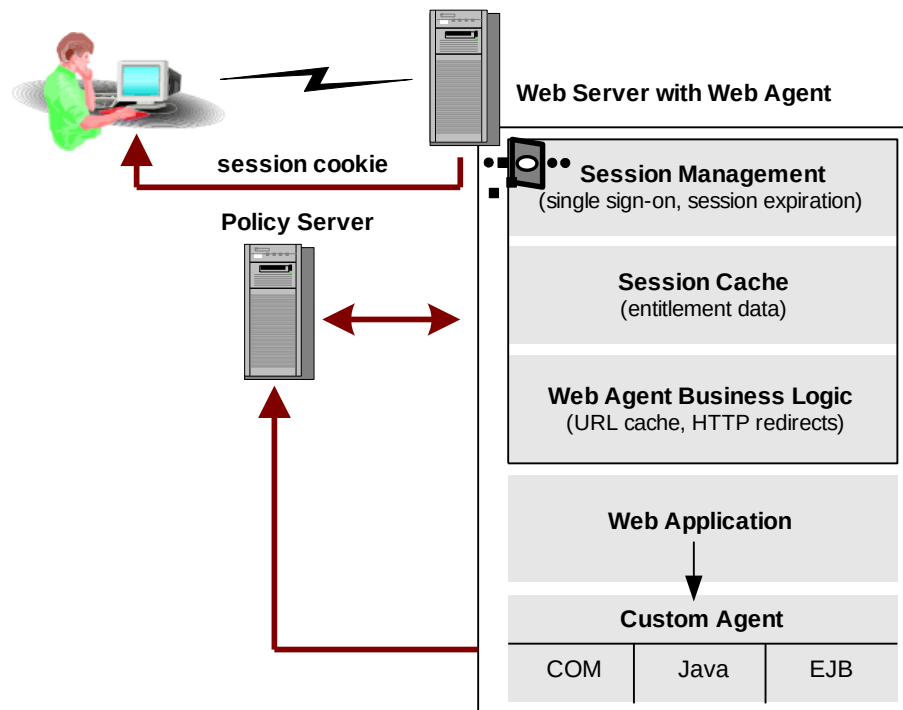
### Session termination

Ending a user session when any of the following events occur:

- When a user logs out.
- When the configured session timeouts expire.
- When the CA SiteMinder system manager disables a user.

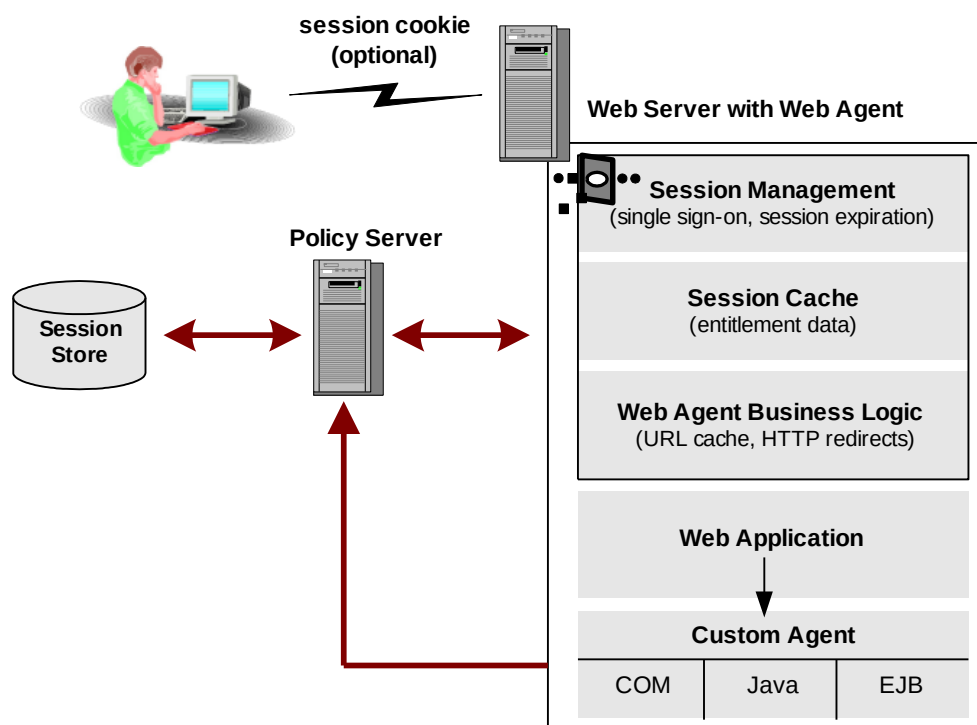
When a user logs out or the user session expires, they must log in again to create a new session. Users who were manually disabled cannot re-initiate a session.

The following graphic illustrates how CA SiteMinder manages a non-persistent session.



The Web Agent passes the session ticket information across each application tier

The following diagram illustrates how CA SiteMinder manages a persistent session.



The Web Agent passes the session ticket information across each application tier

## How a User Session Begins

A user session begins when a user logs in and is authenticated by CA SiteMinder. The Policy Server issues the session ticket, which is then required for all subsequent Agent requests for that user's session. If a user is forced to authenticate again during a session because of a higher protection level, the existing session is maintained.

A session is active until it is terminated when the user logs off, when the session expires, or when an administrator disables a user, thereby terminating the session.

## How Sessions Across Realms Are Maintained

Users who request accesses to resources have a session is created within the context of the realm that contains that resource. An authentication scheme that is associated with the realm determines the type of credentials that the user must present to gain access to the resource.

This authentication context is made available to all web servers in the product environment using proprietary HTTP headers that define the following components:

- The authentication scheme being used.
- The namespace that the user is authenticating against.

You can configure response attributes in a policy to communicate extra information about a user, such as a birth date or a phone number.

If the product is configured for single sign-on, the authentication scheme can also have a protection level. Administrators assign these protection levels. The levels range from 1 through 1000. One is the least secure and 1000 is the most secure. These protection levels enable administrators to implement single sign-on with a higher level of security and flexibility.

The authenticated users from one realm can be validated for a session in another realm. The protection level of the other realm is equal to or lower than the original realm. When the protection level is the equal or lower, that user does not need to re-authenticate. The original user session remains valid. Users who request to access resources that are associated with an authentication scheme with a higher protection level are challenged to re-enter their credentials. The original session is ended and a new one is created.

To configure protection levels for your single sign-on environment, see [Authentication Schemes](#) (see page 269).

## How Sessions Across Multiple Cookie Domains Are Maintained

The product supports single sign-on across multiple cookie domains in environments with heterogeneous web server platforms. If a user visits companyA.com and then goes to companyB.com, the session information stays with them. Configure the agents for single sign-on to maintain session information across multiple cookie domains. With single sign-on configured, the cookie that contains session information can be made available to all agents and servers in the single sign-on environment.

These cookie domains let users authenticate in one cookie domain and then navigate to another cookie domain without being re-challenged for information.



Single sign-on is accomplished using a cookie provider. The cookie provider is an extension of the Web Agents in the single sign-on environment.

To achieve cross-domain logout for resources in separate cookie domains, you can enable persistent sessions for the realms in separate cookie domains. When a user logs out in one domain, the Policy Server sends a logout event terminating the user session.

**Note:** Single sign-on across multiple cookie domains does not require using same user directory throughout the single sign-on environment. However, user directory connections that are configured in the Administrative UI must share the directory object name in each cookie domain.

## How a User Session Is Validated

Agents validate users sessions by checking whether it is still active. The agent first checks its session cache for session information. When the agent reads the cookie and the information exists in the cache, it validates the session. If it does not, the agent contacts the Policy Server to verify the identity of the user. The agent also collects other session and authorization information.

Users who access a resource with a higher protection level than the one used keep their session information even though another authentication occurs.

## How Session Information Is Delegated

User sessions may be delegated between application tiers in a CA SiteMinder installation using the session ticket. The session ticket is the mechanism by which the user identity is passed from one application tier to another. Each application can make authorization calls to the Policy Servers after getting the session ticket.

If your CA SiteMinder installation uses custom Agents, the custom Agent must have access to the information in the session ticket to maintain session information.

In addition to using the session ticket for delegation, the Web Agent makes a set of default HTTP headers available for session management. These default headers can be passed across different business application tiers such as Enterprise Java Beans (EJB) and Component Object Model (COM) based tiers. Included in these headers is a unique session ID and optionally, a universal ID. The session ID identifies an active user session.

The universal ID identifies the user to an application in a CA SiteMinder environment. This ID is typically not the same as the user login ID, but is some other type of unique identifier like a telephone number or a customer account number. The universal ID helps facilitate identification between old and new applications. The universal ID delivers the user identification automatically, regardless of the application. In addition, the ID is built into applications. A built-in ID provides applications a user identification method that is separate from the user directory, which undergoes constant changes.

Both the session ID and the universal ID are shared among all the applications in a CA SiteMinder environment to maintain consistent user sessions.

## Session Timeouts

Each user session includes session timeout information. The timeout values specify the length of an active session and the amount of session inactivity that can pass before a session is invalid. Configure session timeouts on a per-realm basis using the following timeout options.

| Name                                                      | Purpose                                                                                                                                                                                                                                                                                                                                                                                                      |
|-----------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Maximum Timeout</b><br>(All sessions)                  | <p>Specifies the maximum amount of time a user session can be active before the Web Agent challenges the user to re-authenticate.</p> <p>You can override this setting using the WebAgent-OnAuthAccept-Session-MaxTimeout response attribute.</p>                                                                                                                                                            |
| <b>Idle Timeout</b><br>(All sessions)                     | <p>Specifies the amount of time that a user session can be idle before the Web Agent terminates the session. If the session expires, a user must re-authenticate.</p> <p><b>Note:</b> For persistent sessions, this value must be greater than the value of the Session Validation Period.</p> <p>You can override this setting using the WebAgent-OnAuthAccept Session-Idle-Timeout response attribute.</p> |
| <b>Session Validation Period</b><br>(Persistent Sessions) | <p>For persistent sessions only, specifies the maximum period between Agent calls to the Policy Server to validate a session. Session validation calls perform two functions: informing the Policy Server that a user is still active <i>and</i> checking that the user's session is still valid.</p>                                                                                                        |

**More information:**

[Realms](#) (see page 461)

## How Agent Key Management and Session Timeouts are Coordinated

agents use a key to encrypt and decrypt any cookies that pass between agents in the environment that the product secures. All keys must be set to the same value for all agents communicating with a Policy Server.

A product installation can be configured to use dynamic Agent keys that change on a periodic basis. Dynamic key rollover lets you update dynamic keys at regular intervals to ensure the security of encrypted cookies. Specify when key rollovers occur in the Set Rollover Frequency dialog of the Administrative UI. The key updates across a product installation can take up to 3 minutes.

Coordinate the updating of keys together with session timeouts. Otherwise or you could possibly invalidate cookies that contain session information. This coordination is critical because the person designing policies in your organization could possibly be different than the person configuring dynamic key rollover.

Session timeouts must be less than or equal to two times the interval that is configured between Agent key rollovers. When Agent key rollovers occur two times *before* a session expires, any cookies that are written *before* the first key rollover are invalidated. If a session timeout is greater than the specified rollover interval, a user could possibly be re-challenged for their identification before their session terminates.

For example, if you configure a key rollover to occur every three hours, set the Maximum Session timeout for six hours. This setting prevents multiple key rollovers from invalidating the session cookie.

## How a User Session Ends

User sessions can end in any of the following ways:

- A user logs out.
- The session timeouts expire.
- The system manager disables a user.

## Windows User Security Context

In a Windows network, a security context defines a user identity and authentication information. Applications (such as Microsoft Exchange Server or SQL Server) need a user security context to provide security using Microsoft access control lists (ACLs) or other tools.

**Note:** In a Windows security context, the user store must be Active Directory (AD).

The agent can provide a Windows user security context for accessing web resources on IIS Web Servers (Windows 2000 platforms). By establishing a user security context, the server can use this identity to enforce access control mechanisms.

By providing a Windows user security context, the product offers the following benefits:

- Two levels of security  
You can protect web resources using all of capabilities of the product with the additional benefit of working with Microsoft security tools to protect applications.
- The agent can communicate with various web browsers and still provide a Windows security context.  
The product can work with any browser that supports HTTP 1.x requests, HTTP cookies, and where appropriate SSL/TLS.
- The Agent can collect user credentials over SSL connections, then allow subsequent requests over non-SSL connections. The product combines this mechanism for credential collection with the Windows security context when permitting access to resources.
- The product can implement single sign-on using forms-based authentication, and can pass on a user identity to back-office applications.  
Microsoft does not provide general-purpose forms credential collection.

## How Persistent Sessions for User Security Contexts Are Maintained

For the agent to provide a security context for specific resources, enable persistent sessions for all realms that include those resources. The session store maintains persistent sessions.

The session store stores the encrypted credentials of a user and associates the user with a session ID. When a session is established between a client and an agent, the Windows user account is established and linked to the session. When the user session cache of the web agent is purged, the agent retrieves the credentials of the user from the session store. Retrieving the credentials lets the agent re-establish the session. The session store also stores the security context for propagation across single sign-on environments.

## How Sessions Are Revalidated

You can explicitly configure the web agent, working through the Policy Server, to contact the session store to revalidate a session. A session cookie that is stored in the browser of the user contains the session ID. The cookie uses the session ID to reacquire the credentials of the user from the session store.

**Note:** If the session cookie becomes expires, the credentials that are associated with the ID are invalidated. and the user must re-authenticate.

The validation period, determines the frequency at which the agent revalidates a session. The validation period defines how long the agent keeps a session active using the information in its cache. After the validation period expires, the agent contacts the session store.

If the validation period is too small, the agent goes back to the session store frequently, affecting the speed at which the product processes requests. Set the validation value to a high number. When the number of active sessions is lower than the maximum user session cache value of the agent, the agent uses the cached information.

**Note:** If the session store is not operating, the validation period is infinite and the agent does not contact the session store.

## Windows User Security Context Requirements

Your IIS web server environment must meet the following requirements to use the Windows security context feature:

- All IIS servers must be trusted in the domain in which the user is authenticating. You can establish trust relationships among servers that provide distributed services for groups of users.
- Users must have the privileges to log in locally to the web server. If there are multiple servers, users need the right to log in locally to all servers.
- Consider the following guidelines for accounts that start the World Wide Web Publishing Service:
  - System accounts need no additional configuration.
  - Domain accounts need the privileges of the associated user to act as part of the operating system.

## Configuration Overview

| Step                                                                                                 | Product Component                                                                                               |
|------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|
| Designate a relational database as the session store.                                                | Data tab of the Policy Server Management Console                                                                |
| Enable the user directory containing the Windows users to run the security context.                  | Use Authenticated User's Security Context check box on the Directory Setup group box on the User Directory pane |
| Associate one of the <a href="#">Supported Authentication Schemes</a> (see page 111) with each realm | Resource group box of the Realm pane                                                                            |
| Enable persistent sessions for each realm and set a high Validation Enabled Period                   | Session group box of the Realm pane                                                                             |
| If your IIS Web server is not in a physically secure location, set insecureserver to YES             | Agent Configuration Object or WebAgent.conf                                                                     |

## Supported Authentication Schemes

The following authentication schemes are supported:

- Basic Authentication Schemes
- Basic Over SSL Authentication Schemes
- HTML Forms Authentication Schemes
- X.509 Client Certificate and Basic Authentication Schemes
- X.509 Client Certificate and HTML Forms Authentication Schemes

Agents cannot use certificates alone because the credentials of the user are not provided. Certificate authentication must be combined with basic or forms to collect the user credentials.

NTLM authentication schemes are not compatible with the Windows User Security Context for this product. Use NTLM for some resources on a web server and Windows User Security Context for different resources on the same web server. Resources that are accessed using NTLM must be in a different realm than the resources accessed through the Windows User Security Context mechanism.

### More information:

[Authentication Schemes](#) (see page 269)

## Active Directory and NetBIOS Names

Although the Active Directory domains are named according to DNS naming standards, a NetBIOS name must still be defined when creating Active Directory domains.

For the product to support seamless Microsoft security context, NetBIOS names must match the DNS domain name as recommended by Microsoft.

When the DNS name of the Active Directory domain differs from its NetBIOS name, the user domain cannot be established. The web server cannot provide the security context when the product is configured to use an LDAP user directory.

## Single Sign-on in Security Context

The product provides single-sign-on across all supported web servers while preserving the security context required for seamless Microsoft security context.

However, all realms must be persistent. Otherwise the users are challenged again when the product attempts to persist the security context.





# Chapter 7: Agents and Agent Groups

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This section contains the following topics:

[Trusted Hosts for Web Agents](#) (see page 113)  
[Host Configuration Objects for Trusted Hosts](#) (see page 117)  
[SiteMinder Agents Overview](#) (see page 122)  
[Web Agent Configuration Overview](#) (see page 127)  
[How to Configure a Web Agent](#) (see page 130)  
[Agent Configuration Object Overview](#) (see page 136)  
[Enable a Web Agent](#) (see page 140)  
[Configure a RADIUS Agent](#) (see page 141)  
[Agent Groups](#) (see page 142)  
[Custom Agents](#) (see page 144)  
[Resource Protection with a SiteMinder Agent](#) (see page 145)  
[Agent Discovery Introduced](#) (see page 146)

## Trusted Hosts for Web Agents

A trusted host is any client system where one or more agents can be installed.

### Register a Trusted Host with the Policy Server

Register a trusted host from the system where you install an agent. Host registration is part of the Agent configuration process. The registration tool creates the SmHost.conf file. After this file is created successfully, the client computer becomes a trusted host. A trusted host must be registered to communicate with the Policy Server.

**Important!** You only register the host once, not each time you install or configure a Web Agent.

Upon initialization, the agent uses the configuration settings of trusted host in the Host Configuration File (SmHost.conf). The agent attempts to connect to the first Policy Server listed in the Host Configuration File. If the first attempt fails, the trusted host attempts to connect to the next Policy Server listed.

**Note:** You *cannot* create a trusted host using the Administrative UI; you can only view a trusted host once it is registered or delete a trusted host.

Once the Web Agent connects to its bootstrap Policy Server, the trusted host looks for the Host Configuration Object in the Smhost.conf file. The trusted host retrieves its configuration details from this Host Configuration Object.

## Trusted Host Configuration Settings

Most of the trusted host configuration settings are set in a Host Configuration Object. The only exceptions are the PolicyServer and RequestTimeout parameters, which are set in the Host Configuration file, SmHost.conf.

### Request Timeout

The RequestTimeout parameter specifies the number of seconds that the trusted host waits before deciding that a Policy Server is unavailable. Use this setting to optimize the response time of the web server.

**Note:** When the Policy Server is busy due to heavy traffic or a slow network connection, increase the RequestTimeout value.

### Operation Mode

The operation mode determines how the trusted host works with multiple Policy Servers. The following operation modes are available:

#### Failover Mode

Failover is a redundancy mode. If the primary Policy Server fails, there is a backup Policy Server to take over policy operations. Failover is the default operation mode. When the trusted host initializes, it operates in Failover mode.

In this mode, *every* trusted host request is delivered to the first Policy Server in the list. If that Policy Server does not respond, the trusted host marks it *unavailable*. The trusted host sends the request to the next Policy Server in the list. If a previously failed Policy Server recovers, it is returned to its original place in the list.

#### Round Robin Mode

The round-robin mode is a dynamic load-balancing mode. The Agents balance their requests among all the Policy Servers that are listed in the Host Configuration Object.

In round robin mode, the trusted host delivers a request to the first Policy Server in the list. The next request is delivered to the second Policy Server in the list, and so on. This process continues until the trusted host has sent requests to all the available Policy Servers. The next request returns to the first Policy Server in the list and the cycle begins again.

If a Policy Server fails, the request is re-directed to the next Server in the list. The trusted host marks the failed Server as *unavailable* and redirects all of the requests to other servers. After the failed server recovers, it is automatically restored to its original place in the list.

We recommend this setting because dynamic load balancing produces better throughput when using multiple Policy Servers, resulting in more efficient user authentication and authorization. Dynamic load balancing also prevents a single Policy Server from becoming overloaded with requests. Failover still occurs if one of the load balancing Policy Servers is not available.

## Implement an Operation Mode

The operation mode determines how the trusted host works with multiple Policy Servers. Two operation modes exist: failover and round robin.

### Follow these steps:

1. Configure more than one Policy Server.
2. Point all Policy Servers to a common policy store.
3. Set the EnableFailover parameter.
  - To enable the failover mode, set the EnableFailover parameter to YES.
  - To enable round robin dynamic load balancing, set the EnableFailover parameter to NO.

The value for the EnableFailover parameter applies to all Policy Servers specified in the Host Configuration Object.

## TCP/IP Connections

The trusted host and Policy Server communicate across TCP/IP connections. The number of available sockets for the authorization, authentication, and accounting ports of the Policy Server determines the number of available TCP/IP connections.

The number of sockets per port controls the number of simultaneous threads accessing the Policy Server from the web server. Separate web server threads handle each user access request. Each thread requires its own socket. The web server maintains a pool of threads for requests and only creates one when there are no more available threads. As traffic increases, the number of sockets per port must increase.

Several settings affect the TCP/IP connections between the trusted host and the Policy Server.

### Maximum Sockets Per Port

Defines the maximum number of TCP/IP connections that the trusted host uses to communicate with the Policy Server. By default, this value is set to 20, which suits low- and medium-traffic web sites. Increase this number in the following situations:

- You are managing a high-traffic web site.
- You have defined agent identities for virtual servers.

#### **Minimum Sockets Per Port**

Determines the number of TCP/IP connections open for the Policy Server at startup. The default value is 2. If you are managing a high-traffic web site, increase this number.

#### **New Socket Step**

Specifies the number of TCP/IP connections that the Agent opens when new connections are required. The default value is 2. Increase number of sockets to add at each required at each level when you require more sockets.

## **Delete Trusted Host Objects**

You delete a trusted host when you are reregistering it. You reregister a host using the smregghost registration tool. This tool is installed with the Web Agent.

**Note:** You can run the Web Agent Configuration Wizard to reregister a trusted host, but delete or rename the SmHost.conf file or the Wizard does not prompt you to register a trusted host. We recommend that you use the smregghost tool. For more information about registering and reregistering trusted hosts, see the *Web Agent Installation Guide*.

#### **To delete a trusted host**

1. Click Infrastructure, Hosts.
2. Click Trusted Hosts.  
The Trusted Hosts page appears.
3. Specify search criteria and click Search.  
A list of trusted hosts that match the search criteria opens.
4. Select a trusted host from the list  
**Note:** You can select more than one trusted host at a time.
5. Click Delete Trusted Host.  
You are prompted to confirm the deletion of the host.
6. Click Yes.  
The Trusted Host is deleted.

## Host Configuration Objects for Trusted Hosts

Host Configuration Objects hold configuration settings for trusted hosts. After a trusted host connects to a Policy Server, it uses the settings in the Host Configuration Object.

The `hostconfigobject` parameter of the `SmHost.conf` file identifies the Host Configuration Object that the agent uses. The agent uses settings in the `SmHost.conf` file during the initialization phase of each web server child process. The `SmHost.conf` file is not only used at start-up, but is also used at run time by web servers starting new child processes. After this initialization occurs, the settings in the Host Configuration Object are used.

Create a Host Configuration Object before you can create trusted host objects.

### Copy a Host Configuration Object

To create a Host Configuration object, we recommend you to copy an existing Host Configuration object and modify its properties. You can copy the `DefaultHostSettings` object and use its properties as a template for the new object.

**Important!** The name of a Host Configuration Object must be unique; do not use the same name as an existing Agent object. If you use a name assigned to another Web Agent, a message displays stating that the trusted host exists.

#### Follow these steps:

1. Click Infrastructure, Hosts.
2. Click Host Configuration Objects.

The Host Configuration Objects page appears.

3. Click Create Host Configuration.

The Host Configuration Search page appears.

4. Select Create a copy of an object of type Host Configuration and click OK.

**Note:** By default, the `DefaultHostSettings` Host Configuration Object is selected.

The Create Host Configuration page appears.

**Note:** Click Help for descriptions of settings and controls, including their respective requirements and limits.

5. Enter a name and description.

**Note:** Do not start the host configuration object name with a hyphen ("-") character.

6. In Configuration Values and Clusters, modify the properties that are different for the new object.
7. Click Submit.

The Host Configuration Object is created.

## Add Multiple Policy Servers to the Host Configuration Object

A trusted host can access multiple Policy Servers. To set up trusted host connections and failover or round robin operation, add the Policy Servers to a Host Configuration object.

**Note:** If you are using a hardware load balancer to expose Policy Servers as multiple virtual IP addresses (VIPs), we recommend that you configure those VIPs in a failover configuration. Round robin load balancing is redundant as the hardware load balancer performs the same function more efficiently.

**Note:** The following procedure assumes that you are creating an object. You can also copy the properties of an existing object to create an object.

### To add a Policy Server to a Host Configuration object

1. Click Infrastructure, Hosts
2. Click Host Configuration Objects.

The Host Configuration Objects page appears.

3. Click Create Host Configuration and then click OK.

The Create Host Configuration page appears.

**Note:** By default, the Create a new object of type Host Configuration option is selected.

**Note:** Click Help for descriptions of settings and controls, including their respective requirements and limits.

4. Type the name and a description of the Host Configuration object.
5. Specify the Host Configuration settings.
6. In the Clusters group box, click Add.

The Add Cluster page appears.

7. Type the IP address and port number of the Policy Server that you want to add to the cluster.

**Note:** To add another Policy Server to the cluster, click Add to Cluster. To delete a Policy Server from the cluster, click the minus sign next to Port. To change the sequence of Policy Servers in the cluster, click the up and down arrows.

8. Click OK.

The cluster is added.

**Note:** To modify a cluster, click the right-facing arrow to its left. To delete a cluster, click the minus sign to its right. To add another cluster, click Add under Clusters, and repeat steps 6 and 7.

9. Enter the percentage of failover threshold.

**Note:** If the percentage of active servers in a cluster falls below the specified percentage, the cluster fails over to the next available cluster in the cluster list.

10. Click Submit.

The Host Configuration Object is updated with Policy Server details.

**More information:**

[Host Configuration Objects for Trusted Hosts](#) (see page 117)

[Operation Mode](#) (see page 114)

## Configure Policy Server Clusters for a Host Configuration Object

You can configure multiple Policy Servers in a cluster for failover operation. Clustering servers enable failover from one group of servers to another.

**Note:** If you are using a hardware load balancer to expose Policy Servers as multiple virtual IP addresses (VIPs), we recommend that you configure those VIPs in a failover configuration. Clustering is redundant because the hardware load balancer performs the same function more efficiently.

Policy Server clusters are defined as part of a Host Configuration Object. When a CA SiteMinder Web Agent initializes, the settings from the Host Configuration Object are used to setup communication with Policy Servers.

**Note:** The following procedure assumes that you are creating an object. You can also copy the properties of an existing object to create an object.

**To configure a cluster**

1. Click Infrastructure, Hosts.
2. Click Host Configuration Objects.

The Host Configuration Objects page appears.

3. Click Create Host Configuration and then click OK.

The Create Host Configuration page appears.

**Note:** By default, the Create a new object of type Host Configuration option is selected.

**Note:** Click Help for descriptions of settings and controls, including their respective requirements and limits.

4. Type the name and a description of the Host Configuration object.
5. Specify the Host Configuration settings.
6. In the Clusters section, click Add.

The Add Cluster page appears.

7. Type the IP address and port number of the Policy Server that you want to add to the cluster.

**Note:** To add another Policy Server to the cluster, click Add to Cluster. To delete a Policy Server from the cluster, click the minus sign next to Port. To change the sequence of Policy Servers in the cluster, click the up and down arrows.

8. Click OK.

The cluster is added.

**Note:** To modify a cluster, click the right-facing arrow in the first column. To delete a cluster, click the minus sign in the last column. To add another cluster, click Add, and repeat steps 7 and 8.



9. Type a percentage for the Failover Threshold.

<sup>SM</sup> automatically calculates the Failover Threshold value that is based on both the number of Policy Servers configured in the cluster and the Failover Threshold Percent you specify. The Failover Threshold value (displayed in the column to the right of the list of servers in each cluster) is the total number of Policy Servers that must be active in the Cluster to consider the Cluster available based on your configuration. If the number of Active Servers in the Cluster falls below the displayed Failover Threshold value, the Cluster fails over to the next available Cluster in the list. If the calculation of the Failover Threshold value that is based on your configuration would result in a non-whole number, the Policy Server rounds the value up to the nearest integer.

For example, consider a Cluster with 5 Policy Servers configured.

With a Failover Threshold Percentage ...;

...in the range between [0% - 19%], the value of required active servers (Failover Threshold) is rounded up to 1 .

...of 20%, the calculated value for Failover Threshold is 1 .

in the range between [21% - 39%], the value for Failover Threshold is rounded up to 2 .

of 40%, the calculated value for Failover Threshold is 2 .

in the range between [41% - 59%], the value for Failover Threshold is rounded up to 3 .

of 60%, the calculated value for Failover Threshold is 3 .

in the range between [61% - 79%], the value for Failover Threshold is rounded up to 4 .

of 80%, the calculated value for Failover Threshold is 4 .

in the range between [81% - 99%], the value for Failover Threshold is rounded up to 5 .

of 100%, the calculated value for Failover Threshold is 5 .

When you set the Failover Threshold Percentage, it applies to all clusters that use the Host Configuration Object.

**Note:** If the percentage of active servers in a cluster falls below the specified percentage, the cluster fails over to the next available cluster in the cluster list.

10. Click Submit.

The Host Configuration Object is configured with the Policy Server.

**Important!** Configuration Values specifies a single Policy Server and a simple failover operation that are only used when no clusters are specified. If you decide to delete all clusters in favor of a simple failover operation, be sure to delete all Policy Server information.

**More information:**

[Copy Policy Server Objects](#) (see page 55)

## SiteMinder Agents Overview

Agents are network entities that act as filters to enforce network access control or web access control. They are considered Policy Enforcement Points (PEPs). Agents monitor requests for resources. Users request protected resources. The agent prompts the user for credentials that are based on an authentication scheme. The agent sends the credentials to a Policy Server.

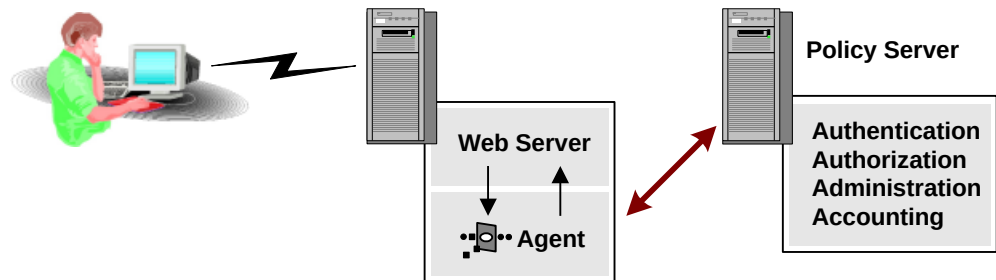
The Policy Server determines whether a user can be authenticated based on the credentials, and whether the user is authorized for the requested resource. The Policy Server then communicates with the Agent, which allows or denies access to the requested resource.

Web Agents, Affiliate Agents, EJB Agents, Servlet Agents, and RADIUS Agents are available by default. All other Agents are considered Custom Agents that must be created using the Agent APIs. Once created, you can configure Custom Agents in the Administrative UI.

### Web Agents

Agents operate with web servers. When a user requests a page from the web server, the Web Agent communicates with the Policy Server. The agent processes the authentication and authorization requests before the user can access the resource. The Policy Server can also provide information for the agent to provide personalized for the user.

The following diagram illustrates the three most basic transactions that an Agent and Policy Server handle. These transactions can contain more detailed information to enable customized content and support other features of the product. The process is similar whenever a user attempts to access a resource through a web server that an agent manages.



1. Is the resource Protected? If yes, request the user's credentials.
2. Is the user authenticated? If yes, check policies for authorization.
3. Is the user authorized? If yes, allow access to the protected resource.

The previous figure assumes that a user requests a protected resource for which the user is authorized. The agent checks with the Policy Server to determine whether the resource is protected. For protected resources, the agent gathers credentials from the user and forwards them to the Policy Server.

The Policy Server authenticates the user and informs the Web Agent that the user has been properly identified. Finally, the Web Agent determines whether the user is authorized for the resource by checking with the Policy Server. Once the Policy Server verifies authorization, the agent is notified. The agent allows the web server to display the protected resource to the user.

Agents that control the same resources and are of the same Agent type (all Web Agents, or all RADIUS Agents) can be grouped.

**More information:**

[Agent Groups](#) (see page 142)

## SAML Affiliate Agents

The SAML Affiliate Agent is part of the eTrust SiteMinder FSS solution, which enables business partners to share user identity information.

**Note:** Legacy Federation and the SAML Affiliate Agent are packaged as separately licensed items.

The SAML Affiliate Agent is installed only at the consumer site. This Agent enables a site to consume assertions that are sent from a producer, facilitating seamless single sign-on between a producer and a consumer. The assertion confirms that a user has been authenticated at the producer. The consumer uses the information in the assertion to provide user information to a web server for access to resources and web applications.

If CA SiteMinder is at the producer, you configure eTrust SiteMinder FSS components that identify each partner for which CA SiteMinder can generate assertions.

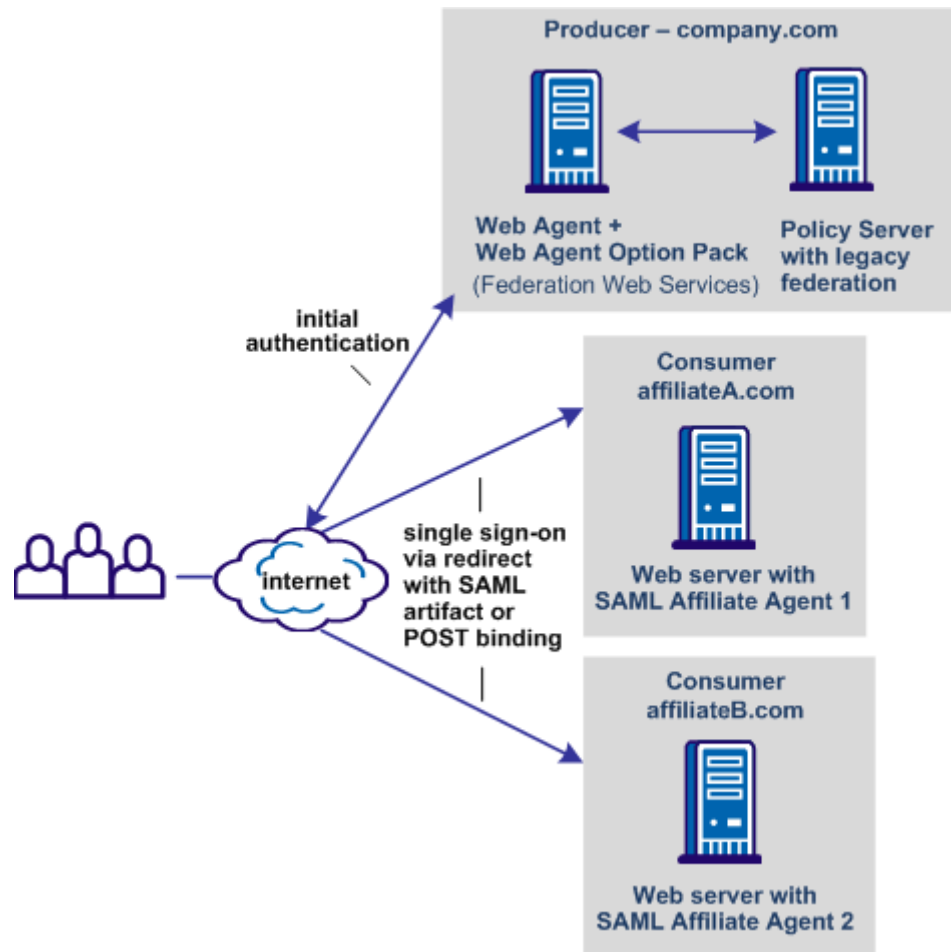
**Note:** In the Administrative UI, you can select an Affiliate Agent as the Agent type. This option is not for the SAML Affiliate Agent. The option is only applicable for 4.x Affiliate Agents. Do not select it.

If you install a SAML Affiliate Agent at an affiliate site, it is the only CA SiteMinder component that is required at that site for federated transactions. A full CA SiteMinder installation is not required at the consumer site because an application at the partner can enforce access control.

If CA SiteMinder is serving as the SAML 1.0 producer, the following producer-side components are required to support eTrust SiteMinder FSS:

- Policy Server
- Web Agent
- Web Agent Option Pack. The option pack provides the Federation Web Services application that is required to process federated transactions.

The following graphic shows a federated network with SAML Affiliate Agents.



In the pictured network, company.com has a full CA SiteMinder installation and can generate assertions. When a user requests a federated resource, the user initially authenticates at company.com. Company.com generates an assertion and redirects the user to the appropriate affiliate partner. At the partner, the SAML Affiliate Agent consumes the assertion and passes the necessary information to the web application. The user experiences a single sign-on transaction and gains access to the requested resource.

## RADIUS Agents

The remote Authentication Dial-In User Service (RADIUS) protocol exchanges session authentication and configuration information between Network Access Servers (NAS) and RADIUS authentication servers. Proxy services, firewalls, or dial-up security devices often use the RADIUS protocol.

A RADIUS Agent secures an entire application that communicates using the RADIUS protocol.

The Policy Server can be used as a RADIUS authentication server. RADIUS Agents allow the Policy Server to communicate with the NAS client devices.

### More information:

[Use the Policy Server as a Radius Server](#) (see page 703)

## Application Server Agents

The Application Server Agent is a collection of Java components that provide a full-featured agent for securing WebLogic and WebSphere application server resources. The Application Server Agent integrates the product with the J2EE platform.

The Application Server Agent can protect the following components:

- Web Applications (including servlets, HTML pages, JSP, image files)
- JNDI lookups
- EJB components
- JMS connection factories, topics, and queues
- JDBC connection pools

The Application Server Agent is a single Agent. From the perspective of the Policy Server, there are different Agent types that protect application server resources. The Agent types offer the flexibility to protect servlets, and EJB components in the following ways:

- Using the Servlet or EJB agent
- Using the agent

## CA SOA Security Manager SOA Agents

CA SOA Security Manager SOA Agents integrate with web and application servers to authenticate and authorize requests for access to web services resources hosted on those servers.

**Note:** More information about SOA Agents exists in the *CA SOA Security Manager Policy Configuration Guide*.

## Web Agent Configuration Overview

The following options for configuring an agent are:

### Central configuration

Indicates that the agent is configured from the Policy Server. The policy store holds the set of configuration parameters that a group of agents shares. Parameter settings are configured using the Administrative UI.

The Agent configuration is specified in an Agent Configuration Object.

**Note:** Central configuration does not apply to RADIUS, EJB, Servlet, or Custom Agents—those Agents can only perform local configuration.

### Local configuration

Indicates that the Web Agent is configured from a local configuration file on each web server where the Agent is installed.

You can store some parameters centrally and others locally.

**Note:** You can only enable and disable the agent from a file on the web server, not from the Policy Server.

## Advantages of Centrally Configuring Web Agents

When you centrally configure agents, the settings are stored in the policy store, not on a local configuration file on a web server.

Compared with local configuration, central configuration provides:

### Improved Usability When Using Central Agent Configuration

- Updating the configuration settings of multiple web Agents is easier and faster. You can change the setting in one place and have it propagate to multiple agents.
- Installing the Web Agent no longer requires the administrator to specify a shared secret. The Policy Server generates the shared secret.

### **Added Security with Central Agent Configuration**

- Controlling access to the Web Agent configuration is easier. For example, you can prevent the Web Server administrator from changing the configuration settings.
- You can store the configuration settings behind an internal firewall, instead of on the Web Server.
- A hardware-bound key can generate the shared secret. The client side uses this secret to establish a secure connection to the Policy Server. The trusted host handles the connection to the Policy Server.

## **Web Agent Components**

On the agent-side of a network, several main in agent operation:

### **Agent**

A virtual interface to a web server; triggers rules and enforces policies.

### **Trusted Host**

A client computer where one or more agents are installed. This host handles the connection to the Policy Server. You can have more than one trusted host on a server, but each requires a unique name.

The trusted host is “trusted,” because it is registered with the Policy Server. Register a trusted host so the Web Agents installed on that host can communicate with the Policy Server.

The following data identifies a trusted host:

- Host name
- Host IP address
- Host description
- Shared secret
- Host Object Identifier (OID)

### **Web Agent Configuration File (WebAgent.conf or LocalConfig.conf)**

Stored on the web server where the Agent resides, this file is used for local configuration. The LocalConfig.conf file holds the Agent configuration parameters for each Web Agent. The WebAgent.conf file enables or disables the agent and loads any related plug-ins.

### **Host Configuration File (SmHost.conf)**

Stored on the web server where the Web Agent resides, this file holds initialization parameters for the trusted host. Once the trusted host connects to a Policy Server, the trusted host uses the settings in the Host Configuration Object. The Host Configuration Object is named in the hostconfigobject parameter of this file.



**More information:**

[Web Agent Configuration Overview](#) (see page 127)

## Policy Server Objects Related to Web Agents

On the Policy Server-side the following objects relate to agent configuration:

**Agent object**

Names the Agent, establishing an Agent identity that can be mapped to a specific web server.

**Agent Configuration Object**

Contains the Web Agent configuration parameters. Use an Agent Configuration Object for managing groups of agents centrally. Though this object is primarily for central Agent configuration, it also contains the parameter that tells the Policy Server to use local configuration.

**Host Configuration Object**

Contains the trusted host configuration parameters. Except for initialization parameters, trusted host parameters are always maintained in a Host Configuration Object.

Configuration objects are stored in the policy store. Create or modify these objects with the Administrative UI.

**More information:**

[Web Agent Configuration Overview](#) (see page 127)

## How to Configure a Web Agent

Several tasks must be completed to configure an agent. These tasks apply to local and central configuration of an agent.

**Note:** Set up the Policy Server for agent communication before you install an Agent and register a trusted host.

**Follow these steps:**

1. Install a Policy Server.
2. Create a Host Configuration Object.
3. Grant the Register Trusted Hosts permission to a Policy Server Administrator. An administrator must have the permission to register trusted hosts.

**Note:** If you create an administrator with *only* the Register Trusted Hosts permission, that administrator cannot use the Administrative UI.

4. Create an Agent object. This object defines the name of the agent. Do not confuse this object with an Agent Configuration Object.
5. Create an Agent Configuration Object.

If you plan to configure an Agent locally, you still need this object to enable the local configuration parameter, AllowLocalConfig.

6. At the client site, install the agent.
7. Register the trusted host. Part of this process is to provide the name of the Host Configuration Object that you already created at the Policy Server.
8. When the Agent-related policy objects are configured, enable the agent. This setting is in the local Agent configuration file.

**More information:**

[Host Configuration Objects for Trusted Hosts](#) (see page 117)

[Agent Configuration Object Overview](#) (see page 136)

[Enable a Web Agent](#) (see page 140)

## Configure Web Agents Centrally

To centrally configure Web Agents, perform the steps outlined in Configure a Web Agent. These tasks apply to local and central configuration of a Web Agent.

If you specify any configuration parameters locally, the parameter values in the local Agent configuration file override the values in the corresponding Agent Configuration Object, merging the input from both configuration sources.

To use a local configuration exclusively, without combining input from an Agent Configuration Object and an Agent configuration file, configure the Agent Configuration Object with only the AllowLocalConfig parameter and set it to yes. This ensures that the Web Agent will only have configuration data from the local configuration file.

To better understand how central and local configuration work together, read Combined Central and Local Configuration.

## Create a Host Configuration Object

You can create (or duplicate) a Host Configuration object.

### Follow these steps:

1. Click Infrastructure, Hosts.
2. Click Host Configuration Objects.
3. Click Create Host Configuration.
4. Do one of the following tasks:
  - (Recommended) Create a copy of an existing Host Configuration object and modify its properties. Copy the DefaultHostSettings object and use those settings as a template for the new object. The Policy Server installation program creates a DefaultHostSettings object.  
**Important!** Do not directly modify and use the DefaultHostSettings object. Always copy this object and then modify it.
  - Create an object.
5. Click OK.
6. Type the name and a description.
7. In Configuration Values, specify the Host Configuration settings.
8. Click Submit.

## Configure Web Agents Locally

Agents read both the agent configuration object and the local agent configuration file. Values in the local agent configuration file override those values in the Agent Configuration Object. The agent uses all of those settings together. You can modify only a small subset of Agent parameters locally, then rely on the central agent configuration object for the rest the configuration settings.

### Follow these steps:

1. Obtain permission for performing local configuration from a Policy Server administrator.
2. Configure a Web Agent.
3. In the Agent Configuration Object, set the AllowLocalConfig parameter to yes.
4. Edit the Web Agent configuration file (LocalConfig.conf).

Be sure to modify a copy of the Web Agent configuration file and maintain a backup copy.

All agents have a sample WebAgent.conf.sample file In the `<web_agent_home>\config` directory. Modify this file, then save it under the name WebAgent.conf to the appropriate web server location.

## Combined Central and Local Configuration

When an agent starts, it searches the agent configuration object for configuration information, and notes the value of the AllowLocalConfig parameter. If this parameter is set to yes, the Web Agent searches the corresponding Agent's local configuration file for modified or additional parameters, overriding any Agent Configuration Object parameters with the value from its configuration file.

## Example of Using Central and Local Configuration

### Scenario:

You want to configure multiple cookie domain single sign-on across your network without having to configure each agent individually.

The CookieDomain parameter in the agent configuration object is set to example.com. Set the CookieDomain parameter to example.org for one agent in your network. Use all of the other parameter values set in the agent configuration object.

### Solution:

#### Follow these steps:

1. Configure an agent configuration object with all the parameters applicable for your environment.
2. In the agent configuration object, set the AllowLocalConfig parameter to yes.
3. For the single agent, change only the CookieDomain parameter to example.org. Do *not* modify any other parameters.

The value for the CookieDomain parameter in the agent configuration file overrides the value in the agent configuration object. The agent configuration object determines the settings for all the other parameters.

## Create an Agent Object to Establish a Web Agent Identity

To create a Web Agent identity, create an Agent object in the Administrative UI. The object name must match the values of either the AgentName or DefaultAgentName parameters in the agent configuration file or agent configuration object. The Policy Server maps the agent name to the IP address of the web server hosting the Web Agent. This mapping associates policies with agents. Creating an agent object and identity lets you associate the agent with a realm.

#### Follow these steps:

1. Click Infrastructure, Agent.
2. Click Agents
3. Click Create Agent.
4. Click OK.

5. Type the name and description of the Agent.

**Note:** Web Agent names have the following limits:

- Agent names must contain 7-bit ASCII characters in the range of 32-127, including one or more printable characters.
- Agent names must not contain the ampersand (&) and asterisk (\*) characters.
- Agent names are not case-sensitive. For example, you cannot create one Agent that is named MyAgent and another Agent named myagent.

6. Select SiteMinder as the Agent Style and Web Agent as the Agent Type.
7. Click Submit.

## Configure an Agent Object for a 4.x Web Agent Identity

To create a 4.x Web Agent identity, create an Agent object in the Administrative UI. The object name must match the Agent name in the local Web Agent configuration file. Creating a Web Agent object and identity lets you associate the Web Agent with a realm.

**Follow these steps:**

1. Click Infrastructure, Agent.
2. Click Agents.
3. Click Create Agent.

Verify that the Create a new object of type Agent option is selected.

4. Click OK.
5. Type the name and description of the Agent.

**Note:** Web Agent names have the following limits:

- Agent names must contain 7-bit ASCII characters in the range of 32-127, including one or more printable characters.
- Agent names must not contain the ampersand (&) and asterisk (\*) characters.
- Agent names are not case-sensitive. For example, you cannot create one Agent that is named MyAgent and another Agent named myagent.

6. Confirm the following settings:
  - That the SiteMinder option is selected.
  - That Web Agent appears in the Agent Type drop-down list.
7. Select the Supports 4.x agents option.

The Trust Settings page appears.

8. Enter the IP Address of the server on which the Agent resides.

**Note:** Like a single server, virtual servers have defined names and IP addresses. Each Agent on a virtual server must have a unique Agent name.

9. Type and confirm a shared secret.

**Limits:**

- The secret that you supply must match the secret that was assigned when the Web Agent was installed on the Web Server.
- The secret must contain at least 1 character and not more than 255 characters.
- The secret must only contain alphanumeric characters.
- The secret must not contain embedded spaces.

**Note:** Any virtual servers on the same web server must use the same secret. When a 4.x Agent attempts to connect to the Policy Server, the Agent and Policy Server use the shared secret for mutual authentication.

10. Click Submit.

The 4.x Web Agent object is created.

**More information:**

[Realms](#) (see page 461)

[Copy Policy Server Objects](#) (see page 55)

## Set the Configuration Parameters in the Agent Configuration Object

The following procedure contains the two general sub-procedures required to set the configuration parameters of an agent configuration object.

**To define the Web Agent's configuration**

1. Create an Agent Configuration Object.
2. Modify the configuration parameters in this object.

**Note:** When configuring centrally or locally configuring a Web Agent, refer to the *Web Agent Configuration Guide* for parameter descriptions, the default values, and instructions on setting the parameters.

**More information:**

[Agent Configuration Object Overview](#) (see page 136)

## Agent Configuration Object Overview

An agent configuration object holds the parameters that define the agent configuration. The configuration object is the Policy Server counterpart to the LocalConfig.conf agent configuration file.

When you configure an agent, you are prompted for the name of the agent configuration object. The configuration object is associated with the agent that you are configuring.

**More information:**

[Required Agent Configuration Object Parameters](#) (see page 138)

## Copy an Agent Configuration Object

You can create a new Agent configuration object by copying an existing Agent configuration object. Sample Agent configuration objects are provided for supported Web Agents. After the new Agent configuration object is created, you can modify its list of parameters and their values.

**Note:** For more information about parameters and default settings, see the *Web Agent Configuration Guide*.

**To copy an Agent Configuration Object**

1. Click Infrastructure, Agent.
2. Click Agent Configuration Objects.  
The Agent Configuration Objects page appears.
3. Click Create Agent Configuration.  
The Create Agent Configuration page appears.
4. Select the Create a copy of an object of type Agent Configuration option, and do one of the following:
  - Select one of the default Agent Configuration Objects from the list.
  - Click Search and select one from the list of Agent Configuration Objects that is displayed.
5. Click OK.  
The Create Agent Configuration: page appears.
6. Enter a new name and description and click Submit.  
You are prompted to specify a parameter or continue entering a comment.



7. Enter a comment and click Yes.

The Agent Configuration Object based on the default Agent Configuration Object is created.

## Create an Agent Configuration Object

The Policy Server installer creates several Agent Configuration Objects for several supported web servers that contain default settings. These sample objects have names, such as IISDefaultSettings or iPlanetDefaultSettings. You can duplicate these default objects and use them as templates for your Agent configuration.

**Note:** We recommend creating a new Agent Configuration Object by copying an existing object and modifying its list of parameters and their values. If you create a new Agent Configuration object without copying an existing one, enter all of your parameters and their values manually.

### Follow these steps:

1. Click Infrastructure, Agent.

2. Click Agent Configuration Objects.

The Agent Configuration Objects page appears.

3. Click Create Agent Configuration.

Verify that the Create a new object of type Agent Configuration option is selected.

4. Click OK.

The Create Agent Configuration page appears.

**Note:** Click Help for descriptions of settings and controls, including their respective requirements and limits.

5. Type the name and a description of the Agent.

6. Click Add.

The Create Parameter page appears.

7. Type the ame and value of the parameter.

8. (Optional) Do *one* of the following:
  - To encrypt the value of the parameter, select the Encrypted option.
  - To add multiple values for a parameter, do the following:
    - a. Select the Multi-value option.
    - b. Type a value for the parameter.
    - c. Click Add.
    - d. Repeat Steps b and c until you have added all the values you want.
    - e. (Optional) To change the sequence of multiple values, click the up and down arrows. Multiple values are separated by the square symbol (■) when displayed on the Parameters page. To delete a value, click the minus sign.

**Note:** You cannot enter multiple values for encrypted parameters. A single encrypted value is displayed as a string of symbols.

9. Click OK.

The parameter is added to the list.

**Note:** Parameters are listed in alphabetical order by name. To edit a parameter on the list, click the right arrow. To delete a parameter from the list, click the minus sign. To add more parameters to the Agent configuration object, repeat Steps 4 through 7.

10. Click Submit.

The Agent Configuration Object is created.

## Required Agent Configuration Object Parameters

Agent configuration objects require settings for the following parameters:

- All Agents require DefaultAgentName
- IIS Agents require DefaultUserName and DefaultPassword
- (Domino Agents only) DominoDefaultUser
- (Domino Agents only) DominoSuperUser

**Note:** More information about these parameters exists in the Web Agent Installation Guide.

## Specify the IIS Proxy User

IIS Web Agents require the following settings in the agent configuration object:

### **DefaultUserName**

Specifies the username of the IIS Proxy user.

### **DefaultPassword**

Specifies the password of the IIS Proxy user.

**Note:** Leave these parameters blank if you are using the NTLM authentication scheme or the Windows User Security Context feature.

These parameters identify an existing NT user account that has sufficient privileges to access resources on an IIS web server that the product protects. Users requesting access could lack the necessary server access privileges. The agent requires this NT user account. An administrator assigns this NT account which acts as a proxy-user account for the product.

## Specify the Domino Users

Configuring an agent on a Domino server requires that you edit the following settings to match your system:

### **DominoDefaultUser**

Specifies the name by which the Domino Web Agent identifies that user to the Domino server. This situation occurs when the user is not in the Domino Directory and they have been authenticated by the product against another user directory. This value can be encrypted.

### **DominoSuperUser**

Ensures that all users successfully logged in to the product are logged in to Domino as the Domino SuperUser. This value can be encrypted.

## Specify the Agent Name

All agents require that you specify a value for the DefaultAgentName.

### **DefaultAgentName**

Identifies the Agent identity that the Web Agent uses for IP addresses that do not have an Agent identity that is assigned to it.

**Default:** the default Agent name is the name of the installed Web Agent.

## Modify Agent Configuration Parameters

You can edit the names and values of the parameters in an Agent configuration object. Parameter names must be unique. Parameter values can be plain, encrypted, or multi-valued. To make an inactive parameter active, remove the pound sign (#).

**Follow these steps:**

1. Click Infrastructure, Agent.
2. Click Agent Configuration Objects.
3. Specify search criteria, and click Search.
4. Click the name of the Agent Configuration object that you want to modify.
5. Click Modify.
6. Click the right arrow to the left of the parameter name.
7. Edit the value of the parameter.

**Note:** To delete a value, click the minus sign. To change the sequence of multiple values, click the up and down arrows. To specify multiple values for one parameter, click Add. The square symbol (□) separates multiple parameters.

8. (Optional) Select the Encrypted option.

**Note:** When Encrypted is selected, the option of specifying multiple values for one parameter is disabled. A single encrypted value is displayed as a string of symbols on the Parameters page.

9. Click OK.

**Note:** Parameters are listed in alphabetical order by name. To edit a parameter on the list, click the right arrow. To delete a parameter from the list, click the minus sign. To edit multiple parameters for the Agent configuration object, repeat steps 5 through 8.

10. Click Submit.

## Enable a Web Agent

You can only enable and disable an agent from the WebAgent.conf file.

The EnableWebAgent parameter value determines whether an Agent is enabled or disabled. Set it to yes to enable the Agent.

To enable the agent, complete the following prerequisites:

- Set up all the necessary objects for Policy Server and agent communication.
- Installed and configured the agent.

## Configure a RADIUS Agent

To create a RADIUS Agent identity, create an Agent object in the Administrative UI. The object name must match the Agent name that was specified when the Agent was installed. If the Agent name is changed in the Web Agent Management Console or in the WebAgent.conf file, the object name must be changed also. The Policy Server uses the RADIUS Agent identity to communicate with the NAS client devices. Creating a RADIUS Agent object and identity lets you associate the RADIUS Agent with a realm.

Once you create a RADIUS Agent identity, you can install and configure an agent on a RADIUS client or application server. You can configure only the RADIUS Agents locally.

### Follow these steps:

1. Click Infrastructure, Agent.
2. Click Agents.
3. Click Create Agent.
4. Click OK.
5. Type the name and a description of the Agent.

#### Limits:

- Agent names must contain 7-bit ASCII characters in the range of 32-127, including one or more printable characters.
  - Agent names must not contain the ampersand (&) and asterisk (\*) characters.
  - Agent names are not case-sensitive. You cannot create one agent that is named MyAgent and another Agent named myagent.
6. Select the Radius option, and then select a RADIUS vendor.  
**Note:** You can select Generic RADIUS as the Agent Type to protect any type of RADIUS device. The generic RADIUS Agent types do not provide access to vendor-specific response attributes.
  7. Specify the following trust settings:
    - Type an IP Address of the RADIUS client (NAS device).
    - Type and confirm an alphanumeric shared secret.
  8. Type the number of the RADIUS realm hint.
  9. Click Submit.

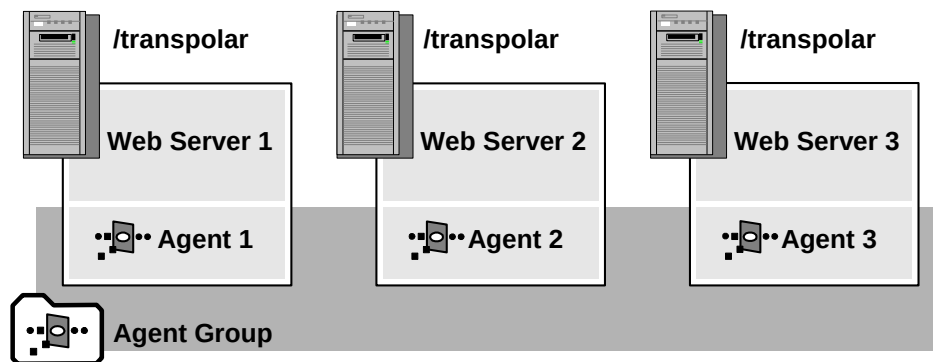
### More information:

[Copy Policy Server Objects](#) (see page 55)

## Agent Groups

An Agent group is a collection of Agents of the same type. These agent Groups allow access to the same resource to a larger user base when the resource is duplicated on many web servers. Groups also save time by defining only one policy for all of the Web Agents. An Agent group can protect a group of Web Servers that use round robin processing to supply access to the same resources.

The following graphic describes protecting the Web farm with one set of policies: One Agent group is bound to the set of policies.



You can create the agent groups before creating agents. Edit an Agent group and add new agents to the group.

**Note:** Share configuration settings in an agent group with an agent configuration object.

**More information:**

[Policies](#) (see page 517)

## Configure an Agent Group

Manage the agents that protect common resources more efficiently with an agent group. All agents in a group must be of the same type.

**Follow these steps:**

1. Click Infrastructure, Agent.
2. Click Agent Groups.
3. Click Create Agent Group.
4. Click OK.
5. Type the name and a description of the Agent group.

6. Select the Agent Style and Agent Type.

**Note:** An Agent group can only contain one type of agent, for example, all Web Agents, all Affiliate Agents, or all RADIUS Agents.

7. Click Add/Remove.

**Note:** Only Agents of the specified Agent type are listed under Available Members. For example, if the specified Agent Style is Radius and the specified Agent Type is 3-Com, only 3-Com Agents are listed. If the specified Agent Type is Generic Radius, all RADIUS Agents are listed.

8. Select one or more Agents from the list of Available Members, and click the right-facing arrow.
9. Click OK.
10. Click Submit.

**More information:**

[Copy Policy Server Objects](#) (see page 55)

## Add Agents to an Agent Group

You can add existing Agents to an Agent group.

**Follow these steps:**

1. Click Infrastructure, Agent.
2. Click Agent Groups.
3. Specify search criteria and click Search.
4. Click the name of an Agent group that you want to modify.
5. Click Modify.
6. Click Add/Remove.

**Note:** Only Agents of the specified Agent type are listed under Available Members. For example, if the specified Agent Style is Radius and the specified Agent Type is 3-Com, only 3-Com Agents are listed. If the specified Agent Type is Generic Radius, all RADIUS Agents are listed.

7. Select one or more Agents from the list of Available Members, and click the right-facing arrows.
8. Click OK.
9. Click Submit.

## Custom Agents

You create a custom agent using either the C or Java version of the Agent API. The Agent API and associated documentation accompany the Software Development Kit, which is available separately.

After you develop your own agent, configure a new agent type. The agent type defines the behavior of an agent and lets you use the custom agent to protect resources. For example, if you developed a custom FTP Agent, you would then need to define an FTP Agent type.

### Configure a Custom Agent Type

You configure a custom agent type to define the behavior of a custom agent and to identify the custom agent when creating the agent object. Create the agent type using the API included with the product.

### Create a Custom Agent Object for the Agent Identity

To create a custom Agent identity, create an Agent object in the Administrative UI. Creating an Agent object and identity lets you associate the Agent with a realm.

**Note:** The following procedure assumes that you are creating an object. You can also copy the properties of an existing object to create an object.

**Follow these steps:**

1. Click Infrastructure, Agent.
2. Click Agents.

The Agents page appears.

3. Click Create Agent.

Verify that the Create a new object of type Agent option is selected.

4. Click OK.

The Create Agent page appears.

**Note:** Click Help for descriptions of settings and controls, including their respective requirements and limits.



5. Type the name and a description of the Agent.

**Limits:**

- Agent names must contain 7-bit ASCII characters in the range of 32-127, including one or more printable characters.
- Agent names must not contain the ampersand (&) and asterisk (\*) characters.
- Agent names are not case-sensitive. You cannot create one agent named MyAgent and another Agent named myagent.

6. Select SiteMinder as the Agent Style, Web Agent as the Agent Type, and the Supports 4.x agents option.

The Trust Settings fields appear.

7. Type the IP Address of the server on which the Agent resides.

8. Type and confirm a shared secret.

**Limits:**

- The secret that you supply must match the secret that was assigned when the Agent was installed on the Web Server.
- The secret must contain at least 1 character and not more than 255 characters.
- The secret must only contain alphanumeric characters.
- The secret must not contain embedded spaces.

9. Click Submit.

The Agent object is created.

**More information:**

[Configure a Custom Agent Type](#) (see page 144)

[Copy Policy Server Objects](#) (see page 55)

## Resource Protection with a SiteMinder Agent

You associate a configured Agent with a realm, which is a collection of resources that you want to protect. Realms are protected by rules, which get included in an access control policy.

## Agent Discovery Introduced

Agent Discovery lets you discover instances of different agent types and versions. Once discovered, you can view agent-specific details such as version, state, and others. You can also view a list of agents that are deployed on various hosts in your enterprise and delete the unwanted agent instance entries from the list.

**Note:** Agent Discovery does not support traditional agents.

The heartbeat messages help identify the r12.5 agents. The frequency with which an agent sends heartbeat messages to the Policy Server is known as heartbeat interval. The `MinTimeBetweenAgentStatusUpdates` parameter that denotes the heartbeat interval, controls the minimum time that has to elapse before a Policy Server updates the Agent Instance objects in the store. Any heartbeat message that the Policy Server receives before the minimum time elapses is ignored. The default value of this parameter is 24 hours and the minimum value is 1 hour. An Agent identifies itself on startup regardless of whether the time set for the `MinTimeBetweenAgentStatusUpdates` parameter has elapsed.

Agent Discovery identifies all agents that communicate with the Policy Server regularly, irrespective of the version of the agent. To identify agents older than r12.5, Agent Discovery uses a combination of the IP address and trusted host of an agent. Any change in this combination for an agent results in multiple entries for the same agent.

Agent Discovery does not identify the ASA agents older than r12.5. These older agents do not send any information to the Policy Server. The attributes of an ASA agent are displayed as unknown in the Agent Instances list. If the ASA agent host has another agent older r12.5 using the same host and trusted host combination, the ASA entry is hidden from the list.

You can view a list of agent instances that are deployed in your enterprise using Agent Instances under Infrastructure in the Administrative UI.

**Note:** For agents prior to r12.5, the IP address is displayed as the host name.

## List Agent Instances

You can list the agent instances to know the number of agents that are deployed across your enterprise. You can also view a list of agent instances that are based on the search criterion you provide. The search criterion can be any attribute of an agent instance.

From the list, you can view all the relevant details of an agent instance and can delete one or more agent instance entries. If you delete an agent older than r12.5, none of the agent attributes are displayed in the list, except the trusted host. All the attributes of the deleted agent appear in the list again, whenever the agent restarts.

**Note:** Even after you delete an agent instance entry, the agent instance remains active so long as it communicates with the Policy Server regularly.

You can sort any attribute of an agent instance to view the list of agents instances that use the same attribute you selected.

**Follow these steps:**

1. Click Infrastructure, Agent.
2. Click Agent Instances.
3. Click the icon under Show Details.

**Note:** The configuration mode is either FIPS Only or Compact for agents older than r12.5. The Administrative UI displays the details that are based on the actual mode being used in server-agent communication.

4. (Optional) Specify the search criterion in the Search field.

The agent instances list is filtered based on the search criterion.

5. (Optional) Click the arrow mark in the table heading of an attribute to sort the agent instances list that is based on the selected attribute.

## Configure the Policy Server Heartbeat Interval

The heartbeat interval helps Agent Discovery determine the state of an agent. When the agent does not send any heartbeat message beyond 24 hours, the state of the agent instance changes to inactive. You can configure the heartbeat interval to change the default value, which is 24 hours.

**Follow these steps:**

1. Open a command prompt in the computer hosting the Policy Server.
2. Enter the following command:  
`XPSConfig`
3. Enter SM.
4. Enter the value against the MinTimeBetweenAgentStatusUpdates option.
5. Enter C.
6. Enter the new value.  
**Default:** 24 hours  
**Minimum:** One hour
7. Enter Q three times.

# Chapter 8: User Directories

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This section contains the following topics:

[User Directory Connections Overview](#) (see page 149)  
[Directory Attributes Overview](#) (see page 151)  
[Ping the User Store System](#) (see page 153)  
[How to Configure a CA Directory User Directory Connection](#) (see page 153)  
[How to Configure a CA LDAP Server for z/OS User Directory Connection](#) (see page 156)  
[Configure Oracle Directory Server Enterprise Edition User Directory Connections](#) (see page 167)  
[Configure IBM Directory Server User Directory Connections](#) (see page 168)  
[How to Configure a Domino User Directory as a User Store](#) (see page 168)  
[How to Configure a Novell eDirectory LDAP Directory Connection](#) (see page 170)  
[Configure Active Directory LDS User Store Directory Connections](#) (see page 174)  
[How to Configure an Active Directory Directory Connection](#) (see page 175)  
[How to Configure an Active Directory Global Catalog User Directory Connection](#) (see page 181)  
[How to Configure an Oracle Internet Directory User Directory Connection](#) (see page 182)  
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[Configure Custom Directory Connections](#) (see page 190)  
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[LDAP Load Balancing and Failover](#) (see page 201)  
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[SQL Query Schemes](#) (see page 205)  
[Define the Same User Directory Connection in Multiple Policy Stores](#) (see page 212)  
[View User Directory Contents](#) (see page 213)  
[Search User Directories](#) (see page 213)  
[Universal IDs](#) (see page 214)  
[Named Expressions](#) (see page 215)  
[User Attribute Mapping](#) (see page 229)

## User Directory Connections Overview

To verify user identities, The Policy Store employs user directories store organizational information, user attributes, and user credentials.. You configure connections to existing user directories and databases through the Administrative UI. These directory connections resolve how the Policy Server establishes a context for user identities.

The Policy Server supports the following types of user directories:

- LDAP
- ODBC
- Oracle
- Custom

## LDAP Overview

The Policy Server can communicate with user directories that use the Lightweight Data Access Protocol (LDAP). The Policy Server opens three connections when connecting to an LDAP user store:

- The first connection verifies that the user store is up and running. By default, the Policy Server contacts the user store every 30 seconds on this connection.
- The second connection is for searches and updates. For example, the Policy Server uses this connection for user lookup and setting attributes on bind failures.
- The third connection is for testing credentials. The Policy Server attempts to bind to the user store using the provided credentials. The result of the bind attempt determines whether the credentials are acceptable.

## ODBC Database Overview

CA SiteMinder can use a proprietary schema in an ODBC-compatible database as a user directory for authentication and authorization purposes. The Policy Server supports connections to the following types of ODBC-compatible databases:

- Microsoft SQL Server—Windows Policy Servers only
- Oracle RDBMS

To configure the Policy Server to use a database as a user directory:

- Type the SQL query information in the fields on the SQL Query Scheme pane. This pane is accessible from the User Directory pane. The fields in this pane map information between the Policy Server and the ODBC-compatible database.

**Note:** Create a unique data source for each query scheme.

- Define an ODBC data source that points to the database containing user information. Configure the ODBC data source as a System DSN. The data source points to a Microsoft SQL Server database or an Oracle database.

## Active Directory Overview

CA SiteMinder supports user directories on the Microsoft Active Directory platform. The configuration for Active Directory (AD) and LDAP namespaces is similar with several functional differences.

The advantage of using the AD namespace when configuring an Active Directory user store include:

- SSL connectivity using a native Windows certificate database.

**Note:** Both the Policy Server and the systems hosting Active Directory user stores have an established trust.

- Support for native Windows SASL, which allows for secure LDAP bind operations.

The disadvantages of using the AD namespace when configuring an Active Directory user store include:

- No support for enhanced LDAP referrals.
- No support for LDAP paging and sorting operations.

**Note:** If the Policy Server is installed on a UNIX operating system, you cannot use the AD namespace for connecting to the AD user store.

## Custom Directory Overview

The Administrative UI allows you to create custom user directory connections by creating shared libraries with the CA SiteMinder Directory API. This C-language API is available separately with the Software Development Kit. Custom connections allow the Policy Server to interact with legacy directories. You configure a custom namespace on the User Directory pane.

## Directory Attributes Overview

Some features require read or write access to seven CA SiteMinder attributes. The attribute values are in the user directories that are connected to the Policy Server. You map the directory user attributes the CA SiteMinder attributes in the User Attributes section. You can also use attribute mapping to define your own common names. You can map each name to user attribute names in multiple user directories.

Each CA SiteMinder attribute is associated with a data type and one or more directory types that are described in the following table. (R) indicates that the attribute requires read access. (RW) indicates that the attribute requires read/write access.

| Attribute Name          | Data Type | Directory Types           | Description                                                                                                                                                                                                                                                                                                             |
|-------------------------|-----------|---------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Universal ID (R)        | string    | LDAP<br>Database<br>WinNT | Specifies the universal ID or user identifier that CA SiteMinder passes to protected applications to maintain a user's identity. This feature is a bridge between CA SiteMinder and legacy applications, which often use attributes to identify a user. The universal ID is also used in configuring Directory mapping. |
| Disabled Flag (RW)      | string    | LDAP<br>Database          | Specifies the user's account status. More information exists in the <i>Policy Server Administration Guide</i> .                                                                                                                                                                                                         |
| Password Attribute (RW) | binary    | LDAP<br>Database          | Specifies the user's password.                                                                                                                                                                                                                                                                                          |
| Password Data (RW)      | binary    | LDAP<br>Database          | Is used to track password policy information.                                                                                                                                                                                                                                                                           |
| Anonymous ID (RW)       | string    | LDAP<br>Database          | Stores the DN of users who are authenticated using an anonymous authentication scheme.                                                                                                                                                                                                                                  |
| Email (R)               | string    | LDAP<br>Database          | This attribute is not currently used by a CA SiteMinder feature.                                                                                                                                                                                                                                                        |
| Challenge/Response (RW) | string    | LDAP                      | Specifies the question and answer pair that is used by the Forgotten Password feature in Password Services and DMS. The Challenge string is the password hint that is passed to the user.                                                                                                                               |

**Note:** You can specify the administrator credentials that the Policy Server uses to access the directory. These credentials have the same read and write access as the corresponding user attributes in the table.



**More information:**

[User Attribute Mapping](#) (see page 229)

## Ping the User Store System

Be sure to ping your user store system before configuring to verify that a network connection exists between the Policy Server and the user directory or database.

**Note:** Some user store systems may require the Policy Server to present credentials.

## How to Configure a CA Directory User Directory Connection

The following process lists the steps for creating a CA Directory user store connection to the Policy Server:

1. Configure a CA Directory User Directory Connection.
2. Enable User Store DSA Parameters.
3. (Optional) Enable Caching for a CA Directory User Store.
4. (Optional) Verify the CA Directory Cache Configuration.

## Configure CA Directory User Directory Connections

You can configure a user directory connection that lets the Policy Server communicate with a CA Directory user store.

**Follow these steps:**

1. Click Infrastructure, Directory.
2. Select User Directories.
3. Click Create User Directory..
4. Complete the required connection information in the General and Directory Setup areas.
5. Configure the LDAP search and LDAP user DN lookup settings in the LDAP Settings area.
6. Select Require Credentials the Administrator Credentials area.
7. Enter the credentials of an administrator account.

8. (Optional) Specify the user directory profile attributes that are reserved in the User Attributes area.
9. (Optional) Click Create in the Attribute Mapping List area to configure user attribute mapping.
10. Click Submit.

The user directory connection is created.

**More information:**

[LDAP Load Balancing and Failover](#) (see page 201)

[Define an Attribute Mapping](#) (see page 232)

## Enable User Store DSA Parameters

The Policy Server connects to CA Directory by performing a bind request for each authentication request. Configure CA Directory to handle these requests, or CA Directory runs out of connections and authentication fails.

**Follow these steps:**

1. Open the .dxi file for the user store DSA.
2. Define the following entries at the bottom of the file:

```
#SiteMinder
set mimic-netscape-for-siteminder = true;
set concurrent-bind-user = DN;
set hold-ldap-connections = true;
```

3. Save and close the .dxi file.

The user store DSA parameters are enabled.

**Note:** The DN is in x500 format.

**Example:** <o acme><cn smadmin>

## Enable Caching for a CA Directory User Store

You can improve authentication and authorization performance for large user stores by enabling the CA Directory DXcache feature. A 5-MB user store is considered large.

**Follow these steps:**

1. As the dsa user, add the following lines to the end of the DXI file (for example, `<dxserver_install>\config\servers\eTrustDsa.dxi`):

```
# cache configuration
set max-cache-size = 100;
set cache-index = commonName, surname, objectClass;
set cache-attrs = all-attributes;
set cache-load-all = true;
set lookup-cache = true;
```

**Note:** The max-cache-size entry is the total cache size in MB. Adjust this value based on the total memory available on the CA Directory server and overall size of the user store. In addition, set the cache-index fields to those fields used to perform a user search in the user store. For example, if users are authenticated and authorized based on their common name (cn=\*), make sure that the commonName is set in the cache-index.

2. As the dsa user, stop and restart the user DSA to allow the DXcache configuration changes to take effect:

```
dxserver stop eTrustDsa
dxserver start eTrustDsa
```

## Verify the CA Directory Cache Configuration

After configuring the CA DXcache feature for the user store, you can verify that the cache is enabled using the DXmanager user interface.

**Follow these steps:**

1. Using a Web browser, connect to the CA DXmanager web interface.

For example:

```
http://<CA_host>:8080/dxmanager/ManagerServlet?hostgroup=All
```

2. Navigate to the DSA configuration page and verify that the DXcache Status field is set to Enabled for your policy store DSA.

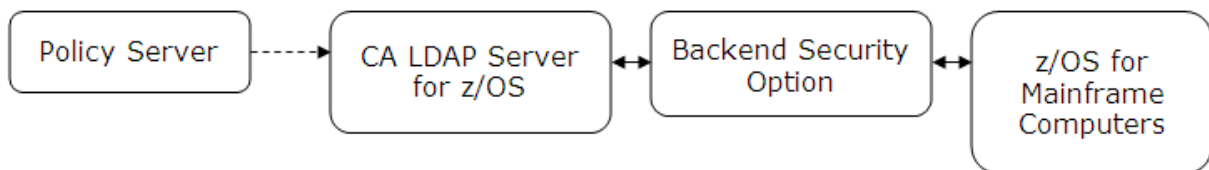
## How to Configure a CA LDAP Server for z/OS User Directory Connection

The following process lists the steps for configuring a CA LDAP Server for z/OS user store connection to the Policy Server:

1. Review the following information:
  - CA LDAP Server for z/OS overview.
  - CA SiteMinder features not supported by CA LDAP Server for z/OS.
  - CA Top Secret r12 (TSS) backend security option and its objectclass hierarchy.
  - CA LDAP Server r15 for z/OS (ACF2) backend security option and its objectclass hierarchy.
  - CA LDAP Server r15 for z/OS (RACF) backend security option and its namespace hierarchy.
2. Configure the Policy Server registry entries for TSS, ACF2, or RACF.
3. Configure the user directory connection.

### CA LDAP Server for z/OS Overview

You can configure a CA LDAP Server for z/OS as a user store by configuring a connection from the Policy Server to the LDAP Server. How you configure the connection from the Policy Server to the LDAP Server depends on the backend option that you are using to secure the LDAP Server:



CA supports the following backend security options for CA LDAP Server:

- CA Top Secret r12 (TSS)
- CA LDAP Server r15 for z/OS (RACF)
- CA LDAP Server r15 for z/OS (ACF2)

Become familiar with the objectclass hierarchy for these backend security options before configuring the connection from the Policy Server to the LDAP Server. Also, add the backend-related objectclasses to the Policy Server registries in the LDAP namespace.

**Note:** z/OS is an IBM operating system for mainframe computers.

## SiteMinder Features Not Supported by CA LDAP Server for z/OS (TSS)

CA LDAP Server for z/OS does not support the following features:

### Password Services

Password Services is not supported.

### Anonymous Binds

When configuring a CA LDAP Server r15 for z/OS as a user store, provide values for the Administrator Credentials in the Create User Directory page.

### Characters Not Supported in User Names

The following characters are not supported in user names:

- Space
- Single quote
- Opening parenthesis
- Closing parenthesis
- Comma
- Backslash

### User Groups and Policies

Adding a user group to a policy and attempting to authorize a user in that group fails.

### Load Balancing and Failover (For TSS)

Load balancing and failover is not supported.

### LDAP Failover and Replication (For RACF and ACF2)

LDAP Failover and Replication is not supported.

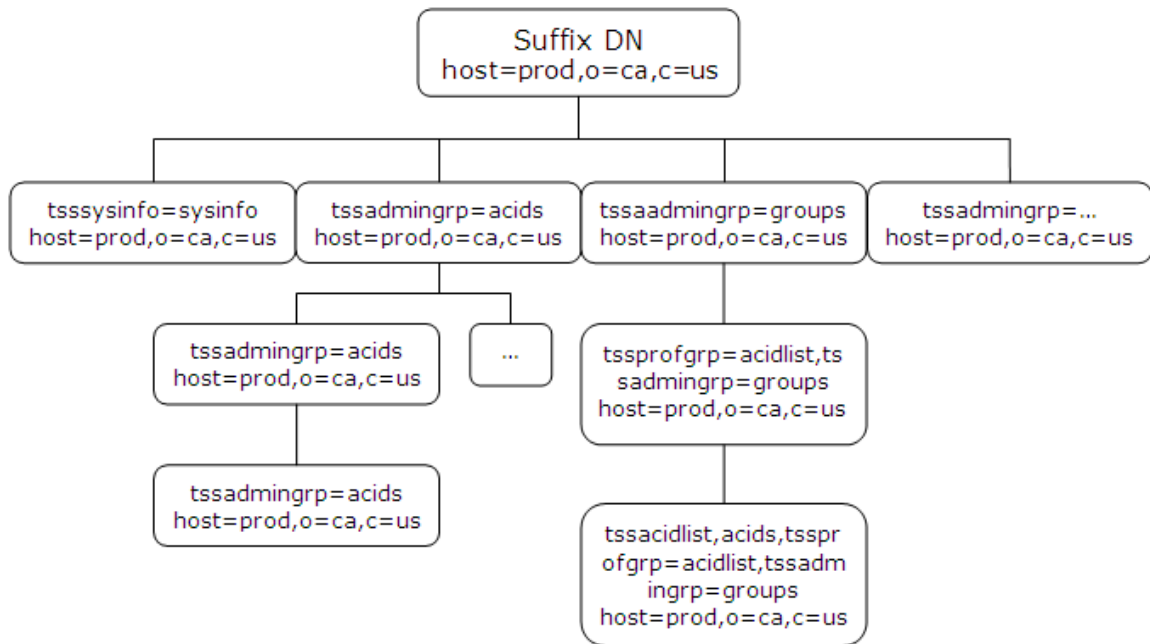
## CA Top Secret r12 (TSS) Backend Security Option

When you are using TSS to secure the CA LDAP Server for z/OS, complete the following steps before configuring the connection from the Policy Server to the CA LDAP Server:

1. Become familiar with the TSS objectclass hierarchy.
2. Add the TSS objectclasses to the Policy Server registries in the LDAP namespace.

## TSS Objectclass Hierarchy

The following diagram shows the hierarchy of objectclass entries in the CA Top Secret Directory Information Tree (DIT). Below the diagram is a description of each objectclass.



### Objectclass host

Object class used to start access to the objectclass hierarchy for a CA Top Secret database.

### Objectclass tsssysinfo

Object class used to create branches in the objectclass hierarchy below the host.

### Objectclass tssadmingrp

Object class used to create branches in the objectclass hierarchy below the host.

#### Values:

- acids
- profiles
- groups
- departments
- divisions
- zones

**Objectclass tssacid**

Object class used to access the ACID record fields of all user types.

**Objectclass tssacidgrp**

Object class used to create the branches in the objectclass hierarchy below an acid.

## Configure Policy Server Registry Entries for TSS

The CA LDAP Server for z/OS contains different object classes than other LDAP servers. Before configuring a connection from the Policy Server to the CA LDAP Server, add the TSS objectclasses to certain Policy Server registry entries in the LDAP namespace. Substitute the replacement values for the default values of the following Policy Server registry entries:

**registry\_entry\_home**

Specifies the following registry entry location:

HKEY\_LOCAL\_MACHINE\SOFTWARE\Wow6432Node\Netegrity\SiteMinder\Current Version\Ds.

**default\_value**

Specifies the default value of the registry entry.

**replacement\_value**

Specifies a new value containing the TSS objectclasses for the registry entry.

- registry\_entry\_home\ClassFilters

**class\_filters\_default\_value:**

organization,organizationalUnit,groupOfNames,groupOfUniqueNames,group

**class\_filters\_replacement\_value:**

class\_filters\_default\_value,eTTSSAcidName,tssacidgrp,tssadmingrp

- registry\_entry\_home\GroupClassFilters

**group\_class\_filters\_default\_value:**

groupOfNames,groupOfUniqueNames,group

**group\_class\_filters\_replacement\_value:**

group\_class\_filters\_default\_value,eTTSSAcidName,tssacidgrp,tssadmingrp

- registry\_entry\_home\PolicyClassFilters

**policy\_class\_filters\_default\_value:**

organizationalPerson,inetOrgPerson,organization,organizationalUnit,groupOfNames,groupOfUniqueNames,group

**policy\_class\_filters\_replacement\_value:**

policy\_class\_filters\_default\_value,eTTSSAcidName,tssacidgrp,tssadmingrp

- registry\_entry\_home\PolicyResolution

Add the following TSS object classes to this registry entry:

| TSS Objectclass | Registry Key Type | Data          |
|-----------------|-------------------|---------------|
| eTTSSAcidName   | REG_DWORD         | 0x00000001(1) |
| tssacid         | REG_DWORD         | 0x00000001(1) |
| tssacidgrp      | REG_DWORD         | 0x00000002(2) |
| tssadmingrp     | REG_DWORD         | 0x00000003(3) |

**Note:** Some LDAP queries that the Policy Server issues (such as a full list of users) can take up to 60 seconds to complete. Under these conditions most of the queries from the Policy Server-side timeout. To improve connectivity, you can adjust this registry key entry as follows:

[HKEY\_LOCAL\_MACHINE\SOFTWARE\Wow6432Node\Netegrity\SiteMinder\CurrentVersion\Debug]  
LDAPPingTimeout = 300; REG\_DWORD

## Configure CA LDAP Server for z/OS User Directory Connections

You configure the user directory connection to let the Policy Server communicate with the user store.

**Note:** Load balancing and failover are not supported for this LDAP server.

**Follow these steps:**

1. Click Infrastructure, Directory.
2. Select User Directories.
3. Click Create User Directory..
4. Complete the required connection information in the General and Directory Setup areas.
5. Configure the LDAP search and LDAP user DN lookup settings in the LDAP Settings area.

**Note:** Be sure to enter 100 in Max Time. The Policy Server requires this amount of time to retrieve data from this LDAP Server.



6. Do the following in the Administrator Credentials area:
  - a. Select the Require Credentials option.
  - b. Type the full DN of an administrator in Username.
  - c. Type the administrator password in Password.
- Note:** TSS does not allow anonymous binds to the user store.
7. (Optional) Specify the user directory profile attributes that are reserved for CA SiteMinder use in the User Attributes area.
8. (Optional) Click Create in the Attribute Mapping List area to configure user attribute mapping.
9. Click Submit.

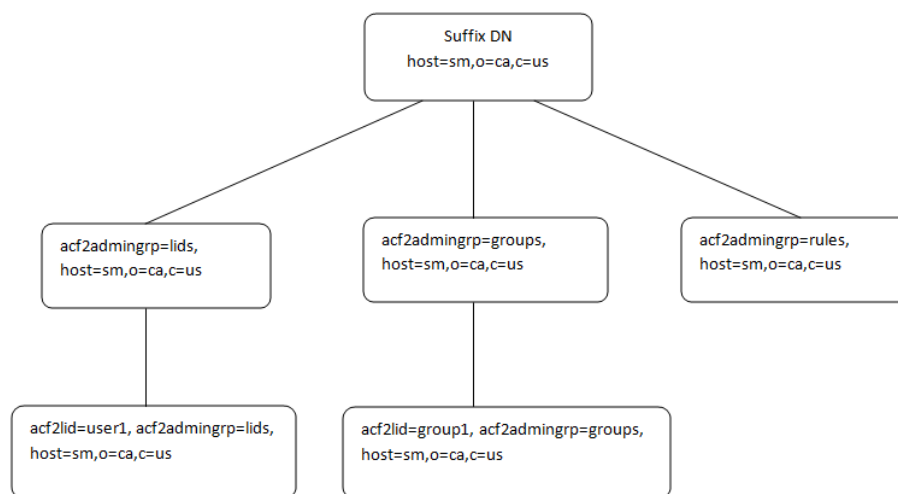
The user directory connection is created.

## CA LDAP Server r15 for z/OS (ACF2) Backend Security Option

This section describes the settings that are required to configure the CA LDAP Server r15 for z/OS (ACF2) as a user store with the Policy Server.

### ACF2 Objectclass Hierarchy

The following illustration shows the hierarchy of objectclass entries in the CA ACF2 Directory Information Tree (DIT). The illustration provides a description of each objectclass.



#### Objectclass host

Object class that is used to start access to the objectclass hierarchy for a CA ACF2 database.

**Objectclass acf2admingrp**

Object class that is used to create branches in the objectclass hierarchy below the host.

**Values:**

- lids
- groups
- rules

**Objectclass acf2lid**

Object class that is used to access the LID record fields (user records). The acf2lid is the only objectclass that can be added, modified, and deleted. All other objectclass objects are read-only.

**Objectclass acf2lidgrp**

Object class that is used to emulate groups in CA ACF2.

**Objectclass acf2ruletype**

Object class that is used to group like rule types. The acf2ruletype objectclass is read-only and cannot be modified, added, or deleted.

## Configure Policy Server Registry Entries for ACF2

The CA LDAP Server r15 for z/OS (ACF2) contains a different set of objectclasses than other LDAP servers. Before configuring a user directory connection from the Policy Server to the CA LDAP Server, add the ACF2 objectclasses to certain Policy Server registry entries in the LDAP namespace. Substitute the replacement values for the default values of the following Policy Server registry entries:

**registry\_entry\_home**

Specifies the following registry entry location:

HKEY\_LOCAL\_MACHINE\SOFTWARE\Wow6432Node\Netegrity\SiteMinder\Current Version\Ds.

**default\_value**

Specifies the default value of the registry entry.

**replacement\_value**

Specifies a new value containing the ACF2 objectclasses for the registry entry.

- registry\_entry\_home\ClassFilters  
**class\_filters\_default\_value:**  
organization,organizationalUnit,groupOfNames,groupOfUniqueNames,group  
**class\_filters\_replacement\_value:**  
class\_filters\_default\_value,\*
- registry\_entry\_home\GroupClassFilters  
**group\_class\_filters\_default\_value:**  
groupOfNames,groupOfUniqueNames,group  
**group\_class\_filters\_replacement\_value:**  
group\_class\_filters\_default\_value,\*
- registry\_entry\_home\PolicyClassFilters  
**policy\_class\_filters\_default\_value:**  
organizationalPerson,inetOrgPerson,organization,organizationalUnit,groupOfNames,groupOfUniqueNames,group  
**policy\_class\_filters\_replacement\_value:**  
policy\_class\_filters\_default\_value,\*
- registry\_entry\_home\PolicyResolution  
Add the following ACF2 objectclasses to this registry entry:

| ACF2 Objectclass | Registry Key Type | Data          |
|------------------|-------------------|---------------|
| acf2lid          | REG_DWORD         | 0x00000001(1) |
| acf2admingrp     | REG_DWORD         | 0x00000002(2) |
| eTACFLidName     | REG_DWORD         | 0x00000001(1) |

- registry\_entry\_home\Debug  
In UNIX, add the following ACF2 objectclass to this registry entry:

| ACF2 Objectclass | Registry Key Type | Data |
|------------------|-------------------|------|
| LDAPPingTimeout= | REG_DWORD         | 300; |

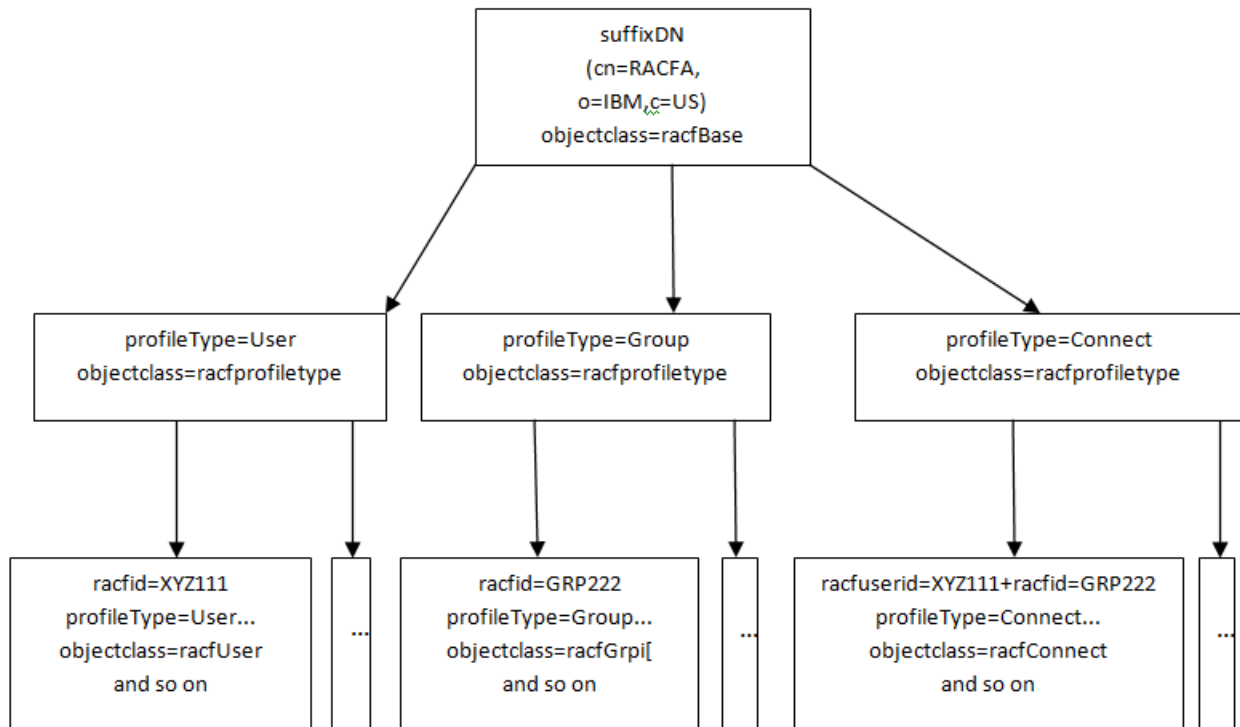
**Note:** The value of this registry key can be changed based on the response time of the CA LDAP Server r15 for z/OS (ACF2).

## CA LDAP Server r15 for z/OS (RACF) Backend Security Option

This section describes the settings that are required to configure the CA LDAP Server r15 for z/OS (RACF) as a user store with the Policy Server.

### RACF Namespace Hierarchy

The following illustration shows the hierarchy of namespace entries in the RACF Directory Information Tree (DIT). The illustration provides a description of each namespace. The RACF namespace hierarchy is similar to the ACF2 object class hierarchy.



Similar to the ACF2 Server, the top four entries in the hierarchy are reserved, read-only, and generated by the server. The purpose of these reserved entries is to enable a hierarchical representation of RACF users, groups, and connections.

## Configure Policy Server Registry Entries for RACF

The CA LDAP Server r15 for z/OS (RACF) contains a different set of objectclasses than other LDAP servers. Before configuring a user directory connection from the Policy Server to the CA LDAP Server, add the RACF objectclasses to certain Policy Server registry entries in the LDAP namespace. Substitute the replacement values for the default values of the following Policy Server registry entries:

### **registry\_entry\_home**

Specifies the following registry entry location:

HKEY\_LOCAL\_MACHINE\SOFTWARE\Wow6432Node\Netegrity\SiteMinder\Current Version\Ds.

### **default\_value**

Specifies the default value of the registry entry.

### **replacement\_value**

Specifies a new value containing the RACF objectclasses for the registry entry.

#### ■ registry\_entry\_home\ClassFilters

##### **class\_filters\_default\_value:**

organization,organizationalUnit,groupOfNames,groupOfUniqueNames,group

##### **class\_filters\_replacement\_value:**

class\_filters\_default\_value,\*

#### ■ registry\_entry\_home\GroupClassFilters

##### **group\_class\_filters\_default\_value:**

groupOfNames,groupOfUniqueNames,group

##### **group\_class\_filters\_replacement\_value:**

group\_class\_filters\_default\_value,\*

#### ■ registry\_entry\_home\PolicyClassFilters

##### **policy\_class\_filters\_default\_value:**

organizationalPerson,inetOrgPerson,organization,organizationalUnit,groupOfNames,groupOfUniqueNames,group

##### **policy\_class\_filters\_replacement\_value:**

policy\_class\_filters\_default\_value,\*

- registry\_entry\_home\PolicyResolution

Add the following RACF objectclasses to this registry entry:

| RACF Objectclass | Registry Key Type | Data          |
|------------------|-------------------|---------------|
| eTRACUserid      | REG_DWORD         | 0x00000001(1) |
| eTRACAdminGrp    | REG_DWORD         | 0x00000002(2) |

- registry\_entry\_home\Debug

In UNIX, add the following RACF objectclass to this registry entry:

| RACF Objectclass | Registry Key Type | Data |
|------------------|-------------------|------|
| LDAPPingTimeout= | REG_DWORD         | 300; |

**Note:** The value of this registry key can be changed based on the response time of the CA LDAP Server r15 for z/OS (RACF).

## Configure a Connection from the Policy Server to CA LDAP Server for z/OS

To configure a directory connection from the Policy Server to the CA LDAP Server for z/OS (RACF) or CA LDAP Server for z/OS (ACF2), open an existing user directory object in the Administrative UI.

### Follow these steps:

1. Open the User Directory Dialog.
2. In Directory Setup, select LDAP as the namespace.
3. Enter the connection information for your LDAP directory.
4. In the LDAP Search section, in the Max Time field, specify a value of 300 seconds.

**Note:** Failover is not supported for this LDAP Server.

**Note:** A greater timeout value is required, because the Policy Server takes more time to retrieve data from this LDAP Server.

5. In Credentials and Connection, specify administrator credentials that the Policy Server uses to connect to this LDAP Server.

**Important!** Specifying administrator credentials is mandatory as anonymous binds to the user store are not allowed with CA LDAP Server r15 for z/OS (RACF) and CA LDAP Server r15 for z/OS (ACF2).

## Configure Oracle Directory Server Enterprise Edition User Directory Connections

You configure a connection to let the Policy Server communicate with an Oracle Directory user store.

**Follow these steps:**

1. Click Infrastructure, Directory.
2. Select User Directories.
3. Click Create User Directory..
4. Complete the required connection information in the General and Directory Setup areas.
5. Configure the LDAP search and LDAP user DN lookup settings in the LDAP Settings area.
6. (Optional) Do the following in the Administrator Credentials area:
  - a. Select Require Credentials.
  - b. Enter the credentials of an administrator account.
7. (Optional) Specify the user directory profile attributes that are reserved for CA SiteMinder use in the User Attributes area.
8. (Optional) Click Create in the Attribute Mapping List area to configure user attribute mapping.
9. Click Submit.

**Note:** Oracle recommends using an administrator account other than cn=Directory Manager. Using cn=Directory Manager can cause performance issues due to security policies applied to this account. Create a user with sufficient privileges to manage the directory and specify that user in Username.

The user directory connection is created.

**More information:**

[LDAP Load Balancing and Failover](#) (see page 201)

[Define an Attribute Mapping](#) (see page 232)

## Configure IBM Directory Server User Directory Connections

You configure a connection that lets the Policy Server communicate with an IBM Directory Server user store.

**Follow these steps:**

1. Click Infrastructure, Directory.
2. Select User Directories.
3. Click Create User Directory..
4. Complete the required connection information in the General and Directory Setup areas.
5. Configure the LDAP search and LDAP user DN lookup settings in the LDAP Settings area.
6. (Optional) Do the following in the Administrator Credentials area:
  - a. Select the Require Credentials option.
  - b. Enter the credentials of an administrator account.
7. (Optional) Specify the user directory profile attributes that are reserved for CA SiteMinder use in the User Attributes area.
8. (Optional) Click Create in the Attribute Mapping List area to configure user attribute mapping.
9. Click Submit.

The user directory connection is created.

**Note:** IBM Directory Server referrals are incompatible with CA SiteMinder.

**More information:**

[LDAP Load Balancing and Failover](#) (see page 201)

[Define an Attribute Mapping](#) (see page 232)

## How to Configure a Domino User Directory as a User Store

Configuring a Domino user directory as a user store is a two-step process:

1. Verify that a Domino User Directory Meets Policy Server Requirements.
2. Configure a Connection from the Policy Server to a Domino User Store



## Verify that a Domino User Directory Meets Policy Server Requirements

A Domino user directory is an LDAP directory. Be sure that the Domino user directory meets the following prerequisites before you configure it as a user store:

- The Domino user groups share the root DN that you specify when configuring the connection from the Policy Server to the Domino user store.

**Example:** When adding the group *marketing/myorg.org* to the address book (names.nsf) in Lotus Notes, type *o=myorg.org* in the Root field on the User Directory screen.

- Each new user has a user name entry and an internet password entry in the Domino user directory.

**Note:** We recommend that you register users when you add them to a Domino user directory. This additional step prevents multiple user name entries in the Domino user directory. When there are multiple entries in the directory, the Policy Server uses the first one. Attempts to log in with other user names fail.

## Configure Domino Directory Connections

You configure a connection that lets the Policy Server communicate with a Domino user store.

### Follow these steps:

1. Click Infrastructure, Directory.
2. Select User Directories.
3. Click Create User Directory..
4. Complete the required connection information in the General and Directory Setup areas.
5. Configure the LDAP search and LDAP user DN lookup settings in the LDAP Settings area.

**Note:** The value that you specify in Root matches the organization name that you assigned in Lotus Notes.

**Example:** You have an organization called "myorg", which is located in the United States. The Search Root is specified as *o=myorg,c=us*.

**Note:** The search strings that you specify in the User DN Lookup Start and End fields adhere to proper LDAP notation, not the Lotus Notes shorthand notation.

6. (Optional) Click Configure to configure load balancing and failover.

7. (Optional) Do the following in the Administrator Credentials area:
  - a. Select the Require Credentials option.
  - b. Enter the credentials of an administrator account.
8. (Optional) Specify the user directory profile attributes that are reserved for CA SiteMinder use in the User Attributes area.
9. (Optional) Click Create in the Attribute Mapping List area to configure user attribute mapping.
10. Click Submit.

The user directory connection is created.

**More information:**

[LDAP Load Balancing and Failover](#) (see page 201)

[Directory Attributes Overview](#) (see page 151)

[Define an Attribute Mapping](#) (see page 232)

## How to Configure a Novell eDirectory LDAP Directory Connection

You can use a Novell eDirectory LDAP user directory as a user store. The following process lists the steps for creating the user store connection to the Policy Server:

1. Configure NetWare
2. Configure Anonymous LDAP Access on Novell eDirectory  
or  
Create access for a specific CA SiteMinder Administrator:
  - Special Access for the CA SiteMinder Administrator
  - Create a Novell eDirectory User Account for CA SiteMinder Administration
3. Configure a Novell eDirectory LDAP Directory Connection

### Configure NetWare

This configuration lets the Policy Server log into the Novell eDirectory, view the contents of the directory, and retrieve directory attributes. Some advanced features can possibly require you to configure the Novell eDirectory to allow the Policy Server write-access

If LDAP is part of your Novell eDirectory installation, name a server in Novell eDirectory "LDAP Server", and an LDAP group named "LDAP Group." LDAP Server is a member of the LDAP Group.

**Follow these steps:**

1. Create an LDAP Server in Novell eDirectory. (For this example, it is called LDAP Server.)
2. Create an LDAP Group in Novell eDirectory. (For this example, it is called LDAP Group.)
3. Assign LDAP Group to LDAP Server.

- a. In the NW Admin tool, right click on LDAP Server.

**Note:** If you are using the Netware ConsoleOne tool instead of the NW Admin tool to modify your Novell eDirectory, you must complete the same tasks using the tools available in ConsoleOne. The interface for the two tools is similar. See your Novell documentation for more information.

- b. From the popup menu, select Details.
- c. Type LDAP Group in the LDAP Group field.
- d. Click OK.

**More information:**

[Directory Attributes Overview](#) (see page 151)

## Configure Anonymous LDAP Access on Novell eDirectory

For the Policy Server to interact with a Novell eDirectory, create an account with enough administrative privileges to allow access to the directory. The easiest configuration is to generate an anonymous user on the LDAP server and make this user the proxy. The user is assigned enough power to perform all functions..

The following instructions assign administrator privileges to an anonymous user, although you can configure the user with more limited privileges. Any anonymous access to the LDAP directory gains the same privileges that you give to CA SiteMinder.

<fsp>

1. Create a user named LDAP\_Anonymous.

The following procedure is an example:

- a. From the menu bar of the NW Admin tool, select Object, Create, User.
- b. Add the name LDAP\_Anonymous.

- c. Do not assign a password.
  - d. In the right frame, select Security Equal To and add the admin user (for example, Admin.transpolar).
  - e. Click OK.
2. Set up a proxy account:

The following procedure is an example:

- a. In the NW Admin tool, select LDAP Group.
- b. From the popup menu, select Details.
- c. Click Continue.
- d. In the Proxy Username field, enter LDAP\_Anonymous.
- e. In right frame, select Access Control and click Add.
- f. In the LDAP ACL Name field, enter LDAP\_Anonymous.
- g. Select the LDAP Distinguished Name check box and enter cn=LDAP\_Anonymous.
- h. Select the All Attributes and Object Rights check box.
- i. Click OK.
- j. In right frame, select Access Control and click Add.
- k. In the box that is labeled LDAP ACL Name, enter Everyone.
- l. Select the Everything check box.
- m. Select the All Attributes and Object Rights check box.
- n. Click OK.
- o. Click OK.

To continue configuring your Novell eDirectory for use with the Policy Server, see [Configure a Novell eDirectory LDAP Connection](#) (see page 173) in the Administrative UI..

## Special Access for the SiteMinder Administrator

The alternate instructions below allow special access only to the Policy Servers. These and may be more appropriate in some environments.

1. Create an Novell eDirectory user to represent the CA SiteMinder administrator. For example, siteminder\_admin.
2. Give this user a password generated by the CA SiteMinder administrator that is entered in the Administrative UI.

## Create a Novell eDirectory User Account for SiteMinder Administration

You can create a user account for the policy administrator using the NW Admin tool.

**Follow these steps:**

1. In the NW Admin tool, right-click LDAP Group.
2. From the popup menu, select Details.
3. In the right panel, click Access Control.
4. Add an ACL.
5. Enter a name for the ACL.
6. In the Access By List screen, click Add.
7. In the Access By List panel, click LDAP Distinguished Name.
8. Enter the following: cn=siteminder\_admin.

By default, set the access level to Read, which is sufficient for basic functions. Customers who use active APIs or advanced features (for example, Password Services, User Disablement, Registration Services) can possibly require Write access.

## Configure Novell eDirectory LDAP Directory Connections

You can configure a user directory connection that lets the Policy Server communicate with a Novell eDirectory user store.

**Follow these steps:**

1. Click Infrastructure, Directory.
2. Select User Directories.
3. Click Create User Directory..
4. Complete the required connection information in the General and Directory Setup areas.
5. Configure the LDAP search and LDAP user DN lookup settings in the LDAP Settings area.  
**Note:** If the user directory contains multiple organizations, you can leave the Root field blank. This lets the Policy Server search for users in multiple organizations.
6. (Optional) Do the following in the Administrator Credentials area:
  - a. Select the Require Credentials option.
  - b. Enter the credentials of an administrator account.

7. (Optional) Specify the user directory profile attributes that are reserved for CA SiteMinder use in the User Attributes area.
8. (Optional) Click Create in the Attribute Mapping List area to configure user attribute mapping.
9. Click Submit.

The user directory connection is created.

**More information:**

[LDAP Load Balancing and Failover](#) (see page 201)

[Define an Attribute Mapping](#) (see page 232)

## Configure Active Directory LDS User Store Directory Connections

You can configure a user directory connection that lets the Policy Server communicate with an Active Directory LDS user store.

**Follow these steps:**

1. Click Infrastructure, Directory.
2. Select User Directories.
3. Click Create User Directory..
4. Complete the required connection information in the General and Directory Setup areas.
5. Configure the LDAP search and LDAP user DN lookup settings in the LDAP Settings area.
6. (Optional) Do the following in the Administrator Credentials area:
  - a. Select the Require Credentials option.
  - b. Enter the credentials of an administrator account.
7. (Optional) Specify the user directory profile attributes that are reserved for CA SiteMinder use in the User Attributes area.
8. (Optional) Click Create in the Attribute Mapping List area to configure user attribute mapping.
9. Click Submit.

The user directory connection is created.

## How to Configure an Active Directory Directory Connection

The following process lists the steps for creating the user store connection to the Policy Server:

1. Verify that an Active Directory User Directory Meets Policy Server Requirements
2. Specify an Active Directory or LDAP Namespace.
3. Configure a Connection from the Policy Server to an Active Directory User Store

### Active Directory Considerations

Before you configure a connection to an Active Directory, consider the following points:

#### Enhanced Active Directory integration

Active Directory 2008 has several user and domain attributes that are specific to the Windows network operating system (NOS) and that the LDAP standard does not require. If you configure the Policy Server to use Active Directory as a user store, enable Enhanced Active Directory Integration from the Policy Server Global Tools task available from the Administrative UI. This option improves the integration between the user management feature of the Policy Server and Password Services with Active Directory by synchronizing Active Directory user attributes with mapped user attributes.

#### Multibyte Character Support

The AD namespace does not support multibyte character sets. To use a multibyte character set with Active Directory, configure your directory connection using the LDAP namespace.

**Note:** Regardless of the code page you are using, CA SiteMinder treats characters as they are defined in Unicode. Although your code page can reference a special character as single-byte, CA SiteMinder treats it as a multibyte character if Unicode defines it as such.

#### Active Directory namespace does not support paging

A search fails when the search results in more than 1000 users.

#### Authentication against a User Directory of an AD namespace

The Policy Server can authenticate a user against an Active Directory using SASL. To enable the use sasl bind, set the SASLBind registry key with a value of 1.

**Note:** When enabling this setting, set the administrator name on the user directory configuration to the AD login name, rather than the fully qualified distinguished name.

Create the registry key EnableSASLBind of type DWORD at the following location:

HKLM\SOFTWARE\Wow6432Node\Netegrity\SiteMinder\CurrentVersion\Ds\LDAPProvider

#### **EnableSASLBind**

Disables or enables the SASL protocol while authenticating users. If you set EnableSASLBind to 1, the authentication occurs with SASL. If you set EnableSASLBind to 0, the authentication occurs with Simple Authentication mechanism.

**Value:** 0 (disabled) or 1 (enabled)

**Note:** The SASL authentication is specific to Windows-based Policy Servers.

**Important!** To configure an Active Directory User Directory using a secure (SSL) connection, set the Policy Server registry key EnableSASLBind to 0.

#### **Administrator Credentials**

When configuring a user directory in the Active Directory (AD) namespace, specify the fully qualified distinguished name of the administrator in the Username field in the Administrator Credentials section. If you do not satisfy this requirement, user authentication can fail.

#### **LDAP Search Root Configuration**

The Policy Server must identify the AD domain of an AD namespace to read account lock status. To configure the Policy Server to identify the AD domain, define the LDAP search root of the user directory as the DN of the domain. If you set the LDAP search root to any other DN, the Policy Server is not able to identify the AD domain. If the Policy Server cannot identify the AD domain, it cannot read the domain Windows lockout policy. This situation can lead users that are locked through the AD console to appear enabled when viewed in the Administrative UI User Management dialog.

For example, create five users through the AD console at the following DN and lock two of these users:

ou=People,dc=clearcase,dc=com

The User Management dialog shows locked users as disabled only if the LDAP search root is configured as the DN of the AD domain, as follows:

dc=clearcase,dc=com

If you configure the LDAP search root as follows, the locked users are incorrectly shown as enabled:

ou=People,dc=clearcase,dc=com



### Disable Password Services Redirect for Natively Disabled Unauthorized Users

By default, CA SiteMinder reprompts users for credentials when they are unauthorized due to being natively disabled in the directory server. This behavior does not occur for users stored in Active Directory. Rather, CA SiteMinder redirects natively disabled users to Password Services, even if Password Services is not enabled for the authentication scheme protecting the resource. Create and enable `IgnoreDefaultRedirectOnADNativeDisabled` to prevent this Active Directory behavior.

#### `IgnoreDefaultRedirectOnADNativeDisabled`

**Location:**

HKEY\_LOCAL\_MACHINE\SOFTWARE\Wow6432Node\Netegrity\SiteMinder\CurrentVersion\Ds\LDAPProvider

**Values:** 0 (disabled) or 1 (enabled).

**Default:** 0. If the registry key is disabled, the default behavior is in effect.

### LDAP Namespace for an Active Directory User Directory Connection

When accessing an Active Directory user directory using an LDAP namespace, disable the following registry key:

HKEY\_LOCAL\_MACHINE\SOFTWARE\Wow6432Node\Netegrity\SiteMinder\CurrentVersion\Ds\LDAPProvider\EnableADEnhancedReferrals

**Values:** 0 (disabled) or 1 (enabled)

**Default Value:** 1

This step prevents LDAP connection errors from occurring.

## LDAP Namespace for an Active Directory Connection

CA SiteMinder supports user directories on the Microsoft Active Directory platform. Although the configuration for Active Directory (AD) and LDAP namespaces in the Administrative UI is very similar, there are several functional differences.

The advantages of using the LDAP namespace for an Active Directory user store include:

- Support for enhanced LDAP referrals.
- Support for LDAP paging and sorting.

The disadvantages include:

- No support for Windows SASL

The LDAP namespace does not support native Windows SASL, which allows native secure LDAP bind operations to support native Windows authentication methods such as Kerberos and NTLM.

- Indexing the Objectclass Attribute

Microsoft Active Directory uses a non-standard method for identifying object classes. Because of this, the objectclass attribute in Active Directory is not indexed by default. This can cause the Administrative UI to timeout when it searches through an Active Directory LDAP implementation that includes large numbers of users or groups.

For CA SiteMinder to run efficiently with an Active Directory user directory, you must index the objectClass attribute in Active Directory. For more information, see your Active Directory documentation.

- Active Directory and Password Services

Microsoft Active Directory requires an SSL connection to change stored user passwords. For Password Services to work with Active Directory user directories, you must configure an SSL connection to any Active Directory LDAP user directory to which password policies will be applied.

Additionally you must define a specific Password Attribute: unicodePWD to enable Password Services to work with Active Directory user directories.

**Note:** For complete information about configuring Microsoft Active Directory, see your Active Directory documentation.

- Using a Windows User Security Context

A Web Agent can run in a Windows user security context for accessing Web resources on IIS Web servers. Before CA SiteMinder can provide the Windows user security context, you must configure a session store and enable persistent sessions on a per realm basis. You enable this feature in the in the User Directory dialog.

## AD Namespace for an Active Directory Connection

CA SiteMinder supports user directories on the Microsoft Active Directory platform. Although the configuration for Active Directory (AD) and LDAP namespaces in the Administrative UI is very similar, there are several functional differences.

The advantages of using the AD namespace when configuring an Active Directory user store include:

- SSL connectivity using a native Windows certificate database.

**Note:** Both the Policy Server and the systems hosting Active Directory user stores must have an established trust. For information about configuring Windows systems and Active Directory for SSL, see your Windows documentation.

- Support for native Windows SASL which allows for secure LDAP bind operations.

The disadvantages include:

- No support for enhanced LDAP referrals.
- No support for LDAP paging and sorting operations.

## Configure Active Directory Connections

You can configure a user directory connection that lets the Policy Server communicate with an Active Directory user store.

### To configure the user directory connection

1. Click Infrastructure, Directory.  
Objects related to user directories appear on the left.
2. Click User Directories.  
The User Directories screen appears.
3. Click Create User Directory.  
The Create User Directory screen appears and displays the required settings to configure an LDAP connection.
4. Microsoft Active Directory is an LDAP-compliant user directory. You can configure the connection using the AD namespace or the LDAP namespace. Do one of the following:
  - a. Leave the default LDAP settings.
  - b. Select AD from the Namespace list in the Directory Setup area.

5. Complete the remaining required connection information in the General and Directory Setup areas.

**Note:** Consider the following:

- For more information about an authenticated user security context, see [How a Windows User Security Context is Obtained](#).
- If you are using an SSL connection from the Policy Server to an Active Directory namespace, specify the FQDN and port number in the Server field in the Directory Setup area. When the FQDN is not specified, an error is logged that states the user directory cannot be contacted. A Windows Event is also logged that reports the certificate does not match the server name.

**Note:** If the Policy Server is operating in FIPS mode and the directory connection is to use a secure SSL connection when communicating with the Policy Server, the certificates used by the Policy Server and the directory store must be FIPS compliant.

6. (Optional) Click Configure in the Directory Setup area to configure load balancing and failover.

**Note:** More information about load balancing and failover, see [LDAP Load Balancing and Failover](#).

7. Do the following in the Administrator Credentials area:
  - a. Select the Require Credentials option.
  - b. Enter the credentials of an administrator account.

**Note:** When configuring a user directory in the Active Directory (AD) namespace, specify the fully qualified domain name (FQDN) of the administrator in the Username field. Otherwise, user authentication can fail.

8. Configure the LDAP Search and LDAP User DN Lookup settings in the LDAP Settings area.
9. (Optional) Specify the user directory profile attributes that are reserved for CA SiteMinder use in the User Attributes area.
10. (Optional) Click Create in the Attribute Mapping List area to configure user attribute mapping.
11. Click Submit.

The user directory connection is created.

**More information:**

[LDAP Load Balancing and Failover](#) (see page 201)

[Directory Attributes Overview](#) (see page 151)

[Define an Attribute Mapping](#) (see page 232)

## How to Configure an Active Directory Global Catalog User Directory Connection

You can use an Active Directory Global Catalog as a user store. The following process lists the steps for creating the user store connection to the Policy Server:

1. Ping the User Store System
2. Configure the Active Directory Global Catalog Connection

### Configure Active Directory Global Catalog Directory Connections

You can configure a user directory connection that lets the Policy Server communicate with an Active Directory Global Catalog user store.

The Policy Server user store supports the Global Catalog Support feature in Active Directory. However, features that require writing to Active Directory, such as Password Services, are not supported, because Global Catalog does not support writes to Active Directory.

**Follow these steps:**

1. Click Infrastructure, Directory.
2. Select User Directories.
3. Click Create User Directory..
4. Complete the required connection information in the General and Directory Setup areas.
5. Configure the LDAP search and LDAP user DN lookup settings in the LDAP Settings area.
6. (Optional) Click Configure to configure load balancing and failover.

**Note:** More information about load balancing and failover, see LDAP Load Balancing and Failover.

7. (Optional) Do the following in the Administrator Credentials area:
  - a. Select the Require Credentials option.
  - b. Enter the credentials of an administrator account.
8. (Optional) Specify the user directory profile attributes that are reserved for CA SiteMinder use in the User Attributes area.

9. (Optional) Click Create in the Attribute Mapping List area to configure user attribute mapping.

10. Click Submit.

The user directory connection is created.

**More information:**

[Define an Attribute Mapping](#) (see page 232)

## How to Configure an Oracle Internet Directory User Directory Connection

You can use an Oracle Internet Directory (OID) user directory as a user store. The following process lists the steps for creating the user store connection to the Policy Server:

1. Ping the User Store System
2. Create the Organizational Unit in Oracle Internet Directory
3. Configure the Oracle Internet Directory Connection

### LDAP Referral Limitation for Oracle Internet Directory User Directory

LDAP referrals do not work when Oracle Internet Directory Server 10g (9.0.4) is configured as a user store and enhanced referrals are enabled. This is a limitation with OID.

### Create an Organizational Unit for an OID Directory

You can create an organizational unit for adding users to an OID directory.

**To create an organizational unit for an OID directory**

1. Create an organizational unit under a domain using the ADD.  
**Example:** OracleSchemaVersion
2. Select the organizational unit, and enter a Distinguished Name.  
**Example:** ou=people,cn=OracleSchemaVersion
3. Right-click Entry Management, and select Create.
4. Click Add on the Distinguished Name dialog, and select inetOrgPerson.

5. Type the following values on the Mandatory Properties tab:
  - cn=user1
  - sn=user1
  - uid=user1
  - userpassword=user1
6. Specify the dn as: cn=user1,ou=people,cn=OracleSchemaVersion.

## Configure Oracle Internet Directory Connections

You can configure a user directory connection that lets the Policy Server communicate with an OID user store.

### Follow these steps:

1. Click Infrastructure, Directory.
2. Click User Directory, Create User Directory.  
**Note:** Click Help for descriptions of settings and controls, including their respective requirements and limits.
3. Select LDAP from the Namespace list.  
LDAP settings open.
4. Complete the remaining required connection information on the General and Directory Setup group boxes.  
**Note:** If the Policy Server is operating in FIPS mode and the directory connection is to use a secure SSL connection when communicating with the Policy Server, the certificates used by the Policy Server and the directory store must be FIPS compliant.
5. Type the LDAP Search and LDAP User DN Lookup settings in the fields on the LDAP Settings group box.
6. (Optional) Do the following in the Administrator Credentials area:
  - a. Select the Require Credentials option.
  - b. Enter the credentials of an administrator account.
7. (Optional) Specify the user directory profile attributes that are reserved for CA SiteMinder use in the User Attributes area.
8. (Optional) Click Create in the Attribute Mapping List area to configure user attribute mapping.
9. Click Submit.  
The user directory connection is created.

**More information:**

[LDAP Load Balancing and Failover](#) (see page 201)

[Define an Attribute Mapping](#) (see page 232)

## How to Configure OpenLDAP Server User Directory Connections

You can use OpenLDAP Server as a user store. Complete the following steps to create the user directory connection:

1. Create a user store.
2. Configure the OpenLDAP Server user directory connection.

### Create a User Store

You can use an OpenLDAP directory server as a user store

**To create a user store**

1. Use an LDIF file to create ou=People under the root DN.
2. Create users under the organizational unit.

## Configure OpenLDAP Directory Server User Directory Connections

You can configure a user directory connection that lets the Policy Server communicate with an OpenLDAP Server user store.

**Follow these steps:**

1. Click Infrastructure, Directory.
2. Select User Directories.
3. Click Create User Directory..
4. Complete the required connection information in the General and Directory Setup areas.
5. Configure the LDAP search and LDAP user DN lookup settings in the LDAP Settings area.
6. Do the following steps in the Administrator Credentials area:
  - a. Select the Require Credentials option.
  - b. Enter the credentials of an administrator account.



7. (Optional) Specify the user directory profile attributes that are reserved for CA SiteMinder use in the User Attributes area.
8. (Optional) Click Create in the Attribute Mapping List area to configure user attribute mapping.
9. Click Submit.

The user directory connection is created.

**More information:**

[LDAP Load Balancing and Failover](#) (see page 201)

[Define an Attribute Mapping](#) (see page 232)

## Configure Red Hat Directory Server User Directory Connections

You can configure a user directory connection that lets the Policy Server communicate with a Red Hat Directory Server user store.

**Follow these steps:**

1. Click Infrastructure, Directory.
2. Select User Directories.
3. Click Create User Directory..
4. Complete the required connection information in the General and Directory Setup areas.
5. Configure the LDAP search and LDAP user DN lookup settings in the LDAP Settings area.
6. Do the following in the Administrator Credentials area:
  - a. Select the Require Credentials option.
  - b. Enter the credentials of an administrator account.
7. (Optional) Specify the user directory profile attributes that are reserved for CA SiteMinder use in the User Attributes area.
8. (Optional) Click Create in the Attribute Mapping List area to configure user attribute mapping.
9. Click Submit.

The user directory connection is created.

## SQL Server User Store Case Insensitivity and Extra Trailing Spaces Password Issues

A SQL Server user store can be case insensitive and also ignore extra trailing spaces in users' passwords. This causes a problem because users entering passwords that are case insensitive or with extra trailing spaces can gain access to protected resources. For example, if a password policy is configured so that a user's password must be the case sensitive "ABCD", but the user enters "ABcd", SQL Server allows entry. In another example, if the password policy is configured so that a user's password must be " A B C ", but the user enters " A B C ", SQL Server ignores the extra trailing spaces in the password and allows entry.

The following are solutions to these two issues.

First Issue: SQL Server User Store is Case Insensitive

The SQL Server database is not performing proper collation and does not recognize case sensitivity in passwords.

### Solution 1

To impose case sensitivity to a SQL Server user store, select the proper collation during table creation when installing the database.

For more information about the collation, see the following:

[http://msdn.microsoft.com/library/default.asp?url=/library/en-us/instsql/in\\_collation\\_30a6.asp](http://msdn.microsoft.com/library/default.asp?url=/library/en-us/instsql/in_collation_30a6.asp)

### Solution 2

If you already installed SQL Server with the default collation and the database does not recognize case sensitivity in passwords, create the proper collation when creating tables for the user store.

To specify the collation, modify and then import one of the following scripts.

*siteminder\_install\db\SQL\smsampleusers\_sqlserver.sql*

*siteminder\_install\db\SQL\smsampleusers\_sqlserver\_upgrade.sql*

**Note:** These two script files use the default US English localization.

**smsampleusers\_sqlserver.sql Script File**

Change the following lines highlighted in bold in the smsampleusers\_sqlserver.sql script file:

```
CREATE TABLE SmGroup (  
    GroupID          int NOT NULL,  
    Name nvarchar(255) COLLATE Latin1_General_CS_AS NOT NULL ,  
    PRIMARY KEY (GroupID)  
)  
DROP TABLE SmUser  
go  
CREATE TABLE SmUser (  
    UserID          int NOT NULL,  
    Name  nvarchar(255) COLLATE Latin1_General_CS_AS NOT NULL,  
    Password nvarchar(255) COLLATE Latin1_General_CS_AS NOT NULL,  
    LastName nvarchar(255) COLLATE Latin1_General_CS_AS NOT NULL,  
    FirstName nvarchar(255) COLLATE Latin1_General_CS_AS NOT NULL,  
    EmailAddress nvarchar(255) COLLATE Latin1_General_CS_AS NOT NULL,  
    TelephoneNumber nvarchar(255) COLLATE Latin1_General_CS_AS NOT NULL ,  
    Disabled nvarchar(255) COLLATE Latin1_General_CS_AS NOT NULL ,  
    PIN      nvarchar(255) COLLATE Latin1_General_CS_AS NOT NULL ,  
    Mileage int NOT NULL,  
    PasswordData varchar(2000) NOT NULL,  
    PRIMARY KEY (UserID)  
)  
go
```

After modifying the script, you need to import it into the SQL Server database.

**Important!** Back up any existing data as running this script removes existing data and creates new tables.

### **smsampleusers\_sqlserver\_upgrade.sql Script File**

The following lines highlighted in bold are changes you need to make in the smsampleusers\_sqlserver\_upgrade.sql script file:

```
/* Upgrade table SmGroup*/
ALTER TABLE SmGroup ALTER COLUMN Name nvarchar(255) COLLATE Latin1_General_CS_AS NOT
NULL
go
/* Upgrade table SmUser*/
ALTER TABLE SmUser ALTER COLUMN Name nvarchar(255) COLLATE Latin1_General_CS_AS NOT
NULL
go
ALTER TABLE SmUser ALTER COLUMN Password nvarchar(255) COLLATE Latin1_General_CS_AS
NOT NULL
go
ALTER TABLE SmUser ALTER COLUMN LastName nvarchar(255) COLLATE Latin1_General_CS_AS
NOT NULL
go
ALTER TABLE SmUser ALTER COLUMN FirstName nvarchar(255) COLLATE Latin1_General_CS_AS
NOT NULL
go
ALTER TABLE SmUser ALTER COLUMN EmailAddress nvarchar(255) COLLATE
Latin1_General_CS_AS NOT NULL
go
ALTER TABLE SmUser ALTER COLUMN TelephoneNumber nvarchar(255) COLLATE
Latin1_General_CS_AS NOT NULL
go
ALTER TABLE SmUser ALTER COLUMN Disabled nvarchar(255) COLLATE Latin1_General_CS_AS
NOT NULL
go
ALTER TABLE SmUser ALTER COLUMN PIN nvarchar(255) COLLATE Latin1_General_CS_AS NOT
NULL
go
```

After modifying the script, you need to import it into the SQL Server database.

**Important!** Back up any existing data as running this script removes existing data and creates new tables.

**Second Issue: SQL Server Ignores Trailing Spaces in the Password**

SQL Server pads the strings that are being compared and makes their lengths equal.

**Solution**

To have SQL Server recognize trailing white spaces in passwords stored in the database, modify the Authenticate User query in the ODBC Query Scheme object using the Administrative UI. To have SQL Server compare strings without padding or trimming, incorporate the LIKE predicate instead of the = operator. When the right side of a LIKE predicate expression features a value with a trailing space, SQL Server does not pad the two values to the same length before the comparison occurs. An example authentication query is:

```
select Name from SmUser where Name = '%s' and Password LIKE '%s'
```

**Important!** Using the LIKE predicate expression in the password matching query can open a security hole. If a user enters a '%' in the password, SQL Server treats it as wild card character for the LIKE predicate and this user can authenticate using more than one password.

Note the following:

- If you are creating the ODBC query scheme object using the SDK, you can specify the authentication query using the pszQueryAuthenticateUser attribute of the Sm\_PolicyApi\_ODBCQueryScheme\_t object.
- If you are creating the ODBC query scheme object using Perl Scripting Interface, you can specify the authentication query while calling the CreateODBCQueryScheme() API.

## Configure ODBC Directory Connections

You can configure a user directory connection that lets the Policy Server communicate with an ODBC user store.

If you use a Microsoft SQL Server database for audit logs and caching is turned on, under heavy load, performance may suffer as the Policy Server queues messages for logging. Turn on asynchronous auditing for the realms associated with the resources being accessed by a high volume of users to alleviate the problem.

**Follow these steps:**

1. Click Infrastructure, Directory.  
Objects related to user directories appear on the left.
2. Click User Directories.  
The User Directories screen appears.

3. Click Create User Directory.

The Create User Directory screen appears and displays the required settings to configure an LDAP connection.

4. Select ODBC from the Namespace list.

ODBC settings appear.

5. Complete the remaining required connection information in the General and Directory Setup areas.

**Note:** If the Policy Server is operating in FIPS mode and the directory connection is to use a secure SSL connection when communicating with the Policy Server, the certificates used by the Policy Server and the directory store must be FIPS compliant.

6. Select a SQL query scheme.

7. (Optional) Do the following in the Administrator Credentials area:

- a. Select Require Credentials.
- b. Enter the credentials of an administrator account.

**Note:** The user name must match the user who owns the tables containing user directory data. For example, if you are using the SmSampleUsers schema, this user must be the owner of the SmUser, SmUserGroup, and SmGroup tables. The administrator account must have read or read/write privileges for the user directory.

8. (Optional) Specify the user directory profile attributes that are reserved for CA SiteMinder use in the User Attributes area.

9. (Optional) Click Create in the Attribute Mapping List area to configure user attribute mapping.

10. Click Submit.

The user directory connection is created.

## Configure Custom Directory Connections

You can configure a user directory connection that lets the Policy Server communicate with a custom user store.

**Follow these steps:**

1. Click Infrastructure, Directory.
2. Click User Directories.

3. Click Create User Directory.

**Note:** Click Help for descriptions of settings and controls, including their respective requirements and limits.

4. Select Custom from the Namespace list.
5. Complete the required connection information in the General and Directory Setup areas.
6. (Optional) Complete the following steps in the Administrator Credentials area:
  - a. Select the Require Credentials option.
  - b. Enter the credentials of an administrator account.
7. (Optional) Click Create in the Attribute Mapping List area to configure user attribute mapping.

**Note:** The Policy Server uses the shared library to determine the user attributes that are available to the custom directory. Before you enter user attributes, create the user directory connection.

8. Click Submit.

The user directory connection is created.

**More information:**

[Directory Attributes Overview](#) (see page 151)  
[Define an Attribute Mapping](#) (see page 232)

## How to Configure an LDAP User Directory Connection over SSL

An LDAP user directory connection over SSL requires configuring your certificate database files.

**Follow these steps:**

1. Create the certificate database files.
2. Add the root Certificate Authority (CA) to the certificate database.
3. Add the server certificate to the certificate database.
4. List the certifications in the certificate database
5. Configure the user directory connection for SSL.
6. Point the Policy Server to the certificate database
7. Verify the SSL connection

## Before You Configure a Connection over SSL

Review the following points before configuring an LDAP user directory connection over SSL:

- Verify that your directory server is SSL-enabled.
- Verify that the database files are in the Netscape database version file format (cert8.db). The Policy Server uses a Mozilla LDAP SDK to communicate with LDAP directories.

**Important!** Do not use Microsoft Internet Explorer to install certificates into your cert8.db database file.

- (Active Directory) Considering the following points:
  - If the user directory connection is configured with the AD namespace, the SSL process that is documented in the subsequent topics does not apply. The AD namespace uses the native Windows certificate repository when establishing an SSL connection. When configuring the AD namespace to communicate over SSL:
    - Verify that the user directory connection is configured for a secure connection.
    - On the computer hosting the Active Directory instance, verify that the root CA certificate and the server certificate are added to the service certificate store.

## Create the Certificate Database Files

To create the certificate database files, use the Mozilla Network Security Services (NSS) certutil application that is included with the Policy Server

**Note:** The following procedure details the specific options and arguments to complete the task. For a complete list of the NSS utility options and arguments, refer to the Mozilla documentation on the [NSS project page](#).

**Important!** Before running a CA SiteMinder utility or executable on Windows Server 2008, open the command-line window with administrator permissions. Open the command-line window this way, even if your account has administrator privileges.



**Follow these steps:**

1. From a command prompt, navigate to the installation bin directory.

**Example:** C:\Program Files\CA\SiteMinder\bin

**Note:** Windows has a native certutil utility. Verify that you are working from the Policy Server bin directory, or you can inadvertently run the Windows certutil utility.

2. Enter the following command:

```
certutil -N -d certificate_database_directory
```

**-N**

Creates the cert8.db, key3.db, and secmod.db certificate database files.

**-d *certificate\_database\_directory***

Specifies the directory in which the certutil tool is to create the certificate database files.

**Note:** If the file path contains spaces, bracket the path in quotes.

The utility prompts for a password to encrypt the database key.

3. Enter and confirm the password.

NSS creates the required certificate database files:

- cert8.db
- key3.db
- secmod.db

**Example: Create the Certificate Database Files**

```
certutil -N -d C:\certdatabase
```

## Add the Root Certificate Authority to the Certificate Database

To add the root Certificate Authority (CA), use the Mozilla Network Security Services (NSS) certutil application, which is in the Policy Server.

**Note:** The following procedure details the specific options and arguments to complete the task. For a complete list of the NSS utility options and arguments, refer to the Mozilla documentation on the [NSS project page](#).

**Important!** Before running a CA SiteMinder utility or executable on Windows Server 2008, open the command-line window with administrator permissions. Open the command-line window this way, even if your account has administrator privileges.

**Follow these steps:**

1. From a command prompt, navigate to the Policy Server installation bin directory.

**Example:** C:\Program Files\CA\SiteMinder\bin

**Note:** Windows has a native certutil utility. Verify that you are working from the bin directory of the NSS utility, or you can inadvertently run the Windows certutil utility.

2. Run the following command:

```
certutil -A -n alias -t trust_arguments -i root_CA_path -d  
certificate_database_directory
```

**-A**

Adds a certificate to the certificate database.

**-n *alias***

Specifies an alias for the certificate.

**Note:** If the alias contains spaces, bracket the alias with quotes.

**-t *trust\_arguments***

Specifies the trust attributes to apply to the certificate. The three available trust categories are expressed in this order: "SSL, email, object signing". In each category position, you can use zero or more of the following attribute arguments.

**p**

Valid peer.

**P**

Trusted peer. This argument implies p.

**c**

Valid CA.

**T**

Trusted CA to issue client certificates. This argument implies c.

**C**

Trusted CA to issue server certificates (SSL only). This argument implies c.

**Important!** This argument is required for the SSL trust category.

**u**

Certificate can be used for authentication or signing.

**-i *root\_CA\_path***

Specifies the path to the root CA file. The path includes the certificate name. The valid extensions for a certificate include cert, .cer, and .pem.

**Note:** If the file path contains spaces, bracket the path in quotes.

**-d *certificate\_database\_directory***

Specifies the path to the directory that contains the certificate database.

**Note:** If the file path contains spaces, bracket the path in quotes.

**Example: Adding a Root CA to the Certificate Database**

```
certutil -A -n "My Root CA" -t "C,," -i C:\certificates\cacert.cer -d C:\certdatabase
```

## Add the Server Certificate to the Certificate Database

To enable communication over SSL, add the server certificate to the certificate. Use the Mozilla Network Security Services (NSS) certutil application, which is available with the Policy Server.

**Note:** The following procedure details the specific options and arguments to complete the task. For a complete list of the NSS utility options and arguments, refer to the Mozilla documentation on the [NSS project page](#).

**Important!** Before running a CA SiteMinder utility or executable on Windows Server 2008, open the command-line window with administrator permissions. Open the command-line window this way, even if your account has administrator privileges.

**Follow these steps:**

1. From a command prompt, navigate to the Policy Server installation bin directory.

**Example:** C:\Program Files\CA\SiteMinder\bin

**Note:** Windows has a native certutil utility. Verify that you are working from the bin directory of the NSS utility, or you can inadvertently run the Windows certutil utility.

2. Run the following command:

```
certutil -A -n alias -t trust_arguments -i server_certificate_path -d  
certificate_database_directory
```

**-A**

Adds a certificate to the certificate database.

**-n *alias***

Specifies an alias for the certificate.

**Note:** If the alias contains spaces, bracket the alias with quotes.

**-t *trust\_arguments***

Specifies the trust argument. The three available trust categories for each certificate are expressed in this order: "SSL, email, object signing". In each category position, you can use zero or more of the following attribute arguments:

**p**

Valid peer.

**P**

Trusted peer. This argument implies p.

**Important!** This argument is required for the SSL trust category.

**-i *server\_certificate\_path***

Specifies the path to the server certificate. The path includes the certificate name. The valid extensions for a certificate include .cert, .cer, and .pem.

**Note:** If the file path contains spaces, bracket the path in quotes.

**-d *certificate\_database\_directory***

Specifies the path to the directory that contains the certificate database.

**Note:** If the file path contains spaces, bracket the path in quotes.

NSS adds the server certificate to the certificate database.

**Example: Adding a Server Certificate to the Certificate Database**

```
certutil -A -n "My Server Certificate" -t "P,," -i C:\certificates\servercert.cer -d C:\certdatabase
```

## List the Certificates in the Certificate Database

To verify that the certificates are in the certificate database, use the Mozilla Network Security Services (NSS) certutil application. Policy Server includes this tool.

**Note:** The following procedure details the specific options and arguments to complete the task. For a complete list of the NSS utility options and arguments, refer to the Mozilla documentation on the [NSS project page](#).

**Important!** Before running a CA SiteMinder utility or executable on Windows Server 2008, open the command-line window with administrator permissions. Open the command-line window this way, even if your account has administrator privileges.

**Follow these steps:**

1. From a command prompt, navigate to the Policy Server installation bin directory.

**Example:** C:\Program Files\CA\SiteMinder\bin

**Note:** Windows has a native certutil utility. Verify that you are working from the bin directory of the NSS utility, or you can inadvertently run the Windows certutil utility.

2. Run the following command:

```
certutil -L -d certificate_database_directory
```

**-L**

Lists all of the certificates in the certificate database.

**-d *certificate\_database\_directory***

Specifies the path to the directory that contains the certificate database.

**Note:** If the file path contains spaces, bracket the path in quotes.

This command displays the root CA alias, the server certificate alias, and the trust attributes you specified when adding the certificates to the certificate database.

**Example: List the Certificates in the Certificate Database**

```
certutil -L -d C:\certdatabase
```

## Configure the User Directory Connection for SSL

You configure an SSL connection to the user store help ensure that the Policy Server and user store communicate properly.

**Follow these steps:**

1. Log in to the Administrative UI.
2. Click Infrastructure, Directory.
3. Click User Directories.
4. Click the name of the user directory connection you want.
5. Scroll down and click Modify.
6. Select the Secure Connection option in the Directory Setup area and click Submit.

The user directory connection can communicate over SSL.

## Point the Policy Server to the Certificate Database

To communicate with the user directory over SSL, point the Policy Server to the certificate database.

**Follow these steps:**

1. Start the Policy Server Management Console.

**Important!** If you are accessing this graphical user interface on Windows Server 2008, open the shortcut with Administrator permissions. Use Administrator permissions even if you are logged in to the system as an Administrator. For more information, see the release notes for your CA SiteMinder component.

2. Click the Data tab.
3. Enter the path to the certificate database file in the Netscape Certificate Database File field.

**Example:** C:\certdatabase\cert8.db

**Note:** The key3.db file must be in the same directory as the cert8.db file.

4. Restart the Policy Server.

The Policy Server can communicate with the user directory over SSL.

## Verify the SSL Connection

To determine whether the user directory and the Policy Server are communicating properly, be sure to verify the SSL connection

**Follow these steps:**

1. Log in to the Administrative UI.
2. Click Infrastructure, Directory.
3. Click User Directories.
4. Click the name of the user directory connection you want.
5. Click View Contents.

When SSL is properly configured, the Directory Content screen appears and lists the contents of the user directory.

## Configure an Oracle User Directory Connection Over SSL

You can configure a connection between the Policy Server and Oracle database to communicate over SSL. Be sure that the Oracle database is enabled for SSL before you configure the connection.

### How the Policy Server connects to an Oracle Database over SSL

The following process describes how the connection is established between the Policy Server and the Oracle database over SSL:

1. When the Policy Server makes a connection request, the Oracle database server presents its public certificate. The Policy Server can be configured to validate the authenticity of the certificate that the Oracle database server presents.

Optionally, you can configure the Policy Server to communicate with an Oracle database over SSL without configuring the Policy Server to validate the certificate.

**Note:** The Policy Server uses a trust store to validate the certificate authenticity. The trust store is a single public certificate of the Certificate Authority (CA). Alternatively, the trust store is a PKCS12 trust store that contains a list of public certificates from trusted CAs. The public certificate is not password-protected, whereas, the PKCS12 trust store is encrypted and password-protected.

2. When the Oracle certificate matches a certificate in the trust store, an encrypted connection is established between the Policy Server and Oracle database. If the certificate that does not match a certificate in the trust store, the connection fails and the Policy Server generates an error.

### Configure SSL on Windows

You can configure the Policy Server to communicate with Oracle over SSL using the ODBC Data Source Administrator Console.

**Follow these steps:**

1. Open the ODBC Data Source Administrator console.
2. In the System DSN tab, select a DSN for your CA SiteMinder Oracle database.
3. Click Configure.

The ODBC Oracle Wire Protocol Driver Setup dialog appears.

4. Click the Security tab.

5. Specify the following encryption parameters:

**Encryption Method**

Specifies the encryption method the Policy Server uses to encrypt data that is sent between the Policy Server and the Oracle database server.

**Default:** 0 – No Encryption

**Required Value:** 1 – SSL Auto

**Validate Server Certificate**

(Optional) Specifies that the Policy Server validates the authenticity of the certificate that the Oracle database server presents.

**Default:** Selected

To configure SSL without requiring the Policy Server to validate the authenticity of the certificate that the Oracle database presents, clear the selection.

**Trust Store**

Defines the path name of the trust store file. To validate the authenticity of the certificate that the Oracle database presents, specify this value when you require the Policy Store.

**Required Value:** The trust store can either be the public certificate of the CA or a PKCS12 trust store that contains one or more certificates. The public certificate is a single certificate which is not password-protected. The PKCS12 trust store is password-protected.

**Trust Store Password**

Defines the password that is required to access the trust store.

**Host Name In Certificate**

Defines the hostname in the certificate. The hostname in the certificate must match the hostname that is used to connect to the Oracle database server. If the hostname does not match, the connection fails.

**Note:** The Key Store, Key Store Password, and Key Password parameters are not applicable for this connection.

6. Click OK.

## Configure SSL on UNIX

Configure SSL for the Policy Server on UNIX to enable the Policy Server to communicate with Oracle over SSL.

**Follow these steps:**

1. Edit the system\_odbc.ini file using an editor. The system\_odbc.ini file is located in the /netc\_ps\_root/db directory.



2. Add the following parameters to the Oracle DSN that you want to connect over SSL:

`ValidateServerCertificate=0 or 1`

When you want to validate the Server Certificate, specify 1. When you do not want to validate the Server Certificate, specify 0.

`TrustStore=Path to the CA certificate or PKCS12 trust store`

`TrustStorePassword=TrustStorePassword`

`HostNameInCertificate=hostname.domain.com`

**Example:**

`ValidateServerCertificate=1`

`TrustStore=\nete_ps_root\db\MyCAcert.cer or`

`\nete_ps_root\db\MyCertTrustStore.p12`

`TrustStorePassword=abcd`

`HostNameInCertificate=mydbhost.abc.com`

3. Save and close the `system_odbc.ini` file.

## LDAP Load Balancing and Failover

To enable failover and load balancing, the Policy Server can spread LDAP queries over multiple LDAP servers. The Policy Server uses one LDAP server to fulfill requests until that server fails to respond. When the default server does not respond, the Policy Server routes the request to the next server specified for failover. This process can be repeated over multiple servers. Once the default server is able to fulfill requests again, the Policy Server routes requests to the original server.

If configured for load balancing, the Policy Server spreads requests over the specified LDAP servers. Load balancing provides faster, more efficient access to LDAP user directory information, with the added benefit of redundancy in the event of a server failure.

## Port Number Considerations

You can assign ports to individual LDAP servers and failover groups, or let the Policy Server use the default port numbers for LDAP servers.

The following guidelines apply when specifying port numbers:

| If                                                                               | Then                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Any server in a failover group other than the last server contains a port number | <p>The Policy Server assumes that servers in the group that do not have a specific port are using a default port. The default for SSL is 636. The default for non-SSL is 389.</p> <p>For example, a failover group of servers includes the following:</p> <p>123.123.12.12:350 123.123.34.34</p> <p>The first server in the failover group includes port 350. Communication with that server takes place on port 350.</p> <p>If the first server fails, the Policy Server communicates with the second server using the default port 389 because no port was specified for the second server in the failover group.</p> |

## Configure Failover

You configure failover to provide for redundancy. Because both directories share the same port number, the failover directory uses the same type of communication (SSL or non-SSL) as the primary directory.

### Follow these steps:

1. Click Configure on the Directory Setup group box on the User Directory pane.
2. Click Add Failover
3. Enter the host name and port of the server to which the Policy Server should failover.

**Note:** When you do not specify a port number, the Policy Server uses the default port. The default port for SSL is 636. The default port for non-SSL is 389.

4. Repeat steps two and three to define additional failover servers.

**Note:** When you specify a port for the last server and do not specify a port for any other servers in the group, the Policy Server uses the specified port for every server in the group.

5. Click OK.

## Configure Load Balancing

You configure load balancing to have the Policy Server distribute requests evenly across LDAP servers.

**Follow these steps:**

1. Click Configure in the Directory Setup group box.
2. Click Add Load Balancing.
3. Enter the host name and port of the server to which the Policy Server should load balance.
4. Repeat steps two and three to define additional load balancing servers.
5. Click OK.

The User Directory pane opens. The Server field lists the servers designated for load balancing. A comma (,) separates each server designated for load balancing.

## Configure Load Balancing and Failover

To spread requests over multiple servers and provide redundancy, you configure load balancing and failover.

**Follow these steps:**

1. Click Configure in the Directory Setup group box.
2. Enter the host name and port of the Policy Server that is designated for failover.  
  
When you do not specify a port number, the Policy Server uses the default port. The default port for SSL is 636. The default port for non-SSL is 389.
3. Repeat steps two and three to define other failover servers.  
  
When you specify a port for the last server, and you do not specify other ports, the Policy Server uses the specified port for the other servers
4. Click Add Load Balancing.  
  
A new Failover Group opens.
5. Enter the host name and port of the Policy Server that is designated for load balancing.

**Note:** You can add the same server multiple times for load balancing, which forces more requests to a specific system. For example, consider two servers in a group: Server1 and Server2. Server1 is a high-performance server and Server2 is a lesser system. You can add Server1 to the load balancing list twice so that it processes two requests for each request that Server2 processes.

6. Repeat steps five and six to define other load balancing servers.
7. Click OK.

The User Directory pane opens. The Server fields lists the servers that are designated for failover and load balancing. A space separates each server that is designated for failover. A comma (,) separates each server that is designated for load balancing.

## Use Case - Load Balancing and Failover

In this example, a CA SiteMinder environment contains two user directories, A and B, which must meet the following requirements:

- User directory A must failover to user directory B and load balance with B.
- User directory B must failover to user directory A and load balance with A.

Spaces represent failover and commas represent load balancing. The requirement is written as:

A B, B A

### Solution:

The configuration requires two failover groups.

1. Add user directory B to the first failover group.

The current configuration is A B.

2. Add a load balancing group.

**Note:** Load balancing groups open as new failover groups.

3. List user directory B as the first server in the load balancing group.

The current configuration is A B, B.

4. List user directory A as the second server in the load balancing group.

The result is two failover groups: "A B" and "B A", which load balance each other. If both directories are available, load balancing occurs between the first directories in each failover group: A and B. If user directory A becomes unavailable, failover occurs to user directory B. This action results in user directory B handling all of the requests until user directory A becomes available.

## Configure ODBC Data Source Failover

To provide for redundancy when the primary and subsequent ODBC data sources become unavailable, you configure failover.

**Follow these steps:**

1. Click Configure in the Directory Setup section.
2. Click Add.
3. Enter the data source that is designated for failover.
4. Repeat steps two and three to add other data sources.
5. Click OK.

The User Directory pane opens. The Server field lists the data sources that are designated for failover.

## SQL Query Schemes

The Policy Server uses SQL Query Schemes to build queries that find user data in a relational database. You create and edit SQL Query Schemes using the SQL Query Scheme dialog.

**Note:** The “SM\_” prefix in column names is reserved for special names. Do not begin column names in your user directory with the “SM\_” prefix.

## Configure a SQL Query Scheme

You can configure a SQL Query Scheme that finds user data in the user store relational database.

**Follow these steps:**

1. Click Infrastructure, Directory.
2. Click SQL Query Scheme.
3. Click Create SQL Query Scheme.
4. Verify that the Create New Object option is selected and click OK.
5. Type a name and description in the fields in the General area.
6. Update the contents of the query fields to correspond to your database schema.

Configure each of the queries to work with your relational database. Replace the following database table and column names with the table and column names from your relational database:

- Name

The Name parameter for a user is unique.

- SmUser—table

- SmGroup—table
- Password
- SmUserGroup—table
- Id
- UserID
- FirstName
- LastName
- TelephoneNumber
- EmailAddress
- Mileage
- PIN
- GroupID
- Disabled

7. Select a query type and click Submit.

The query is saved. You can associate the query scheme with a user directory connection.

8. Restart the Policy Server.

## Add SQL Query Schemes to ODBC User Directory Connections

You can select an SQL Query Scheme using the User Directory Dialog.

### Follow these steps:

1. Open the User Directory pane for an existing user directory connection object.
2. Select the SQL query scheme from the SQL Query Scheme list, and click Submit.
3. Restart the Policy Server using the Policy Server Management Console.

**Note:** If your queries are returning names that include the apostrophe character (for example, O'Neil), replace any instance of 's' in the query strings to "%s". To avoid this problem, base your queries on user IDs that do not include apostrophes, or modify the query strings that include 's'.

## Configure SQL Query Schemes for Authentication Using Stored Procedures

When stored procedures are required for authentication with ODBC user directories, configure the SQL query scheme to call the stored procedure as follows:

### SQLServer

**Syntax:** Call *Procedure\_Name* %s , %s

**Example:** Call EncryptPW %s , %s

The Stored procedures in SQLServer must meet the following requirements:

- The first parameter must be the username, and the second parameter must be the password.
- All parameters must be defined using the keyword OUT.
- The stored procedure must return an integer value.

The following example shows how to create a stored procedure for a SQLServer user directory:

```
CREATE PROCEDURE EncryptPW
@UserName varchar(20) OUT ,
@PW varchar(20) OUT
AS
SELECT Smuser.name from Smuser where Smuser.name= @UserName and password = @PW
SELECT Smuser.password from Smuser where name= @UserName and password = @PW
return 0
```

### MySQL

**Syntax:** Call *Procedure\_Name* %s, %s

**Example:** Call EncryptPW %s, %s

The Stored procedures in MySQL must meet the following requirements:

- The first parameter must be the username, and the second parameter must be the password.
- The stored procedure does not return a value.

The following example shows how to create a stored procedure for a MySQL user directory:

```
CREATE PROCEDURE EncryptPW(INOUT p_UserName varchar(20), INOUT p_PW varchar(20))
BEGIN
SELECT SmUser.Name into p_UserName from test.SmUser where SmUser.Name =
p_UserName and SmUser.Password = p_PW;
SELECT SmUser.Password into p_PW from test.SmUser where SmUser.Name =
p_UserName and SmUser.Password = p_PW;
END;
```

### Oracle Functions

For Oracle user directories, you can create the following functions using the templates:

- EncryptPW
- ChangePW

The stored procedures in Oracle functions must meet the following requirement:

- The first parameter must be the username, and the second parameter must be the password.

### EncryptPW Function

The EncryptPW function must return an integer value, as follows:

- The value of zero specifies success.
- The value of one specifies failure.

You can use the following template to create the EncryptPW function:

```
CREATE OR REPLACE FUNCTION EncryptPW(p_UserName IN OUT SmUser.Name%type, p_PW IN OUT
SmUser.Password%type)
RETURN INTEGER IS
nRet INTEGER :=1;
nCount NUMBER := 0;
BEGIN
select count(*) into nCount
from SmUser
where SmUser.Name = p_UserName and SmUser.Password = p_PW;
IF (nCount = 1) THEN
SELECT SmUser.Name into p_UserName
from SmUser
where SmUser.Name = p_UserName and SmUser.Password = p_PW;
SELECT SmUser.Password into p_PW
from SmUser
where SmUser.Name = p_UserName and SmUser.Password = p_PW;
```



```
RETURN 0;  
END IF;  
RETURN nRet;  
END EncryptPW;
```

### ChangePW Function

The ChangePW function must return an integer value, as follows:

- The value of one specifies success.
- The value of zero specifies failure.

You can use the following template to create the ChangePW function:

```
CREATE OR REPLACE FUNCTION ChangePW(p_PW IN SmUser.Password%type, p_UserName IN  
SmUser.Name%type)  
RETURN INTEGER IS  
nRet INTEGER :=1;  
nCount NUMBER := 0;  
BEGIN  
select count(*) into nCount  
from SmUser  
where SmUser.Name = p_UserName;  
IF (nCount = 1) THEN  
UPDATE SmUser  
SET SmUser.Password = p_PW  
where SmUser.Name = p_UserName;  
COMMIT;  
RETURN 0;  
END IF;
```

## Asynchronous Call Support During Failover and Connection Pooling

Synchronous calls return only after the request is complete. Asynchronous calls return immediately. To avoid the delays that are associated with network failures, a caller can abandon an asynchronous call.

You can make asynchronous calls to the following databases:

- SQLServer
- Oracle 8 through Oracle 11g on Windows NT and Solaris

## Asynchronous Call Support Configuration

The following registry options are stored under the registry sub-key *Netegrity\SiteMinder\CurrentVersion\Database*.

### **AsynchronousCalls**

Determines whether database calls are made asynchronously.

**Values:** 0 (no); 1 (yes)

**Default:** 0

### **AsynchronousSleepTime**

Specifies the amount of time between calls to wait before checking the status of an outstanding SQL call.

**Values:** 0 to n milliseconds

**Default:** 15 milliseconds

### **LoginTimeout**

The amount of time to allow for a connection to log in to the database.

**Values:** minimum of 1 second

**Default:** 15 seconds

### **QueryTimeout**

The amount of time to allow for a query to complete before canceling it.

**Values:** minimum of 1 second

**Default:** 15 seconds

**Note:** When SQL Server is running on Windows NT, an asynchronous call support causes a small memory leak. You may choose to extend the timeouts to reduce the number of failovers in an unreliable network by adjusting the settings.

## Configure Oracle 8 on Solaris for Asynchronous Calls

The Merant ODBC driver for Oracle on Solaris 2.6 and 2.7 may cause a core dump when asynchronous calls are supported. This is due to an Oracle bug which is fixed as follows:

### **Oracle 8.0.5**

To each data source in `system_odbci.ini` in the `<install_directory>/db` directory, add the entry:

`ArraySize=1`

**Note:** This change turns off multi-row fetches and will affect performance when loading large policy stores.

**Oracle 8.1.5**

1. Remove or rename libclntsh.so in *siteminder/bin* and/or *siteminder/odbc/lib*.
2. Verify that the Oracle client has libclntsh.so installed in \$ORACLE\_HOME/lib. Refer to the Oracle documentation for installation and rebuilding instructions.
3. Make sure that LD\_LIBRARY\_PATH references the Oracle client library directory \$ORACLE\_HOME/lib.

If you get the following log message:

```
[MERANT][ODBC Oracle 8 driver][Oracle 8] ORA-03106: fatal two-task  
communication protocol error
```

add an entry to the affected data source in system\_odbc.ini in the <install directory>/db directory:

```
ArraySize=<value_greater_than 60000>
```

This increases the size of the multi-row fetch buffer to eliminate the error. The default value of this variable is 60000 bytes. The maximum allowed value is 4 Gigabytes.

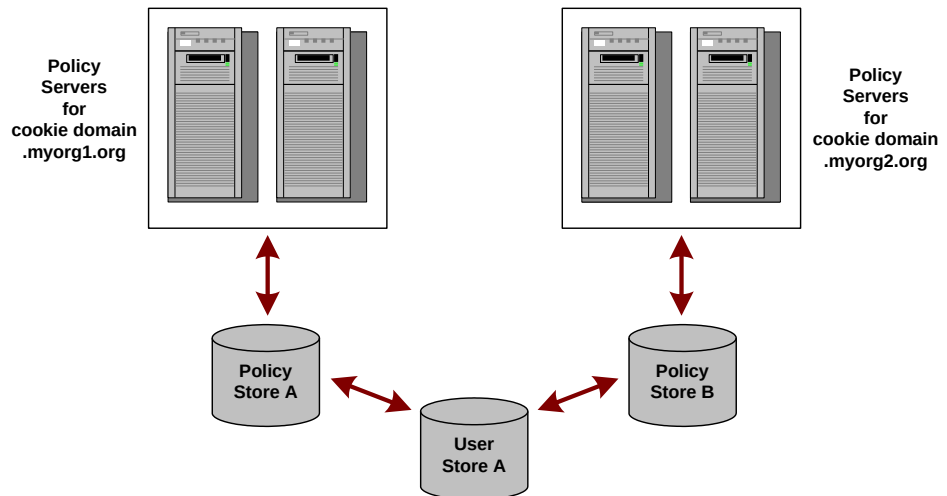
## ODBC Connection Pooling

The following criteria apply to ODBC connection pooling:

- The ODBC data source pools connections. When multiple directories use a data source, the number of connections available can reach the total number of directories and stores. The policy store must use the data source, and another store on the Policy Server must use the data source.
- SQL Server is more limited than Oracle in how connections are shared. Two callers cannot share an open result set. Concurrent activity can be limited, especially on multi-processor machines. Increasing the number of connections generally improves concurrency.
- Oracle allows for multiple callers to share a connection, but can serialize calls internally.
- When the connections are shared, the number of active requests are balanced across the connections in a pool.
- When Policy Server shuts down, it closes open connections.

## Define the Same User Directory Connection in Multiple Policy Stores

Every Policy Server connects to a policy store. You can configure multiple Policy Servers to point to a single policy store. The objects that you add and modify are stored in the policy store that is associated with the Policy Server. As shown in the following figure, your environment can contain multiple independent policy stores for maintaining Policy Server data.



The Policy Servers for myorg1 are connected to Policy Store A. The Policy Servers for myorg2 are connected to Policy Store B. However, both organizations require data from User Store A.

### Follow these steps:

1. Open the Administrative UI associated with one of the policy stores in your deployment.
2. Configure a user directory connection.

When defining the user directory connection, note the value that you supply in the Name field.

3. Open the Administrative UI associated with another policy store in your deployment.

4. Configure the same user directory connection.

When defining the user directory connection, use the same Name that you used in step 2.

5. Repeat this process for all independent policy stores in your deployment that access the same user store.

You can use the same user directory name when defining the connections to the user store in each independent policy store. Single sign-on is available for users who access resources that are protected by policies in the different policy stores.

**More information:**

[How to Configure a CA Directory User Directory Connection](#) (see page 153)

## View User Directory Contents

The Administrative UI lets you view the contents of a user directory.

**Follow these steps:**

1. Open the User Directory dialog for an existing user directory connection.

**Note:** You cannot view the contents of a directory until you have saved the directory connection.

2. Click View Contents.

**Note:** The default view lists groups. Use the search features to view individuals.

## Search User Directories

The Administrative UI contains a user directory search feature. User directory searches let you view users or groups of users based on search expressions or directory attributes. User directory searches vary for each type of user directory.

**Note:** You can also access user directory searches from the Policy Users/Groups pane. You use this pane when adding or removing users and groups in a policy. The Policy Users/Groups pane contains the same search icon used to access a user search as described below.

**Follow these steps:**

1. Open the User Directory pane for the directory that you want to search.
2. Click View Contents.

The Directory Contents pane opens. The contents of the pane differ based on the type of directory you are viewing.

3. Enter your search criteria, and click Go.

Results that match your criteria open.

## Universal IDs

A Universal ID (UID) is a customer identifier to any application that is under CA SiteMinder control. UIDs are often different from user login names.

UIDs bridge the gap between new applications and legacy applications, and can avoid changes in underlying user repositories. The goal is to make the process of delivering this ID to applications automatic, regardless of the number or types of applications. For example, a company can have legacy applications that look up user information according to an employee ID number. When you configure a user directory connection in the Administrative UI, you can specify a UID in the User Attributes section on the User Directory pane.

**More information:**

[How to Configure a CA Directory User Directory Connection](#) (see page 153)

## How CA SiteMinder Uses UIDs

When you configure a user directory connection with a UID, once a user logs into CA SiteMinder, the Policy Server fetches the UID from the designated attribute in the user's directory profile.

This value is placed in the session ticket (SESSIONSPEC) and returned to the requesting agent. Web Agents make this value available to web-based applications in a header variable (HTTP\_SM\_UNIVERSALID). This value can be passed to applications or objects designed using the Agent API to validate the session ticket or to ask for an authorization. In either case the UID is returned as part of successful outcome.

## Named Expressions

User directories store user attributes such as organizational information, user and group attributes, and individual credentials. Some user attribute values are read directly from the user directory, while other values must be calculated each time that they are needed. These calculations are stored as expressions that can be named or unnamed.

*Named expressions* are policy store objects that you reference by name. You can reuse them in security policies defined in application objects. *Unnamed expressions* are stored in domain objects, like responses. They are rules for use in traditional security policies.

**Note:** Named expressions can only be used in application objects. Named expressions *cannot* be used in traditional security policies defined using domain objects like responses and rules.

All expressions, both named and unnamed, are used to determine the values of calculated user attributes.

To create named expressions, an administrator must have the appropriate privileges.

**Note:** Active expressions and named expressions are not the same. While both types of expressions are evaluated at run-time, they differ in the following ways:

- While active expressions are Boolean expressions, named expressions can return a string, number, or Boolean value.
- While active expressions are referenced as is and must be reentered each time that they are used, named expressions are referenced by name and can be referenced from anywhere and reused.

## Benefits of Named Expressions

Named expressions provide the following benefits::

- Named expressions are stored in the policy store as objects that you can referenced by name and reuse.
- System administrators create each named expression once. Domain administrators reference the expression name, not the underlying expression, to obtain user information. Administrators do not have to reenter the entire expression each time that the user information is required.
- System administrators create and manage named expressions in one place. If an expression must be changed, the administrator only change once.
- If business logic requires a change to an expression, system administrators only change once. Domain administrators can continue to reference the expression name without regard for the underlying change.
- Only administrators who have the appropriate privileges can create named expressions. Named expressions can call privileged built-in functions and any named expression, including expressions that are marked as private. For example, a named expression can call a private expression that adds the current user to a group, while an unnamed expression cannot. This restriction prevents a domain administrator from bypassing security, such as adding the current user to an administrative group.

## Define Named Expressions

Named expressions are policy store objects that can be referenced by name and reused in security policies defined in application objects.

**Note:** Named expressions can only be used in application objects. Named expressions *cannot* be used in traditional security policies defined using domain objects like responses and rules.

CA SiteMinder evaluates named expressions to determine the values of calculated user attributes.

There are two types of named expressions:

- [Virtual user attributes](#) (see page 217)
- [User classes](#) (see page 219)



## Virtual User Attributes

A virtual user attribute lets you define a re-usable expression to calculate user information. You use this type of expression when the user attribute is not uniquely referenced by the user directory. Rather, the user attribute must be calculated using attributes and other criteria that is established by business logic.

Virtual user attributes name expressions that result in values having one of the following data types:

- string
- number
- Boolean

Virtual user attributes are prefixed by the "pound" sign (#). The "pound" sign prevents name clashes with user attribute names and mappings and is a visual reminder that the user attribute value is calculated.

As an expression, a virtual user attribute can include:

- User attributes, either directory-specific or mapped
- References to other named expressions
- Built-in functions and expression syntax

**Note:** Named expressions can only be used in application objects. Named expressions *cannot* be used in traditional security policies defined using domain objects like responses and rules.

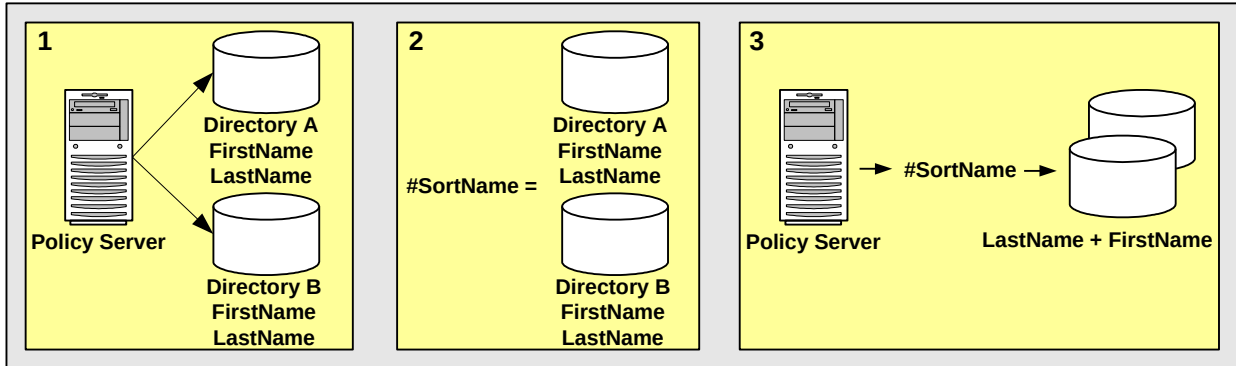
**More information:**

[Expression Syntax Overview](#) (see page 740)

## Virtual User Attribute Use Case

This use case represents a basic scenario in which two LDAP user directories identify the last and first names of users with different underlying schema.

The following illustration shows how the virtual user attribute *#SortName* (LastName,FirstName) can be calculated for users in different user directories through user attribute mapping. User attribute mapping lets you map one common name to different user attribute names in different user directories.



- Two user directories identify the last and first names of users differently. To create a common view of this information, you can create user attribute mappings:
  - `FirstName` maps to the underlying directory schema that identify the first names of users in Directory A and Directory B.
  - `LastName` maps to the underlying directory schema that identify the last names of users in Directory A and Directory B.
- #SortName* is a virtual user attribute that can calculate the sort name of users in both directories with the following expression:  
 $(LastName + "," + FirstName)$
- Instead of entering the expression  $(LastName + "," + FirstName)$  repeatedly, you can create a virtual user attribute named *#SortName* that is defined as:  $(FirstName + "," + LastName)$ . Then, you can enter *#SortName* each time that the expression is needed.

## Define a Virtual User Attribute

You define a virtual user attribute to calculate user information that is not uniquely referenced by one or more user directories.

**Note:** The following procedure assumes that you are creating an object. You can also copy the properties of an existing object to create an object.

**Follow these steps:**

1. Click Policies, Expression.
2. Click Named Expressions.
3. Click Create Named Expression.
4. Verify that the create new object option is selected and click OK.

**Note:** Click Help for descriptions of settings and controls, including their respective requirements and limits.

5. Select the Virtual User Attribute option and enter a name for the expression in the General area.
6. Type the expression in the Expression field in the Add Named Expression area.
7. (Optional) Select the Disabled option in the Add Named Expression area to disable the expression. A disabled expression is not listed in the expression editor and another named or unnamed expression cannot call it.
8. (Optional) Select the Private option in the Add Named Expression area. Only other named expressions can call a private expression. An unnamed expression cannot call a private expression.
9. (Optional) Click Edit in the Add Named Expression area to open the Expression Editor.
10. Click Submit.

The named expression is created.

## User Classes

A user class lets you define a re-usable expression to calculate user information. You use this type of expression when the user attribute is not uniquely referenced by the user directory. Rather, the user attribute must be calculated using attributes and other criteria that is established by business logic.

A user class names an expression that returns a TRUE value if a user is a member of a specified class or a FALSE value if not.

User classes are prefixed by the "at" symbol (@). The "at" symbol prevents name clashes with user attribute names and mappings and is a visual reminder that the user attribute value is calculated.

As an expression, a user class can include:

- User attributes, either directory-specific or mapped
- References to other named expressions
- CA SiteMinder built-in functions and expression syntax

**Note:** Named expressions can only be used in application objects. Named expressions *cannot* be used in traditional security policies defined using domain objects like responses and rules.

A user class is not a role. A role is a feature of Enterprise Policy Management. While roles can use user classes, they have additional information associated with them. For more information about roles, see the Enterprise Policy Management.

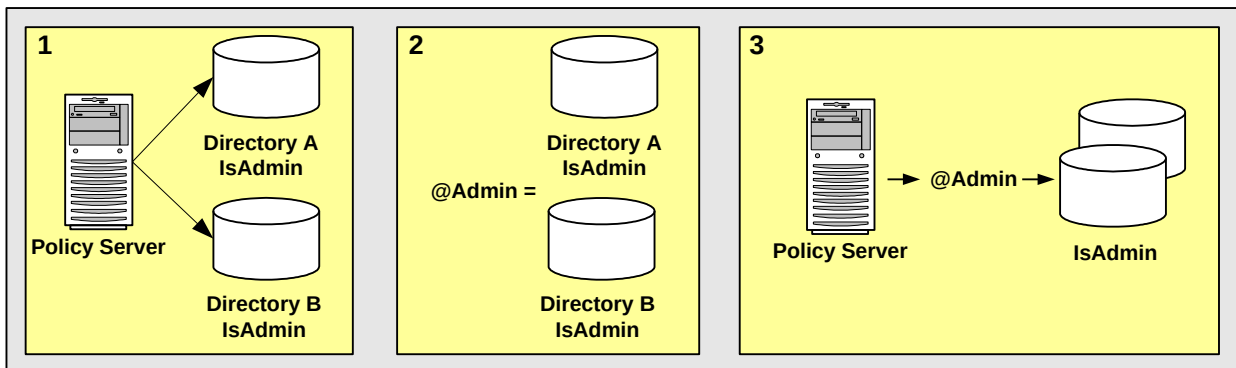
**More information:**

[Expression Syntax Overview](#) (see page 740)

## User Class Use Case

This use case represents a basic scenario in which two LDAP user directories identify membership in the Administrator group using different underlying schema.

The following illustration details how the user class `@Admin` can be calculated for users in different user directories through user attribute mapping. User attribute mapping lets you map one common name to different user attribute names in different user directories.



1. Two user directories identify membership in the Administrator group differently. To create a common view of this information, you can create user attribute mappings:
  - IsAdmin maps to the underlying directory schema that identifies membership in the Administrator group in Directory A.
  - IsAdmin maps to the underlying directory schema that identifies membership in the Administrator group in Directory B.

2. *@Admin* is the named expression of type user class that CA SiteMinder evaluates to determine if users in both directories are Administrators:  
(IsAdmin)
3. Instead of entering the expression (IsAdmin) repeatedly, you can create a user class named *@Admin* that is defined as: (IsAdmin). Then, you can enter *@Admin* each time that the expression is needed.

## Define a User Class

You define a user class attribute to calculate user information that is not uniquely referenced by one or more user directories. The result of the calculation can only be TRUE or FALSE. The result either applies to the user or it does not.

**Note:** The following procedure assumes that you are creating an object. You can also copy the properties of an existing object to create an object.

### Follow these steps:

1. Click Policies, Expression.
2. Click Named Expressions.
3. Click Create Named Expression.
4. Verify that the Create New Object option is selected and click OK.
5. Select the User Class option and enter a name for the expression in the General area.
6. Type the expression in the Expression field in the Add Named Expression area.
- Note:** The expression must be a Boolean expression.
7. (Optional) Select the Disabled option in the Add Named Expression area to disable the expression. A disabled expression is not listed in the expression editor and any other named or unnamed expression cannot call it.
8. (Optional) Select the Private option in the Add Named Expression area. Only other named expressions can call a private expression. An unnamed expression cannot call a private expression.
9. (Optional) Click Edit in the Add Named Expression area to open the Expression Editor.
10. Click Submit.

The named expression is created.

## How to Use the Expression Editor

You can use the expression editor to do the following tasks::

- Look up functions and operators and user-defined named expressions
- Build a Boolean expression

**Note:** If you prefer to enter an expression directly, you can click Cancel and return to the Create Expression: *Name* pane, where you can type the expression in the Expression field on the Add Named Expression group box.

Building a Boolean expression in the expression editor is a two-part process. The parts of the process can be repeated in any order:

1. Create conditions
2. Edit the expression

In the first part of the process, you can create conditions and add them to the Infix Notation group box. A *condition* is a simple Boolean expression that consists of a single function or operation. In the editor, a function can have up to three parameters and has the following format:

```
FUNCTION_NAME(parameter_1[, parameter_2][, parameter_3])
```

An operation requires two operands and has the following format:

```
left_operand operator right_operand
```

Since conditions are Boolean expressions, they result in a Boolean value. If a condition contains a function or operation that results in a string, it will be converted to a Boolean value. Specifically, the following string values are converted to TRUE: "TRUE", "true", "YES", and "yes". All other string values are converted to FALSE.

Likewise, if a condition contains a function or operation that results in a number, it will be converted to a Boolean value. All non-zero numbers are converted to TRUE, while zero is converted to FALSE.

Each condition is displayed on a separate line in the field on the Infix Notation group box and is connected to the condition in the line above by one or two Boolean operators, as follows:

```
condition_1  
AND | OR | XOR [NOT] condition_2
```

In the second part of the process, you can edit the expression by modifying and deleting the conditions, changing the parentheses that group the conditions, and by changing the Boolean operators that connect the conditions in the field on the Infix Notation group box. For example, you can change how the conditions are grouped:

```
(condition_1  
AND condition_2)  
OR NOT condition_3
```

can become

```
condition_1  
AND (condition_2  
OR NOT condition_3)
```

## Create a Condition Containing a Function

You can create a condition containing a built-in CA SiteMinder function and add the condition to an expression in the expression editor.

### To create a condition containing a built-in CA SiteMinder function

1. Select a name from the drop-down list of functions or type a name in the Function field on the Condition group box on the Expression Editor pane.
2. Specify the first parameter by clicking Named Expression or by typing it in the First Parameter field on the Condition group box.

**Note:** Clicking Named Expression opens the Variable Lookup group box.

3. (Optional) Specify the second parameter by clicking Named Expression or by typing it in the Second Parameter field on the Condition group box.

**Note:** Clicking Named Expression opens the Variable Lookup group box.

4. (Optional) Specify the last parameter by selecting TRUE or FALSE from the drop-down list or by typing it in the Last Parameter field on the Condition group box.
5. Click Add.

The specified function is added to the Infix Notation and Resulting Notation group boxes.

## Create a Condition Containing an Operation

You can create a condition containing a built-in CA SiteMinder operation and add the condition to an expression in the expression editor.

### Follow these steps:

1. Select an Operator Type and an Operator from the drop-down lists on the Condition group box on the Expression Editor pane.
2. Specify the left operand by clicking Named Expression or by typing it in the Left Operand field on the Condition group box.
3. Specify the right operand by clicking Named Expression or by typing it in the Right Operand field on the Condition group box.
4. Click Add.

The specified operation is added to the Infix Notation and Resulting Notation group boxes.

## How to Edit an Expression

Each condition that you create in the expression editor is displayed on a separate line in the field on the Infix Notation group box. As you build an expression, you can change the parentheses that group the conditions and the Boolean operators that connect the conditions by using the buttons on the Infix Notation group box.

Editing an expression is a three-step process. The first step includes four options, which can be repeated in any order:

1. Select an option:
  - [Modify a Condition in an Expression](#) (see page 225)
  - [Delete a Condition from an Expression](#) (see page 225)
  - [Group the Conditions in an Expression](#) (see page 225)
  - [Change a Boolean Operator in an Expression](#) (see page 226)
2. (Optional) Repeat step 1.
3. Close the expression editor by clicking OK.



## Modify a Condition in an Expression

You can modify a condition in an expression by clicking the Modify button on the Infix Notation group box in the expression editor.

### To modify a condition in an expression

1. Select a condition by clicking it.
2. Click Modify.

The Edit group box opens, and the condition is displayed in the group box.

## Delete a Condition from an Expression

You can delete one or more conditions from an expression by clicking the Remove button on the Infix Notation group box in the expression editor.

### To delete a condition from an expression

1. Select a condition by clicking it.

**Note:** To select multiple adjacent conditions, hold down the Shift key while clicking.

2. Click Remove.

The selected condition is removed from the expression.

**Note:** If multiple conditions are selected, clicking Remove deletes them one at a time.

## Group the Conditions in an Expression

You can change the grouping of conditions in an expression by clicking the buttons that add and remove parentheses on the Infix Notation group box in the expression editor.

### To change the grouping of conditions in an expression

1. Select two or more adjacent conditions by clicking them.

**Note:** To select multiple adjacent conditions, hold down the Shift key while clicking.

2. Click one of the two following buttons:

( )

Adds parentheses to the outside of the selected conditions.

#### Example:

condition\_1

AND condition\_2

becomes

(condition\_1

AND condition\_2)

### **Remove( )**

Deletes parentheses from the outside of the selected conditions.

#### **Example:**

(condition\_1  
OR condition\_2  
OR condition\_3)  
becomes  
condition\_1  
OR condition\_2  
OR condition\_3

The edited expression is displayed in the fields on the Resulting Notation and Infix Notation group boxes in the expression editor.

## **Change a Boolean Operator in an Expression**

You can change a Boolean operator in an expression by clicking one of the following buttons on the Infix Notation group box in the expression editor:

- And/Or
- Not
- XOR
- Conditional?YES:NO

#### **Follow these steps:**

1. Select one condition or group of conditions by clicking it.  
**Note:** To select multiple adjacent conditions, hold down the Shift key while clicking.
2. Click one of the following buttons:

#### **And/Or**

Switches between the Boolean operators AND and OR.

#### **Example:**

AND condition\_1  
becomes  
OR condition\_1

**Note:** The AND/OR button switches XOR to AND.

**Not**

Switches between adding and removing the Boolean operator NOT.

**Example:**

AND condition\_1

becomes

AND NOT condition\_1

**XOR**

Switches the Boolean operators AND and OR to XOR.

**Example:**

AND condition\_1

becomes

XOR condition\_1

**Note:** The exclusive OR (XOR) operator takes two Boolean operands and returns TRUE if either operand is TRUE, but not both.

**Conditional?YES:NO**

Adds the conditional decision operator.

**Example:**

condition\_1

becomes

condition\_1 ? "YES" : "NO"

The edited expression is displayed in the fields on the Resulting Notation and Infix Notation group boxes in the expression editor.

## Apply Named Expressions

This use case represents a scenario in which a retail clothing company wants to define a role that prevents customers from making Web-based credit purchases if they have met or exceeded their credit limit. The company policy dictates that customers have a \$1,000 credit limit, while company employees have a \$2,000 credit limit.

In this use case, the environment contains two user directories:

- Directory A stores employees. Employees can also be customers. Therefore, Directory A identifies customers as those employees who are members of the group: cn=Customers,ou=Groups,o=acme.com.
- Directory B only stores customers. Because every user is a customer, Directory B does not have a user attribute that identifies customers.

The following details how you can use attribute mapping, virtual user attributes, and user classes to satisfy the company's credit policy.

1. Create user attribute mappings and a universal schema or common name that identifies customers for each user directory:
  - a. Create a *group name* attribute mapping for Directory A (employees):
    - Name the mapping **IsCustomer**.
    - Define IsCustomer as **cn=Customers,ou=Groups,o=acme.com**.
  - b. Create a *constant* attribute mapping for Directory B (customers):
    - Name the mapping **IsCustomer**.
    - Define IsCustomer as **TRUE**.

**Note:** IsCustomer is a common name that maps to the same user information in Directories A and B. To access this information, you can use IsCustomer in an expression.
2. Create *constant* attribute mappings and a universal schema or common name that identifies the company's credit limit for each user directory:
  - a. Create a *constant* attribute mapping for Directory A (employees):
    - Name the mapping **CreditLimit**.
    - Define CreditLimit as **2000**.
  - b. Create a *constant* attribute mapping for Directory B (customers):
    - Name the mapping **CreditLimit**.
    - Define CreditLimit as **1000**.

**Note:** CreditLimit is a common name that maps to the same user information in Directories A and B. To access this information, you can use CreditLimit in an expression.
3. Assume that **#CreditBalance** is a virtual user attribute that retrieves the user's credit balance from the accounting database.
4. Create a user class that returns a TRUE value if a customer's credit balance is under the credit limit:
  - Name the user class **@IsUnderCreditLimit**.
  - Define @IsUnderCreditLimit as:  
  
(IsCustomer AND (#CreditBalance < CreditLimit))

**Note:** This expression conforms to the syntax rules of a CA SiteMinder expression.

5. Create an EPM Role that lets customers make Web-based purchases if their credit balance is less than their credit limit:
  - Name the Role **PurchaseWithCredit**
  - Define the Role as **@IsUnderCreditLimit**

## User Attribute Mapping

When you configure a connection from the Policy Server to a user directory, you can map the following built-in attributes to directory-specific user attribute names:

- Universal ID
- Disabled Flag
- Password Attribute
- Password Data
- Anonymous ID
- Email
- Challenge/Response

User attribute mapping lets you define common names in CA SiteMinder and to map each one to user attribute names. The attribute names can be in multiple user directories with different underlying schema.

## User Attribute Mapping Overview

The five types of user attribute mappings Include:

- Alias
- Group name
- Mask
- Constant
- Expression

The named expression types are:

- Virtual user attributes
- User classes

User attribute mappings are similar to named expressions with the following differences:

- Access
  - Some types of user attribute mappings are read only (R) and map to user attribute values. These attributes are not changed. Other types of user attribute mappings are read/write (RW) and map to user attribute values. These attributes are modifiable.
  - All named expressions are read only (R).
- Data Types
  - User attribute mappings map to user attributes that have specified data types.
  - Named expressions, when evaluated, result in specified data types.
- Visibility
  - User attribute mappings are not global and must be defined for each user directory to which they apply.
  - Named expressions are global and can apply to any user in any user directory.
- Prefix?
  - User attribute mappings follow the same syntax rules as user attribute names.
  - Named expressions follow the same syntax rules as user attribute names and have a prefix:
    - Virtual user attributes must begin with the "pound" sign (#).
    - User classes must begin with the "at" sign (@).

For a summary of these differences, see the following tables:

| User Attribute Mapping Type | Data Types              | Visibility         | Prefix? |
|-----------------------------|-------------------------|--------------------|---------|
| alias (RW)                  | string, number, Boolean | directory-specific | no      |
| group name (RW)             | Boolean                 | directory-specific | no      |
| mask (RW)                   | Boolean                 | directory-specific | no      |
| constant (R)                | string, number, Boolean | directory-specific | no      |
| expression (R)              | string, number, Boolean | directory-specific | no      |

| Named Expression Type      | Data Types              | Visibility | Prefix? |
|----------------------------|-------------------------|------------|---------|
| virtual user attribute (R) | string, number, Boolean | global     | #       |

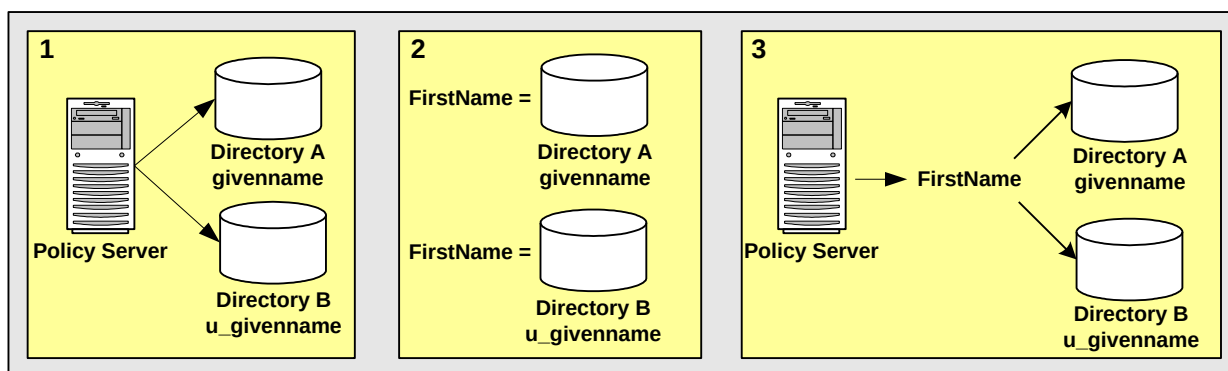
| Named Expression Type | Data Types | Visibility | Prefix? |
|-----------------------|------------|------------|---------|
| user class (R)        | Boolean    | global     | @       |

## How Attribute Mapping Works

The purpose of user attribute mapping is to create a common view of the same user information by defining a universal schema. This universal schema resolves user information across multiple user directories. You can define a user attribute mapping by mapping a *common name* to the underlying directory schema that identifies a user attribute. Mapping the same common name to the underlying schema of each user directory in the environment results in a universal schema for the user attribute.

Creating such a view references user attributes without regard for the directory type. You can greatly reduce the number of policies or other objects that must be configured to account for multiple user directories. Each user attribute mapping is specific to the user directory in which it is defined.

The following diagram illustrates the basic concept of user attribute mapping:



- Two user directories identify the first name of users differently:
  - Directory A identifies the first name of users with givenname.
  - Directory B identifies the first name of users with u\_givenname.

This configuration results in two different representations and views of the same user information.

2. FirstName is a common name that is mapped to the underlying directory schema:
  - FirstName is mapped to givenname in Directory A.
  - FirstName is mapped to u\_givenname in Directory B.
3. FirstName results in a common view of the same user information. You can reference FirstName when defining policies, expressions, or other objects that require the first name of users, without concern for the directory-specific schema. The directories are operationally identical.

## Define an Attribute Mapping

You can use one or more of the following attribute mapping types:

- [Alias](#) (see page 232)
- [Group Name](#) (see page 234)
- [Mask](#) (see page 236)
- [Constant](#) (see page 241)
- [Expression](#) (see page 243)

### Alias

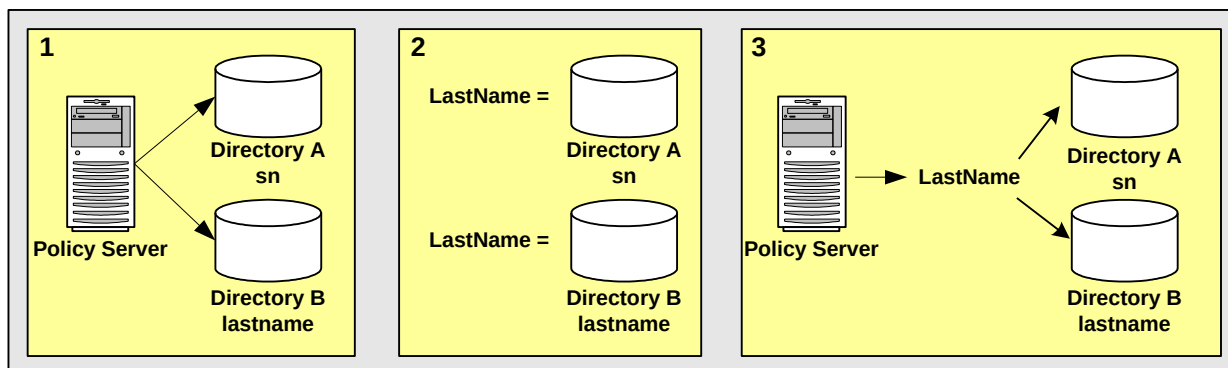
*Alias* attribute mappings map common names to user attribute values that can be read or changed. This type of access is called read/write (RW). *Alias* attribute mappings can map to user attributes that have any of the following data types:

- string
- number
- Boolean



## Alias Attribute Use Case

This use case shows two LDAP user directories, which identify the last name of users, but the directories have different underlying schema. The following illustration details how two alias attribute mappings can create a common view of the same user information.



1. Two user directories identify the last name of users differently:

- Directory A identifies the last name of users with sn.
- Directory B identifies the last name of users with lastname.

This configuration results in two different views of the same user information.

2. LastName is the common name or *alias* that is mapped to the underlying directory schema:

- LastName is mapped to sn in Directory A.
- LastName is mapped to lastname in Directory B.

LastName results in a common view of the same user information. Use LastName when defining policies, expressions, or other objects that require the last names.

### More information:

[Advanced User Attribute Mapping Examples](#) (see page 246)

[Named Expressions](#) (see page 215)

## Create an Alias Attribute Mapping

You can map a common name or *alias* to the user attribute name specified by the user directory's underlying schema. User attribute mappings are directory-specific.

### Follow these steps:

1. Navigate to the User Directory: *Name* pane.
2. Click Create on the Attribute Mapping List group box.  
The Create Attribute Mapping pane opens.
3. Verify that Create a new object is selected, and click OK.  
The Create Attribute Mapping: *Name* pane opens.
4. Type the common name and a description of the attribute mapping in the fields on the General group box.

**Note:** Common names must conform to the same rules as user attribute names.

5. Select Alias on the Properties group box.
6. Type the definition in the Definition box on the Properties group box.

### Example:

Name: FirstName

Definition: givenname

Description: The common name FirstName is mapped to the user attribute name givenname.

7. (Optional) Select Disabled to disable this attribute mapping.
8. Click OK.

The Create Attribute Mapping task is submitted for processing. The new attribute mapping is added to the list on the Attribute Mapping List group box.

## Group Name

A *group name* attribute lets you map a common name to the underlying directory schema that identifies whether a user belongs to a specific group. Group name attribute mappings map common names to user attributes that can be read or changed.

Group name attribute mappings result in a Boolean value. If the user is a member of the specified group, the mapping results in a TRUE value. Otherwise, the result is FALSE.

Group name attribute mapping and user classes, one type of named expression, are similar in the following ways:

- Both are used to determine the group membership.
- Both result in a Boolean value.

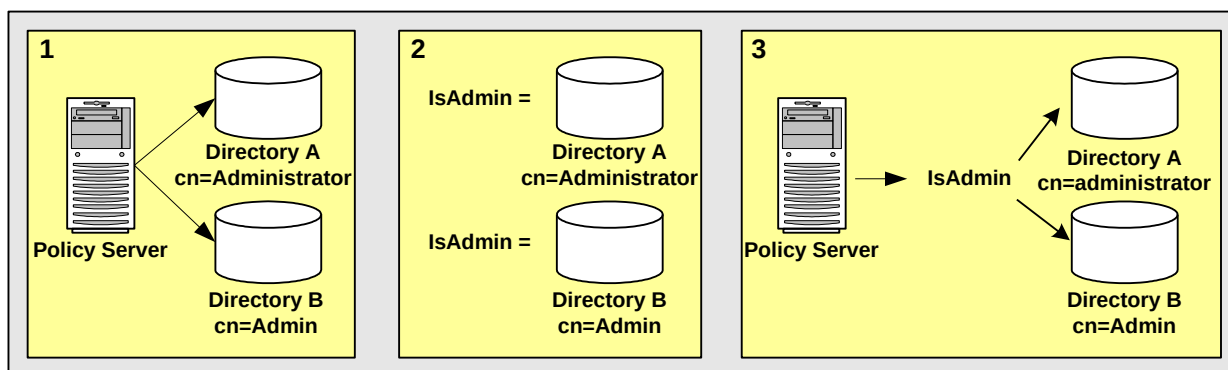
Group name attribute mapping differs from user classes as follows:

- A group name attribute mapping is defined for particular user directories. User classes are global and can be applied to any user in any user directory.
- A group name attribute mapping can change a membership in a group in a user directory. User classes are Boolean expressions and cannot be changed.
- User classes must begin with the "at" sign (@). A group name mapping does not begin with the "at" sign.

## Group Name Use Case

This use case shows two LDAP user directories, which use different underlying schema to identify users that belong to an Administrator group.

The following illustration details how two group name attribute mappings can create a common view of the same user information.



1. Two user directories identify membership to the administrator group differently:
  - Directory A identifies membership in the administrator group as `cn=Administrators,ou=groups,o=acme.com`.
  - Directory B identifies membership in the administrator group as `cn=Admin,ou=groups,o=acme.com`.

This configuration results in two different views of the same user information.

2. `IsAdmin` is the common name that is mapped to the underlying directory schema:
  - `IsAdmin` is mapped to `cn=Administrators,ou=groups,o=acme.com` in Directory A.
  - `IsAdmin` is mapped to `cn=Admin,ou=groups,o=acme.com` in Directory B.

`IsAdmin` results in a common view of the administrator group. You can reference `IsAdmin` when defining policies, expressions, or other objects that apply to the Administrator group.

## Create a Group Name Attribute Mapping

You define a group name attribute to map a common name to the underlying directory schema that identifies whether a user belongs to a specific group. The result of a group name attribute mapping is a Boolean value. You can use a group name attribute mapping to read or change a user group name in a user directory. User attribute mappings are directory-specific.

### Follow these steps:

1. Navigate to the User Directory: *Name* pane.
2. Click Create on the Attribute Mapping List group box.  
The Create Attribute Mapping pane opens.
3. Verify that Create a new object is selected, and click OK.  
The Create Attribute Mapping: *Name* pane opens.
4. Type the common name and a description of the attribute mapping in the fields on the General group box.
- Note:** Common names must conform to the same rules as user attribute names.
5. Select Group on the Properties group box.
6. Type the definition in the Definition box on the Properties group box.

### Example:

Name: IsAdmin

Definition: cn=administrators,ou=groups,o=acme.com

Description: The common name IsAdmin is mapped to the group name cn=administrators,ou=groups,o=acme.com. If the user is a member of cn=administrators,ou=groups,o=acme.com, IsAdmin is TRUE.

7. (Optional) Select Disabled to disable this attribute mapping.
8. Click OK.

The Create Attribute Mapping task is submitted for processing. The new attribute mapping appears in the list on the Attribute Mapping List group box.

## Mask

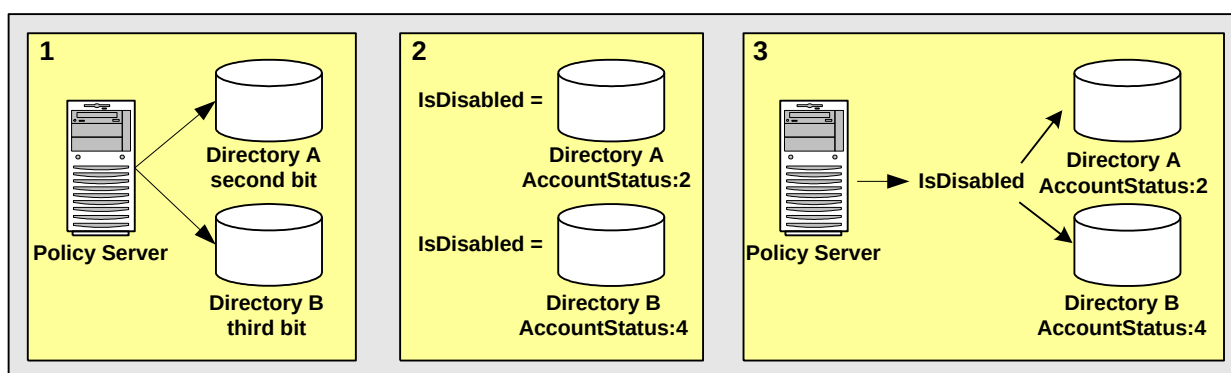
*Mask* attribute mapping lets you map a common name to the name used for identifying a user attribute that stores a bit pattern. *Mask* attribute mappings map common names to user attributes that can be read or changed. *Mask* attribute mappings result in a Boolean value. If the bit pattern in the user directory matches the specified mask, the mapping results in a TRUE value. Otherwise, the result is FALSE.

## Mask Use Case

Some directory implementations use individual bits in an attribute to provide information about that attribute, such as the state of an account. You can apply a bit mask to an attribute.

This use case shows two Active Directory user stores that identify disabled user accounts. Each account has a different underlying schema.

The following illustration details how two mask attribute mappings can create a common view of the same user information.



- Two user directories contain a user attribute named AccountStatus. AccountStatus stores user information in a bit pattern, where each bit is a flag.
  - In Directory A, the second bit flags a disabled account. When the second bit equals 1, the account is disabled.
  - In Directory B, the third bit flags a disabled account. When the third bit equals 1, the account is disabled.

This configuration results in two different views of the same user information.

- IsDisabled is the common name that is mapped to the underlying directory schema. In both directories, IsDisabled is mapped to AccountStatus.
  - In Directory A, the bit mask 2 (decimal) determines whether the second bit of AccountStatus is set and the account is disabled.
  - In Directory B, bit mask 4 (decimal) determines whether the third bit of AccountStatus is set and the account is disabled.

IsDisabled results in a common view of disabled user accounts. You can reference IsDisabled when defining policies, expressions, or other objects that require the account status of users.

**More information:**

[Advanced User Attribute Mapping Examples](#) (see page 246)

[Named Expressions](#) (see page 215)

## Create a Mask Attribute Mapping

You can map a common name to a bit pattern whose user attribute name is specified by the user directory's underlying schema. The result of a mask attribute mapping is a Boolean value. You can use a mask mapping to read or change a user attribute value in a user directory. User attribute mappings are directory-specific.

### To Create a User Attribute Mapping of Type Mask

1. Navigate to the User Directory: *Name* pane.
2. Click Create on the Attribute Mapping List group box.  
The Create Attribute Mapping pane opens.
3. Verify that Create a new object is selected, and click OK.  
The Create Attribute Mapping: *Name* pane opens.
4. Type the common name and a description of the attribute mapping in the fields on the General group box.

**Note:** Common names must conform to the same rules as user attribute names.

5. Select Mask on the Properties group box.
6. Type the definition in the Definition box on the Properties group box.

**Example:**

Name: IsDisabled

Definition: AccountStatus:4

Description:

The common name IsDisabled is mapped to the user attribute name AccountStatus. AccountStatus stores one or more states in a bit pattern. For example, AccountStatus stores the account state in the third bit. When the account is disabled, the third bit is set to 1. Conversely, when the account is enabled, the third bit is set to 0.

CA SiteMinder performs a bitwise AND operation on AccountStatus and the specified state or *mask*, which in this example is 4, to determine whether the account is disabled. If the account is disabled, IsDisabled is TRUE.

7. (Optional) Select Disabled to disable this attribute mapping.
8. Click OK.

The Create Attribute Mapping task is submitted for processing, and the new attribute mapping is added to the list on the Attribute Mapping List group box.

## Bit Masks in Mask Attribute Mapping

A bit mask attribute mapping tests the value of one or more bits by masking the values of the other bits in a user attribute.

A mask attribute mapping is defined as follows:

user\_attribute\_name:bit\_mask

For example, assume that the user attribute is named AccountStatus. The attribute AccountStatus stores the states of the following three flags in a bit pattern:

| Bit Pattern | Flag              |
|-------------|-------------------|
| 00?         | account disabled? |
| 0?0         | password expired? |
| ?00         | gold member?      |

When a bit equals one, the flag is TRUE. The table shows the results:

| Bit Pattern | Account Status                                  |
|-------------|-------------------------------------------------|
| 000 (0)     | no flags are TRUE                               |
| 001 (1)     | account disabled                                |
| 010 (2)     | password expired                                |
| 100 (4)     | gold member                                     |
| 011 (3)     | password expired, account disabled              |
| 101 (5)     | gold member, account disabled                   |
| 110 (6)     | gold member, password expired                   |
| 111 (7)     | gold member, password expired, account disabled |

**Note:** Equivalent decimal values are shown in parentheses.

Assume that you only want to test whether a user is a gold member. To test this bit, select the bit pattern that corresponds to a gold member as the bit mask or 100 (binary) and specify it as 4 (decimal). The resulting mask attribute mapping is defined as follows:

AccountStatus:4

A bitwise AND operation on AccountStatus is performed on the bit mask and tests whether the result is equal to the bit mask. An equal result means the value of the tested bit is one and the flag is TRUE. The following table shows the results:

| Account Status | Bit Mask | Result of Bitwise AND | Gold Member? |
|----------------|----------|-----------------------|--------------|
| 000 (0)        | 100 (4)  | 000 (0)               | FALSE        |
| 001 (1)        | 100 (4)  | 000 (0)               | FALSE        |
| 010 (2)        | 100 (4)  | 000 (0)               | FALSE        |
| 011 (3)        | 100 (4)  | 000 (0)               | FALSE        |
| 100 (4)        | 100 (4)  | 100 (4)               | TRUE         |
| 101 (5)        | 100 (4)  | 100 (4)               | TRUE         |
| 110 (6)        | 100 (4)  | 100 (4)               | TRUE         |
| 111 (7)        | 100 (4)  | 100 (4)               | TRUE         |

**Note:** Equivalent decimal values are shown in parentheses.

You can also use a bit mask to test the value of a bit set or more than one bit at a time. Assume that you want to know whether the account is disabled and the password has expired. To test these bits, specify a bit mask of 011 (binary) or 3 (decimal). The resulting mask attribute mapping is defined as follows:

AccountStatus:3

A bitwise AND operation on AccountStatus is performed on the bit mask and tests whether the result is equal to the bit mask. An equal result means the value of both tested bits is one and both flags are TRUE. The following table shows the results:

| Account Status | Bit Mask | Result of Bitwise AND | Both Flags Set? |
|----------------|----------|-----------------------|-----------------|
| 000 (0)        | 011 (3)  | 000 (0)               | FALSE           |
| 001 (1)        | 011 (3)  | 001 (1)               | FALSE           |
| 010 (2)        | 011 (3)  | 010 (2)               | FALSE           |
| 011 (3)        | 011 (3)  | 011 (3)               | TRUE            |
| 100 (4)        | 011 (3)  | 000 (0)               | FALSE           |



| Account Status | Bit Mask | Result of Bitwise AND | Both Flags Set? |
|----------------|----------|-----------------------|-----------------|
| 101 (5)        | 011 (3)  | 001 (1)               | FALSE           |
| 110 (6)        | 011 (3)  | 010 (2)               | FALSE           |
| 111 (7)        | 011 (3)  | 011 (3)               | TRUE            |

**Note:** Equivalent decimal values are shown in parentheses.

## Constant

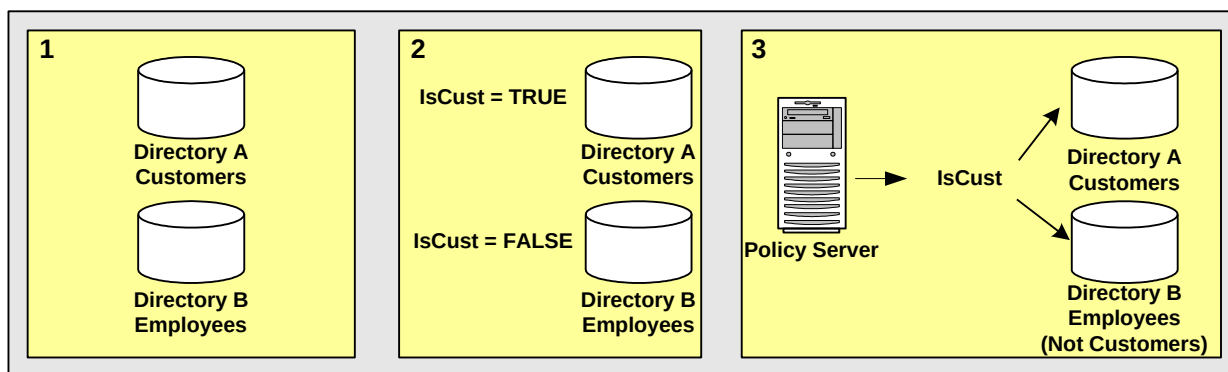
*Constant* attribute mapping lets you map a common name to a value that is the same or *constant* for every user in a directory. Since *constant* attribute mappings map common names to constants, which are read only (R), they cannot be changed (except by a system administrator).

*Constant* attribute mappings can map to constants that have any of the following data types:

- string
- number
- Boolean

## Constant Use Case

This use case represents a scenario in which one user directory stores only customers, while another user directory stores only employees. The following illustration details how two constant attribute mappings can represent different values for different user directories.



1. Directory A only stores customers. Directory B only stores employees.
2. IsCust is the common name that is mapped to different values in different directories:
  - IsCust is mapped to TRUE in Directory A.
  - IsCust is mapped to FALSE in Directory B.
3. Reference IsCust when defining policies, expressions, or other objects. The common name lets the system determine whether a user is a customer, without regard to the particular directory in which the user is stored. The mapping indicates that every user in Directory A is a customer, while every user in Directory B is not a customer.

**More information:**

[Advanced User Attribute Mapping Examples](#) (see page 246)

[Named Expressions](#) (see page 215)

## Create a Constant Attribute Mapping

You can map a common name to a constant value that conveys information about every user in a directory. The constant's data type can be string, number, or Boolean. You can use a constant attribute mapping to read a user attribute value that applies to every user in a user directory. User attribute mappings are directory-specific.

**Follow these steps:**

1. Navigate to the User Directory: *Name* pane.
2. Click Create on the Attribute Mapping List group box.  
The Create Attribute Mapping pane opens.
3. Verify that Create a new object is selected, and click OK.  
The Create Attribute Mapping: *Name* pane opens.
4. Type the common name and a description of the attribute mapping in the fields on the General group box.  
**Note:** Common names must conform to the same rules as user attribute names.
5. Select Constant on the Properties group box.

6. Type the definition in the Definition box on the Properties group box.

**Example:**

Name: IsCustomer

Definition: TRUE

Description: The common name IsCustomer is mapped to the constant value TRUE. Because the user directory only stores customers, the user is always a customer, and IsCustomer is always mapped to TRUE.

7. (Optional) Select Disabled to disable this attribute mapping.
8. Click OK.

The Create Attribute Mapping task is submitted for processing. The new attribute mapping appears on the Attribute Mapping List group box.

## Expression

An *expression* attribute mapping lets you map a common name to an expression. The expression can contain one or more user attribute names that are specified by the underlying schema. The expression conforms to the syntax rules of a CA SiteMinder expression.

Expression attribute mappings map common names to expressions that can be read, but not changed. This type of access is called read only (R). When evaluated, the expressions result in a string, number, or Boolean value.

Expression attribute mapping and virtual user attributes, one type of named expression, are similar in the following ways:

- Both are CA SiteMinder expressions.
- Both are read only (R).
- Both result in one of the following data types:
  - string
  - number
  - Boolean

Expression attribute mapping differs from virtual user attributes as follows:

- An expression attribute mapping is defined for particular user directories. Virtual user attributes are global and can be applied to any user in any user directory.
- Virtual user attributes must begin with the pound sign (#). An expression mapping does not.

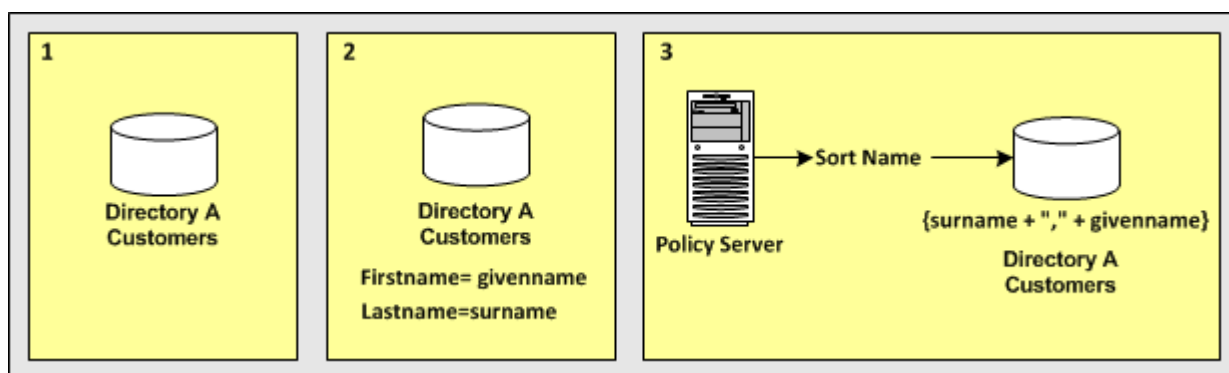
**More information:**

[Named Expressions](#) (see page 215)

**Expression Use Case**

This use case shows how you can use an expression attribute mapping to simplify references to multiple user attributes in one directory. A protected resource needs the *sort name* of each user (last name, first name). The user directory does not uniquely reference this attribute. Instead, the directory does store the last name of each user as surname and the first name of each user as givenname.

The following illustration details how an expression attribute mapping can create a common view of the same user information.



In the single user directory, a common name is mapped to an expression that creates the sort name using the user attribute names in the directory.

- Directory A contains all user records.
- The name of the mapping is **SortName**.
- The expression that defines SortName is:  
`{surname + "," + givenname}`  
**Note:** The expression conforms to the syntax rules of a CA SiteMinder expression.
- SortName is the common name that is mapped to the expression that includes the surname and the givenname attributes.

Reference SortName when defining policies, expressions, or other objects that require the sort name of users without concern for the directory-specific schema.

**More information:**

[Advanced User Attribute Mapping Examples](#) (see page 246)

[Named Expressions](#) (see page 215)

[Expression Syntax Overview](#) (see page 740)

## Create an Expression Attribute Mapping

You can map a common name to an expression that references one or more user attribute names that are specified by the underlying schema. An expression attribute mapping data type is string, number, or Boolean. You can use expression attribute mapping to read the result of an expression, but not to write a value to a user directory.

**Note:** User attribute mappings are directory-specific. To create a global object that is defined as an expression, create a named expression.

**Follow these steps:**

1. Navigate to the User Directory: *Name* pane.
2. Click Create on the Attribute Mapping List group box.  
The Create Attribute Mapping pane opens.
3. Verify that Create a new object is selected, and click OK.  
The Create Attribute Mapping: *Name* pane opens.
4. Type the common name and a description of the attribute mapping in the fields on the General group box.

**Note:** Common names must conform to the same rules as user attribute names.

5. Select Expression on the Properties group box.

**Note:** Selecting Expression activates the Edit button. Clicking Edit opens the Expression Editor. The expression must conform to the syntax rules of a CA SiteMinder expression.

6. Type the definition in the Definition box on the Properties group box.

**Example:**

Name: SortName

Definition: (surname + ',' + givenname)

Description: The common name SortName is mapped to an expression that references the user attribute names surname and givenname.

7. (Optional) Select Disabled to disable this attribute mapping.
8. Click OK.

The Create Attribute Mapping task is submitted for processing. The new attribute mapping appears on the Attribute Mapping List group box.

## Advanced User Attribute Mapping Examples

The following examples show more complex user attribute mapping configurations.

The example deployment is a retail clothing company that uses two user directories of different types:

### Directory A

An internal LDAP user directory for employees only.

### Directory B

An ODBC user directory for customers only.

Each user attribute mapping is specific to the user directory for which it is defined.

The following table details how Directory A and Directory B identify the same user information. The accompanying use cases explain how to use different attribute mappings to define a common view of the same user information. The common view serves as a universal schema, which makes the directories operationally identical.

| Attribute Description                          | Directory A Attributes (LDAP)                                                  | Directory B Attributes (ODBC) |
|------------------------------------------------|--------------------------------------------------------------------------------|-------------------------------|
| First name of each user                        | givenname                                                                      | u_first_name                  |
| Last name of each user                         | surname                                                                        | u_last_name                   |
| Sort name of each user (last name, first name) | The user directory does not uniquely store the user attribute.                 | sort_name                     |
| User as a customer                             | group:cn=customer,ou=groups,o=acme.com                                         | Users are always customers.   |
| Status of a user account                       | AccountStatus attribute (a set of flags).<br>Second bit is a disabled account. | u_disabled                    |

## Map a First Name Attribute with an Alias Mapping Type

Use two alias attribute mappings to represent the first name user attribute in Directory A and Directory B.

### Deployment

User Directory A identifies the first name of users with `givenname`. Directory B identifies the first name of users with `u_first_name`.

### Solution

1. Create an alias attribute mapping for Directory A.

#### Name

`FirstName`

#### Mapping Type

`Alias`

#### Definition

`givenname`

2. Create an alias attribute mapping for Directory B.

#### Name

`FirstName`

#### Mapping Type

`Alias`

#### Definition

`u_first_name`

When referencing users in Directory A, the `FirstName` is mapped to `givenname`. When referencing users in Directory B, the `FirstName` maps to `u_first_name`.

## Map a Last Name Attribute with an Alias Mapping Type

Use two alias attribute mappings to represent the last name user attribute in Directory A and Directory B.

### Deployment

User Directory A identifies the last name of users with `surname`. Directory B identifies the last name of users with `u_last_name`.

### Solution

1. Create an alias attribute mapping for Directory A.

#### Name

LastName

#### Mapping Type

Alias

#### Definition

surname

2. Create an alias attribute mapping for Directory B.

#### Name

LastName

#### Mapping Type

Alias

#### Definition

u\_last\_name

When referencing users in Directory A, the common view determines that the last name of users is identified by surname. When referencing users in Directory B, the common view determines that the last name is identified by u\_last\_name.

## Map a Sort Name Attribute with Expression and Alias Mapping Types

Use an expression attribute mapping and an alias attribute mapping to represent the sort name of a user in Directory A and Directory B.

### Deployment

- Directory A does not uniquely identify the sort name for each user. For each user, Directory A stores the first name as givenname and a last name as surname for each user.
- Directory B identifies a sort name using sort\_name.



**Solution**

1. Create an expression attribute mapping for Directory A:

**Name**

SortName

**Mapping Type**

Expression

**Definition**

(surname + "," + givenname)

**Note:** The expression must conform to the syntax rules of an expression.

2. Create an alias attribute mapping for Directory B:

**Name**

SortName

**Mapping Type**

Alias

**Definition**

sort\_name

When referencing users in Directory A, the sort name is calculated based on the specified expression. When referencing users in Directory B, the sort name is represented by the attribute sort\_name.

## Map Customers with Group and Constant Mapping Types

Use a group and a constant attribute mapping to identify customers in Directory A and Directory B.

**Deployment**

- Directory A stores employee. An employee of the company can also be a customer, so Directory A identifies customers as those employees that belong to the following group:  
`cn=Customers,ou=Groups,o=acme.com`
- Directory B only stores customers. Directory B does not have a user attribute that identifies customers. Storing a user in Directory B implies that the user is a customer.

### **Solution**

1. Create a group attribute mapping for Directory A.

#### **Name**

IsCustomer

#### **Mapping Type**

Group

#### **Definition**

cn=Customers,ou=Groups,o=acme.com

2. Create a constant attribute mapping for Directory B.

#### **Name**

IsCustomer

#### **Mapping Type**

Constant

#### **Definition**

TRUE

When referencing Directory A, a user is considered a customer if they belong to cn=Customers,ou=Groups,o=acme.com. When referencing Directory B, every user is a customer.

## **Map the Account Status with the Mask and Expression Mapping Types**

Use a mask attribute mapping and an expression attribute mapping to identify user accounts that are disabled in Directory A and Directory B.

### **Deployment**

- Directory A identifies disabled accounts with a user attribute named AccountStatus, which is a set of flags. The second bit indicates a disabled account.
- Directory B identifies disabled accounts with a user attribute named u\_disabled. When u\_disabled is equal to "y", the account is disabled. When u\_disabled is equal to "n", the account is active.

**Solution**

1. Create a mask attribute mapping for Directory A.

**Name**

IsDisabled

**Mapping Type**

Mask

**Definition**

AccountStatus:2

The definition indicates that the bit pattern is stored in AccountStatus, and the bit mask is 2 (decimal).

2. Create an expression attribute mapping for Directory B.

**Name**

IsDisabled

**Mapping Type**

Expression

**Definition**

(u\_disabled = "y")

u\_disabled is a Boolean expression.

When referencing Directory A, the bit pattern determines if a user is disabled. When referencing Directory B, the expression determines if a user is disabled.



# Chapter 9: Directory Mapping

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This section contains the following topics:

[Directory Mapping Overview](#) (see page 253)  
[Directory Mapping Requirements](#) (see page 255)  
[Identity Mappings Configuration](#) (see page 255)  
[Legacy Directory Mapping Configuration](#) (see page 261)  
[Remove Directory Mappings from Realms](#) (see page 264)  
[Directory Mapping Examples](#) (see page 264)  
[Directory Mapping and Responses](#) (see page 267)

## Directory Mapping Overview

The Policy Server assumes that a user is authenticated and authorized against the same user directory. However, users can be authenticated against one directory, and authorized against a separate directory. This feature is called directory mapping.

You can map a central directory that stores authentication information with separate distributed user directories that store authorization information. The authorization directories are associated with particular network applications. The mappings locate authenticated users in separate authorization directories.

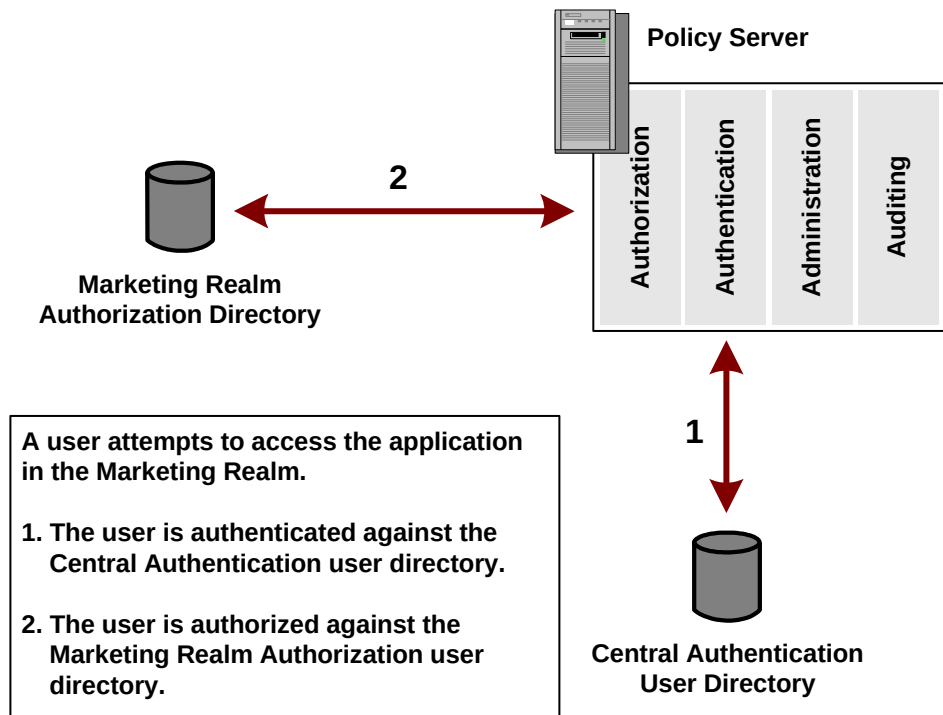
**Note:** Directory mapping does not support Impersonation. The user being impersonated, must be uniquely present in the authentication directories that are associated with the domain or the impersonation fails.

Mapping from an authentication directory to an authorization directory is a three-step process.

1. Set up user directory connections.
2. Configure a directory mapping.
3. Assign a directory mapping to a realm. A user is authorized against this directory for specific network applications.

For example, all the users in the company are authenticated against one central user directory. The marketing organization is authorized against a separate user directory. You can configure a directory mapping between the authentication and the marketing authorization user directories then create a realm for the marketing application. The realm uses the authorization directory defined in the mapping. When a user tries to access the marketing application, the user is authenticated against the central user directory and authorized against the marketing user directory.

The following diagram shows this example.



## Authorization Identity Mappings

Authorization Identity Mapping is a directory mapping that authenticates users against one directory and authorize users against a separate directory.

## Validation Identity Mappings

Validation Identity Mapping is a directory mapping that authenticates users against one directory and validate users against a separate directory. You map an authentication user directory that is connected to one Policy Server to a validation user directory that is connected to a different Policy Server.

## Directory Mapping Methods

You can map authentication directories with authorization and validation directories using the following methods:

### Identity Mappings

Identity mappings let you configure multiple target user directories and use custom search criteria. Identity Mappings provide greater flexibility than the legacy directory mappings.

### Legacy (Auth/Az and AuthValidate) Directory Mappings

The legacy Auth/Az and AuthValidate directory mappings available in previous releases are still available in this release.

#### More information:

[Identity Mappings Configuration](#) (see page 255)

[Legacy Directory Mapping Configuration](#) (see page 261)

## Directory Mapping Requirements

For legacy directory mappings, the user directory connections to the Policy Server must exist for the authentication directory and the authorization or validation directory. Identity mappings do not require existing user directory connections.

#### More information:

[User Directory Connections Overview](#) (see page 149)

## Identity Mappings Configuration

Identity mappings provide an enhanced method of mapping users from a source directory to a target directory using custom search criteria. You can use identity mappings for user authorization and user validation.

Identity mapping provides the following two methods of mappings:

- Authorization Mapping (the default)
- Validation Mapping

Identity Mappings enable custom search and let you control the order of mapping rules using different identity mapping entry objects. The Policy Server first attempts to locate a user with the mapping mechanism defined in an Identity Mapping. If the mapping fails, the session user directory is used to locate the user. The session directory must be in the policy store for the Policy Server to default to this directory.

**Note:** For validation mapping, the authentication directory does not have to be in the local store.

## Supported Directories for Identity Mappings

The following table lists supported types of directory mapping, and the method available to map the authentication directory to the authorization or validation directory.

| Authorization Directory/Validation Directory |               |                     |
|----------------------------------------------|---------------|---------------------|
| Authentication Directory                     | LDAP          | Relational Database |
| LDAP                                         | Identical DN  | Universal ID        |
|                                              | Universal ID  | Custom Search       |
|                                              | Custom Search |                     |
| AD                                           | Identical DN  | Universal ID        |
|                                              | Universal ID  | Custom Search       |
|                                              | Custom Search |                     |
| Relational Database                          | Universal ID  | Identical DN        |
|                                              | Custom Search | Universal ID        |
|                                              |               | Custom Search       |

## Identity Mapping Entry Types

An identity mapping can contain one or more entries. An identity mapping entry defines a rule that specifies how to find a user in the target directory. To find the user in the target directory, the Policy Server uses search criterion that is based on the session ticket information.

An identity mapping can contain more than one target user directory. You can add entries for different target user directories in the same identity mapping object. The identity mapping entries are processed as an ordered list of mappings.



The two types of identity mapping entries are:

**Authorization Identity Mapping Entry**

Specifies the links to the source and target directories. If the links are not available, the Authentication Directory is used for authorization. You can select either an Identical DN, a Universal ID, or can specify custom search criteria.

**Validation Identity Mapping Entry**

Specifies the source directory name as a text string and a link to the target directory. You can provide the name of the source directory or can select the default value, SMSESSION User Directory. The default value denotes that the user directory within the session ticket is used for validation. If there is no link to the target directory, the Authentication Directory is used for validation. You can select an Identical DN, a Universal ID, or can specify a custom search attribute.

## Using Complex User Search Expressions

You can map an authentication directory to an authorization directory or a validation directory using complex user search criteria. A user search criterion is a combination of attributes. The attribute can be from a source or target directory.

Typically, the user search criterion is user directory-specific. For example, an ODBC-based user search criterion can be different from an LDAP-based user search criterion.

To support user directories in different namespaces, define the search criteria for each user directory. You can also define a User Directory Attribute Mapping for the target user directory. Each user directory is then required to define its own specific search criterion for the attribute mapping. User Directory Attribute Mapping lets you define user directory-specific search criteria.

## How to Configure an Authorization Identity Mapping

Configuring an authentication-authorization identity mapping is a two-step process:

1. Configure an authorization identity mapping
2. Assign an authorization identity mapping to a realm

## Configure an Authorization Identity Mapping

To authenticate users against one directory and authorize users against another directory, configure an identity mapping.

**Follow these steps:**

1. Click Infrastructure, Directory.
2. Click Identity Mappings.
3. Click Create Identity Mapping.
4. Specify a name and description for the mapping.
5. Select the mapping type as Authentication-Authorization.
6. Click Create Entry.
7. Specify a name for the identity mapping entry.
8. Select the source and target directories from the respective lists.
9. Select one of the following options as a user search criterion:

**Identical DN**

Maps the distinguished name (DN) of a user from the authentication directory to the validation directory.

**Universal ID**

Matches the Universal ID attribute value from the authentication directory with the Universal ID value from the validation directory.

**Custom Search**

Specifies the attributes from the target directory and source directory. The source directory attribute can be a user-specified attribute or a CA SiteMinder session attribute.

10. Click OK.

The identity mapping entry is added to the authorization identity mapping object.

11. Click Submit.

The authorization identity mapping object is configured.

## Assign an Authorization Identity Mapping to a Realm

Assign an authorization identity mapping to a realm. The Policy Server uses the authorization mapping that is specified in the realm to authorize users.

**Follow these steps:**

1. Click Policies, Domain, Realms.  
The Realms page appears.
2. Select the realm that you want to modify.
3. Click Modify.
4. Select the identity mapping that you want to use as the authorization directory from the Authorization Mapping list.
5. Click Submit.

The authorization identity mapping is assigned to the selected realm.

**More information:**

[Configure Advanced Policy Components for Applications](#) (see page 451)

## How to Configure a Validation Identity Mapping

Configuring an authentication and validation identity mapping is a two-step process:

1. Configure a validation identity mapping.
2. Assign a validation identity mapping to a realm.

**Note:** You can create validation mappings for directories within the same store. The source directory does not have to be in the local store.

## Configure a Validation Identity Mapping

Configure an identity mapping to authenticate users against one directory and validate users against another directory.

**Follow these steps:**

1. Click Infrastructure, Directory.
2. Click Identity Mappings.
3. Click Create Identity Mapping.
4. Type the name and description.

5. Select the mapping type as Authentication-Validation.
6. Click Create Entry.
7. Type the name.
8. Specify a Source Directory if the directory is not from within the session.
9. Select the target directory.
10. Select a user search criterion.

If you select Custom search, specify the attributes from the Target Directory and Source Directory.

The Source Directory attribute can be a user-specified attribute or a CA SiteMinder session attribute.

11. Click OK.

The identity mapping entry is added to the validation identity mapping object.

12. Click Submit.

The validation identity mapping object is configured.

### Assign a Validation Identity Mapping to a Realm

Assign a validation identity mapping to a realm. The Policy Server uses the validation directory mapping that is specified in the realm to authorize users.

#### Follow these steps:

1. Click Policies, Domain, Realms.
2. Select the realm that you want to modify.
3. Click Modify.
4. Select the identity mapping that you want to use as the authorization directory from the Validation Mapping list.
5. Click Submit.

The validation identity mapping is assigned to the selected realm.

#### More information:

[Configure Advanced Policy Components for Applications](#) (see page 451)

## Configure a Default Global Validation Directory Mapping

A single validation identity mapping can serve as the global default for validation mapping. Setting a global validation identity mapping saves you time because you do not have to set one for every realm. However, you can override the global validation identity mapping with a local mapping.

**Follow these steps:**

1. Click Policies, Global.
2. Click Select Global Validation Directory Mapping.  
The Select Global Validation Directory Mapping page appears.
3. Select a validation identity mapping object from the corresponding list.
4. Click Submit.  
The selected validation identity mapping object is set as the global default for validation mapping.

## Legacy Directory Mapping Configuration

Legacy directory mapping maps the authentication directory to an authorization or a validation directory using an Identical DN or a Universal ID.

The two types of legacy directory mapping methods are:

- Auth/Az (Authorization mapping)
- AuthValidate (Validation mapping)

If an Auth/Az or AuthValidate mapping is configured, the Policy Server first attempts to use the session user directory to locate a user, then uses the specified mapping mechanism only if the user is not found in the session user directory.

## How to Configure an Authentication and Authorization Directory Mapping

Configuring an Auth/Az directory mapping is a two-step process:

1. Configure the directory mapping.
2. Assign an authorization directory to a realm.

## Configure a Directory Mapping

To authenticate users against one directory and authorize users against another directory, configure a directory mapping.

**Follow these steps:**

1. Click Infrastructure, Directory.
2. Click Auth/Az Mapping.
3. Click Create Directory Mapping.
4. Select the authentication and authorization directories from the respective lists.
5. Select the Identical DN or Universal ID.

**Important!** The directory mapping is successful only if the Universal ID points to a single entry in the authorization directory.

6. Click Submit.

The Create Directory Mapping task is submitted for processing.

**More information:**

[Universal IDs](#) (see page 214)

## Assign an Authorization Directory to a Realm

Assign a directory mapping to a realm. The Policy Server uses the authorization directory that is specified in the realm to authorize users.

**Follow these steps:**

1. Open the realm that you want to assign a directory mapping.
2. From the Directory Mapping list, select the user directory that the realm can use to authorize an authenticated user.

The default value indicates that there is no directory mapping. The authentication directory is used as the authorization directory when a user attempts to access a resource in the realm. The list only contains user directories that are configured as authorization directories in an existing directory mapping.

**Important!** You can map only one authorization directory per realm.

3. Click Submit.

The Policy Server saves the directory mapping. Users that access the realm authenticate normally and authorize against the directory that is specified in the realm.

**More information:**

[Configure a Realm](#) (see page 467)

## How to Configure an AuthValidate Directory Mapping

AuthValidate Directory Mapping is an extension of authentication and authorization directory mapping. Both types of directory mapping let users authenticate against one user directory and authorize against another user directory. In both cases, the directory mapping type can be further specified as Identical DN or Universal ID.

AuthValidate directory mapping extends authentication and authorization directory mapping in three ways:

- With AuthValidate directory mapping, you can map an authentication user directory that is connected to one Policy Server to a validation user directory that is connected to another Policy Server. The user directories are located by OID and directory name.
- With AuthValidate directory mapping, the user directories can be of different types.
- With AuthValidate directory mapping, user lookup by Universal ID is attempted if user lookup by DN fails.

## Configure an AuthValidate Directory Mapping

To authenticate users against one directory and validate users against another directory, configure an AuthValidate directory mapping.

**Note:** The AuthValidate mappings are global.

**Follow these steps:**

1. Click Infrastructure, Directory.
2. Click AuthValidate Directory Mappings.
3. Click Create AuthValidate Directory Mapping.
4. Type the name of the directory that is used to authenticate users in the Authentication Directory field.
5. Select the directory that is used to validate users from the Validation Directory list.
6. Select a mapped DN from the available options.
7. Click Submit.

The AuthValidate Directory Mapping task is created.

## Remove Directory Mappings from Realms

To update, or delete a directory mapping of type authorization or validation, dissociate the directory mappings from the existing realms,

**Follow these steps:**

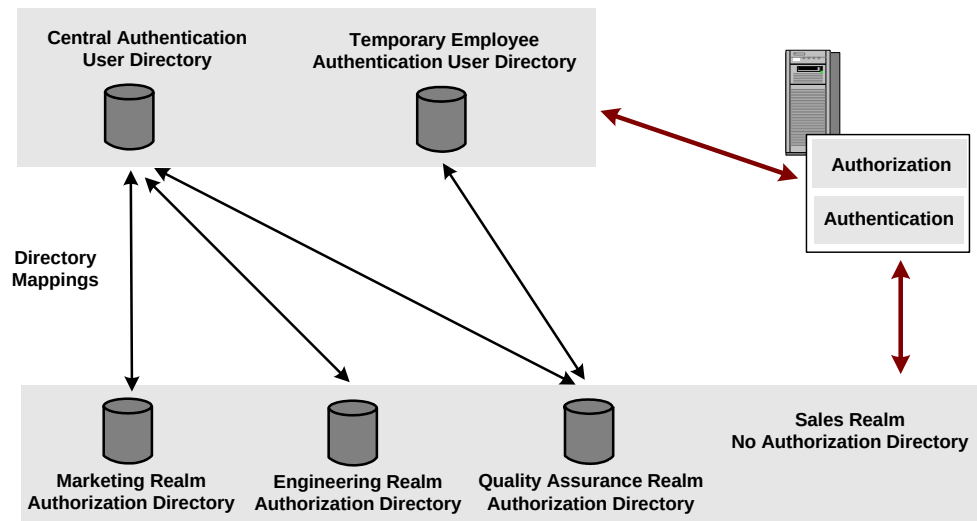
1. Click Policies, Domain, Realms.
2. Select the realm that you want to modify.
3. Click Modify.
4. Select the directory mapping that you want to dissociate from the corresponding list.
5. Click Submit.

The directory mapping is removed from the selected realm.

You can follow the same procedure to dissociate the identity mappings of type authorization and validation, from a realm.

## Directory Mapping Examples

Multiple directory mappings are required to authenticate and authorize users that have access to network resources. The following figure illustrates a simple case where multiple directory mappings are required.





In the example, there are three realms that have separate authorization user directories and one realm that does not have its own authorization user directory. User authentication information is maintained in two distinct authentication directories. If the requested resource is in the Marketing, Engineering, or Quality Assurance realms, the Policy Server uses one of the authentication directories. The decision is based on the directory in the session ticket information.

You can use identity mapping to map the directories using complex user search criteria.

**More information:**

[Realms](#) (see page 461)

## Employee Accesses an Engineering Realm Resource

In the previous graphic showing multiple user directories, the authentication data for a regular employee resides in the central authentication user directory. When the employee tries accessing a resource in the engineering realm, the employee is authenticated.

The Policy Server recognizes that the engineering realm uses its own authorization directory. The Policy Server looks for the directory mapping between the central authentication user directory and the engineering realm authorization user directory. The server then maps the user identity to the authorization directory. The Policy Server can now verify whether the employee has access to the requested realm.

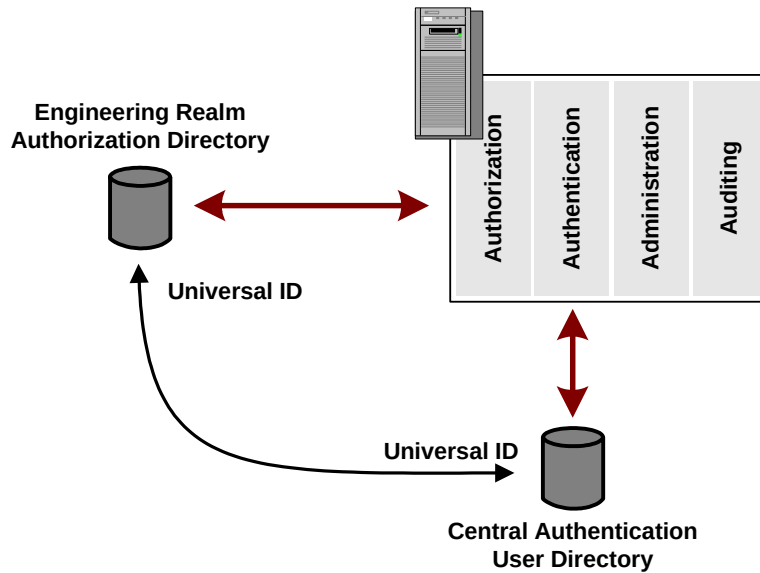
## Temporary Employee Accesses a Quality Assurance Realm Resource

In the previous graphic showing multiple user directories, the authentication data for a temporary employee resides in the temporary employee authentication user directory. The employee tries accessing a resource in the sales realm. The sales realm is not associated with its own authorization directory.

The Policy Server authenticates the employee in the authentication directory, then checks to see if a directory mapping is set up. Since the sales realm does not have its own authorization directory, the Policy Server tries to authorize the employee against the same directory where the employee was authenticated.

## Directory Mapping by Universal ID

In the previous figure showing multiple user directories, the authentication data for an employee resides in the central authentication user directory. The employee attempts to access a resource in the Engineering realm. After the employee is authenticated, the Policy Server uses a directory mapping to find the employee in the Engineering authorization directory. The user is identified by the employee Universal ID. See the following figure.



In the previous figure, assume that the directory mapping uses a Universal ID. To find a matching universal ID in the authorization directory, the Policy Server uses the universal ID attribute that is defined in authentication directory. After locating the universal ID in the authorization directory, the policy processing can finish and determine whether the user can access the protected resource.

## Directory Mapping Case Sensitivity

Case-sensitive directories, such as an Oracle database, treat the values "ROBIN" and "robin" as two different user names. Other directories, such as an LDAP directory, are not case-sensitive and treat the values "Robin", "ROBIN", "robin", and "RobIn" as the same user name. A conflict can occur if the authentication directory is not case-sensitive, but the authorization directory is case-sensitive.

Authentication can fail because the authentication directory is case-sensitive. However, the user can recover by reentering the user name in the format that the directory requires. If the directory requires the user name to be in the format "Name", for example, the user can reenter the name correctly as "Robin". If authorization fails due to case-sensitivity, the Policy Server has no way to recover.

If the authorization directory is case-sensitive, change the format of the authenticated user name so that it matches the format that the authorization directory requires. If the authenticated user name is "RoBiN," but the authorization directory requires the format "Name", first change "RoBiN" to "Robin" and then authorize the user.

## Identity Mapping by Complex User Search Criterion

Identity Mapping locates a user by relying on the session ticket information and the construction of the identity mapping entries.

The XPS function IDENTITY\_MAP finds the Identity Mapping object by name. On finding a user in the target user directory by resolving its entries, returns the value of the attribute specified by the second parameter.

### Example:

To get the last name of the user in the target user directory defined by the Identity Mapping named "target", provide the following:

```
IDENTITY_MAP ("target", last_name);
```

## Directory Mapping and Responses

You can configure responses that can incorporate user directory attributes. If you use directory mappings, consider the effects that the mappings have on responses. For example, for an OnAuth event, the directory mapping retrieves values from the authentication directory. For an OnAccess event, the directory mapping retrieves values from the authorization directory. For a description of events that are associated with responses, see [Responses and Response Groups](#) (see page 493).



# Chapter 10: Authentication Schemes

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This section contains the following topics:

- [Authentication Schemes Overview](#) (see page 269)
- [Basic Authentication Schemes](#) (see page 279)
- [Basic Over SSL Authentication Schemes](#) (see page 281)
- [HTML Forms Authentication Schemes](#) (see page 282)
- [Windows Authentication Schemes](#) (see page 297)
- [Information Card Authentication Schemes](#) (see page 300)
- [MS Passport Authentication Schemes](#) (see page 318)
- [RADIUS CHAP/PAP Authentication Schemes](#) (see page 321)
- [RADIUS Server Authentication Schemes](#) (see page 323)
- [SafeWord Server Authentication Schemes](#) (see page 324)
- [SafeWord Server and HTML Forms Authentication Schemes](#) (see page 325)
- [SecurID Authentication Schemes](#) (see page 327)
- [X.509 Client Certificate Authentication Schemes](#) (see page 334)
- [X.509 Client Certificate and Basic Authentication Schemes](#) (see page 337)
- [X.509 Certificate or Basic Authentication Schemes](#) (see page 339)
- [X.509 Client Certificate and HTML Forms Authentication Schemes](#) (see page 341)
- [X.509 Client Certificate and HTML Forms Authentication Schemes](#) (see page 344)
- [Anonymous Authentication Schemes](#) (see page 347)
- [Custom Authentication Schemes](#) (see page 349)
- [OpenID Authentication Scheme](#) (see page 350)
- [Legacy Federation Authentication Schemes](#) (see page 360)
- [Impersonation Authentication Schemes](#) (see page 360)

## Authentication Schemes Overview

Owners of network resources want to verify the identity of users who attempt to access these resources are typically. Identifying a user determines the resources that users can access, and can determine how to personalize the content for that user. Tracking anonymous uniquely is useful so that their history can be used to provide a quality experience when they once again access the network. To identify a user, authentication schemes are used.

Authentication schemes provide a way to collect credentials and determine the identity of a user. During authentication, Web Agents communicate with the Policy Server to determine the proper credentials that must be retrieved from a user who is requesting resources.

The Policy Server supports various authentication schemes. Use simple schemes for low risk network resources and complex schemes for added security for critical network resources.

The Policy Server uses authentication scheme templates, which provide the Policy Server with the information required to process a scheme. Configure authentication scheme templates using the Administrative UI.

## Supported Authentication Schemes and Password Policies

Some authentication scheme types support Password Policies, while others do not. You can view whether a particular type of authentication scheme supports Password Policies by opening the Authentication Scheme Properties dialog in the Administrative UI. To view a particular authentication scheme type, select it from the drop-down list on the Scheme Common Setup group box and observe the Password Policies Enabled for this Authentication Scheme check box. If the authentication scheme does not support Password Policies, the check box description is dimmed and the check box is unavailable.

To view supported authentication scheme types and whether they support Password Policies without accessing the Administrative UI, see the following table:

| Authentication Scheme Type         | Type Supports Password Policies? |
|------------------------------------|----------------------------------|
| Anonymous                          | No                               |
| Basic                              | Yes                              |
| Basic over SSL                     | Yes                              |
| Custom                             | Yes                              |
| HTML Forms                         | Yes                              |
| Impersonation                      | No                               |
| MS Passport                        | No                               |
| OpenID                             | No                               |
| RADIUS CHAP/PAP                    | Yes                              |
| RADIUS Server                      | Yes                              |
| SafeWord                           | No                               |
| SafeWord and HTML Forms            | No                               |
| SecurID                            | No                               |
| SecurID and HTML Forms             | No                               |
| X.509 Client Certificate           | No                               |
| X.509 Client Certificate and Basic | Yes                              |
| X.509 Client Certificate or Basic  | Yes                              |

| Authentication Scheme Type              | Type Supports Password Policies? |
|-----------------------------------------|----------------------------------|
| X.509 Client Certificate and HTML Forms | Yes                              |
| X.509 Client Certificate or HTML Forms  | Yes                              |
| Windows Authentication                  | Yes                              |

## Limit Policy Server Search to One User Store during Authentication

A single user can be stored in more than one user directory or database that is associated with a policy domain. This user has the same password in each user store. During the authentication process, the Policy Server can find that a user is disabled in one user store. However, by default, it continues searching for the user in all stores that are associated with the policy domain. The user fails authentication only if the Policy Server finds the user that is disabled in all associated user stores. The user is authenticated if it is enabled in any associated user store.

This default behavior is configurable. Stop the Policy Server from searching directories after it finds the user that is disabled in a user store.

### Follow these steps:

1. Add the registry key ReturnOnDisabledUser:

#### Windows

Add the registry key ReturnOnDisabledUser to the following location:

```
HKEY_LOCAL_MACHINE\SOFTWARE\Wow6432Node\Netegrity\SiteMinder\CurrentVersion
\PolicyServer
```

#### Solaris

Add the following lines to the sm.registry file:

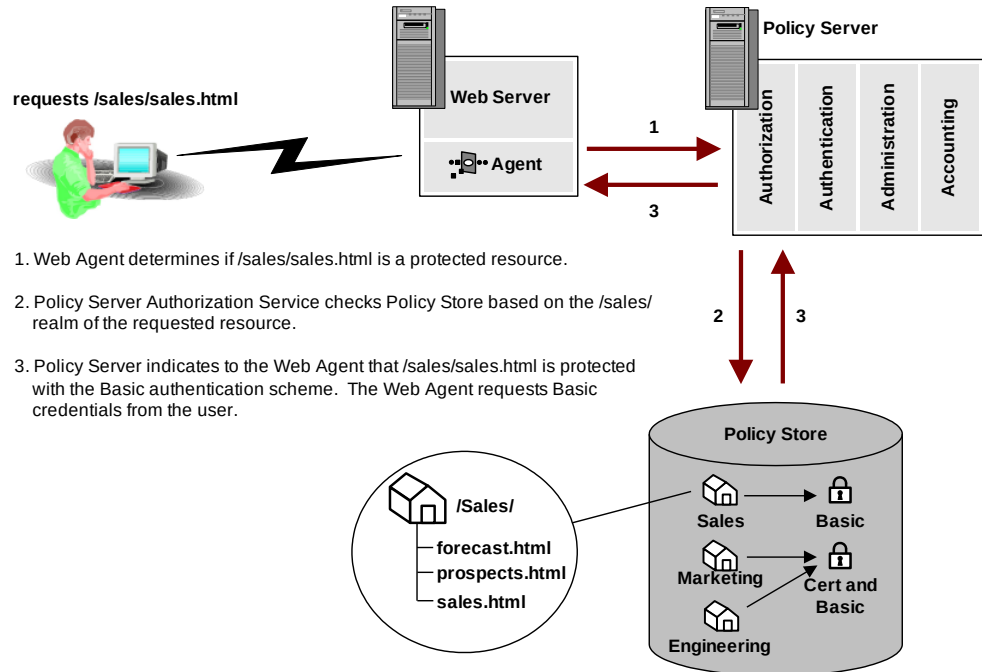
```
HKEY_LOCAL_MACHINE\SOFTWARE\Wow6432Node\Netegrity\SiteMinder\CurrentVersion
\PolicyServer
ReturnOnDisabledUser=0x1; REG_DWORD
```

2. Assign ReturnOnDisabledUser the value of one.

## Authentication Scheme Processing

To determine the identity of a user, the Policy Server employs the authentication scheme for the realm containing the resource. The authentication scheme specifies the credentials that the user must supply for authentication, and the method that the Policy Server uses to validate the user's identity.

To configure authentication schemes, use the Administrative UI and assign the schemes to realms. The following diagram illustrates how an authentication scheme is called when a user attempts to access a protected resource.



In the example above, the user requests the protected resource `sales.html` from the `/Sales/` realm. This realm requires Basic authentication. The **Policy Server** informs the **Web Agent** that the resource is protected and requests Basic credentials from the user by way of the **Web Agent**. The **Agent** prompts the user for a user name and password.

#### More information:

[Configure a Realm](#) (see page 467)

## Authentication Scheme Types

The authentication schemes fall into a number of categories. These categories represent the general characteristics of available authentication methods. Details are provided in the sections of this chapter that discuss each specific authentication scheme.



## Basic Authentication Schemes

Basic authentication identifies a user by the user name and password. The user's identity is stored in a user directory. The Policy Server locates a user in a directory that is based on the user name. The Policy Server then verifies that the password matches the one saved in the user directory. If the user name and password that is supplied by the user match the data in the user directory, the user is authenticated.

The Administrative UI provides authentication scheme templates for the following basic schemes:

- Basic (HTTP Basic)
- Basic over SSL

## HTML Forms-based Authentication Schemes

Configure customized HTML forms to collect more than basic authentication information. In a forms-based authentication scheme, a user can be required to enter more information such as an, organization or account number. The Policy Server verifies the additional information against user directory attributes before authenticating the user.

## Windows Authentication Scheme

Integrated Windows Authentication (IWA) is a proprietary mechanism developed by Microsoft to validate users in pure Windows environments. IWA enforces Single Sign-On by allowing Windows to gather user credentials during the initial interactive desktop login process and subsequently transmitting that information to the security layer. The Policy Server, using the Windows Authentication scheme, secures resources by processing user credentials obtained by the Microsoft Integrated Windows Authentication infrastructure.

## X.509 Client Certificate Authentication Schemes

You can configure X.509 V3 client certificates. Digital certificates act as cryptographic proof of a user's identity. Once a certificate is installed on a client, that certificate can be used to verify the identity of a user who is accessing a resource. Certificate authentication uses SSL communication and can be combined with basic authentication to provide an even higher level of access security.

The following authentication scheme templates are available for certificate-based authentication schemes:

- X.509 Client Certificates
- X.509 Client Certificates and Basic
- X.509 Client Certificates or Basic

- X.509 Client Certificates and HTML Forms
- X.509 Client Certificates or HTML Forms

**Note:** For certificate-only authentication schemes, the web agent returns HTTP Error 403: Access Denied/Forbidden for any failed authentication or authorization attempt. This is because there is no way for the web agent to challenge the user for a new certificate.

### Proxy Authentication Schemes

Proxy authentication schemes use the Policy Server as a proxy or substitute for the server that is required by a third-party authentication product. With a proxy scheme, the Policy Server performs the authentication function of the third-party server using scheme-specific libraries.

The following proxy authentication schemes are available:

- RSA ACE/Server (used with SecurID tokens)
- RSA ACE/Server (used with SecurID tokens) with HTML forms support for resetting passwords
- Secure Computing SafeWord Server
- RADIUS Server

### Digest Authentication Schemes

A digest authentication scheme reads an encrypted user attribute string that is stored in a directory. The scheme then compares the string to the encrypted string it receives from the user. If the encrypted strings match, the Policy Server authenticates the user. A digest scheme compares a string encrypted on a client workstation to an encrypted string on a server without using an encrypted transmission.

The following digest authentication schemes are available:

- RADIUS CHAP
- RADIUS PAP

### Anonymous Authentication Schemes

An anonymous authentication scheme allows non-registered users access to specific web content. A user tries accessing a resource that is protected by an anonymous authentication scheme. The Policy Server assigns the user a Global User Identification (GUID). This GUID is placed in a persistent cookie on the user's browser so that the user can access specific resources without being challenged to authenticate.

## Custom Authentication Schemes

If the Policy Server does not provide a method of authentication that you want to use, use CA's APIs to develop a custom authentication scheme.

**Note:** If you have installed the Software Development Kit, see the API Reference Guide for C or the API Reference Guide for Java for more information about creating custom authentication schemes.

## Authentication over SSL

Authentication can be configured to run over a Secure Sockets Layer (SSL) connection.

The following authentication scheme types are configured to use an SSL connection:

- Basic\*
- HTML Forms\*
- X.509 Client Certificates
- X.509 Client Certificates and Basic
- X.509 Client Certificates or Basic
- X.509 Client Certificate or HTML Forms
- X.509 Client Certificate and HTML Forms

**Note:** An asterisk denotes that an SSL connection is optional.

## Persisting Authentication Context Data

In addition to storing user data in the session ticket, you can optionally specify that CA SiteMinder persist the authentication context data in the session store. CA SiteMinder creates session variables and treats them as if they were session ticket fields that are named after the session variables. The Policy Server can access session variables in the session store, which can affect authentication decisions.

You can configure Responses and Policies to manipulate, store, or send back session context attributes available from the persisted authentication data. The information is retrieved from the session store and sent to the web agent. The web agent can store the data again, or can provide it to the authorization engine for evaluation. In addition, you can configure your own session variables and can use them for authorization.

To save the authentication context information, select the Persist Authentication Session Variables check box in the Scheme Setup section. This option is available for the Custom scheme, the SAML authentication schemes, and the X.509 Certificate schemes.

**Important!** Persisting authentication data in the session store creates a degradation in the authentication time. Only select this option when you really intend to use the variables at a later time for authentication decisions. Otherwise, you can possibly experience a significant performance impact with no benefit.

## Protection Levels

Authentication schemes require a protection level. This level ranges from zero to 1000. A higher number indicates that the scheme provides higher level of protection. When users authenticate successfully against a scheme, they can access any resource with a protection level equal to or below the current authentication scheme. Users still require authorization for a resource to gain access to it.

**Note:** Anonymous authentication schemes always have a protection level of zero. Custom schemes have a protection level between zero and 1000. All other authentication schemes have a protection level between 1 and 1000.

For example, a set of resources is available to all network users, you can assign a Basic (user name and password) authentication scheme. For revenue information that is available only to corporate executives, you can assign an X.509 client certificate scheme with a higher protection level. A user who has authenticated with a user name and password can authenticate a second time with a digital certificate to access the revenue information.

Sometimes the predefined protection level of the authentication scheme can be inadequate. For example, in a federation scenario, the asserting party can possibly require a different protection level to accommodate the relying party. In such cases, the administrator can specify that a protection value in the authentication scheme library overrides the protection level that is specified in the Administrative UI. The value in the library is written to the user session ticket. Select the Allow Protection Override check box in the Scheme Common Setup section of the Create Authentication Scheme dialog for Custom and SAML authentication schemes.

### More information:

[Policies](#) (see page 517)

[Domains](#) (see page 453)

## Authentication Schemes and Credential Requirements

The following table lists all supported authentication schemes and their credential requirements:

| Credential Requirements                               |                     |                    |                 |                     |                         |
|-------------------------------------------------------|---------------------|--------------------|-----------------|---------------------|-------------------------|
| Authentication Schemes                                | Directory User Name | Directory Password | Code from Token | X.509 Certificate   | User Profile Attributes |
| Anonymous                                             |                     |                    |                 |                     |                         |
| Basic                                                 | yes                 | yes                |                 |                     |                         |
| Basic over SSL                                        | yes                 | yes                |                 |                     |                         |
| Custom                                                | optional            | optional           | optional        | optional            | optional                |
| HTML Forms (over SSL optional)                        | custom credentials  | custom credentials |                 |                     | optional                |
| Impersonation                                         | yes                 |                    |                 |                     | optional                |
| MS Passport                                           | yes                 | yes                |                 |                     | yes                     |
| NTLM or Windows                                       | yes*                | yes*               |                 |                     |                         |
| RADIUS CHAP/PAP                                       | yes                 | yes                |                 |                     |                         |
| RADIUS Server                                         | yes                 | yes                |                 |                     |                         |
| SafeWord Server                                       | yes                 | yes                |                 |                     |                         |
| SafeWord and Forms                                    | yes                 | yes                |                 |                     | optional                |
| SecurID                                               | yes                 |                    | yes             |                     |                         |
| SecurID and Forms                                     | yes                 |                    | yes             |                     | optional                |
| TeleID                                                | yes                 |                    | yes             |                     |                         |
| X.509 Client Certificate                              |                     |                    |                 | yes                 |                         |
| X.509 Client Certificate and Basic (uses SSL)         | yes                 | yes                |                 | yes                 |                         |
| X.509 Client Certificate or Basic (over SSL optional) | yes for Basic       | yes for Basic      |                 | yes for Certificate |                         |
| X.509 Client Certificate and HTML Forms               | custom credentials  | custom credentials |                 | yes                 | optional                |

| Credential Requirements                |                                   |                                   |                 |                     |                         |
|----------------------------------------|-----------------------------------|-----------------------------------|-----------------|---------------------|-------------------------|
| Authentication Schemes                 | Directory User Name               | Directory Password                | Code from Token | X.509 Certificate   | User Profile Attributes |
| X.509 Client Certificate or HTML Forms | custom credentials for HTML Forms | custom credentials for HTML Forms |                 | yes for Certificate | optional for HTML Forms |

\*For NTLM or Windows, when trying to access a resource, CA SiteMinder does not prompt the user to enter a username and password. This scheme relies on a properly-configured IIS Web server to acquire and verify a user's credentials. The Policy Server bases authorization decisions on the user's identity as asserted by the IIS server.

## Set Up an Authentication Scheme

Set up an authentication scheme in the Administrative UI. Configure the components in the following order:

1. Web Server (only for certificate, SSL, and HTML forms-based schemes)
2. Policy Server (including Certificate Mapping for X.509 certificate schemes)

### More information:

[Certificate Mapping for X.509 Client Certificate Authentication Schemes](#) (see page 363)

## Web Server

For a Web Agent to support any SSL-based Authentication Scheme, configure a web server for SSL.

## Policy Server

After you configure your web servers to support authentication schemes, configure the Policy Server to support the schemes.

### More information:

[Authentication Schemes Overview](#) (see page 269)

## Multiple Instances of a Single Authentication Scheme Configuration

You can configure multiple instances of most authentication schemes in the Administrative UI. For example, you can create multiple HTML forms-based schemes to process login, forgotten password requests, and logout. If you create multiple instances of a scheme type, set protection levels to reflect your security requirements.

## Basic Authentication Schemes

The Policy Server installation process automatically configures a Basic authentication scheme. This scheme verifies a user's identity according to a user name and password that are passed to a user directory service for authentication. For LDAP user directories, this is done via an LDAP "Bind" operation. The HTTP Basic Authentication protocol is used to deliver credentials from the browser to the Web server protected by the CA SiteMinder Web Agent. Basic authentication schemes are supported only with ASCII characters.

When a user attempts to access a resource protected by Basic authentication, the CA SiteMinder Agent prompts the user to enter a user name and password. When the user enters a name and password, the Agent passes the credentials to the Policy Server over an encrypted connection, and the Policy Server matches the name against the users contained in the directories attached to the policy domain that contains the resource. When the Policy Server finds a matching user name, it compares the password in the user directory to the password supplied by the user. If the passwords match, the user is authenticated, and the Policy Server sends a message to the Web Agent indicating that the Agent may proceed. If the authentication fails, the user is challenged to re-enter credentials.

**Note:** This scheme does not provide encrypted credential delivery by default. Instead, the user name and password are delivered from the browser to the Web server protected by the Web Agent via the standard HTTP Basic protocol, unless every protected URL on the Web server is set up to require SSL. However, communication between the Web Agent and the Policy Server always takes place over an encrypted connection. For an encrypted authentication scheme based on simple user names and passwords, see [Basic Over SSL Authentication Schemes](#) (see page 281).

Realms that you create in the Administrative UI use the Basic authentication scheme by default. You can change the authentication scheme when you create a new realm or modify an existing realm.

For an additional level of security with Basic authentication, you can create password policies. This CA SiteMinder feature allows you to manage password rules.

**More information:**

[Realms](#) (see page 461)

[Password Policies](#) (see page 635)

[Domains](#) (see page 453)

## Review Basic Scheme Prerequisites

Verify that the following prerequisites are met before configuring a Basic authentication scheme:

- Client user name and password information exists in a user directory.
- A directory connection exists between the Policy Server and the user directory.

**More information:**

[User Directories](#) (see page 149)

## Configure a Basic Authentication Scheme

Configure a Basic authentication scheme in the Administrative UI to verify user identities against user names and passwords that exist in the user directory.

**Note:** The following procedure assumes that you are creating an object. You can also copy the properties of an existing object to create an object.

**Follow these steps:**

1. Click Infrastructure, Authentication.
2. Click Authentication Schemes.
3. Click Create Authentication Scheme.

Verify that the Create a new object of type Authentication Scheme is selected.

Click OK

4. Enter a name and protection level.
5. Select Basic Template from the Authentication Scheme Type list.
6. Click Submit.

The authentication scheme is saved and can now be assigned to a realm.



## Basic Over SSL Authentication Schemes

The Basic Over SSL Authentication Scheme verifies a user's identity by passing a user name and password credentials to a user directory in a process similar to Basic authentication. However, credential delivery is always done over an encrypted Secure Sockets Layer (SSL) connection even if the protected URLs are not setup to require SSL. The CA SiteMinder Web Agent accomplishes this by redirecting the user's browser to establish an SSL connection prior to credential delivery. After the credentials are delivered the Web Agent redirects the browser back to the original URL.

For an additional level of security with Basic over SSL authentication, you can create password policies. This CA SiteMinder feature allows you to manage password rules.

### More information:

[Password Policies](#) (see page 635)

[Basic Authentication Schemes](#) (see page 273)

## Verify the Basic over SSL Authentication Scheme Prerequisites

Before configuring a Basic over SSL authentication scheme, verify that the following prerequisites are met:

- Client user names and passwords must exist in a user directory.
- A directory connection exists between the Policy Server and the user directory.
- An X.509 Server Certificate is installed and SSL configured on the SSL web server.
- The network must support an SSL connection to the client browser using the HTTPS protocol.
- A web agent is installed on the web server where requests are redirected for SSL. The web agent enables the server to handle the .scc MIME type that the authentication scheme requires.

### More information:

[User Directories](#) (see page 149)

## Configure a Basic Over SSL Authentication Scheme

You can use a Basic Over SSL authentication scheme to verify user identities against the user names and passwords that exist in the user directory. Credential delivery is completed over an encrypted Secure Sockets Layer.

**Note:** The following procedure assumes that you are creating an object. You can also copy the properties of an existing object to create an object. For more information, see [Duplicate Policy Server Objects](#).

**Follow these steps:**

1. Click Infrastructure, Authentication.
2. Click Authentication Schemes.
3. Click Create Authentication Scheme.

Verify that the Create a new object of type Authentication Scheme is selected.

Click OK

4. Enter a name and protection level.
5. Select Basic over SSL Template from the Authentication Scheme Type list.  
Scheme-specific settings open.
6. Enter Server Name and Target information.
7. Click Submit.

The authentication scheme is saved and may be assigned to a realm.

## HTML Forms Authentication Schemes

HTML Forms authentication schemes provide a method for authentication based on credentials gathered in a custom HTML form. This flexible means of credential collection allows you to:

- Provide a “branded” look, perhaps including a company logo.
- Substitute custom labels for user name and password collection (for example, if users think in terms of an account number and a PIN rather than a name and password).
- Provide authentication based on credentials other than a user name and password (via user directory attributes). In this case, an authentication scheme library on the Policy Server machine maps the user’s data to a DN. By mapping the user to a DN, the Policy Server can match an attribute list to the appropriate values in a user directory. This process is called back-end mapping.

- Provide authentication based on credentials that include user attributes in addition to the user name and password. This is considered additional attribute verification. A custom authentication scheme library is not required for additional attribute verification.

For example, a custom form can be used to collect a name and a secret phrase for users who forget their password.

- Provide multiple HTML forms for login, logout, forgotten passwords, etc.

**Note:** HTML Forms authentication schemes are supported with multi-byte characters.

Multiple *Forms-based* Authentication Schemes can be configured in a Policy Server installation. Each scheme consists of the following components:

#### **Forms Credential Collector (FCC)**

The FCC process files are composed in a simple mark-up language that includes HTML and some custom notation.

Each HTML Forms scheme must have its own .fcc file. This file contains the custom form definition and additional information that the FCC uses to process HTML Forms authentication. The FCC extracts credentials that a user enters in the custom form generated from the .fcc file.

For the HTML Forms authentication scheme, the default extension for .fcc files is .fcc. If you want to use a different extension:

- For Apache or iPlanet Web servers, configure your Web server to use that extension.
- For Domino or IIS Web servers, specify that extension in the FCCExtensions parameter of your Web Agent configuration file or object. For more information on Web Agent configuration parameters, see the *Web Agent Configuration Guide*.

#### **.unauth file**

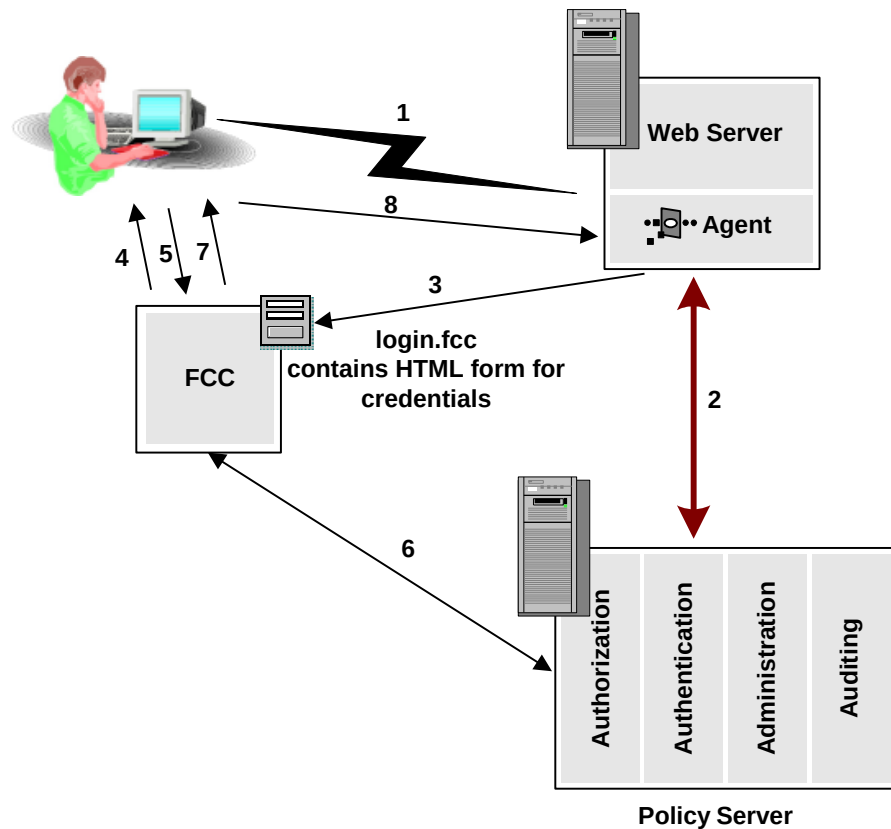
A file displayed to users who exceed the maximum number of failed authentication attempts specified by the authentication scheme. A .unauth file should exist for each .fcc file. For example, if you have a login.fcc file on a Web server, you should also have a login.unauth file in the same location.

If an smerrorpage variable has been defined in the .fcc file, the .unauth file is not required.

#### **Authentication Scheme Library**

This is a shared library that runs on the Policy Server machine and performs authentications.

The following diagram describes the process for HTML Forms authentication.



The following steps explain the process for HTML Forms authentication:

1. A user requests a resource contained in a realm protected by HTML Forms authentication.
2. The Web Agent contacts the Policy Server and determines that the user's request must be redirected to the credential collector.
3. The Web Agent redirects the request to the URL of the credential collector file.
4. The credential collector displays the form described in the .fcc file in the user's browser.
5. The user fills out the custom form and Posts (submits) the form. The credential collector processes the credentials.
6. The credential collector (FCC) logs the user into the Policy Server. The Policy Server returns user session data to the credential collector.

7. If the user is authenticated, the credential collector creates a session cookie, passes the session cookie to the browser and redirects the user to the resource that he or she originally requested.
8. The user uses the session cookie to authenticate. Then, the Web Agent handles user authorization.

**More information:**

[SiteMinder FCC Files](#) (see page 287)

## Review the HTML Forms Scheme Prerequisites

Verify that the following prerequisites are met before configuring an HTML Forms authentication scheme:

- A customized .fcc file resides on a Web Agent server in the cookie domain in which you want to implement HTML Forms authentication. CA provides sample .fcc files under the Samples/Forms subdirectory where you installed your Web Agent.
- A customized .unauth file resides on the Web Agent server.

**Note:** This file is not required if the .fcc file uses the smerrorpage directive.

- A directory connection exists between the Policy Server and the user directory.
- The default HTML forms library is installed. This library handles HTML Forms authentication processing:
  - SmAuthHTML.dll on Windows
  - smauthhtml.so on Solaris

These files are installed automatically when you configure a Web Agent.

- (Sun Java Systems) If you are using a Sun Java Systems web server, increase the value of the StackSize parameter in the magnus.conf file to a value greater than 131072. Failing to change the value causes the web server to dump its core and restart each time an authentication request is made using forms.

**More information:**

[User Directories](#) (see page 149)

[SiteMinder FCC Files](#) (see page 287)

## Custom Authentication Scheme Library Writing and Installation

The user name and password data that the FCC collects are passed to the Policy Server, which passes them to the authentication scheme library.

Unless back-end mapping is required, the SmAuthHTML authentication scheme library can be used. SmAuthHTML is distributed with the Policy Server and already installed on the Policy Server system.

**Note:** Back-end mapping requires a custom authentication scheme library. If you have installed the software development kit, see the API Reference Guide for C.

If you write a custom authentication scheme and you want to gather more data than the user name and password, the FCC must pack that data into the user name and password fields. These fields must be less than 511 characters long. The custom authentication scheme library must then be able to unpack the data and map it to the user name and password.

The FCC can be installed on the same system as the Policy Server.

## HTML Forms Authentication Templates

The templates for forms authentication are text files that use an extended version of HTML. These files are referred to as .fcc files.

The default extension for .fcc files used in an HTML Forms authentication scheme is .fcc. However, you can use a different extension:

- For Apache Web servers, configure your Web server to use the extension you want.

**Note:** More information exists in the *Web Agent Installation Guide*.

- For Domino or IIS Web servers, specify the extension that you want in the FCCExtensions parameter of your Web Agent configuration file or object.

**Note:** For more information about Web Agent configuration parameters, see the *Web Agent Configuration Guide*.

The Web Agent includes sample English, French and Japanese .fcc files, which you can customize. These files are located in the following directories:

| Language | Directory                                                            |
|----------|----------------------------------------------------------------------|
| English  | Windows: Web Agent\Samples\Forms<br>UNIX: webagent/samples/forms     |
| French   | Windows: Web Agent\Samples\Formsfr<br>UNIX: webagent/samples/formsfr |
| Japanese | Windows: Web Agent\Samples\Formsja<br>UNIX: webagent/samples/formsja |

By default, the product uses the English .fcc files.

To use the sample .fcc files, create a form authentication scheme that specifies the appropriate target directory.

## Secure HTML Forms Authentication Templates

Secure versions of the HTML forms authentication templates are also available. The secure HTML forms authentication templates differ from the standard versions in the following ways:

- Secure versions do not display the username in returned messages
- Secure versions include a Logout hyperlink in the top right side corner of the form template which logs out the user and redirects them to the custom logoff page
- Autocomplete is turned off for all text fields in secure versions

The secure template files are located in the following directories:

- Windows: `webagent\secureforms`
- UNIX: `webagent/secureforms`

To use the secure versions of the HTML forms authentication templates, copy the files from the `secureforms` directory to the following location, replacing the standard versions there:

- Windows: `webagent\samples\forms`
- UNIX: `webagent/samples/forms`

**Note:** Localized versions of the secure HTML forms authentication templates are not available; only English language versions are supplied.

## SiteMinder FCC Files

The CA SiteMinder Forms Credential Collector (FCC) incorporated into CA SiteMinder Web Agents reads template files called .fcc files. The .fcc files are written using standard HTML tags and a small amount of proprietary notation required by CA SiteMinder to verify attributes and take advantage of custom features described later in this section.

**Important!** If you create or edit an .fcc file on a Windows system and move that file to a UNIX system, your UNIX system may append ^M at the end of lines of text. These characters, which identify the file as a Windows text file, cause .fcc files to fail during authentication. When moving files from Windows text editors to UNIX systems, be sure to examine the files and remove the appended characters. To avoid this situation, create and edit .fcc files that will be used in a UNIX environment on a UNIX system.

For the HTML Forms authentication scheme, the default extension for .fcc files is .fcc. If you want to use a different extension:

- For Apache or iPlanet Web servers, configure your Web server to use that extension.
- For Domino or IIS Web servers, specify that extension in the FCCExtensions parameter of your Web Agent configuration file or object. For more information on Web Agent configuration parameters, see the Web Agent Guide.

When a user requests a resource protected by an HTML Forms scheme, the Web Agent redirects the user to an .fcc file. The .fcc file invokes the FCC on the Web server in order to collect credentials from the user via a customized form. The FCC generates a browser page and builds a user name and password based on the contents of the .fcc file. The file resides in a Web server's name space and is accessed like any HTML file. The .fcc file may contain two parts. Both parts are optional.

The first part of the FCC contains directives that are used when executing a POST operation on the .fcc file. The directives are never passed to the client. They must be at the beginning of the file and are of the form: @name=value

The name is the name of a variable. The value is the variable's value. The value may contain strings of the form: %name1%. This will be replaced by the value of the variable associated with name1.

The second part of the .fcc file contains HTML code that is returned when a GET operation is performed on the .fcc file. This part may include text in the form "\$\$name\$\$", including the quotation marks (") that will be replaced by the value associated with name. The name is not case sensitive.

The hidden inputs listed in the following figure are used to hold state for the credential collectors:

| Name                 | To dynamically set, use the value:* | Data preserved                                   |
|----------------------|-------------------------------------|--------------------------------------------------|
| target               | \$\$target\$\$                      | Resource that a user wants to access             |
| smauthreason         | \$\$smauthreason\$\$                | Reason for a login failure                       |
| postpreservationdata | \$\$postpreservationdata\$\$        | Data that a user submits through a post request. |
| smagentname          | \$\$smagentname\$\$                 | Agent name used for logging user in.             |



\*Be sure to enter the quotation marks (").

At a minimum, an .fcc file must collect the following:

- User name
- Password
- Target

Important! If users will be submitting post requests to a resource protected by an authentication scheme that uses a credential collector (see the following figure), use the postpreservationdata input. Otherwise, data that users attempt to post to the requested resource will be lost.

| Schemes                                                        |
|----------------------------------------------------------------|
| Basic Over SSL Authentication Schemes                          |
| HTML Forms Authentication Schemes                              |
| X.509 Client Certificate Authentication Schemes                |
| X.509 Client Certificate and Basic Authentication Schemes      |
| X.509 Certificate or Basic Authentication Schemes              |
| X.509 Client Certificate and HTML Forms Authentication Schemes |
| X.509 Client Certificate or HTML Forms Authentication Schemes  |

The following is an example of a valid (though simple) .fcc file:

**Creates a user name  
based on form data**

**Collects the user's  
password**

**Collects the user's  
organization**

```
@username=uid=%USER%,ou=%GROUP%,o=%ORG%
@smretries=3
<html>
<head><title>Sample Login Form</title></head>
<body>
<h3> Please enter your login credentials</h3>
<form method=post><table>
<tr>
  <td>User Name:</td>
  <td><input type=text name=USER></td>
</tr>
<tr>
  <td>Password:</td>
  <td><input type=password name=PASSWORD></td>
</tr>
<tr>
  <td>Group: </td><td><input type=text name=GROUP></td>
</tr>
<BR>
<tr>
  <td>Organization: </td>
  <td><Select Name=ORG SIZE=1>
    <OPTION>Company A
    <OPTION>Company B
    <OPTION>Company C
    <OPTION>Company D
  </SELECT></td>
  <input type=hidden name=target value="$$target$$">
  <input type=hidden name=smauthreason value="$$smauthreason$$">
</tr><td><input type=submit value=LOGIN></td></tr>
</table></form></body>
</html>
```

The file above is the usermap.fcc sample file included with the default installation of CA SiteMinder Web Agents.

The .fcc file above creates a distinguished name (DN) for the user based on the information the user enters in the User Name field and the Organization drop-down list of the HTML form. This DN is the user name authentication credential. The user's password is collected from the Password field of the HTML form. The hidden realm and target input values are also collected so that the user can be directed to the appropriate resource when authentication is complete.

**More information:**

[HTML Forms Authentication Schemes](#) (see page 282)

## How Name/Value Pairs are Generated in FCC Files

The login.fcc template generates a namespace for use in `$$name$$` expansions and for use by special name value pairs. If a name is entered more than once the last value wins. Name/value pairs are added to this namespace in the following order:

1. Name/Values from the query string (on Get only).
2. The name `smtarget` is created by copying the value of the target (on Get only).
3. Name/Values from the post data.
4. Name/Values from the cookies.
5. Name/Values from the `@` directives (on POST only).
6. Responses named in the “`smheaders`” name value pair (on POST only).

## Special Name/Value Pairs

An FCC can interpret a number of special name/value pairs (`@directives`) that invoke nonstandard processing. The special `@directives` and their meanings follow:

### **username**

Name for the login user name.

### **password**

Password to perform the login.

### **target**

Resource to access after login.

### **smheaders**

Colon separated list of response names to include in the namespace. The colon separated list must contain an entry for each header that you want to include in a transaction. For example, if you want to pass the value of `header1` and `header2` as part of a transaction, include the following line in your FCC:

```
@smheaders=header1:header2
```

### **smerrorpage**

If there is an error on a POST to the custom form, the user browser is redirected to this page. If this special value is not specified in a .fcc file, the system uses the `.unauth` file that is associated with the .fcc file as the error page.

#### **smretries**

Specifies the maximum number of login attempts allowed. If you set this directive to 0, the number of retries is unlimited. If you set the number to 1 or greater, that is the number of retries allowed.

**Note:** If users log in using a POST to an .fcc form, it appears that the user is given more attempts to log in beyond the value of the smretries directive. However, the user is allowed access only if valid credentials are entered in the number of attempts that smretries specifies.

#### **smpasswordfcc**

Determines whether data is posted from the Password Services FCC file or from a different FCC file.

**Default:** 1

**Important!** Use the default value. The SafeWord authentication scheme works properly as long as you use the default value.

#### **smusrmsg**

Text that describes why the user was challenged / failed to log in.

#### **smauthreason**

Reason code that is associated with a login failure.

#### **smsavecreds**

Set to Yes to save user credentials in a persistent cookie on the user browser.

#### **smsave**

Colon separated list of names to be saved as persistent cookies.

#### **save**

Another name for smsave.

#### **smtransient**

Colon separated list of names to be saved as transient cookies.

#### **smagentname**

Specifies the agent name that is supplied to the Policy Server when a user enters credentials and submits the form for authentication. If the Agent parameter, FCCCompatMode=NO, specify a value using this directive.

#### **smlogout**

Logs a user out of the system, similar to the LogoffUri parameter. By placing @smlogout=true in your .fcc template, the FCC logs a user out and redirect the user to the target. As such, the @smlogout directive is typically used with the @target directive (@target=<yoururlhere>).

**urlencode(*name*)**

Replaced by the URL encoded value of the named variable.

**Note:** If you expect the additional attributes or the Password to contain special characters (" . & = + ? ; / : @ = , \$ %), URL-encode each additional attribute value in the .fcc template file. The template uses US-ASCII encoding.

**urldecode(*name*)**

Replaced by the URL decoded value the named variable.

**Note:** The “sm” prefix for name/value pairs is reserved for additional special names that the system requires. When creating names for your login page do not use the “sm” prefix.

## Localization Name/Value Pairs

The .fcc template files include two localization parameters:

**smlocale**

Used to determine the language used in the HTML forms that collect user information or display status messages.

The value that is paired with **smlocale** corresponds to part of the name of a localization properties file. The localization properties file contains IDs mapped to text strings in the specified language.

**smlocale** values have the following format:

COUNTRY-LANGUAGE

For example, the value for **smlocale** for United States English is:

SMLOCALE=US-EN

**smenc**

Contains information that tells the browser what language encoding to use. Changing the default value for this variable overrides the encoding set in the following META tag:

```
<meta http-equiv="Content-Type" content="text/html; charset=ISO-8859-1">
```

## Collect Additional Attributes

In addition to the user name and password, you can collect other attributes from users, such as an email address or job title.

### Follow these steps:

1. Specify the attribute or attributes by configuring the HTML forms authentication scheme and the associated .fcc template file.
2. Configure the HTML forms authentication scheme by specifying new attributes in the Additional Attribute List fields of the Scheme Setup dialog.

**Note:** If you expect the additional attributes or the Password to contain special characters (" . & = + ? ; / : @ = , \$ %), URL-encode each additional attribute value in the .fcc template file. The template uses US-ASCII encoding.

3. Modify the .fcc template file to collect additional attributes.

Add the following line at the beginning of the file:

```
@password=PASSWORD=%PASSWORD%&newattr1=%newattr1%&newattr2=%newattr2%
```

If the additional attributes have special characters, the line looks like the following sample:

```
@password=PASSWORD=%urlencode(PASSWORD)%&newattr1=%urlencode(newattr1)%&newattr2=%urlencode(newattr2)%
```

**newattr1=%newattr1%**

Represents the first additional attribute.

**newattr2=%newattr2%**

Represents the second additional attribute.

The value before the equal sign is the attribute name and the value between the percent sign (%) sign is the attribute value.

The FCC parses the names of the new attributes from the attribute values.

**Note:** Append additional attributes to the @password directive with the ampersand (&) character.

When you add attributes to the template file, consider the following points:

- The attribute name, which the `%attribute_name%` format identifies, must match the input name entry that you also add to the file. For example, if you add the new attribute address:

```
@password=PASSWORD=%PASSWORD%&mail=%address%
```

or

```
@password=PASSWORD=%urlencode(PASSWORD)%&mail=%urlencode(address)%
```

you add a line to the .fcc file similar to the following string:

```
<input name="address" type="text">
```

- The name of the additional attribute must match the name of the attribute in the user directory. For example, to collect email addresses from an LDAP directory, specify one of the following strings:

```
@password=PASSWORD=%PASSWORD%&mail=%address%
```

or

```
@password=PASSWORD=%urlencode(PASSWORD)%&mail=%urlencode(address)%
```

where mail is the name of the LDAP attribute that stores email addresses.

- Do not add more spaces after the value you specify for the @password directive. Additional spaces can be interpreted as meaningful characters and can prevent users from being authenticated.
- The name of the attribute in the HTML forms authentication scheme must match the name of the additional attribute in the .fcc file.

For example, to add the attribute mail (from the previous example ) to the authentication scheme, enter the following string in the Additional Attributes List field:

```
AL=PASSWORD,mail
```

**Note:** The additional attribute names are case-sensitive.

#### More information:

[HTML Forms Authentication Schemes](#) (see page 282)

## Tell Users Why Login Failed

The default behavior of forms-based authentication is to redirect unauthenticated or unauthorized users back to the original login form. To provide users with more login attempts, configure the `smretries` directive (`@smretries`). Be aware that the default behavior does not let the software display a message informing users why the login failed.

The Web Agent ships with the DynamicRetry.fcc and DynamicRetry.unauth files. This pair of .fcc files changes the behavior of the redirect. The login page (DynamicRetry.fcc) is configured to send users to the unauthorized page (DynamicRetry.unauth) after one failed login attempt. The unauthorized page is a different template file than the login file. As a result, the unauthorized page can contain a message stating why the login failed. By default, the unauthorized page displays a message that informs users that they have entered invalid credentials for the resource they are attempting to access.

**Note:** You can change this message by opening DynamicRetry.unauth and updating the text in between the h3 tags.

To tell users why login failed, specify the target path to the DynamicRetry.fcc file when configuring the authentication scheme. The default path to the DynamicRetry.fcc file is *agent\_home\samples\forms\DynamicRetry.fcc*

***agent\_home***

Specifies the Web Agent installation path.

Consider the following limitations when using the DynamicRetry pair of .fcc files:

- You cannot count user login attempts based on the SMTRYNO cookie.
- You cannot limit the number of login attempts.

**Note:** You can use this method in combination with Password Services to disable users with a password policy after a specified number of failed attempts. More information about password policies exists in the Password Policies.

## Configure an HTML Form Authentication Scheme

You can use an HTML Forms authentication scheme to authenticate users with a custom HTML form.

**Note:** The following procedure assumes that you are creating an object. You can also copy the properties of an existing object to create an object. For more information, see Duplicate Policy Server Objects.

**Follow these steps:**

1. Click Infrastructure, Authentication.
2. Click Authentication Schemes.
3. Click Create Authentication Scheme.

Verify that the Create a new object of type Authentication Scheme is selected.

Click OK

4. Enter a name and protection level.
5. Select HTML Form Template from the Authentication Scheme Type list.



6. Enter Web Server Name, Target, and Additional Attribute List information.

**Note:** Verify that the .fcc file you specify in the Target field complies with the guidelines for this field.

7. Click Submit.

The authentication scheme is saved and can be assigned to a realm.

## Enable Non-browser Client Support

You can configure HTML Form schemes that collect Basic credentials (user name and password) using non-browser HTTP clients. These clients can be developed using Perl scripts, C++, and Java programs that communicate using HTTP protocol.

Custom clients must send the basic credentials with the initial request through an HTTP authorization header or the Policy Server does not authenticate the users. If the credentials are not sent through an HTTP authorization header, the Policy Server redirects to the HTML Form scheme without non-browser client support.

### Follow these steps:

1. Open the HTML Form authentication scheme.
2. Select the Support non-browser clients check box.
3. Click Submit.

Non-browser client support is enabled.

## Windows Authentication Schemes

Integrated Windows Authentication (IWA) is a proprietary mechanism developed by Microsoft to validate users in pure Windows environments. The Windows authentication scheme available with the Policy Server secures resources by processing user credentials that the Microsoft Integrated Windows authentication infrastructure obtains.

Previous versions of the product supported Windows authentication through the NTLM authentication scheme. However, this support was limited to environments with NT Domains or where the Active Directory service is configured to support legacy NT Domains in mixed mode.

The Windows authentication scheme provides access control in deployments with Active Directories running in native mode. The scheme also supports Active Directories that are configured to support NTLM authentication. The Windows authentication scheme replaces the product's NTLM authentication scheme. Existing NTLM authentication schemes continue to be supported and can be configured using the new Windows authentication scheme.

**Note:** In some circumstances, it is better to combine Windows User Security Context functionality with other authentication schemes instead of using the Windows authentication scheme.

The Windows authentication scheme is for resources that Web Agents on IIS web servers protect, and whose users access resources using Internet Explorer web browsers. This scheme relies on a properly configured IIS web server to acquire and verify user credentials. The Policy Server bases authorization decisions on a user identity as asserted by the IIS server.

**More information:**

[Windows User Security Context Requirements](#) (see page 109)

## Review Kerberos Support Considerations

Kerberos is a network protocol for domain authentication in supported Windows and UNIX environments. Creating a CA SiteMinder Kerberos authentication scheme is part of the process of configuring Kerberos authentication for your network.

See CA SiteMinder Kerberos AAuthentication for further information.

## Verify that Windows Authentication Prerequisites Are Met

Verify that the following prerequisites are met before configuring a Windows authentication scheme:

- For legacy WinNT directories or Active Directory in mixed mode:
  - The user directory connection that you create in the Administrative UI specifies the WinNT namespace.
  - The requested resources can be on any type of web server. However, the authentication server and the web agent protecting those resources must be on a Microsoft IIS web server.
- For Active Directories running in native mode:
  - User data resides in an Active Directory.
  - User directory connections must specify either an LDAP or AD namespace.

- The requested resources can be on any type of web server. However, the authentication server and the web agent protecting those resources must be on a Microsoft IIS web server.
- Client and server accounts are enabled for delegation.
- Users must use a browser that supports sending windows credentials and that is configured properly to send those credentials automatically.
- To work on IIS in Windows, the "Verify that file exists" option in the Wildcard Application Maps must not be set.
- Windows Authentication schemes also require that any virtual directory on the IIS web server that contains the creds.ntc file remain unprotected.
- Internet Explorer browser options are configured for automatic logon with the current username and password of the user.

## Review Windows Authentication Scheme Considerations

The IIS web server, not the Policy Server, performs authentication based on credentials it receives from the Internet Explorer web browser. Therefore, you cannot use the OnAuthAttempt authentication event to redirect users who do not exist in the user store.

## Configure a Windows Authentication Scheme

You can use a Windows authentication scheme to authenticate users in a Windows environment.

**Note:** The following procedure assumes that you are creating an object. You can also copy the properties of an existing object to create an object. For more information, see Duplicate Policy Server Objects.

### Follow these steps:

1. Click Infrastructure, Authentication.
2. Click Authentication Schemes.
3. Click Create Authentication Scheme.  
Verify that the Create a new object of type Authentication Scheme is selected.  
Click OK
4. Enter a name and protection level.
5. Select Windows Authentication Template from the Authentication Scheme Type list.  
Scheme-specific settings appear.

6. Enter Server Name, Target, and User DN information. If your environment requires NT Challenge/Response authentication, obtain the following values from the agent owner:

**Server Name**

The fully qualified domain name of the IIS web server, for example:  
server1.myorg.com

**Target**

/siteminderagent/ntlm/smntlm.ntc

**Note:** The directory must correspond to the virtual directory already configured by the installation. The target file, smntlm.ntc, does not need to exist and can be any name that ends in .ntc or the custom MIME type that you use in place of the default.

**Library**

**smauthntlm**

7. Click Submit.

The authentication scheme is saved and can be assigned to a realm.

## Information Card Authentication Schemes

The Information Card Authentication Scheme (ICAS) feature lets you create multiple information card authentication schemes. Each one is configured as a custom authentication scheme.

### Introduction to Information Cards

Information cards are like the physical cards that we carry in our wallets. Each information card represents a set of identity information. For example, an information card that represents a driver's license might contain the following sensitive identity information: photo, birth date, first and last name, and driver's license number.

Information cards let users manage their identity information. Users can view their information cards and the associated identity information. They can choose from the available cards for a given information exchange. And they can authorize the release of the identity information associated with a selected card.

Information cards are exposed by an Identity Selector.

## Introduction to Identity Selectors

An Identity Selector is an application that lets users manage their identity information and their online relationships with Relying Parties and Identity Providers. A Relying Party (RP) is the web site, application, or service that requires identity information to authenticate the user. The Identity Provider (IdP) is a third party that authenticates identity information and creates security tokens that the user can share with the Relying Party.

Identity Selectors allow users to access web-based resources without having to manage a multitude of user names and passwords. Likewise, businesses no longer have to maintain a database of user identity information that can be inaccurate and vulnerable to misuse. Eliminating the maintenance of users and databases reduces risk and liability while enhancing agility.

Identity Selectors also give the user control over the identity information is released to each Relying Party. And finally, Identity Selectors provide users with a consistent user interface and better user experience.

### Windows CardSpace

Windows CardSpace is the Microsoft implementation of an Identity Selector. CardSpace provides users with a consistent user interface for interacting with any Relying Party or Identity Provider. The Policy Server supports Windows CardSpace through a custom authentication scheme called Information Card Authentication Scheme (ICAS).

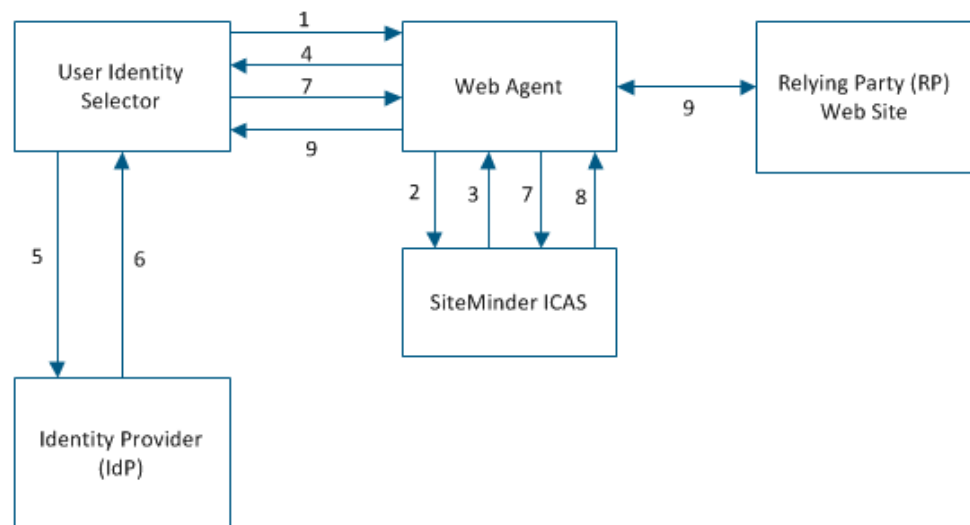
### SiteMinder Information Card Authentication Scheme (ICAS)

The Information Card Authentication Scheme (ICAS) available on the Policy Server supports Windows CardSpace. Each instance of ICAS is configured as a custom authentication scheme in the Administrative UI and implemented like any other custom authentication scheme.

## ICAS Overview

Authenticating a user with ICAS involves these components and steps:

- User
- Identity Selector
- Web Agent
- Relying Party (RP)
- Identity Provider (IdP)



1. A user wants to visit a protected web site or Relying Party (RP).
2. The Web agent intercepts the user's request and invokes ICAS.
3. ICAS sends the RP policy requirements to the Web agent.
4. The Web agent instructs the browser to launch an Identity Selector on the user's computer and sends the RP policy requirements.
5. The Identity Selector reads the policy requirements and highlights for the user those information cards that satisfy the requirements. The user selects one highlighted card. The Identity Selector collects the user's credentials and sends them to the Identity Provider (IdP) for authentication. The Identity Selector also sends the RP policy requirements to the IdP and requests a token.

**Note:** The user can select a card that contains optional claims that are not required by the RP.

6. The IdP authenticates the user and processes the policy requirements. It generates a token containing the required claims and sends it back to the Identity Selector.
7. The Identity Selector displays the claims, and the user approves release of the claims to the RP.

8. ICAS decrypts the token, verifies the token authenticity and integrity, and associates the user claims to a user's identity in the user database. The Policy Server then performs standard policy-based authorization and grants access to the user if authorized.
9. The user accesses the web site.

## ICAS Terms

The following terms are useful for understanding ICAS:

### **Identity Metasystem**

An architecture that specifies how identity information is shared by users, Relying Parties, and Identity Providers.

### **User**

The person whose identity information is being shared. Sometimes, the user is called the subject.

### **Relying Party (RP)**

The Web site that requests and consumes identity information.

### **Identity Provider (IdP)**

A third party that authenticates identity information and shares the information with Relying Parties by creating security tokens. Credit card companies, banks, government agencies, employers, and insurance companies are all examples of Identity Providers.

### **Security Token Service (STS)**

The technology that the Identity Providers use to create security tokens. A Security Token Service:

- Authenticates users.
  - Creates security tokens that
    - Contain different subsets of identity information, depending on the requirements of the Relying Party and the restrictions of the user.
    - Are of different types.
- Note:** SAML 1.0 and 1.1 specifications are supported.
- Are encrypted for security and signed for authenticity and integrity.

### **Security Token**

A cryptographically signed and encrypted set of claims.

### **Claim**

An assertion of truth. Each token contains one or more claims about the user's identity. Examples of claims are the first name, last name, email address, birth date, and so on. The user or a third-party Identity Provider can make claims.

### Information Card

A set of identity information. Information cards are comparable to the physical cards that we carry in our wallets. For example, an information card that corresponds to a driver's license can contain the following sensitive identity information: photo, birth date, first and last name, license number, state, height, and sex.

### Personal Card

An information card that contains claims that the user asserts about himself, but a third party does not corroborate the claims. A personal card contains a Private Personal Identifier (PPID) that is generated when the card is created. Personal cards are appropriate for low-sensitivity identity information, such as an email address.

**Note:** Personal cards are also called self-issued cards.

### Managed Card

An information card contains claims that the user asserts about himself and that are corroborated by a third party. A managed card contains a Private Personal Identifier (PPID) that is generated when the card is created and a pointer to the Identity Provider's STS. Managed cards are appropriate for sensitive identity information, such as a credit card number.

### Identity Selector

An application that lets users manage their relationships with Relying Parties and Identity Providers and control how their identity information is shared and used. An identity selector:

- Enables sharing of information between parties that use multiple communication protocols and security technologies
- Provides a consistent user interface across multiple Identity Providers and Relying Parties using information cards
- Highlights those information cards that are available for each exchange of identity information
- Lets users view and consent to sharing identity information

### Windows CardSpace

Microsoft's Identity Selector for the Windows operating system.

### Information Card Authentication Scheme (ICAS)

Support for Windows Cardspace, Microsoft's Identity Selector, implemented in SiteMinder as a custom authentication scheme.

### Private Personal Identifier (PPID)

Identifier generated by the Identity Selector when an information card is created.



## ICAS Files

Two files are required to configure each instance of ICAS: the fcc file and the properties file.

### ***filename.fcc***

Specifies the authentication settings that you can customize for each instance of ICAS.

### **InfoCard.fcc**

A sample fcc file that is shipped with the Web Agent kit.

### ***filename.properties***

Specifies how an instance of ICAS behaves.

### **InfoCard.properties**

A sample properties file

**Note:** When configuring an instance of ICAS in the Administrative UI, the administrator specifies the path to the properties file.

## ICAS Prerequisites

Before you can implement ICAS, the following conditions must be met:

### **Web Browser Configuration**

Use one of the following web browsers:

- Internet Explorer 7.0
- Firefox 2.x with CardSpace plug-in

### **Web Server Configuration**

The Web Server must be configured for SSL communication. This configuration protects the fcc file.

**Note:** For more information, see the *Web Agent Configuration Guide*.

### **Web Agent Configuration**

The InfoCard.fcc file that is shipped with the Web Agent kit must be customized for each instance of ICAS.

**Note:** For more information, see the *Web Agent Configuration Guide*.

### **Java Runtime Environment (JRE) Configuration**

The Java Runtime Environment must be configured to decrypt security tokens that are encrypted with strong encryption algorithms.

### Policy Server Configuration

Policy Server configuration includes the following tasks:

- Configuring an ICAS properties file.
- Configuring the certificate data store.
- Configuring a user directory for ICAS.
- Creating an instance of ICAS.
- Configuring an active response that retrieves a claim value.

### Configure the Java Runtime Environment (JRE) for ICAS

Configure the Java Runtime Environment (JRE) by installing the Java Cryptography Extension (JCE) Unlimited Strength Jurisdiction policy files. These files are needed to decrypt security tokens that are encrypted with strong encryption algorithms.

**Important!** Back up the default policy files that are shipped with the JRE before installing the new policy files.

**Follow these steps:**

1. Download the Java Cryptography Extension (JCE) Unlimited Strength Jurisdiction policy files from <http://www.oracle.com/technetwork/java/index.html>.
2. Install them in the \$NETE\_JRE\_ROOT\lib\security directory.
3. Add the following line to the \$NETE\_JRE\_ROOT\lib\security\java.security file:  
`security.provider.7=com.rsa.jsafe.provider.JsafeJCE`

### How to Configure the Policy Server for ICAS

Configuring the Policy Server for ICAS includes the following steps:

1. Configure an ICAS properties file.
2. Store claims for later use in active responses.
3. Configure the certificate data store for ICAS.
4. Configure a user directory for ICAS.
5. Create an instance of ICAS.
6. Configure an active response that retrieves a claim value.
7. Configure support for ICAM white list.

## Configure an ICAS Properties File

An ICAS properties file specifies how an instance of ICAS behaves. When configuring an instance of ICAS in the Administrative UI, the administrator specifies the path to the associated properties file. To configure a new properties file, open a sample properties file with a text editor and edit the contents. Always save and rename the new properties file.

**Note:** Multiple instances of ICAS can use the same properties file.

**Example:** A properties file named InfoCard.properties contains the following properties and sample values:

### **fcc**

Specifies the location of the Information Card fcc file.

**Example:** fcc=https://web\_server\_home/siteminderagent/forms/InfoCard.fcc

**Note:** To activate the Identity Selector, specify "https".

### **vppid\_attribute**

Specifies the VPPID attribute value. The command UpdateUserStoreWithVPPID requires this attribute to update a user attribute.

**Example:** vppid\_attribute=mail

### **vppid\_claim**

Specifies the claim necessary to disambiguate the user.

#### **Examples:**

vppid\_claim=http://schemas.xmlsoap.org/ws/2005/05/identity/claims/surname

vppid\_claim=http://schemas.xmlsoap.org/ws/2005/05/identity/claims/givenname

vppid\_claim=http://schemas.xmlsoap.org/ws/2005/05/identity/claims/emailaddresses

### **alias**

Specifies the key in the certificate data store that is used to retrieve the SSL certificate of the Relying Party.

**Example:** alias=rpssl

### **guestuser**

If ICAS is configured in *anonymous* mode, this setting specifies the guest user login.

**Example:** guestuser=guest

### **tokenPrim**

Specifies the provider of the tokenPrim interface.

**Example:** tokenPrim=com.ca.sm.authscheme.infocard.higgins.TokenAdapter

**storeclaims\_attribute**

Specifies the user attribute where the claims are stored when the command *StoreClaimsToUserStore* is executed.

**Example:** storeclaims\_attribute=description

**preprocessingchain**

Defines a chain of commands to execute during user disambiguation.

**Example:** preprocessingchain=+vppidchain

**Note:** For more information, see [Configure ICAS Command Chains](#) (see page 308).

**postprocessingchain**

Defines a chain of commands to execute during user authentication.

**Example:**

postprocessingchain=+vppidchain;com.ca.sm.icas.command.StoreClaimsToContext

**Note:** For more information, see [Configure ICAS Command Chains](#) (see page 308).

**errorprocessingchain**

Defines a chain of commands to execute during error processing.

**Note:** For more information, see [Configure ICAS Command Chains](#) (see page 308).

**whiteListLocation**

(Optional) Defines the location of the XML file that contains the White List that is specified by Federal Identity, Credentialing, and Access Management (ICAM).

**Example:** whiteListLocation=C:\\Program  
Files\\ca\\siteminder\\config\\WhiteList.xml

**Note:** For more information about ICAM White List, see [Configure Support for the ICAM White List](#) (see page 317).

## Configure ICAS Command Chains

Command chains are defined in the ICAS properties file. A chain is a set of commands that executes in an orderly manner.

The named chain commands include:

- preprocessing
- postprocessing
- errorprocessing

These named chains are present by default.

Consider the following information:

- If the specific named chains are found in the ICAS properties file, then ICAS uses these named chains.
- You can define your own chains then place them in the ICAS properties file and refer them in the named chains.
- If any customized chain is not referred in any of these named command chains, that chain execution is ignored.

According to your requirements, configure the following class files:

- [Key class files to configure ICAS](#) (see page 309)
- [Class files to check the values of claims](#) (see page 310)
- [Class files to debug](#) (see page 311)

## Key Class Files to Configure ICAS

The following key class files are used to configure ICAS:

### **com.ca.sm.icas.StoreClaimsToSessionStore**

Stores extracted claims to the session store of Policy Server.

### **com.ca.sm.icas.command.ExecuteClaimChain**

Executes a set of commands over a claim. For each claim name, which forms the last part of the namespace, ICAS looks for a chain that is defined as chainID.claimID in the properties file. If the chain definition is found, then ICAS executes it and passes the context with the specific claim.

#### **Example:** For

executeClaimCommand1=com.ca.sm.icas.command.ExecuteClaimChain, define the email claim as follows:

**executeClaimCommand1.emailaddress=com.ca.sm.icas.command.DumpClaimsCommand;**

Processes the DumpClaimsCommand if a token is found with an emailaddress claim.

### **com.ca.sm.icas.command.HashVPPID**

Generates a hash of the VPPID claim attribute.

### **com.ca.sm.icas.command.SetVPPIDAsAnonymous**

Sets the VPPID claim attribute value to anonymous. This class file is used for logging in with information cards that are not linked to any user accounts (anonymous access).

### **com.ca.sm.icas.command.SetVPPIDFromToken**

Sets the VPPID claim attribute value from the information card token to the context object.

**com.ca.sm.icas.command.StopChain**

Returns the value true, which stops the execution of the currently running chain.

**com.ca.sm.icas.command.StoreClaimsToContext**

Reads the claims from the information card token and store them to the application-specific context.

**com.ca.sm.icas.command.StoreClaimsToUserStore**

Stores the claims read from the information card token to a specified user attribute (in the ICAS properties file) in the user directory.

**com.ca.sm.icas.command.TransformScriptInClaim**

Escapes the script tags (<, >) in the claims using HTML entities. For example, <td> becomes &lt;td;&gt;

**com.ca.sm.icas.command.TransformSqlInClaim**

Escapes the characters in a claim value so that it can be passed to an SQL query.

**com.ca.sm.icas.command.TranslateErrorCode**

Translates the exception string that is found within context. This translated string is stored back into the context.userText that is available in the FCC.

**com.ca.sm.icas.command.TranslateErrorCodeFromParms**

Translates the exception string that is found within the ICAS properties file. This translated string is stored back into the context.userText that is available in the FCC.

**com.ca.sm.icas.command.UpdateUserStoreWithVPPID**

Stores the claims read from the information card token to a specified user attribute (available in the ICAS properties file) from the user directory.

## Class Files to Check the Values of Claims

The following class files are used to check the values of claims:

**com.ca.sm.icas.StoreClaimsToSessionStore**

Stores extracted claims to the session store of Policy Server.

**com.ca.sm.icas.command.ErrorIfEmptyClaim**

Generates an exception when the claim is empty.

**com.ca.sm.icas.command.ErrorIfMultiValueClaim**

Generates an exception when the given claim has multiple values.

**com.ca.sm.icas.command.ErrorIfNotEmptyClaim**

Generates an exception when the given claim is not empty.

**com.ca.sm.icas.command.ErrorIfNotMultiValueClaim**

Generates an exception when the given claim is not multivalued.

**com.ca.sm.icas.command.ErrorIfNotNullClaim**

Generates an exception when the given claim is not null.

**com.ca.sm.icas.command.ErrorIfNotSingleValueClaim**

Generates an exception when the given claim is not single valued.

**com.ca.sm.icas.command.ErrorIfNullClaim**

Generates an exception when the given claim is null.

**com.ca.sm.icas.command.ErrorIfSingleValueClaim**

Generates an exception when the given claim is single valued.

## Class Files to Debug

The following class files are used for debugging purpose:

**com.ca.sm.icas.command.debug.DumpChainID**

Displays the chain ID on the console.

**Note:** To view the output, start the Policy Server in the console mode.

**com.ca.sm.icas.command.debug.DumpClaim**

Displays the VPPID claim details (name and value) on the console.

**Note:** To view the output, start the Policy Server in the console mode.

**com.ca.sm.icas.command.debug.DumpClaims**

Displays the details of all the claims in the token on the console

**Note:** To view the output, start the Policy Server in the console mode.

**com.ca.sm.icas.command.debug.DumpContext**

Displays the details of the context object on the console.

**Note:** To view the output, start the Policy Server in the console mode.

**com.ca.sm.icas.command.debug.DumpParameters**

Displays the details of the parameters that are specified in the ICAS properties file on the console.

**Note:** To view the output, start the Policy Server in the console mode.

**com.ca.sm.icas.command.debug.DumpSystemVars**

Displays the details of the system environment on the console.

**Note:** To view the output, start the Policy Server in the console mode.

**com.ca.sm.icas.command.debug.DumpThreadStack**

Displays the stack trace of the executing thread on the console.

**Note:** To view the output, start the Policy Server in the console mode.

**com.ca.sm.icas.command.debug.GenerateClaim\_claims\_AsHTML**

Generates a new claim "\_claims\_" that has an HTML table representing the known claims. You can use this claim in an active response to create a cookie or header to show the retrieved claims to a user.

**com.ca.sm.icas.command.debug.GenerateClaim\_parameters\_AsHTML**

Generates an HTML table representing the parameters that are specified in the ICAS properties file. You can use this HTML table in an active response to create a cookie or a header to show the retrieved claims to a user.

**com.ca.sm.icas.command.debug.LogClaim**

Writes the claim details (name and value) in the chain context to the Policy Server trace logs.

**com.ca.sm.icas.command.debug.LogClaims**

Writes the details of all the claims in the token to the Policy Server trace log.

**com.ca.sm.icas.command.debug.LogDecryptedClaims**

Logs the decrypted XML token to the Policy Server trace log.

**com.ca.sm.icas.command.debug.LogEncryptedClaims**

Logs the encrypted token that is obtained from the IDP to the Policy Server trace logs.

**com.ca.sm.icas.command.debug.START**

Displays a START message on the console.

**Note:** To view the output, start the Policy Server in the console mode.

**com.ca.sm.icas.command.debug.STOP**

Displays a STOP message on the console.

**Note:** To view the output, start the Policy Server in the console mode.

**com.ca.sm.icas.command.debug.ThrowException**

Generates an exception object that includes the claim value as a part of the message.



## Store Claims for Later Use in Active Responses

You can store claims for later use in active responses. To store claims for later use, add the following property to the properties file:

### **postprocessingchain**

Defines the chain of commands to execute during user authentication. This phase includes any claim transformation and storage commands.

#### **Example:**

```
postprocessingchain=com.ca.sm.authscheme.infocard.command.StoreClaimsToContext
```

## Configure the Certificate Data Store for ICAS

Consider the following information:

- The Relying Party must use SSL to protect the fcc file.
- The Relying Party must export the SSL certificate that is associated with the website to a pfx file.
- A Policy Server administrator configures the certificate data store for ICAS by importing the SSL certificate from the Relying Party website.
- The imported certificate is associated with an alias, which is stored in the fcc file. The private key of the certificate is used to decrypt the security token and verify the digital signature.

### **Follow these steps:**

1. Use the Web Server Certificate Wizard and export the SSL certificate from an IIS web server to a pfx file.

**Note:** For more information, see the Microsoft documentation. To import the SSL certificate from the pfx file, the Policy Server uses the password that you provide when exporting the SSL certificate to the pfx file.

2. Import the SSL certificate into the certificate data store using the Administrative UI.

## Configure a User Directory for ICAS

Authentication of the user depends on finding a match between one of the claims that are presented to ICAS and a user attribute in the user database. During token disassembly, the specified claim value is used as a lookup value in the user directory. Therefore, configure the user directory so that the LDAP lookup string or SQL query scheme specifies the user attribute that corresponds to the specified claim.

The following examples show how to configure an LDAP lookup string and SQL query scheme for an email address.

### LDAP Example

LDAP User DN Lookup

**Start**

(mail=

**End**

)

### SQL Example

SQL Queries

#### Get User/Group Info

```
SELECT EmailAddress, 'User' FROM SmUser WHERE EmailAddress = '%s' UNION  
SELECT Name, 'Group' FROM SmGroup WHERE Name = '%s'
```

#### Authenticate User

```
SELECT EmailAddress FROM SmUser WHERE EmailAddress = '%s' AND Password  
= '%s'
```

## Create an Instance of ICAS

You can create an instance of ICAS by specifying a custom authentication scheme in the Administrative UI.

**Limit:** Each policy store can support up to ten instances of ICAS.

### Follow these steps:

1. Click Infrastructure, Authentication.
2. Click Authentication Schemes.
3. Click Create Authentication Scheme.
4. Select Create a new object of type Authentication Scheme, and click OK.
5. Enter the authentication scheme name and description.

6. Select Custom Template from the list of Authentication Scheme Types.  
The Scheme Setup group fields appear.
7. Enter a value in the Protection Level field.
8. Clear the Password Policies enabled for this Authentication Scheme Types.  
**Note:** ICAS does not support Password Policies.
9. Enter the values for the following fields in Scheme Setup:

**Library**

smjavaapi

**Note:** The custom authentication scheme uses the Java Authentication API.

**Secret and Confirm Secret**

Leave these fields blank.

**Note:** The custom authentication scheme does not use the shared secret.

**Parameter**

Type the following two parameters in the Parameter field and separate them by a space:

**com.ca.sm.icas.SmAuthInfoCard**

This is the fully qualified name of the class that implements the SmAuthScheme interface.

**policy\_server\_home\config\icas\InfoCard.properties**

This is the location of the properties file.

Example:

```
com.ca.sm.icas.SmAuthInfoCard  
policy_server_home\config\icas\InfoCard.properties
```

10. (Optional) Select the Store Auth Scheme Context to Session Store option in the Scheme Setup. This option specifies that the authentication context data is persisted.
11. Click Submit.

The Create Authentication Scheme task is submitted for processing.

## Configure an Active Response that Retrieves a Claim Value

To configure an active response that retrieves a claim value after authentication is complete, use the custom class `com.ca.sm.icas.GetClaimValue`

**Note:** Storing and retrieving claim values requires a session store. For more information about session stores, see the *Policy Server Administration Guide*.

**Follow these steps:**

1. Click Policies, Domain.
2. Click Responses.
3. Click Create Response.
4. Select a domain, and click Next.
5. Type the name and a description of the response.
6. Specify Web Agent as the Agent Type.
7. Click Create Response Attribute in Attribute List.
8. Select WebAgent-HTTP-Header-Variable or WebAgent-HTTP-Cookie-Variable from the list of attributes in Attribute Type.
9. Select Active Response as the Attribute Kind in Attribute Setup.
10. Type the following values in the Attribute Fields.

**Cookie or Variable Name**

Specifies the name of the claim.

**Example:** emailaddress

**Library Name**

Specifies the name of the library.

**Value:** smjavaapi

**Function Name**

Specifies the name of the function.

**Value:** JavaActiveExpression

**Parameters**

Specifies the custom ICAS command and the location of the file, claims.xsd, that defines standard claim types according to the Information Card model.

**Example:** com.ca.sm.authscheme.infocard.GetClaimValue  
<http://schemas.xmlsoap.org/ws/2005/05/identity/claims/emailaddress>

11. Click OK.

The response that retrieves a claim value is created.

## Configure Support for the ICAM White List

The ICAS implementation supports the Federal Identity, Credentialing, and Access Management Identity Metasystem Interoperability 1.0 Profile (ICAM IMI 1.0 Profile) specification, which is based on White List of issuers and LOA authorization.

**Note:** For more information about White List and LOA support, see *ICAM IMI 1.0 Profile Release Candidate*.

To enable White List processing, update the following parameters in the *Infocard.properties* file.

### **postprocessingchain**

Defines the chain of commands to execute during user authentication.

**Example:** `postprocessingchain=com.ca.sm.icas.whiteListChecker.whiteListChecker`

### **whitelistlocation**

Defines the location of the XML file that contains the White List that is specified by ICAM.

**Example:** `whitelistlocation=C:\\Program  
Files\\ca\\siteminder\\config\\WhiteList.xml`

The ICAS implementation supports the verification of three Level of Assurances (LOAs)

- LOA1
- LOA2
- LOA3

White List processing is mandatory to verify LOA1, LOA2, and LOA3. Append the following details to the `postprocessingchain` parameter to support LOA processing:

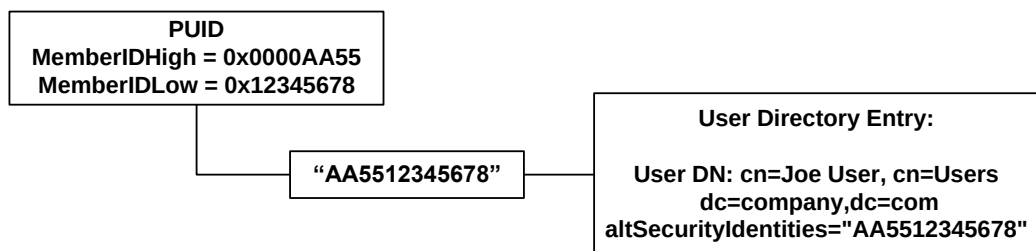
- For LOA1 processing  
`postprocessingchain=com.ca.sm.icas.whiteListChecker.whiteListChecker;  
com.ca.sm.icas.whiteListChecker.ErrorIfLOA1ClaimMissing`
- For LOA2 processing  
`postprocessingchain=com.ca.sm.icas.whiteListChecker.whiteListChecker;  
com.ca.sm.icas.whiteListChecker.ErrorIfLOA2ClaimMissing`
- For LOA3 processing  
`postprocessingchain=com.ca.sm.icas.whiteListChecker.whiteListChecker;  
com.ca.sm.icas.whiteListChecker.ErrorIfLOA3ClaimMissing`

## MS Passport Authentication Schemes

Microsoft® .NET Passport is an online service that provides common Internet authentication across participating Web sites. Using a .NET Passport account, a user can move among participating sites without the need to authenticate with each of them. These sites become participating .NET Passport sites by implementing support for the .NET Passport authentication service through the .NET Passport single sign-in (SSI). This implementation includes a link to login through Passport using a common interface that supports co-branding. Users that are already logged into Passport will automatically be authenticated with the site, by means of a browser redirect to acquire Passport identity, and creation of site cookies containing the Passport identity. However, Passport does not authorize or deny a specific user's access to participating sites or resources.

The Passport identity does not contain any data for authorization. The only field that can be used to derive identity and subsequently permissions is the Passport Unique ID (PUID). CA SiteMinder uses this PUID to map to a local identity that is used to personalize the site and to authorize access to resources protected by CA SiteMinder policies.

The PUID is converted to a string and is mapped to a CA SiteMinder identity through a user directory attribute. In the following diagram, the user DN for "Joe User" is mapped to a Passport PUID through the directory attribute "altSecurityIdentities".



Since Passport authentication in CA SiteMinder is based on mapping the Passport identity to a CA SiteMinder user, registration is a required component for using Passport for authentication or personalization.

Registration is controlled through a registration URL that is configured in the authentication scheme. The configuration parameter is `?registrationurl=?` followed by a registration page or the keyword "FORM=" and CA SiteMinder form URL. This model provides two methods for registration of Passport users.

The first method uses a site-provided web application to link the Passport identity with a CA SiteMinder user account through the attribute configured in the authentication scheme. This requires the site to develop the web pages to accept registration data and to provide a service for setting the user directory attribute. CA SiteMinder can be used to provide the interfaces to the user directory and the secure tunnel behind the firewall using a tunnel service.

The second method of registration leverages the CA SiteMinder FCC and the forms authentication model. When the registrationurl includes the keyword FORM=, the subsequent URL is treated as a forms redirect. CA SiteMinder provides the passport.fcc file to use as a template for developing a Passport registration page using forms.

CA SiteMinder [insert SiteMinder version number] provides a Passport Authentication Scheme template. The library name is smauthmspp. This authentication scheme can be used on both Windows and UNIX Policy Servers.

## Passport Authentication Support in the Policy Server

The Policy Server and CA SiteMinder Web Agents support the following implementations of Passport authentication:

- Passport authentication established through a common registration URL
- Passport authentication using CA SiteMinder HTML forms for registration
- Anonymous logins when no Passport identity exists

For information about deploying Passport authentication in your enterprise, see: <http://www.microsoft.com>

## Set Protection Levels for Passport Authentication

Since the process of establishing a Passport identity does not include any authorization for access to participating sites or resources, the Passport authentication scheme should be assigned a relatively low protection level. We recommend using Passport authentication for personalization, and enforcing an authentication scheme with a higher protection level for sensitive resources. For example, Passport users could be authenticated, and their identities established using a CA SiteMinder protection level of 1. When the users request sensitive financial information, they might be forced to reauthenticate using an HTML forms authentication scheme with a protection level of 10.

## Passport Authentication Prerequisites

Ensure the following prerequisites are met before configuring a Passport authentication scheme:

- Passport SDK version 1.4 for WinNT, or version 2.1 for Win2000 is configured
- Passport Partner site is configured
- CA SiteMinder 5.x QMR1 or QMR v2 Web Agents, when available, are installed and running on Internet Information Server (IIS) on Windows systems
- Policy Server version 5.5 must be installed

## Configure a Microsoft Passport Authentication Scheme

You can use a Microsoft Passport authentication scheme to authenticate users across participating .NET Passport Web sites.

**Note:** The following procedure assumes that you are creating an object. You can also copy the properties of an existing object to create an object. For more information, see Duplicate Policy Server Objects.

**Follow these steps:**

1. Click Infrastructure, Authentication.
2. Click Authentication Schemes.
3. Click Create Authentication Scheme.

Verify that the Create a new object of type Authentication Scheme is selected.

Click OK

4. Enter a name and protection level.
5. Select Microsoft Passport Template from the Authentication Scheme Type list.  
Scheme-specific settings appear.
6. Enter configuration information.
7. Click Submit.

The authentication scheme is saved and can be assigned to a realm.

## Map Search Specifications for Passport Authentication

You configure a search specification so CA SiteMinder can recognize the identity established through Microsoft® .NET Passport. The search specification lets CA SiteMinder locate the Passport Unique ID (PUID) in a user directory.

You can configure a search specification for the following namespaces:

- LDAP
- ODBC
- Custom

**Note:** CA SiteMinder does not support Passport authentication using a WinNT user directory.

**To map a search specification for a namespace**

1. Open the MS Passport Authentication scheme that you want.



2. Enter a mapping in the respective directory field in the Scheme Setup group box.

Mappings should be configured as follows:

- LDAP:

`altSecurityIdentities=Kerberos:%s@company.local`

- ODBC:

`PassportUID=PUID:%s@company.local`

- Custom:

`PassportUID=PUID:%s@company.local`

**Note:** The authentication scheme can be configured to provide a search specification for one or more directory types.

3. Click Submit.

The search specification is saved.

## RADIUS CHAP/PAP Authentication Schemes

A digest authentication scheme reads an encrypted user attribute string that is stored in a directory. The scheme then compares the string to the encrypted string it receives from the user. If the encrypted strings match, the Policy Server authenticates the user. The comparison of the encrypted strings occurs without using an encrypted transmission.

The following digest authentication schemes are available:

- RADIUS CHAP
- RADIUS PAP

### PAP Overview

The Password Authentication Protocol (PAP) provides a simple method for a user to authenticate using a two-way handshake. PAP only executes this process during the initial link to the authenticating server. A user's machine repeatedly sends an Id/Password pair to the authenticating server until authentication is acknowledged or the connection is terminated.

This authentication method is most appropriately used where a plain text password must be available to simulate a login at a remote host. In such use, this method provides a similar level of security to the usual user login at the remote host.

## CHAP Overview

CHAP (Challenge-Handshake Authentication Protocol) is a more secure authentication scheme than PAP. In a CHAP scheme, the following process occurs to establish a user's identity:

1. After the link between the user's machine and the authenticating server is made, the server sends a challenge message to the connection requester. The requester responds with a value obtained by using a one-way hash function.
2. The server checks the response by comparing it against its own calculation of the expected hash value.
3. If the values match, the authentication is acknowledged; otherwise the connection is terminated.

At any time, the server can request the connected party to send a new challenge message. CHAP identifiers are changed frequently and the server can make an authentication request at any time, CHAP provides more security than PAP.

## RADIUS CHAP/PAP Scheme Overview

The RADIUS CHAP/PAP scheme authenticates users by computing the digest of a user's password. The Policy Server then compares the digest to the CHAP password in the RADIUS packet. The digest consists of the hashed password, which is calculated using a directory attribute. This attribute is specified during the configuration of the RADIUS CHAP/PAP authentication scheme.

## RADIUS CHAP/PAP Scheme Prerequisites

Meet the following prerequisites before configuring a RADIUS CHAP/PAP authentication scheme:

- The field in the user directory that is specified for the clear text password contains a value.
- The Policy Server is not operating in FIPS-only mode. If the Policy Server is operating in FIPS-only mode, a RADIUS CHAP/PAP authentication scheme is not supported.

## Configure a RADIUS CHAP/PAP Authentication Scheme

Use a RADIUS CHAP/PAP authentication scheme when you are using the RADIUS protocol.

**Note:** The following procedure assumes that you are creating an object. You can also copy the properties of an existing object to create an object. For more information, see [Duplicate Policy Server Objects](#).

**Follow these steps:**

1. Click Infrastructure, Authentication.
2. Click Authentication Schemes.
3. Click Create Authentication Scheme.

Verify that the Create a new object of type Authentication Scheme is selected.

Click OK

4. Enter a name and protection level.
5. Select RADIUS CHAP/PAP Template from the Authentication Scheme Type list.
6. Specify the clear text password in Scheme Setup section.
7. Click Submit.

The authentication scheme is saved and may be assigned to a realm.

## RADIUS Server Authentication Schemes

The RADIUS protocol is supported by letting the Policy Server act as the RADIUS server. A NAS client acts as the RADIUS client. RADIUS Agents let the Policy Server communicate with the NAS client devices. In the RADIUS server authentication scheme, the Policy Server is attached to the protected network.

This scheme accepts user name and password as credentials. Multiple instances of this scheme can be defined. This scheme does not interpret RADIUS attributes that may be returned by the RADIUS server in the authentication response.

For more information on RADIUS Server authentication, see the *Policy Server Administration Guide*.

## RADIUS Server Scheme Prerequisites

Complete following prerequisites before configuring a RADIUS server authentication scheme:

- The RADIUS server is on a network accessible by the Policy Server.
- The Policy Server is not operating in FIPS-only mode. If the Policy Server is operating in FIPS-only mode, a RADIUS Server authentication scheme is not supported.

## Configure a RADIUS Server Authentication Scheme

Use a RADIUS Server authentication scheme when you are using the Policy Server as the RADIUS Server and a NAS client as a RADIUS client.

**Note:** The following procedure assumes that you are creating an object. You can also copy the properties of an existing object to create an object. For more information, see Duplicate Policy Server Objects.

**Follow these steps:**

1. Click Infrastructure, Authentication.
2. Click Authentication Schemes.
3. Click Create Authentication Scheme.

Verify that the Create a new object of type Authentication Scheme is selected.

Click OK

4. Enter a name and a protection level.
5. Select RADIUS Server Template from the Authentication Scheme Type list.
6. Enter the RADIUS server IP address, port number, and shared secret in Scheme Setup.
7. Click Submit.

The authentication scheme is saved. You can assign it to a realm.

## SafeWord Server Authentication Schemes

The SafeWord authentication schemes authenticate users against a SafeWord Server, including users who are logging in via the SafeWord hardware tokens. You can define multiple instances of this scheme. The exact configuration parameters of the SafeWord Server are specified by the SafeWord configuration file.

**Note:** SafeWord authentication schemes, `smauthenigma` and `smauthenigmahtml`, are only supported on Windows and Solaris platforms after the 6.0 SP3 CR03 release.

## SafeWord Server Scheme Prerequisites

Complete the following prerequisites before configuring a SafeWord authentication scheme:

- The SafeWord Server is installed on a network accessible by the Policy Server.
- The exact location of the SafeWord Server is specified in the SafeWord configuration file.

## Configure a SafeWord Server Authentication Scheme

Use a SafeWord Server authentication scheme when you need to authenticate users against a SafeWord Server, including users who are logging in via SafeWord hardware tokens.

**Note:** The following procedure assumes that you are creating an object. You can also copy the properties of an existing object to create an object. For more information, see [Duplicate Policy Server Objects](#).

**Follow these steps:**

1. Click Infrastructure, Authentication.
2. Click Authentication Schemes.
3. Click Create Authentication Scheme.

Verify that the Create a new object of type Authentication Scheme is selected.

Click OK

4. Enter a name and protection level.
5. Select SafeWord Template from the Authentication Scheme Type list.
6. Enter the location of the SafeWord server configuration file.
7. Click Submit.

The authentication scheme is saved. You can now assign it to a realm.

## SafeWord Server and HTML Forms Authentication Schemes

The SafeWord Server and HTML forms authentication scheme authenticates users against a SafeWord Server together with a custom HTML form. The scheme also covers users who are logging in using SafeWord hardware tokens. You can define multiple instances of this scheme. The exact configuration parameters of the SafeWord Server is defined in the SafeWord configuration file.

### SafeWord Server and HTML Forms Scheme Prerequisites

Complete the following prerequisites before configuring a SafeWord Server and HTML Forms authentication scheme:

- The SafeWord Server is installed on a network accessible by the Policy Server.
- The exact location of the SafeWord Server is specified in the SafeWord configuration file.

- A customized .fcc file resides on a Web Agent server in the cookie domain in which you want to implement HTML Forms authentication. CA provides sample .fcc files under the Samples/Forms subdirectory, where you installed your Web Agent.
- A customized .unauth file resides on the Web Agent server  
**Note:** The .unauth file is not required if the .fcc file uses smerrorpage directive.
- A directory connection exists between the Policy Server and the user directory.
- The default HTML forms library is installed. The HTML forms library handles HTML Forms authentication processing:
  - SmAuthHTML.dll on Windows
  - smauthhtml.so on SolarisThese files are installed automatically when you configure a Web Agent.
- (Sun Java Systems) If you are using a Sun Java Systems web server, increase the value of the StackSize parameter in the magnus.conf file to a value greater than 131072. Failing to change the value causes the web server to dump its core and restart each time there is an authentication request using forms.

**More information:**

[User Directories](#) (see page 149)

[SiteMinder FCC Files](#) (see page 287)

## Configure a SafeWord Server and HTML Forms Authentication Scheme

Use a SafeWord Server and HTML Forms authentication scheme when to authenticate users against a SafeWord Server and a custom HTML form. This scheme also covers users who are logging in via SafeWord hardware tokens.

**Note:** The following procedure assumes that you are creating an object. You can also copy the properties of an existing object to create an object. For more information, see Duplicate Policy Server Objects.

**Follow these steps:**

1. Click Infrastructure, Authentication.
2. Click Authentication Schemes.
3. Click Create Authentication Scheme.

Verify that the Create a new object of type Authentication Scheme is selected.

Click OK

4. Enter a name and protection level.

5. Select SafeWord HTML Form Template from the Authentication Scheme Type list.
6. Enter the server name, the location of the SafeWord configuration file, and server and target information.
7. Click Submit.

The authentication scheme is saved and can be assigned to a realm.

## SecurID Authentication Schemes

The RSA Ace/SecureID authentication schemes authenticate users logging in with ACE credentials, which include the user names, PINs, and TOKENCODEs. ACE usernames and passwords reside in the ACE/Server user store and can be changed by ACE/Server administrator. Single-use TOKENCODEs are generated by SecureID tokens.

CA SiteMinder supports the following SecurID authentication schemes:

### SecurID Authentication

This Authentication Scheme authenticates users who are logging in via RSA SecureID hardware tokens. The scheme accepts a user name and password. The password is the user's token PIN followed by the dynamic code.

**Note:** The SecurID Template authentication scheme will fail to authenticate a user if the user does not use the user directory attribute named 'uid' to map to the userid of the user in the Ace Server. Use the SecurID HTML Forms Template when mapping LDAP directory attributes other than uid to the userid of the user in the Ace Server.

### SecurID Authentication with HTML Forms Support

CA SiteMinder supports a scheme for SecurID authentication that includes HTML forms support. The HTML forms provide a method for users to identify themselves and reactivate their accounts after they have been disabled because they entered their PIN or token information incorrectly.

The RSA ACE/SecurID scheme authenticates users who are not allowed to change their ACE PIN. However, users allowed or required to change their PIN are authenticated through the RSA ACE/SecurID scheme with HTML form. Both schemes are based on ACE/Server - Ace/Agent model and require RSA/SecurID (tokens) and RSA/ACE (server software) products.

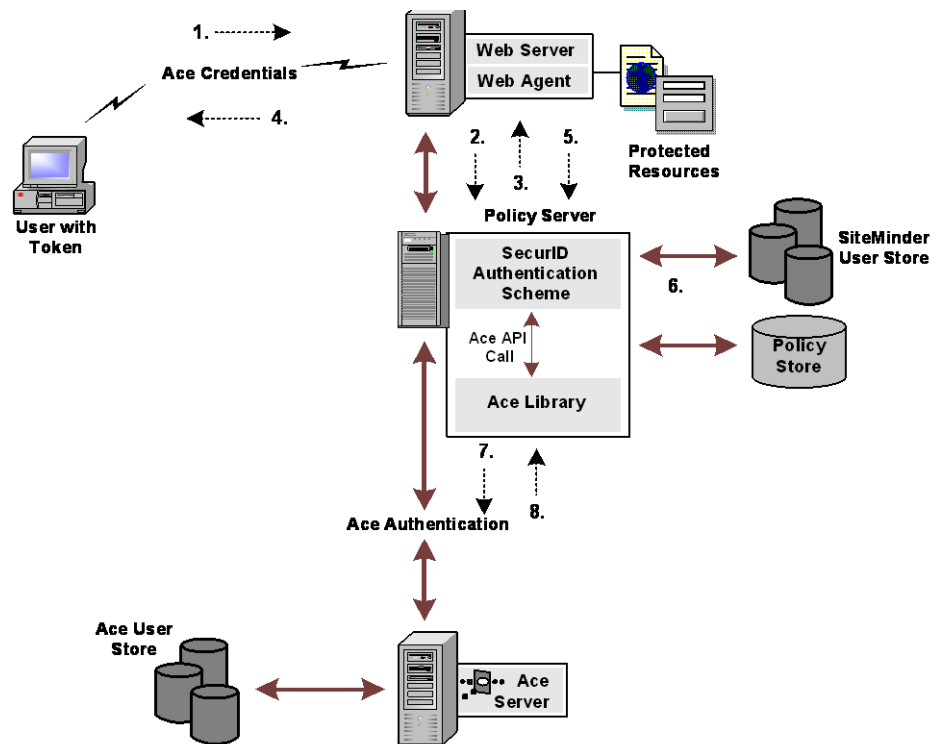
The RSA ACE/Server works with RSA SecurID tokens to authenticate users' identities through valid RSA Ace/Agents. Further, RSA supports Web Agents and custom Agents. CA SiteMinder SecurID authentication schemes act as custom ACE/Agents and use ACE/SDK and libraries.

The ACE/Server, however, has its own policy in handling users' credentials and stores this information in the ACE user store. The policy includes several requirements and limitations for each user, which are defined by the ACE administrator that can be changed at any time. The administrator configures users to authenticate by either PIN or TOKENCODE. If users are configured to authenticate by PIN, the system does not require a TOKENCODE. If users are configured to authenticate with TOKENCODE, both the TOKENCODE and PIN are required. In addition, users could be required to set a new PIN while trying to authenticate. Under this "new PIN mode", the old and new PINs are required.

To successfully authenticate users, CA SiteMinder SecureID authentication schemes require mapping between the ACE and CA SiteMinder users. This mapping is represented as an authentication scheme object attribute in the CA SiteMinder policy store.

In 5.5 SP1, the enhancement to the RSA ACE/SecurID Scheme with HTML form affects the "new PIN mode".

The following figure shows how the RSA ACE/Server interacts with CA SiteMinder:



1. A user requests a resource such as a Web page.
2. The CA SiteMinder Web Agent determines if the resource is protected.
3. The Policy Server indicates the requested resource is protected by the RSA ACE/SecurID Authentication Scheme with HTML form.



4. The Web Agent prompts the user for credentials.
5. The user enters credentials and the Agent sends them to the Policy Server.
6. The Policy Server performs user disambiguation and maps the CA SiteMinder user name to RSA/ACE user name. At this point, the Policy Server does not apply CA SiteMinder password policies.
7. The Policy Server forwards the authentication request to the ACE/Server by making a sequence of ACE API calls. It also send the user's credentials to the ACE/Server.
8. The ACE/Server indicates that the user is required to change the PIN and then returns control back to the Policy Server.
9. The Policy Server returns control to the Web Agent and then the Agent redirects the user to a CGI or JSP.
10. The CGI or JSP generates the applicable HTML form, presents it to the user, and then prompts for a user name, old PIN, new PIN, and new PIN confirmation.
11. The Web Agent sends a new set of credentials to the Policy Server.
12. The Policy Server makes a new sequence of API calls to the ACE/Server.
13. If new the PIN is accepted, then the ACE API call returns success. From here, the user is asked to login with the new PIN and the authentication process is complete.
14. If new PIN is rejected, Step 10 to Step 12 are repeated.

The PIN can be rejected if it:

- Is too long
- Is too short
- Contains alphabetic characters

In the process illustrated in the previous figure authentication includes presenting back-end PIN policy-related messages on the HTML form. The PIN policy validation is done by the SecurID Authentication scheme before sending a new PIN to the ACE/Server. The ACE SDK has a set of functions that can retrieve the following PIN attributes:

- Maximum length
- Minimum length
- Alphabetic and numeric or only numeric characters

Based on this information, the PIN is validated and the appropriate error messages are constructed and presented to the user, and the validation is done in the following order:

- The PIN is not too long
- The PIN is not too short
- The PIN does not have invalid characters

In the 5.5 SP1, only the relevant portion of the policy is made available to users in these new error messages. The following shows an example of how these new messages might appear:

If a sample user, Joe, has a PIN that is 5 to 8 digits long but enters a new PIN as "poem", then he would see the following error message:

Your new PIN is too short. PIN must contain at least 5 character(s).

If the next PIN he entered was "novel", he would get:

Your new PIN may not have alphabetic characters.

If the next PIN he entered was "123412341234," he would see.

Your new PIN is too long. PIN must contain 8 or fewer character(s).

It is possible that, despite the successful PIN validation by the SecureID Authentication scheme, the ACE/Server will reject a new PIN. In this case, the user is asked for a new set of credentials, but no reason is given. Further, in the enhanced SecurID Authentication scheme, the user is automatically granted access to the target Web page after a successful PIN change.

## SecurID Scheme Prerequisites

Be sure that the following prerequisites are met before configuring a SecureID authentication scheme:

- On Windows Policy Servers, the RSA ACE/Client software is installed on the same system as the Policy Server. For information about supported RSA ACE/Client versions, see the Platform Support Matrix on the [Support site](#).
- If the following conditions are true, configure the ACE paths to point to the location of the SecurID file:
  - The ACE environment is using ACE Client 7.0 or later.
  - The ACE environment is not using a Node Secret.
  - The ACE environment is protecting another application, which the Policy Server does not protect.
  - The ACE environment is protecting another third-party product.

Configuring the ACE paths prevents the authentication request that the Policy Server sends to the ACE Server from failing.

**Note:** The SM\_ACE\_FAILOVER\_ATTEMPTS environment variable has been removed. This variable was used to set the failover attempts to the ACE server.

## Configure a SecurID Authentication Scheme

You can use a SecurID authentication scheme to authenticate users logging in with ACE credentials.

**Note:** The following procedure assumes that you are creating an object. You can also copy the properties of an existing object to create an object. For more information, see [Duplicate Policy Server Objects](#).

**Follow these steps:**

1. Click Infrastructure, Authentication.
2. Click Authentication Schemes.
3. Click Create Authentication Scheme.

Verify that the Create a new object of type Authentication Scheme is selected.

Click OK

4. Enter a name and a protection level.
5. Select SecurID Template from the Authentication Scheme Type list.
6. Enter the ACE User ID attribute.
7. Click Submit.

The authentication scheme is saved and can be assigned to a realm.

## SecurID HTML Form Scheme Prerequisites

Complete following prerequisites before configuring a SecureID HTML Form authentication scheme:

- The RSA ACE/Client software is installed on the same system as the Policy Server.
- For Policy Servers on Windows, the ACE configuration information file (sdconf.rec) resides in the winnt\system32 directory. The VAR\_ACE and USR\_ACE variables are pointing to the appropriate ACE agent data and prog directories respectively.
- For Policy Servers on UNIX, the sdconf.rec file resides in the *<policy\_server installation\_dir>/bin* directory. Additionally, the VAR\_ACE and USR\_ACE variables are pointing to the *<policy\_server installation\_dir>/bin*, allowing the Policy Server to use API libraries and not the ACE agent.
- A customized .fcc file resides on a Web Agent server in the cookie domain in which you want to implement HTML Forms authentication. CA provides sample .fcc files under the Samples/Forms subdirectory, where you installed your Web Agent.
- A customized .unauth file resides on the Web Agent server.

**Note:** The .unauth file is not required if the .fcc file uses the smerrorpage directive.

- A directory connection exists between the Policy Server and the user directory.
- The default HTML forms library is installed. This library handles HTML Forms authentication processing:
  - SmAuthHTML.dll on Windows
  - smauthhtml.so on Solaris

These files are installed automatically when you configure a Web Agent.

**More information:**

[User Directories](#) (see page 149)

[SiteMinder FCC Files](#) (see page 287)

## Configure a SecurID HTML Form Authentication Scheme

You can use a SecurID HTML Form authentication scheme to use a custom HTML form to authenticate users logging in with ACE credentials.

**Note:** The following procedure assumes that you are creating an object. You can also copy the properties of an existing object to create an object. For more information, see Duplicate Policy Server Objects.

**Follow these steps:**

1. Click Infrastructure, Authentication.
2. Click Authentication Schemes.
3. Click Create Authentication Scheme.  
Verify that the Create a new object of type Authentication Scheme is selected.  
Click OK
4. Enter a name and a protection level.
5. Select SecurID HTML Form Template from the Authentication Scheme Type list.
6. Enter server, target, and ACE attribute information.
7. Click Submit.

The authentication scheme is saved and can be assigned to a realm.

## SecurID HTML Form Support for Re-activating and Verifying SecurID Users

If you protect a realm with the SecurID HTML Form scheme, users who are suspended due to improper logins can attempt to activate their accounts using a number of customizable HTML forms. You can modify the layout and wording of these forms, but you must not modify the tags that gather user information.

The forms provided with the Policy Server include the following:

### **PWLogin.template**

This form is where users enter a username and passcode to login.

### **PWNextToken.template**

This template requests multiple token codes to confirm that the user is in possession of a working SecurID token.

## SecurID HTML Form Support for Activating New User Accounts

The Policy Server uses the following forms when an administrator creates a user account, and that user logs in. Through the forms, a user creates a PIN, or has the Policy Server generate a random PIN.

### **PWSystemPIN.template**

For new users, or users whose accounts have been suspended (due to too many invalid login attempts), this template prompts the user to acquire a new PIN. This template accepts the user's original username and passcode, but instead of granting access to a protected resource, it redirects the user to another form where the user can receive or create a new PIN.

### **PWNewPINSelect.template**

This template allows a user to indicate if the system should generate a new PIN, or if the user wants to enter a new PIN.

### **PWUserPIN.template**

This template allows a user to enter a new PIN. The user must provide a valid username and passcode along with the new PIN. In this template, \$USRMSG\$ is replaced with instructions for creating a PIN number. For example:

PINs must be between 4 and 8 characters in length.

### **PWPINAccept.template**

This template indicates that a new system-generated PIN has been created. In this template, the system-generated PIN replaces the \$USRMSG\$ variable.

When a user clicks Continue, the user is immediately prompted to log in using the new PIN.

## X.509 Client Certificate Authentication Schemes

You can configure X.509 V3 client certificates. After a certificate is installed on a client, that certificate can be used to verify the identity of a user requesting a resource. Certificate authentication uses SSL communication and can be combined with basic authentication to provide an even higher level of access security.

**Note:** For certificate-only authentication schemes, the web agent returns HTTP Error 403: Access Denied/Forbidden for any failed authentication or authorization attempt. This is because there is no way for the web agent to challenge the user for a new certificate.

The X.509 Client Certificate authentication schemes implement certificate authentication. To use X.509 client certificate authentication, your environment must be able to handle SSL communication. This means that the client browser, the web server and any user certificates must be configured to accept and perform certificate authentication. These tasks are outside the scope of the Policy Server configuration.

After the necessary SSL components are set up properly, configure a X.509 authentication scheme. The configuration tasks include:

- Select an advanced SSL authentication scheme when running the Web Agent Configuration Wizard.

For information about the Web Agent Configuration Wizard, see the *Web Agent Installation Guide*.

- Configure one of the X.509 authentication schemes using the Administrative UI, which is detailed in this guide.

The X.509 Client Certificate authentication schemes do the following tasks:

- Collect the client certificate information.
- Identify a user in a directory based on the information from the user certificate. This process is named *certificate mapping*.
- Optionally, checks whether the certificate is valid, using Certificate Revocation Lists (CRLs) or the Online Certificate Status Protocol (OCSP).

**More information:**

[Certificate Mapping for X.509 Client Certificate Authentication Schemes](#) (see page 363)

## Extracting a Certificate for Certificate Authentication

When a user requests a protected resource, the Web Agent first contacts the Policy Server to determine which authentication scheme is protecting the resource. If an X.509 authentication scheme is protecting a resource, the Web Agent redirects the user's browser to the credential collector that corresponds to the configured authentication scheme. The path to the credential collector is defined in the authentication scheme configuration.

The connection to the credential collector is an SSL-secured connection and the web server is configured to require a client certificate. Therefore, the browser must submit a client certificate for authentication. The resource name and extension at the end of the credential collector URL instructs the Web Agent to extract a user certificate from the web server. The Web Agent then passes the certificate to the Policy Server for use by the authentication scheme.

### More information:

[Authentication over SSL](#) (see page 275)

## How SiteMinder Uses Certificate Data to Identify Users

After the Web Agent collects certificate information, it passes the data to the Policy Server for verification. The Policy Server then performs certificate mapping. The goal of certificate mapping is to locate a user by the Subject Name in the user certificate.

First, the Policy Server looks up the appropriate certificate mapping in the policy store. The Policy Server uses the certificate Issuer DN to locate the mapping. The Issuer DN is part of the certificate mapping configuration. After the Policy Server finds the mapping, it takes the Subject Name from the certificate and applies the mapping to find the user entry in the user directory.

The Policy Server can access user certificates that are stored only in the following repositories:

- LDAP/AD user directory
- ODBC store

**Important!** You are required to configure certificate mapping for any X.509 client certificate authentication scheme.

### More information:

[Certificate Mapping for X.509 Client Certificate Authentication Schemes](#) (see page 363)

## X.509 Client Certificate Scheme Prerequisites

Satisfy the following prerequisites before configuring an X.509 Client Certificate authentication scheme:

- Install an X.509 server certificate on the SSL web server. Be sure that the certificate is not expired.  
**Note:** If the Policy Server is operating in FIPS mode, ensure the certificate was generated using only FIPS-approved algorithms.
- Verify that the network supports an SSL connection to the client browser (HTTPS protocol).
- Verify that the X.509 client certificates are installed for client browsers. Be sure that the certificates are not expired.

## Configure an X.509 Certificate Authentication Scheme

In addition to setting up the SSL environment, complete the following process to configure certificate authentication:

1. Set up your environment to handle SSL communication. Configure the client browser, the web server and any user certificates to accept and perform certificate authentication.
2. Verify that the installed Web Agent can handle SSL authentication.
3. Configure a X.509 authentication scheme in the Administrative UI.
4. Define certificate mappings to identify a user that is based on the information in the client certificate.
5. (Optionally) Configure certificate validation using CRLs or OCSP.

**Note:** The following procedure assumes that you are creating an object. You can also copy the properties of an existing object to create an object. For more information, see Duplicate Policy Server Objects.

### Follow these steps:

1. Click Infrastructure, Authentication.
2. Click Authentication Schemes.
3. Click Create Authentication Scheme.  
Verify that the Create a new object of type Authentication Scheme is selected.  
Click OK
4. Enter a name and a protection level.
5. Select the X.509 Client Cert Template from the Authentication Scheme Type list.



6. Enter the server name and target information for the SSL Credentials Collector.
7. (Optional) Select the Persist Authentication Session Variables in Scheme Setup. This option specifies that the authentication context data is saved in the session store for later use in authentication decisions.
8. Click Submit.

The authentication scheme is saved and can be assigned to a realm.

The X.509 certificate authentication scheme is now configured in the Administrative UI. Now set up [certificate mapping](#) (see page 363).

## X.509 Client Certificate and Basic Authentication Schemes

The X.509 Client Certificate and Basic authentication scheme combines Basic authentication and X.509 Client Certificate authentication. This authentication scheme provides an extra layer of security for critical resources.

For a user to authenticate successfully, the following two events must occur:

- The user's X.509 client certificate must be verified.
- AND
- The user must provide a valid user name and password.

For X.509 Client Certificate authentication, the Policy Server instructs the Web Agent to redirect the user to an SSL server and map the user's certificate to the server. The Policy Server then verifies that the user exists, verifies the user's basic credentials, and confirms that certificate credentials and the basic credentials represent the same user.

### More information:

[Basic Over SSL Authentication Schemes](#) (see page 281)

[X.509 Client Certificate Authentication Schemes](#) (see page 273)

## X.509 Client Certificate and Basic Scheme Prerequisites

Verify that the following prerequisites are met before configuring a X.509 Client Certificate and Basic authentication scheme:

- An X.509 Server Certificate is installed on the SSL Web server.  
**Note:** If the Policy Server is operating in FIPS mode, ensure the certificate was generated using only FIPS-approved algorithms.
- The network supports an SSL connection to the client browser (HTTPS protocol).

- X.509 client certificates are installed on client browsers.
- Trust must be established between client certificates and server certificates.
- The certificate is issued by a valid and trusted Certification Authority (CA).
- The issuing CA public key validates the issuer's digital signature.
- Client and server certificates have not expired.
- The user's public key validates the user's digital signature.
- Client user name and password information exists in a user directory.
- A directory connection exists between the Policy Server and the user directory.

**Note:** For Apache Web servers where certificates are required or optional, the SSL Verify Depth 10 line in the httpd.conf file must be uncommented.

**More information:**

[User Directories](#) (see page 149)

## Configure an X.509 Certificate and Basic Authentication Scheme

Use an X.509 Certificate and Basic authentication scheme to combine certificate authentication and basic authentication.

**Note:** The following procedure assumes that you are creating an object. You can also copy the properties of an existing object to create an object. For more information, see Duplicate Policy Server Objects.

**Follow these steps:**

1. Click Infrastructure, Authentication.
2. Click Authentication Schemes.
3. Click Create Authentication Scheme.  
Verify that the Create a new object of type Authentication Scheme is selected.  
Click OK
4. Enter a name and a protection level.
5. Select X509 Client Cert and Basic Template from the Authentication Scheme Type list.

6. Enter the server name and target information for the SSL Credentials Collector.
7. (Optional) Select Persist Authentication Session Variables in Scheme Setup. This option specifies that the authentication context data is saved in the session store.
8. Click Submit.

The authentication scheme is saved and can be assigned to a realm.

## X.509 Certificate or Basic Authentication Schemes

The X.509 Client Certificate or Basic authentication scheme allows either Basic authentication or X.509 Client Certificate authentication to establish a user identity. For a user to authenticate successfully, one of the following two events must occur:

- The user X.509 client certificate must be verified.
- OR
- The user must provide a valid user name and password.

With this scheme, when a user requests a protected resource, the Web Agent challenges the browser to present a certificate. If the user does not have a certificate or chooses not to provide one (by clicking Cancel), the Web Agent challenges the user with the HTTP Basic protocol. HTTP Basic authentication allows the agent to obtain a user name and password.

This scheme is useful if you must gradually deploy X.509 certificates. For example, in a company with 50,000 users, it is a challenge to issue and deploy 50,000 certificates simultaneously. This scheme allows you to issue certificates as you see fit (500 or 5,000 at a time). During this transition period, your resources can be protected with certificates for those users who already have them, allowing other authorized users to access resources based on directory user names and passwords.

This scheme gives you the option of configuring the Basic authentication exchange to require an SSL connection.

**Note:** If you implement multiple certificate-based authentication schemes that include a mixture of X509 Certificate OR Basic schemes, a browser caching limitation can cause unexpected behavior. When a user does not choose certificate-based authentication for accessing a resource in a realm protected by a Certificate or Basic authentication scheme, the browser automatically caches this decision. If the same user (using the same browser session) then attempts to access a resource that is protected by an authentication scheme with a mandatory certificate portion (such as X509 Certificate, X509 Certificate and Basic, or X509 Certificate and Form) the user receives a "Forbidden" error message.

Because the user chose not to send a certificate for the certificate-based authentication when accessing the first resource, and the browser cached that decision, the user is automatically rejected when accessing the realm that requires the certificate.

Encourage users who have valid certificates to use them when accessing resources in a deployment that includes a mixture of realms protected by certificate-based authentication schemes that include X509 Certificate or Basic schemes and other certificate-based schemes that do not allow a user to choose whether to send a certificate for authentication.

**More information:**

[Basic Authentication Schemes](#) (see page 273)

[X.509 Client Certificate Authentication Schemes](#) (see page 273)

## X.509 Client Certificate or Basic Scheme Prerequisites

Ensure the following prerequisites are met before configuring a X.509 Client Certificate or Basic authentication scheme:

- An X.509 Server Certificate is installed on the SSL Web server.  
**Note:** If the Policy Server is operating in FIPs mode, ensure the certificate was generated using only FIPS-approved algorithms.
- The network must support an SSL connection to the client browser (HTTPS protocol).
- X.509 client certificates are installed on client browsers.
- Trust is established between client certificates and server certificates.
- Certificates are issued by a valid and trusted Certification Authority (CA).
- The issuing CA's public key validates the issuer's digital signature.
- Client and server certificates have not expired.
- The user's public key validates the user's digital signature.
- Client user name and password information exists in a user directory.
- A directory connection exists between the Policy Server and the user directory.

**Note:** For Apache Web servers where Certificates are required or optional, the SSL Verify Depth 10 line in the httpd.conf file must be uncommented.

**More information:**

[User Directories](#) (see page 149)

## Configure an X.509 Certificate or Basic Authentication Scheme

You use an X.509 Certificate or Basic authentication scheme to implement certificate authentication or basic authentication or both.

**Note:** The following procedure assumes that you are creating an object. You can also copy the properties of an existing object to create an object. For more information, see Duplicate Policy Server Objects.

**Follow these steps:**

1. Click Infrastructure, Authentication.
2. Click Authentication Schemes.
3. Click Create Authentication Scheme.  
Verify that the Create a new object of type Authentication Scheme is selected.  
Click OK
4. Enter a name and a protection level.
5. Select X509 Client Cert or Basic Template from the Authentication Scheme Type list.
6. Enter server and target information for the SSL Credentials Collector.
7. (Optional) Select Persist Authentication Session Variables in Scheme Setup. This option specifies that the authentication context data is saved in the session store.
8. Click Submit.

The authentication scheme is saved and can be assigned to a realm.

## X.509 Client Certificate and HTML Forms Authentication Schemes

The X.509 Client Certificate and HTML Forms authentication scheme combines HTML Forms authentication and X.509 Client Certificate authentication. This authentication scheme provides an extra layer of security for critical resources.

For a user to authenticate successfully, the following two events must occur:

- The user's X.509 client certificate must be verified.
- AND
- The user must provide the credentials that are requested by an HTML form.

For this scheme, the authentication process follows these steps:

1. The Policy Server instructs the Web Agent to redirect the user to an FCC on an SSL-enabled web server.
2. The Web Agent presents the form.
3. The FCC passes the certificate and form back to the Policy Server.
4. The Policy Server verifies that the user in the certificate mapping exists.
5. The Policy Server verifies the user's HTML form credentials and verifies that the certificate credentials and the HTML Forms credentials represent the same user.

**More information:**

[HTML Forms Authentication Schemes](#) (see page 282)

[X.509 Client Certificate Authentication Schemes](#) (see page 273)

## X.509 Client Certificate and HTML Forms Scheme Prerequisites

Verify the following prerequisites are met before configuring a X.509 Client Certificate and HTML Forms authentication scheme:

- An X.509 Server Certificate is installed on the SSL Web server.  
**Note:** If the Policy Server is operating in FIPs mode, ensure the certificate was generated using only FIPS-approved algorithms.
- The network supports an SSL connection to the client browser (HTTPS protocol).
- X.509 client certificates are installed on client browsers.
- Trust is established between client certificates and server certificates.
- The certificate is issued by a valid and trusted Certification Authority (CA).
- The issuing CA's public key validates the issuer's digital signature.
- Client and server certificates have not expired.
- The user's public key validates the user's digital signature.
- Form credentials information exists in a user directory.
- A directory connection exists between the Policy Server and the user directory.
- (Sun Java Systems) If you are using a Sun Java Systems web server, increase the value of the StackSize parameter in the magnus.conf file to a value greater than 131072. Failing to change the value causes the web server to dump its core and restart each time the Policy Server makes an authentication request using forms.

**Note:** For Apache Web servers where Certificates are required or optional, the SSL Verify Depth 10 line in the httpd.conf file must be uncommented.

The certificate and forms data are collected and passed to the Policy Server together.

| If...                                                  | then...                      |
|--------------------------------------------------------|------------------------------|
| There is no certificate                                | The browser issues error 500 |
| The certificate and forms credentials are not accepted | The browser issues error 500 |

**More information:**

[User Directories](#) (see page 149)

## Agent API Support

The X.509 Client Certificate and HTML Forms uses the Sm\_AuthApi\_Cred\_SSLRequired and the Sm\_AuthApi\_Cred\_FormRequired bits.

## Configure an X.509 Certificate and HTML Forms Authentication Scheme

Use an X.509 Certificate and HTML authentication scheme to combine certificate authentication and HTML forms-based authentication.

**Note:** The following procedure assumes that you are creating an object. You can also copy the properties of an existing object to create an object. For more information, see Duplicate Policy Server Objects.

**Follow these steps:**

1. Click Infrastructure, Authentication.
2. Click Authentication Schemes.
3. Click Create Authentication Scheme.  
Verify that the Create a new object of type Authentication Scheme is selected.  
Click OK
4. Enter a name and a protection level.
5. Select X509 Client Cert and Form Template from the Authentication Scheme Type list.

6. Enter the server name and target information for the SSL Credentials Collector.
7. (Optional) Select Persist Authentication Session Variables in Scheme Setup. This option specifies that the authentication context data is saved in the session store.
8. Click Submit.

The authentication scheme is saved and can be assigned to a realm.

## X.509 Client Certificate or HTML Forms Authentication Schemes

The X.509 Client Certificate or HTML Forms authentication scheme allows either HTML Forms authentication or X.509 Client Certificate authentication to establish a user identity. For a user to authenticate successfully, one of the following two events must occur:

- The X.509 client certificate must be verified.
- OR
- The user must provide the credentials requested by an HTML form.

When a user requests a protected resource, the Web Agent challenges the browser to present a certificate. The scheme has the following effect:

| If...                           | then...                              |
|---------------------------------|--------------------------------------|
| A certificate is presented      | The certificate is processed         |
| The certificate is not accepted | The browser issues error 500         |
| No certificate is presented     | The browser presents a form          |
| The form is rejected            | The browser prompts again for a form |

This scheme is useful if you must deploy X.509 certificates gradually. For example, in a company with 50,000 users, it is a challenge to issue and deploy 50,000 certificates simultaneously. This scheme allows you to issue certificates as you see fit (500 or 5,000 at a time). During this transition period, your resources can be protected with certificates for those users who already have them, allowing other authorized users to access resources based on HTML forms credentials.



**Note:** If you implement multiple certificate-based authentication schemes that include a mixture of X509 Certificate OR Forms schemes, a browser caching limitation may cause unexpected behavior. When a user does not use the certificate-based authentication for accessing a resource in a realm protected by a Certificate or Forms authentication scheme, the browser automatically caches this decision. If the same user (using the same browser session) then attempts to access a resource that is protected by an authentication scheme with a mandatory certificate portion, such as X509 Certificate, X509 Certificate and Basic, or X509 Certificate and Form, the user receives a "Forbidden" error message.

Because the user chose not to send a certificate for the certificate-based authentication when accessing the first resource, and the browser cached that decision, the user is automatically rejected when accessing the realm that requires the certificate.

Encourage users who have valid certificates to use them when accessing resources in a deployment that includes a mixture of realms protected by certificate-based authentication schemes that include X509 Certificate or Forms schemes and other certificate-based schemes that do not allow a user to choose whether to send a certificate for authentication.

**More information:**

[HTML Forms Authentication Schemes](#) (see page 282)

[X.509 Client Certificate Authentication Schemes](#) (see page 273)

## X.509 Client Certificate or HTML Forms Scheme Prerequisites

Ensure the following prerequisites are met before configuring a X.509 Client Certificate or HTML Forms authentication scheme:

- An X.509 Server Certificate is installed on the SSL Web server.  
**Note:** If the Policy Server is operating in FIPs mode, ensure the certificate was generated using only FIPS-approved algorithms.
- The network must supports SSL connection to the client browser (HTTPS protocol).
- X.509 client certificates are installed on client browsers.
- Trust must be established between client certificates and server certificates.
- Certificates are issued by a valid and trusted Certification Authority (CA).
- The issuing CA's public key validates the issuer's digital signature.
- Client and server certificates have not expired.
- The user's public key validates the user's digital signature.
- User attributes requested by the HTML form exist in a user directory.

- A directory connection exists between the Policy Server and the user directory.
- (Sun Java Systems) If you are using a Sun Java Systems web server, increase the value of the StackSize parameter in the magnus.conf file to a value greater than 131072. Failing to change the value causes the web server to dump its core and restart each time the Policy Server makes an authentication request using forms.

**More information:**

[User Directories](#) (see page 149)

## Agent API Support

In the Agent API, the value Sm\_AuthApi\_Cred\_CertOrForm has been added to the enumerated type Sm\_Api\_Credentials\_t. Sm\_Api\_Credentials\_t specifies the credentials, if any, that are required for a user to access the realm referenced by the structure Sm\_AgentApi\_Realm\_t. The enumerated type applies to the nRealmCredentials field of the structure.

The new value specifies that user authentication requires either an X.509 certificate or a forms-based authentication scheme.

## Configure an X.509 Certificate or HTML Forms Authentication Scheme

You can use an X.509 Certificate or HTML Forms authentication scheme to implement certificate authentication or HTML forms-based authentication, or both.

**Note:** The following procedure assumes that you are creating an object. You can also copy the properties of an existing object to create an object. For more information, see Duplicate Policy Server Objects.

**Follow these steps:**

1. Click Infrastructure, Authentication.
2. Click Authentication Schemes.
3. Click Create Authentication Scheme.  
Verify that the Create a new object of type Authentication Scheme is selected.  
Click OK
4. Enter a name and a protection level.
5. Select X509 Client Cert or Form Template from the Authentication Scheme Type list.

6. Enter server and target information.
7. (Optional) Select Persist Authentication Scheme Data in Scheme Setup. This option specifies that authentication context data is saved in the session store.
8. Click Submit.

The authentication scheme is saved and can be assigned to a realm.

**Note:** For Apache Web servers where Certificates are required or optional, uncomment the SSL Verify Depth 10 line in the httpd.conf file.

## Anonymous Authentication Schemes

The Anonymous authentication scheme provides access privileges to users who are not yet identified in your network. Assigning an anonymous authentication scheme to a realm does not provide access control, but it does allow personalized content for the user.

When a user accesses a resource in a realm that uses the anonymous scheme, the Policy Server assigns a Global Unique Identifier (GUID). This GUID is stored on the user's browser and provides a method for identifying the anonymous user.

When you create an Anonymous authentication scheme, you must specify a guest distinguished name (DN). You can bind policies to this guest DN that provide personalized content.

**Note:** Personalized content in a realm protected by an Anonymous scheme is based on the guest DN, not the GUID of the user. Anonymous users view content according to policies that include the guest DN. Identified users have a distinct DN, so an identified user who accesses the same resource (protected by an anonymous scheme) views the content of the resource based on their unique DN rather than the guest DN.

### More information:

[Realms](#) (see page 461)

## Anonymous Scheme Prerequisites

Verify that the following prerequisites are met before configuring an anonymous authentication scheme:

- A guest DN for anonymous user exists in a user directory.
- A directory connection exists between the Policy Server and the user directory.
- To track users according to GUIDs assigned by Anonymous authentication, enable user tracking on the Global Settings pane of the Administrative UI.

**Note:** More information on enabling user tracking exists in the *Policy Server Administration* guide.

**More information:**

[User Directories](#) (see page 149)

## Configure an Anonymous Authentication Scheme

You can use an Anonymous authentication scheme to give non-registered users access to specific Web content.

**Note:** The following procedure assumes that you are creating an object. You can also copy the properties of an existing object to create an object. For more information, see Duplicate Policy Server Objects.

**Follow these steps:**

1. Click Infrastructure, Authentication.
2. Click Authentication Schemes.
3. Click Create Authentication Scheme.

Verify that the Create a new object of type Authentication Scheme is selected.

Click OK

4. Enter a name and a protection level.
5. Select Anonymous Template from the Authentication Scheme Type list.
6. Enter the DN of a user.
7. Click Submit.

The authentication scheme is saved and can be assigned to a realm.

## Custom Authentication Schemes

If the Policy Server does not provide a method of authentication that you want to use, use the CA APIs to develop a custom authentication scheme.

If you have installed the Software Development Kit, see the API Reference Guide for C or the API Reference Guide for Java for more information about creating custom authentication schemes. After you create a custom scheme, configure the scheme on the Authentication pane.

**Note:** For information on configuring an smauthetsso custom authentication scheme, which is required for enabling single sign-on, see [CA SSO/WAC Integration](#) (see page 685).

The prerequisites of a custom authentication scheme are determined when you create the scheme using the CA APIs. Prerequisites differ between authentication schemes.

### Custom Scheme Prerequisites

The prerequisites of a custom authentication scheme are determined when you create the scheme using the CA APIs. Prerequisites differ between authentication schemes.

### Configure a Custom Authentication Scheme

You can use a custom authentication scheme to specify a scheme that the product does not provide.

**Note:** The following procedure assumes that you are creating an object. You can also copy the properties of an existing object to create an object. For more information, see Duplicate Policy Server Objects.

**Follow these steps:**

1. Click Infrastructure, Authentication.
2. Click Authentication Schemes.
3. Click Create Authentication Scheme.

Verify that the Create a new object of type Authentication Scheme is selected.

Click OK

4. Enter a name and a protection level.
5. Select Custom Template from the Authentication Scheme Type list.  
Scheme-specific settings open.

6. (Optional) Select the Allow Protection Override check box in Scheme Common Setup. This option specifies that the protection level in the library takes precedence over the protection level specified in the Administrative UI.
7. Enter the library that is to process the credentials for the authentication scheme and the parameters that are passed to the library in Scheme Setup.
8. (Optional) Select Persist Authentication Session Variables in Scheme Setup. If you do not select this option, session variables are not saved in the session store.
9. Click Submit.

The authentication scheme is saved and can be assigned to a realm.

## OpenID Authentication Scheme

This scenario describes how to configure an OpenID authentication scheme.

The OpenID authentication scheme lets users submit credentials through an OpenID provider. The OpenID provider authenticates the user and sends an authentication response to the Policy Server. The Policy Server verifies the response, completes the authentication process, and authorizes access to the resource.

The goal of the scenario is to let the intended audience:

- Identify how the OpenID authentication process works.
- Configure the required agent–side components to enable the authentication scheme.
- Configure the required Policy Server–side components to enable the authentication scheme.

CA SiteMinder [insert SiteMinder version number] supports OpenID versions 1.1 and 2.0 and OpenID Attribute Exchange version 1.0.

## How OpenID Authentication Works in CA SiteMinder

The flow of an OpenID authentication process following these steps:

1. A user requests the resource.
2. The agent intercepts the request and contacts the Policy Server to see if the resource is protected.
3. The Policy Server determines that the resource is protected with an OpenID authentication scheme and requests that the agent redirect the user to the OpenID forms credential collector (FCC).
4. The agent redirects the user to the FCC.

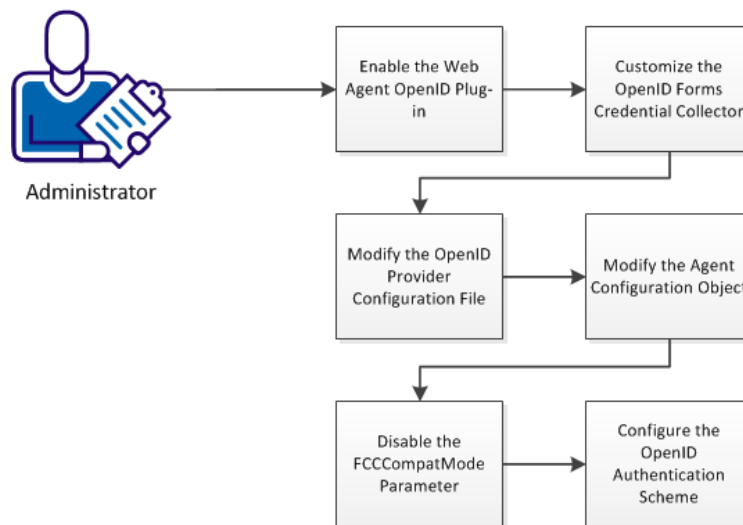
5. The user completes one of the following tasks. How the FCC is customized determines the work flow in this step. The user can:
  - Select an OpenID provider and submit OpenID credentials at the provider site.
  - Select an OpenID provider and submit an OpenID user name.
  - Select OpenID and submit the complete OpenID user identifier.
6. The FCC constructs the OpenID user identifier and passes it to the Policy Server.
7. The Policy Server redirects the user to the OpenID provider for authentication by constructing an OpenID authentication request.
8. The user authenticates with the OpenID provider using provider-specific credentials.
9. The OpenID provider redirects the successful authentication response to the FCC.
10. The agent passes the authentication response to the Policy Server.
11. The Policy Server verifies the provider authentication response and uses it to determine the value of the first required claim. The Policy Server searches all user directories in the policy domain to locate a user with an attribute that matches the claim value. Upon a match, the Policy Server authenticates the user.

**Note:** The authentication scheme supports an anonymous mode of authentication. In anonymous mode, the Policy Server does *not* use the claim value to map to a user. The Policy Server searches all user directories in the policy domain for a user matching the anonymous user that you defined in the authentication scheme.
12. The Policy Server returns the session details of the authenticated user to the FCC.
13. The FCC creates the session cookie and passes it to the Web browser. The user is redirected to the requested resource and the Policy Server maintains all authorization decisions.

## How to Configure an OpenID Authentication Scheme

This section describes how a Policy Server administrator can configure the OpenID authentication scheme. The following diagram illustrates the required tasks:

### How to Configure an OpenID Authentication Scheme



#### Follow these steps:

1. [Enable the web agent OpenID plug-in](#) (see page 352).
2. [Customize the OpenID forms credential collector](#) (see page 353).
3. [Modify the OpenID providers configuration file](#) (see page 356).
4. Modify the agent configuration object.
5. Disable the FCCCompatMode parameter.
6. [Configure the OpenID authentication scheme](#) (see page 359).

### Enable the Web Agent OpenID Plug-in

The OpenID plug-in is referenced in the web agent configuration file (WebAgent.conf). The plug-in is required to let agents communicate with an OpenID provider and communicate the OpenID provider authentication response to the Policy Server.

Contact agent owners and instruct them to enable the required plug-in.



**Follow these steps:**

1. Log in to the web agent host system.
2. Open the web agent configuration file.

**Note:** The default location of the file depends on the web server type:

- IIS

*agent\_home\bin\IIS*

***agent\_home***

*Specifies the agent installation path.*

- Oracle iPlanet (iPlanet/SunOne)

*web\_server\_home/https-hostname/config*

***web\_server\_home***

*Specifies the web server installation path.*

- Apache, IBM HTTP Server, and Oracle HTTP Server

*web\_server\_home/conf*

***web\_server\_home***

*Specifies the web server installation path.*

- (Windows) Domino

*C:\lotus\domino*

- (UNIX) Domino

*\$HOME/notesdata*

3. Uncomment line that loads the OpenID plug-in.

**Example:**

```
#LoadPlugin="C:\Program Files\CA\webagent\bin\OpenIDPlugin.dll"
```

4. Save the file.
5. Restart the web server.

## Customize the OpenID Forms Credential Collector

A sample OpenID FCC is included with the web agent installation. The FCC is required to let users authenticate by:

- Entering an OpenID provider user name.
- Entering a complete OpenID identifier.

By default, the FCC presents numerous OpenID providers. Contact the agent owner and instruct them to display only those providers that the protected application supports by modifying the FCC.

**Follow these steps:**

1. Log in to the web agent host system.
2. Go to the following location:

*agent\_home*\samples\forms

***agent\_home***

Specifies the web agent installation path.

3. Open the following file with a text editor:

openid.fcc

4. Review the FCC. Determine if the OpenID providers you require are available or if you have to add a profile. The default providers are located in the following sections:

```
var providers_large
var providers_small
```

5. Remove the unnecessary providers from the FCC by commenting them. Begin the comment at the provider name. End the comment at the end of the profile.

**Example:**

```
/*google : {
    name : 'Google',
    url : 'https://www.google.com/accounts/o8/id'
},*/
```

6. If you have to add a provider, locate the custom provider ID in either the large or small provider sections:

**Example:**

```
*/*,
myprovider : {
    name : 'MyProvider',
    label : 'Enter your provider username',
    url : 'http://ca.com/{username}/',
    image : 'images/image.png'
}*/
```

**Note:** The separate provider sections correspond to the sizes of provider icons that the FCC displays:

- The supported size of an icon in the large section is 100 pixels by 60 pixels. The FCC can display up to five large icons.
- The supported size of an icon in the small section is 24 pixels by 24 pixels. The FCC can display up to 11 small icons.

- a. Add the new provider by removing the following characters:

```
/*  
*/
```

- b. Update the label and name values. The label value determines the text that the user sees after clicking the provider icon.

**Example:**

```
myprovider : {  
  name : 'Foward Inc',  
  label : 'Enter your Forward Inc user name',  
  url : 'http://ca.com/{username}/',  
  image : 'images/image.png'  
}
```

**Note:** Forward, Inc. is a fictitious company name that is used strictly for instructional purposes only and is not meant to reference an existing company.

- c. Update the URL value. The URL value represents the OpenID user identifier. The Policy Server forwards the user identifier to the OpenID provider.

**Example:**

```
myprovider : {  
  name : 'Foward Inc',  
  label : 'Enter your Forward Inc user name',  
  url : 'http://{username}.forwardinc.com/'  
  image : 'images/image.png'  
}
```

- d. Update the image value. The image value represents the location of the provider icon that the FCC is to display.

**Example:**

```
myprovider : {  
  name : 'Foward Inc',  
  label : 'Enter your Forward Inc user name',  
  url : 'http://{username}.forwardinc.com/'  
  image : 'images/forwardinc.png'  
}
```

7. By default, the FCC displays the provider icons in the order in which the provider ID is configured and enabled in the FCC. If you want to change the icon order, adjust the order of the provider IDs accordingly.

**Important!** The default provider IDs include the following image index property:

`imageidx`

Do *not* remove or change the property. The property verifies that the FCC displays the correct provider icon.

8. Save the script.
9. Restart the web server.

## Modify the OpenID Provider Configuration File

The product provides an OpenID provider configuration file. The file must reference the configuration details of each provider that the protected application supports. If the file does not include the correct settings, authentication fails.

- By default, the file includes sample settings for all of the providers that the OpenID FCC makes available. Review the sample settings and modify them as required.

**Important!** The values are samples only. We recommend that you verify all configuration settings with your OpenID provider before deploying the authentication scheme.

- If you added a provider to the FCC, add configuration settings for the provider.

### Follow these steps:

1. Log in to the Policy Server host system.
2. Go to the following location:

`siteminder_home\config\properties`

**`siteminder_home`**

Specifies the Policy Server installation path.

3. Do one of the following steps:

- Open the default provider configuration file:

`Openidproviders.xml`

- Create another instance by copying the default configuration file. Each OpenID authentication scheme that you configure can use its own provider configuration file.

**Example:** You can enable Federal Identity, Credential, and Access Management (ICAM) compliance for one instance of the authentication scheme and can disable ICAM compliance for another.

4. Review the file and determine if the OpenID provider settings you require are available or if you have to add settings.
5. If you have to add settings, complete the following steps:
  - a. Copy an existing OpenID provider node and all of its child nodes. All required and optional nodes are included within the following nodes:

```
<OpenIDProvider>
</OpenIDProvider>
```
  - b. Add the new OpenID provider node and all of its child nodes to the following root node:

```
<TrustedOpenIDProviders>
</TrustedOpenIDProviders>
```
6. Configure the settings for each provider that the authentication scheme is to support using the following node descriptions:

**OpenIDProvider *RequestType*="value"**

Indicates the beginning of the configuration settings for a provider.

***RequestType***

(Optional) Specifies the schema type that the provider supports.

**Valid values:** ax or sreg.

**Default:** ax.

**ProviderName**

Specifies the URL of the OpenID provider hosting the service. The value can include a comma-separated list of provider URLs.

**Required Claims**

Specifies the claims that the OpenID provider returns as part of the authentication request. If the provider cannot provide all of the required claims, authentication fails. This node requires at least one claim node.

**Claim**

Defines an individual required claim.

### URI

Specifies the URI form of the OpenID provider claim. The Policy Server constructs the authentication request using this value.

**Important!** Verify that the value of the first required claim maps to a user attribute in your user directories. The Policy Server determines the value of the first required claim that is based on the provider authentication response. The Policy Server then searches all user directories in the policy domain for a user that matches the claim value. If the Policy Server cannot map the claim value to a user attribute, authentication fails.

**Value:** The value must adhere to the type of schema that the provider supports.

### Alias

(Optional) Defines the user-friendly name of the URI node value and prevents the URI from being stored or referenced. The system uses the alias to identify the claim.

**Value:** Any string.

**Example:** Instead of storing a URI that returns the first name of users in the session store, the system can reference the claim name as fullname.

**Note:** The system appends the following prefix to an alias that is stored in the session store:

smopenidclaim

### Optional Claims

(Optional) Specifies the optional claims that the OpenID provider is to return as part of the authentication request. If the provider cannot provide an optional claim, authentication does not fail. This node requires at least one claim node.

### Pape

(Optional) Defines the properties that ICAM compliance requires. If you are configuring the authentication scheme for ICAM compliance, this node and all child nodes are required.

#### max\_auth\_age

(Optional) Specifies the time for which the OpenID provider user session is valid. If the user session is valid, the OpenID provider authenticates the user for a protected resource using a provider-specific cookie. If the session expires, the user is prompted to reauthenticate.

**Unit of measurement:** seconds.

**Default:** 0.

If you leave the default value, the user must authenticate against the OpenID provider, regardless of a valid session.

**Value:** The value must be a positive integer.

**Policies**

(Optional) Specifies a comma-separated list of the ICAM policies to which the OpenID provider must adhere. If the provider does not adhere to the compliance level, authentication fails.

7. Save and close the file.

## Configure the OpenID Authentication Scheme

You use the Administrative UI to configure the OpenID authentication scheme object.

If your network includes multiple cookie domains and each cookie domain requires the authentication scheme, configure a separate authentication scheme object in each cookie domain.

**Note:** For operation on any Solaris platforms, modify the `java.security` file in the directory `jre_root/lib/security` so that the **sun.security.provider.Sun** provider is registered as the first provider.

**Follow these steps:**

1. Click Infrastructure, Authentication, Authentication Schemes.
2. Click Create Authentication Scheme.
3. Select the new object option and click OK.  
The Create Authentication Scheme page appears.
4. Enter a name and a protection level.
5. Select the OpenID template from the Authentication Scheme Type list.  
The scheme-specific settings appear.
6. Configure the remaining parameters and click Submit.

**Important!** If you change any of the proxy settings or the post processing chain setting, restart the Policy Server.

You have completed the required tasks to configure an OpenID authentication scheme. You can now bind the authentication scheme to a policy realm and an Enterprise Policy Management (EPM) application component.

## Legacy Federation Authentication Schemes

The following federation authentication schemes are available to you:

- SAML Artifact Template
- SAML POST Template
- SAML 2.0 Template
- WS-Federation Template

**Note:** More information about these authentication schemes, see the *Legacy Federation Guide*.

## Impersonation Authentication Schemes

By configuring a series of Policy Server objects, you can allow privileged users to impersonate other users. This feature is useful in situations where a helpdesk or customer service representative must troubleshoot problems for a customer, or when an employee is out of the office.

Part of the impersonation process requires an impersonation authentication scheme, which allows a privileged user to begin the impersonation process, identify the user to be impersonated (impersonatee), and establish an impersonation session. This authentication scheme is similar to the HTML Forms authentication scheme.

**More information:**

[HTML Forms Authentication Schemes](#) (see page 282)

[Impersonation](#) (see page 613)

## Impersonation Scheme Prerequisites

Verify that the following prerequisites are met before configuring an Impersonation authentication scheme:

- A customized .fcc file resides on a Web Agent server in the cookie domain in which you want to implement impersonation. CA provides sample .fcc files under the /forms subdirectory, where you installed your Web Agent.

For general details about composing .fcc files, see [SiteMinder FCC Files](#) (see page 287). For information about specific .fcc file requirements for impersonation, see [Enable Impersonation through an .fcc File](#) (see page 622).

- Directory connections exist between the Policy Server and the user directories containing impersonators and impersonatees.



- The following default HTML forms library, which handles authentication processing is installed on the Policy Server:

- `smauthimpersonate.dll` on Windows
- `smauthimpersonate.so` on Solaris

These libraries handle authentication processing. These files are installed automatically when you install the Policy Server.

**Note:** Directory mapping does not support impersonation. The impersonatee, the user being impersonated, must be uniquely present in the authentication directories that are associated with the domain or the impersonation fails.

**More information:**

[User Directories](#) (see page 149)

## Configure an Impersonation Authentication Scheme

You use an Impersonation authentication scheme to let privileged users impersonate other users.

**Note:** The following procedure assumes that you are creating an object. You can also copy the properties of an existing object to create an object. For more information, see [Duplicate Policy Server Objects](#).

**Follow these steps:**

1. Click Infrastructure, Authentication.
2. Click Authentication Schemes.
3. Click Create Authentication Scheme.

Verify that the Create a new object of type Authentication Scheme is selected.

Click OK

4. Enter a name and a protection level.
5. Select Impersonation Template from the Authentication Scheme Type list.

**Note:** Click Help for descriptions of settings and controls, including their respective requirements and limits.

6. Enter the server name and target information.
7. Click Submit.

The authentication scheme is saved and can be assigned to a realm.



# Chapter 11: Certificate Mapping and Validity Checking for X.509 Certificates

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This section contains the following topics:

[Certificate Mapping for X.509 Client Certificate Authentication Schemes](#) (see page 363)

[Certificate Validity Checking for X.509 Client Certificate Authentication](#) (see page 370)

## Certificate Mapping for X.509 Client Certificate Authentication Schemes

For the Policy Server to use a certificate to identify a user, it compares the certificate information to a user record in the user directory. A certificate mapping defines how the Policy Server uses the Subject Name from the user certificate to locate a CA SiteMinder user in a user directory and then authenticate that user.

You can configure certificate mapping for users whose authentication information is stored in a Microsoft SQL Server, Oracle, or LDAP user directory.

### **More information:**

[User Directories](#) (see page 149)

## Configure a Certificate Mapping

To determine how to compare user certificate information with the information stored in the user directory, configure a certificate mapping.

### **Follow these steps:**

1. Click Infrastructure, Directory.
2. Click Certificate Mappings.
3. Click Create Certificate Mapping.

4. Type the Issuer DN exactly as it appears in the certificate. Do not add any additional spaces or characters.

When entering the DN, escape reserved special characters with a backslash (\).

Special characters include:

- semicolons (;)
- quotes ("")
- backslashes (\)
- plus character (+)
- greater than character (>)
- less than character (<)

More information about reserved special characters for DNs exists at <http://www.faqs.org/rfcs/rfc2253.html>.

**Note:** If you use a relational database as a policy store, Issuer DNs cannot exceed 255 characters. If you use an LDAP directory as a policy store, verify the character limit for your specific directory.

5. Select the directory type against which the certificate is mapped.

For LDAP directories only, you can configure the Policy Server to verify that the certificate the user presents matches the certificate that is stored in the user record in the user directory. The Certificate Required in Directory option lets you require this verification.

**Note:** The attribute in the user record where the certificate is stored is named **usercertificate**.

6. Specify how to map X.509 user certificate information to a user entry in the user directory. The Policy Server can apply a mapping using one of the following properties to locate the correct user entry:

- A single attribute
- A custom mapping expression
- The entire Subject Name from the user certificate

7. Select an attribute name from the list.
8. Click Test to test the certificate mapping.
9. (Optional) Select Perform CRL Checks and specify the CRL settings.

If you do not select CRLs, you can use OCSP.

10. Click Submit.

The certificate is mapped with the selected user directory.

**More information:**

[Certificate Validity Checking for X.509 Client Certificate Authentication](#) (see page 370)

## Test a Certificate Mapping

Testing a certificate mapping displays the search string the Policy Server is to use to map client certificates to user directory attributes.

**Follow these steps:**

1. Open the certificate mapping.
2. Click Test in the Mapping section.

The Certificate Map Test pane opens.

3. Select a user directory connection from the Directory list.

**Note:** The Directory list includes all of the existing directory connections of the type you selected when creating the certificate mapping.

The contents of the Directory Information group box change depending on the type of user directory connection. For WinNT, ODBC and OCI user directory connections, the group box displays the Directory Type you are testing. For LDAP directory connections, the group box displays the Directory Type and the Lookup Start and Lookup End values used to locate a user DN within the LDAP directory.

The Policy Server tests the certificate mapping and the Certificate Map Test group box provides the results.

4. Click Close.

The Certificate Map Test group box closes.

## Custom Mapping Expressions

You can use custom mapping expressions for complex multiple attribute mapping. Custom mapping expressions allow you to specify multiple user attributes to extract from a user DN to establish a certificate mapping.

**Note:** Custom mapping expressions are also useful when simulating certificate-based authentications through the Test Tool.

The syntax for a custom mapping expression is a parsing specification that is designed to enable full mapping flexibility. The syntax indicates which information to take from the certificate and where to apply it in the user directory. The basic syntax is as follows:

```
UserAttribute=%{CertificateAttribute},  
UserAttribute2=%{CertificateAttribute}
```

**More information:**

[Certificate-based Authentication Tests](#) (see page 666)

## Omit Unwanted User DN Lookup Start and End Strings From Custom Certificate Mappings

When you create a custom certificate mapping for an LDAP user directory, the resulting search query string incorrectly includes the LDAP User DN Lookup Start and End strings. (Only the mapping expression that you specify on the Create Certificate Mapping pane is required.) The resulting query is invalid, as seen in the following example:

**LDAP User DN Lookup Start**

```
(samAccountName=
```

**LDAP User DN Lookup End**

```
)
```

**Certificate Mapping Expression**

```
(mail=%{E})
```

**Resulting Search Query**

```
(samAccountName=(mail=%{E}))
```

To omit the User DN Lookup Start and End strings from the search query, navigate to \Netegrity\SiteMinder\CurrentVersion\PolicyServer\ and set the EnableCustomExprOnly registry key to 1. The resulting search query string is valid, as seen in this example:

**Certificate Mapping Expression**

```
mail=%{E}
```

**Resulting Search Query**

```
mail=%{E}
```

**Note:** If the EnableCustomExprOnly registry key is 0 (the default) or the key does not exist, the User DN Lookup Start and End strings are included in the resulting search query.

## Configure Support for Logic Operators in LDAP Syntax Search Filters

To use LDAP syntax to create search filters that contain logic operators, enable the LegacyCertMapping registry key. Enabling the registry key allows legacy behavior in certificate mapping, which ensures that users are authenticated using the specified LDAP search criteria.

### LegacyCertMapping

KeyType: DWORD

Values: 0 (disabled) and 1 (enabled)

Default: 0

### To enable the registry key on Windows

1. Navigate to  
HKEY\_LOCAL\_MACHINE\SOFTWARE\Wow6432Node\Netegrity\SiteMinder\CurrentVersion\  
PolicyServer, and open LegacyCertMapping.
2. Edit the KeyType value to REG\_DWORD.
3. Edit the Values value to 1.

**Note:** If a value other than 0x1 is set, or the registry value does not exist, the registry key is disabled.

4. Save the registry key.

LegacyCertMapping is enabled, and LDAP search filter syntax can be used with custom mapping.

### To enable the registry key on UNIX

1. Open the sm.registry file.
2. Add the following lines to the file:

```
HKEY_LOCAL_MACHINE\SOFTWARE\Wow6432Node\Netegrity\SiteMinder\CurrentVersion\  
PolicyServer=XXXXX  
LegacyCertMapping=0X1 REG_DWORD
```

3. Save the file.

LegacyCertMapping is enabled, and LDAP search filter syntax can be used with custom mapping.

### Custom Mapping: Example 1

If a user certificate contains:

SubjectDN: CN=John Smith, UID=JSMITH, OU=development, O=CompanyA

You can specify the following custom mapping:

CN=%{UID}, OU=%{OU}, O=%{O}

The resulting UserDN is:

CN=JSMITH, OU=development, O=CompanyA

### Custom Mapping: Example 2

The custom mapping syntax also handles more complex mappings, as illustrated in the example:

If the user certificate contains:

Subject DN: CN=John Smith + UID=jsmith +EMAIL=jsmith@companyA.com,  
ou=development, o=companyA

You can specify the following custom mapping:

CN=%{CN.CN}+UID=%{CN.UID}, OU=%{O}

The resulting UserDN is:

CN=John Smith+UID=JSMITH, OU=companyA

In the previous example, the CN contained multiple attributes. The syntax indicated which components of the CN to take and apply to the CN of the UserDN by specifying "CN.CN or CN.UID." This syntax indicates that the custom expression uses both the CN and UID parts of the CN.

**Note:** You cannot use the "+" operator to disambiguate multiple attributes in a user directory. The "+" operator is used like any other character in the user DN for a user that is present in the user directory.



### Custom Mapping: Example 3

Static text can be represented in a custom expression by leaving it outside of the bracket notation.

The user certificate contains:

Subject DN: CN=John Smith, UID=JSMITH, OU=development

You can specify the following mapping:

CN=%{UID}, OU=%{OU}, O=companyA

The resulting UserDN is:

CN=JSMITH, OU=development, O=CompanyA

### Template String Usage

The template string is composed of text and hash-bracketed expressions %{...}. All text outside the brackets is returned unchanged. The hash-bracketed expressions are evaluated based on the following rules:

- Undistinguished variable names (For example, DN) are resolved before being returned.
- Distinguished variable names (for example, DN.UID) are resolved to the variable component before being returned.

### Map to the Certificate Serial Number or IssuerDN

Certificate Mapping supports mapping of the CertSerialNumber and IssuerDN attributes, which are not part of the subjectDN. These attributes in the subjectDN of user certificates can be mapped to default or custom user-attributes, such as UID or CN in the user directory.

To map these attributes, add the following notation in the Mapping Expressions field in the Certificate Mapping pane:

- CustomAttributeinLDAP1 = %{CertSerialNumber}

### Custom Certificate Mapping for Multiple Attributes of the Same Type

Some certificates can have multiple attributes of the same type in their Subject DN. CA SiteMinder supports a simple method for using a custom certificate mapping to see attributes other than the first attribute of a particular type. The syntax is as follows:

%{attribute\_name} for the first occurrence of attribute\_name

%{attribute\_nameN} for the Nth occurrence of attribute\_name

For example, If the Subject DN of the certificate contains the following attributes, you can set up a custom certificate mapping to any of the sn attributes:

CN=user,ou=dev,sn=1234,sn=2345,sn=3456,o=company,c=us

So, to map to the first sn, enter %{sn} as the custom mapping. To map to the second sn, you could enter %{sn2} as the custom mapping.

### Map to Non-Required Attributes

Sometimes, certificates for individuals can be slightly different. For example, some users can have two account numbers, while others have a single number. In these cases, you can map to the second of the numbers when a second attribute exists. You can do so using the following notation:

%{attribute\_name2/attribute\_name}

In the previous example, you could enter %{SN2/SN} as a custom mapping to indicate that the second number in the Subject DN should be used if it exists; otherwise, the first occurrence of the account number attribute should be used.

This notation can also be used to specify two different attributes that are acceptable for a certificate mapping. For example, to indicate that the SN should be used, but a CN can be used if the SN does not exist, you can enter %{SN/CN}.

## Certificate Validity Checking for X.509 Client Certificate Authentication

Certificate validity checking is an optional feature for X.509 client certificate authentication.

The Policy Server can confirm whether a user certificate is valid using the following methods:

- Certificate Revocation List (CRL) checking

The Policy Server can use CRLs to determine whether a certificate is revoked. In the Administrative UI, you can specify a path to a CRL directory or you can select CRL Distribution Points (CDPs) to locate CRLs.

- Online Certificate Status Protocol (OCSP) checking

The Policy Server sends a request to an OCSP responder regarding a single user. The OCSP responder determines the revocation status of the user certificate and sends back the response.

The Policy Server determines which certificate validation method it uses as follows:

- If you configure only CRL checking, the Policy Server uses CRLs.
- If you configure only OCSP, the Policy Server uses OCSP.
- If you configure CRL checking and OCSP with failover enabled, the Policy Server uses the designated primary validation method first (CRL or OCSP). If the primary validation method fails, the secondary method is used. For the next request, the Policy Server reverts to the primary method.

The Policy Server regards the first *good* or *revoked* response that it obtains to be definitive. The Policy Server does not request subsequent CRLs or OCSP responses after the first valid response. In addition, the Policy Server does not aggregate the results of CRL and OCSP validation to determine the comprehensive status of the user certificate.

**More information:**

[Failover Between OCSP and CRLs](#) (see page 388)

## Prerequisites for Implementing Validity Checking

To validate a user certificate, configure an X.509 client certificate authentication scheme to authenticate a user when they request a protected resource.

Review the instructions for setting up an [X.509 client certificate authentication scheme](#) (see page 334).

The instructions for configuring CRLs and OCSP are described in the sections that follow.

## Certificate Revocation List Checking

A certificate revocation list (CRL) is a digitally signed list of revoked certificates that are published by a Certificate Authority (CA) that issued the corresponding certificates. Comparing certificates against CRLs is one method of determining whether a certificate is valid.

You can use one CRL for each Issuer DN that you configure in a Policy Server certificate mapping.

The Policy Server retrieves a CRL in one of the following ways:

- Retrieves a CRL from an LDAP directory.

The Policy Server can establish a connection to an LDAP directory that you specify in the CRL configuration. From that directory, the Policy Server retrieves a CRL.

Multiple CRLs can exist in an LDAP directory; however, each certificate mapping can refer to only one CRL identified by its entry point. Therefore, each entry point for each CRL must be different.

**Note:** The Policy Server only accepts a CRL that contains all reason codes, and rejects a CRL with only specific reason codes.

- Retrieves a CRL from a location that is specified by a CRL distribution point extension (CDP).

A user certificate can contain a distribution point extension. A CDP extension points to a location from where a CRL can be obtained. The Policy Server supports a distribution point extension with a single entry to a CRL or multiple pointers to different CRLs.

The distribution points can use different sources, such as HTTP, HTTPS, and LDAP. If the CDP extension contains entries that use distribution point names with multiple values, these values must all point to the same CRL.

After the Policy Server retrieves a CRL, it can make the necessary checks. If you enable CRL caching in the Administrative UI, the Policy Server can store the CRL in memory. If you do not enable caching, the Policy Server has to retrieve a CRL for every authentication request.

## Reason Code Requirements for CRLs

The Policy Server only supports CRLs that include revocation information for all possible reason codes. If a CRL contains certificates that are revoked for only some reason codes, the Policy Server generates an error and treats the CRL as invalid. The Policy Server ignores invalid CRLs and continues looking for an available CRL until it finds a valid one.

The Policy Server treats *delta* CRLs as invalid CRLs. A delta CRL lists only those certificates whose revocation status changed after the CA issued the complete CRL. The Policy Server ignores delta CRLs and continues looking for an available CRL until it finds a valid one.

If the Policy Server searches through all available CRLs and cannot find a valid one, it does not authenticate the user.

## Size Limits for CRLs

The Policy Server caches CRLs. The Policy Server default cache size is up to 2 MB. If your CRLs exceed the default cache size, increase the cache size up to a maximum of 1 GB. To increase the cache size, add the MaxCRLBufferMB registry key.

### Follow these steps:

1. Access the Policy Server and follow the step for your operating platform:

**Windows:** Open the Registry Editor and navigate to HKEY\_LOCAL\_MACHINE\Software\Wow6432Node\Netegrity\SiteMinder\CurrentVersion\PolicyServer.

**UNIX:** Open the sm.registry file. The default location of this file is *siteminder\_home/registry*.

#### ***siteminder\_home***

Specifies the Policy Server installation path.

2. Add MaxCrlBufferMB with a registry value type of REG\_DWORD.

**Unit of measurement:** Megabytes

**Base:** Decimal

**Default value:** 2

**Minimum value:** 1

**Maximum value:** 1023

3. Complete one of the following steps:

**Windows:** Exit the Registry Editor.

**UNIX:** Save the sm.registry file.

4. Restart the Policy Server.

## CRL Signature Verification

CRL signature verification is an optional feature of CRL checking.

Before the Policy Server compares certificates against a CRL, it verifies the signature of the CRL with a CA certificate stored in an LDAP directory. The Policy Server retrieves the CA certificate from a specific entry in an LDAP user directory, which is identified based on the Issuer DN in the certificate or the DN in the CRL directory that you configure for the certificate mapping in the Administrative UI.

Store the CA certificates in an LDAP directory that the Policy Server can access. In the LDAP directory, configure the specific directory entry with an attribute named **cacertificate**. The cacertificate attribute is a multivalued attribute where you can store more than one CA certificate. Multiple CA certificates can be necessary if CRLs are partitioned and a different CA key signs each partition. The Policy Server can only verify the signature of a partition if it can access the associated CA signing certificate for a given partition.

For signature verification, the Policy Server can use the following hash algorithms:

- MD5
- MD2
- SHA1
- SHA2 algorithms (SHA224, SHA256, SHA384, and SHA512)

**Note:** The signature algorithm in use is specified in the CRL.

If a CA certificate is not available or your CRL is signed with an unsupported algorithm, you can disable signature checking during the CRL verification process.

**Important!** If signature checking is turned off, confirm that the repository where CRLs are stored is protected appropriately.

## CRL Distribution Points to Locate CRLs

A CRL Distribution Point (CDP) is a certificate extension that points to a location of a CRL. From the specified location, the Policy Server can retrieve the CRL and can confirm which certificates are revoked.

A CDP extension can specify several sources to locate a CRL. Each source contains all the information to locate a CRL. The different options for retrieval ensure that the Policy Server obtains a CRL. The sources in a CDP extension include:

- LDAP
- HTTP

## ■ HTTPS

For an HTTPS distribution point, the Policy Server makes a secure connection. To make this secure connection, a valid CA certificate file or certificate bundle (a file of concatenated certificates that form a chain) must exist in the directory *policy\_server\_home/config*. If there is no valid certificate, the connection to the HTTPS server fails.

The CA certificate file for the HTTPS connection must be in PEM format (base64 encoded) and named **cert.pem**. If the certificate is not in the PEM format, convert it using the OpenSSL command-line utility. The cert.pem file must contain the issuer certificate for the SSL web server that is configured in the CDP extension, and it must contain the trusted CA certificate for each distribution point.

**Note:** For more information about the OpenSSL utility, see the OpenSSL documentation.

If a CDP extension has multiple entries, the Policy Server uses the first successfully retrieved CRL with all reason codes to validate certificates. The order in which it retrieves the CRLs is the same order that the entries are listed in the certificate itself. If the Policy Server cannot retrieve the first CRL in the CDP list, it tries to retrieve the second CRL, and so on. The Policy Server continues in this manner until it is successful.

If the Policy Server cannot retrieve a valid CRL from any source, authentication fails and the user is denied access. Enabling failover between CRLs and OCSP is the only exception to this behavior. If CRL checking is the primary validation method and it fails, the Policy Server fails over to OCSP as the secondary method.

**Note:** Enable [failover](#) (see page 388) in the configuration file for OCSP.

Configure CRL Distribution Points as part of the CRL Checking settings in the Certificate Mapping dialog.

### Verifying Signatures of Partitioned CRLs

Different CA keys can sign different partitions of CRLs. The Policy Server can verify the signature of any CRL partition as long as it can access the associated CA signing certificate for each partition.

The use of partitioned CRLs is relevant when using certificate distribution points to locate CRLs. The extension can have multiple links to different CRLs, all whose signatures need verifying.

The Policy Server verifies the signature of the CRL with the CA certificate stored in an LDAP directory. In this LDAP directory, configure a specific entry with the attribute named **cacertificate**, which is a multivalued attribute. Multiple CA certificates are required to verify partitioned CRLs signed by different CA keys.

## Configure Certificate Revocation List Checking

Configure CRL checking to verify whether a user certificate has been revoked. This verification ensures that a user with an invalid client certificate cannot access a protected resource.

You can obtain a CRL from an LDAP directory or from a location that a CDP specifies. If the Policy Server is going to obtain CRLs from a specific LDAP directory, configure a connection to that directory. This LDAP directory can act as a user store and a CRL store. Configure the directory before configuring CRL checking or during the CRL configuration process.

### Follow these steps:

1. Click Infrastructure, Directory.

2. Click Certificate Mappings.

The Certificate Mappings page appears.

3. Click the Issuer DN name to select the certificate mapping.

The View Certificate Mapping page appears.

4. Click Modify.

The settings and controls become active.

5. Select Perform CRL Checks.

CRL-specific fields and controls display.

6. Select the name of the LDAP directory from where the Policy Server obtains the CRL in the CRL Directory field.

The directory name is the name that you assigned when configuring the directory in the User Directory section of the Administrative UI. If there is no user directory in the list, click Create to add a directory connection.

If you do not specify an LDAP directory, select Use Distribution Points as the method by which the Policy Server retrieves a CRL.

**Note:** An optional text string value for the CRL Directory field exists and it reads "Take from Certificate Extension." Only select this option if you plan to use distribution points for CRL retrieval.

7. If you specified a user directory in CRL Directory, enter a value for the entry point in DN in CRL Directory.

The value that is specified in DN in CRL Directory is the DN where the Policy Server looks in the CRL directory to locate the CRL. This value is valid only when an LDAP directory is selected as the CRL Directory. If you enable distribution points to locate CRLs, leave this field blank.



8. (Optional) Select Verify signature to verify the signature of the CRL.

The Policy Server requires an accessible LDAP host to retrieve the certificate necessary to verify the signature of the CRL. Be sure that you have configured an LDAP host as a user directory connection in the Administrative UI.

The Policy Server can use a CRL distribution point to locate a CRL. If that distribution point is an LDAP URI, the Policy Server can verify the CRL signature. If the distribution point is an HTTP URI, do not select the Verify Signature option because no LDAP host is available from which to retrieve the certificate.

9. (Optional) Select Use Distribution Points to use the CDP extension to locate CRLs. You can use this option as an alternative to specifying a CRL directory.

If you select Use Distribution Points and you enter a directory in CRL Directory, the Policy Server uses only the distribution points to locate the CRL. Distribution points take precedence over the CRL directory.

10. Complete the remaining settings, as necessary, and click Submit.

Certificate revocation list checking is enabled.

## Accessing a CRL through an HTTP Proxy

CRLs requests can be made over an HTTP connection, requiring an HTTP GET request to retrieve the CRL for certificate validation.

In many enterprise environments, HTTP traffic goes through an HTTP proxy. For the Policy Server to retrieve a CRL through an HTTP proxy, set the `http_proxy` environment variable on the system where the Policy Server resides. For example:

```
set http_proxy=http://username:password@proxy.example.org:8080
export http_proxy
```

If you do not specify a port number, CA SiteMinder defaults to port 1080.

### *username*

The login user name for the proxy server. This name has to be a valid user in the proxy server configuration.

### *password*

The login password for the proxy server. This password has to be a valid entry in the proxy user configuration.

**Note:** You cannot use this environment variable for accessing an OCSP Responder through a proxy.

## Online Certificate Status Protocol Checking (OCSP)

The Online Certificate Status Protocol (OCSP) helps maintain security across your environment by verifying whether user certificates are valid. OCSP uses OCSP responders to determine the revocation status of an X.509 client certificate. The OCSP responder does its verification in real time by aggregating certificate validation data and responding to an OCSP request for a particular certificate.

One benefit of OCSP is that you do not have to keep downloading a CRL at the client side to maintain up-to-date certificate status information. Additionally, CRLs can be large.

To implement OCSP checking, the Policy Server uses a text-based configuration file named `SMocsp.conf` file. This file is located in the directory `policy_server_home/config`, and it must exist to use the CA SiteMinder OCSP feature.

The `SMocsp.conf` file contains settings that define the operation of one or more OCSP responders. When verifying if a user certificate is valid, the Policy Server looks for an Issuer DN in the `SMocsp.conf` file. If it finds the Issuer DN, a certificate status check is made using the specified OCSP responder that is associated with the Issuer DN. The Policy Server only performs OCSP checking and considers the certificate valid if the Policy Server finds the issue DN. A certificate is considered valid in the absence of an Issuer DN to satisfy cases where OCSP validation is not required.

You can sign an OCSP request; however, signing requests is an optional feature.

When the OCSP responder returns a response to the Policy Server, the Policy Server default behavior is to validate the signed response. Several settings in the `SMocsp.conf` file require configuration to enable response verification.

**Note:** If CRL checking is enabled in the Administrative UI, the Policy Server uses CRL checking by default, regardless of whether an `SMocsp.conf` file is present. OCSP takes precedence over CRL checking only if you enable failover and you set OCSP as the primary validation method. Failover is configured in the OCSP configuration file.

### OCSP Prerequisites

Set up the following components to use OCSP for certificate validation:

- Establish a Certificate Authority (CA) environment.
- Set up an OCSP responder.
- Configure an LDAP directory to store an OCSP trusted responder certificate that validates the signature of an OCSP response returned to CA SiteMinder. The OCSP trusted responder certificate is a single trusted verification certificate or a collection of certificates.

You obtain these certificates in a communication that is separate from an OCSP transaction.

To store the trusted certificate or collection of certificates, configure the LDAP directory in the User Directory section of the Administrative UI. The presence of the user directory enables the Policy Server to connect to it and locate the certificate or collection of certificates to verify the response signature. If you are storing a collection of certificates, be sure to use a multi-valued binary attribute for the directory entry to store all the certificates.

The OCSP responder can include the signature verification certificate with the response. In this case, the Policy Server validates the certificate and the response signature with the trusted certificate in the LDAP directory.

If the signature verification certificate is not in the response, the Policy Server verifies the signature of the response with the certificate or collection of certificates in the LDAP directory.

When you configure OCSP, specify the location of the certificate or the collection of certificates in the ResponderCertEP setting of the SMocsp.conf file.

The Policy Server can work with any OCSP response that is signed using SHA-1 and the SHA-2 family of algorithms (SHA224, SHA256, SHA384, SHA512).

- Store the CA certificate that issued the user certificate in an LDAP directory. This CA certificate validates the user certificate. You can store this certificate in the same LDAP directory where you store the OCSP trusted responder certificate or in a different LDAP directory.
- Configure a CA SiteMinder OCSP configuration file (SMocsp.conf). A sample configuration file, SMocsp.Sample.conf, is installed with the Policy Server. Copy this file, rename it to SMocsp.conf, then modify it as needed.

For UNIX operating platforms, the file name must maintain the case-sensitivity.

- Optionally, be sure that the private key/certificate pair that the Policy Server uses to sign the OCSP request is available to the Policy Server. Store this key/certificate pair in the certificate data store.

## Create an OCSP Configuration File

The Policy Server uses a file that is named SMocsp.conf to implement OCSP checking. This file is an ASCII file with one or more OCSPResponder records.

The SMocsp.conf file must reside in the directory *siteminder\_home*/config. For ease of configuration, a sample file (SMocsp.Sample.conf) is installed with the Policy Server in the config folder. To configure OCSP for your environment, copy the sample file and rename it SMocsp.conf.

**Note:** For UNIX platforms, maintain the case-sensitivity of the file name.

The following excerpt is an example of an SMocsp.conf file with a single OCSPResponder entry.

**Note:** The sample file shows all available settings. Not all settings are required.

```
[
OCSPResponder
IssuerDN C=US,ST=Massachusetts,L=Boston,O=,OU=QA,CN=Issuer,E=user@domain.com
AlternateIssuerDN C=US,ST=New York,L=Islandia,O=,OU=QA,CN=Issuer,E=user@domain.com
CACertDir 10.1.22.2:389
CACertEP uid=caroot,dc=systest,dc=com
ResponderCertDir 10.2.11.1:389
ResponderCertEP cn=OCSP,ou=PKI,ou=Engineering,o=ExampleInc,c=US
ResponderCertAttr cacertificate
ResponderLocation http://10.12.2.4:389
AIAExtension NO
HttpProxyEnabled YES
HttpProxyLocation http://10.11.2.5:80
HttpProxyUserName proxyuser1
HttpProxyPassword letmein
SignRequestEnabled YES
SignDigest SHA256
Alias defaultenterpriseprivatekey
IgnoreNonceExtension NO
PrimaryValidationMethod OCSP
EnableFailover YES
ResponderCertAlias cert1
ResponderGracePeriod 0
]
```

Guidelines for modifying the SMocsp.conf file are as follows:

- Names of settings are not all case-sensitive. Case sensitivity for entries depends on the particular setting.
- If a setting in the file is left blank, the Policy Server sends an error message. The message indicates that the entry is invalid. The Policy Server ignores the setting. If you intended to leave the setting blank, disregard the message.
- Do not put leading white spaces in front of the name of a setting.

The settings in the file are as follows:

**OCSPResponder**

Required. Indicates that the entry is an OCSP responder record. Each OCSP Responder record must start with the name OCSPResponder.

**IssuerDN**

Required. Specifies the DN of the certificate issuer. This value labels each OCSP Responder record in the file.

**Entry:** The Issuer DN value in the certificate.

**AlternateIssuerDN**

Optional. Specifies a secondary IssuerDN or reversed DN.

#### **CACertDir**

Required. Specifies the name of the CA certificate directory that holds the CA certificate that issues the user certificate.

Be sure to configure this directory as a CA SiteMinder user directory in the Administrative UI so the Policy Server can connect to it.

Enter a valid IP address and port number of the user directory.

#### **CACertEP**

Required. Specifies the entry point in the CA certificate directory where the CA certificate resides.

Enter a string representing an entry point in the certificate directory.

#### **ResponderCertDir**

Required. Specifies the LDAP directory where the responder certificates is stored.

Be sure to configure this directory as a CA SiteMinder user directory in the Administrative UI so the Policy Server can connect to it.

Enter a valid IP address and port number of the directory.

#### **ResponderCertEP**

Required. Specifies the entry point in the LDAP directory where the responder certificate resides. The responder certificate directory is specified in the ResponderCertDir setting.

The signature verification certificate is the certificate that directly verifies the response signature or the collection of intermediate certificates.

The OCSP responder can include the signature verification certificate with the response. In this case, the Policy Server verifies the response signature and the certificate using the trusted certificate in the LDAP directory. If the signature verification certificate is not in the response, the Policy Server verifies only the response signature with the certificate or collection of certificates in the LDAP directory.

Enter a string representing an entry point in the directory where the certificate or the collection of certificates resides.

#### **ResponderCertAttr**

Required. Indicates the LDAP directory attribute that the Policy Server uses to look up the responder certificate in the responder certificate directory, which is specified in the ResponderCertDir setting.

### **ResponderLocation**

Optional. Indicates the location of the OCSP responder server.

You can use the ResponderLocation setting or the AIAExtension setting, but note the following conditions:

- If the ResponderLocation setting is left blank or it is not in the SMocsp.conf file, set the AIAExtension setting to YES. Additionally, an AIA extension must be in the certificate.
- If the ResponderLocation setting has a value and the AIAExtension is set to YES, the Policy Server uses the ResponderLocation for validation. The ResponderLocation setting takes precedence over the AIAExtension.
- If the OCSP responder specified for this setting is down and the AIAExtension is set to YES, authentication fails. The Policy Server does not try the responder that is specified in the AIA extension of the certificate.

If you enter a location, enter the value in the form  
*responder\_server\_url:port\_number*.

Enter a URL and port number of the responder server.

### **AIAExtension**

Optional. Specifies whether the Policy Server uses the Authority Information Access extension (AIA) in the certificate to locate validation information.

You can use the AIAExtension or ResponderLocation settings, but note the following items:

- If AIAExtension is set to YES and the ResponderLocation is not configured, the Policy Server uses the AIA Extension in the certificate for validation. The extension has to be in the certificate.
- If the AIAExtension is set to YES and ResponderLocation also has a value, the Policy Server uses the ResponderLocation for validation. The ResponderLocation setting takes precedence over the AIAExtension.
- If AIAExtension is set to NO, the Policy Server uses the ResponderLocation setting. The Policy Server disregards the AIA extension if it exists.

Enter YES or NO.

**Default:** NO

### **HttpProxyEnabled**

Optional. Tells the Policy Server to send the OCSP request to the proxy server, not to the web server.

Enter YES or NO.

**Default:** NO

#### **HttpProxyLocation**

Optional. Specifies the URL of the proxy server. This value is only required if HttpProxyEnabled is set to YES.

Enter a URL beginning with http://.

**Note:** Do not enter a URL beginning with https://.

#### **HttpProxyUserName**

Optional. Specifies the user name for the login credentials to the proxy server. This user name must be the name of a valid user of the proxy server. This value is only required if HttpProxyEnabled is set to YES.

Enter an alphanumeric string.

#### **HttpProxyPassword**

Optional. Specifies the password for the proxy server user name. This value is displayed in clear text. This value is only required if HttpProxyEnabled is set to YES.

Enter an alphanumeric string.

#### **SignRequestEnabled**

Optional. Instructs the Policy Server to sign the generated OCSF request. Set this value to Yes to use the signing feature.

This value is independent of any user certificate signatures and is only relevant for the OCSF request.

**Note:** This setting is required only if the OCSF responder requires signed requests.

Enter YES or NO.

**Default:** NO

#### **SignDigest**

Optional. Designates the algorithm the Policy Server uses when signing the OCSF request. This setting is not case-sensitive. This setting is required only if the SignRequestEnabled setting is set to YES.

Enter one of the following options: SHA1, SHA224, SHA256, SHA384, SHA512

**Default:** SHA1

#### **Alias**

Optional. Specifies the alias for the key/certificate pair that signs the OCSF request that is sent to an OCSF responder. This key/certificate pair must be in the CA SiteMinder certificate data store.

**Note:** The alias is required only if the SignRequestEnabled setting is set to YES.

Enter an alias using lower-case ASCII alphanumeric characters.

### **IgnoreNonceExtension**

Optional. Tells the Policy Server not to include the nonce in the OCSP request. The nonce (number that is used once) is a unique number sometimes included in authentication requests to prevent the reuse of a response. Setting this parameter to Yes instructs the Policy Server *not* to include the nonce in the OCSP request.

Enter YES or NO.

**Default:** NO

### **PrimaryValidationMethod**

Optional. Indicates whether OCSP or CRL is the primary method the Policy Server uses to validate certificates. This setting is only required if the EnableFailover setting is set to Yes.

Enter OCSP or CRL.

**Default:** OCSP

### **EnableFailover**

Tells the Policy Server to failover between OCSP and CRL certificate validation methods.

Enter YES or NO.

**Default:** NO

### **ResponderCertAlias**

(Required for federation only). Names the alias of the certificate that verifies the signature of the OCSP response. For the Policy Server to perform response signature verification, specify an alias for this setting. Otherwise, the CA issuer has no available OCSP configuration.

**Note:** The Policy Server does not use this setting for X.509 certificate authentication.

Enter a string that names the alias.

You can see whether each issuer has an OCSP configuration after the SMocsp.conf file is loaded. The following message is a sample status message:

```
The SMocsp.conf file was loaded.  
OCSP configuration was added for the following issuer aliases:  
ocspcert  
ocspcert1  
ocspcert2
```

The issuer alias in the status message refers to the alias you specified in the Administrative UI when adding a CA certificate to the data store. If an issuer alias is not in the list, check the SMocsp.conf and the cds.log file. The log file is located in *siteminder\_home*\log.



**RevocationGracePeriod**

(Optional) Specifies the period (in days) to delay the invalidation of a certificate after it is revoked. The OCSF grace period gives you time to update certificates so that the configuration does not suddenly stop working. A value of 0 indicates that when a certificate is revoked it becomes invalid immediately.

If you do not specify a value for this field, the Policy Server uses the default revocation grace period setting in the Administrative UI. You can find the default setting by navigating to Infrastructure > X.509 Certificate Management > Certificate Management.

**Default:** 0

## Configure OCSF Checking

Configure OCSF checking so that a user with an invalid client certificate cannot access a protected resource.

**Note:** Before you enable OCSF checking, set up your environment for [certificate authentication](#) (see page 334).

The Policy Server can work with any OCSF response that is signed using SHA-1 and the SHA-2 family of algorithms (SHA224, SHA256, SHA384, SHA512).

**To configure OCSF checking (without failover enabled)**

1. Navigate to *policy\_server\_home/config*.  
A sample file, named *SMocsp.Sample.conf* is installed with the Policy Server in the config directory.
2. Copy the sample configuration file and rename it *SMocsp.conf*.  
For UNIX platforms the file name is case-sensitive; for Windows platforms it is not.
3. Open the file in a text editor.
4. Add a unique OCSFResponder entry in the file for each IssuerDN that matches an IssuerDN specified in your certificate mapping.  
**Important!** Configure a responder record for each Issuer DN else the Policy Server authenticates users without confirming the validity of the certificate.
5. Save the file.
6. Restart the Policy Server.
7. Log on to the Administrative UI.
8. Select Infrastructure, Directory.
9. Expand the Certificate Mapping option.

10. Select Create or Modify a Certificate Mapping.

The Certificate Mappings dialog opens.

11. Clear the Perform CRL Checks check box if OSCP is the only validity checking method that you plan to use. Do not disable CRL checking if you plan to use failover.

If the issuer of the user certificate matches a certificate mapping and CRL Checking is enabled, the Policy Server uses CRL checking and not OSCP. Enabling failover is an exception to CRL checking taking precedence over OSCP. If you [enable failover](#) (see page 388), the Policy Server uses the configured primary validation method.

12. Save the changes then exit the Administrative UI.

13. (Optional) Configure the Policy Server to sign the OSCP requests.

OCSP is now enabled. To disable OSCP, change the name of the SMocsp.conf file.

## Accessing an OSCP Responder through a HTTP Proxy

OCSP requests are made over an HTTP connection, requiring an HTTP GET for the request to the OSCP responder for certificate validation.

In many enterprise environments, HTTP traffic goes through an HTTP proxy. For the Policy Server to send an OSCP request through an HTTP proxy, configure the proxy settings in the SMocsp.conf file.

### Follow these steps:

1. Edit the existing SMocsp.conf file or create a file in the Policy Server config directory, *policy\_server\_home/config*.
2. Edit the following settings as follows:

- HttpProxyEnabled YES
- HttpProxyLocation *proxy\_server\_URL*
- HttpProxyUserName *user\_login\_name*
- HttpProxyPassword *password\_for\_login*

Learn how to set each value by reviewing how to create an OSCP configuration file.

3. Restart the Policy Server.

## Configure Prerequisites for Signing OSCP Requests (Optional)

The Policy Server can sign OSCP requests when using a CA SiteMinder certificate authentication scheme. Signing requests is only necessary if an OSCP responder requires signed requests.

**Follow these steps:**

Before you configure OCSF signing, complete the following prerequisite tasks:

1. Configure [OCSP checking](#) (see page 378).
2. Add the key/certificate pair that signs requests to the certificate data store. Perform this task using the Administrative UI.

When you add a key/certificate pair, specify an alias. The Policy Server uses the alias to identify the certificate entry in the certificate data store. When you specify an alias, note the following restrictions:

- Store a certificate only once under a single alias. Attempts to store the same certificate under a different alias fail. Use the same alias for multiple responders if they use the same signing certificate.
- The alias value that you specify must match the value for the alias setting in the `SMocsp.conf` file.
- A certificate alias can be any name, but the first alias must be *defaultenterpriseprivatekey*.
- An alias must:
  - Be all lower-case USA ASCII
  - Use alphanumeric characters.

**Note:** Private keys must be RSA keys.

## Configure OCSP Request Signing

The Policy Server can sign requests and can verify responses when using a CA SiteMinder certificate authentication scheme.

**Follow these steps:**

1. Open the `SMocsp.conf` file in an editor. The file is in the directory *policy\_server\_home/config*.
2. Add the following entries to the `SMocsp.conf` file for each responder:

**SignRequestEnabled**

Instructs the Policy Server to sign an OCSP request.

**Limits:** Yes or No

Set this value to Yes to use the signing feature.

Accept the default, No, to disable signing.

**Default:** No. If the `SignRequestEnabled` entry is not present in a responder record, the Policy Server cannot sign OCSP requests.

### **SignDigest**

Indicates the algorithm to use to sign an OCSP request.

#### **Options:**

- SHA1
- SHA224
- SHA256
- SHA384
- SHA512

SignDigest is not case-sensitive.

**Default:** SHA1

### **Alias**

Indicates the alias under which the Policy Server looks to retrieve the signing key/certificate pair. Aliases are restricted to lower-case USA ASCII alphanumeric characters.

3. Save the SMocsp.conf file.
4. Restart the Policy Server.

Signing of OCSP requests is now enabled.

## **Failover Between OCSP and CRLs**

The Policy Server can use OCSP and CRLs as certificate validation mechanisms. If you configure both mechanisms, you can configure the Policy Server to failover between the two. Enabling failover is preferable to failing the authentication when one of the certificate validation mechanisms is not available.

You implement failover for certificate checking by designating a primary verification method in the OCSP configuration file (SMocsp.conf). If the primary validation method is unavailable, the Policy Server uses the secondary validation to complete the request. For the next request, the Policy Server reverts to the primary method and uses that method unless a failure occurs.

### **OCSP as the Primary Validation Method**

If the primary method is OCSP and an OCSP responder is not available, the Policy Server uses a CRL to perform the certificate validation instead.

Failover does not override OCSP functionality as long as the OCSP responder returns a response indicator of *good* or *revoked*. If the response indicator is "unknown," failover to CRL checking occurs.

If you configure OCSP as the primary validation method, the Policy Server behaves as follows:

| OCSP Certificate Validation | Failover Disabled      | Failover Enabled                                                          |
|-----------------------------|------------------------|---------------------------------------------------------------------------|
| Valid                       | User authenticated     | User authentication based on OCSP results only. No CRL checking required. |
| Revoked                     | User not authenticated | User is not authenticated. No CRL checking required.                      |
| Unknown or No response      | User not authenticated | Perform CRL checking                                                      |

#### CRL Checking as the Primary Validation Method

If the primary method is CRL checking and the Policy Server cannot retrieve a CRL, the Policy Server fails over to the OCSP responder. In this case, the Policy Server only relies on OCSP when a connection to the CRL directory server is not available. If the CRL returns a valid response, the Policy Server does not use OCSP.

**Note:** If failover is not enabled and CRL checking and OCSP are both configured, the Policy Server uses only CRL checking for certificate validation.

If you configure CRL as the primary validation method, the Policy Server behaves as follows:

| CRL Certificate Validation   | Failover Disabled                                                                                                                                                                                                                                                                                                                                               | Failover Enabled                                                                                                                                                                                                                                                                                                      |
|------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Valid                        | User authenticated                                                                                                                                                                                                                                                                                                                                              | Checking is based on the first valid CRL results. No further CRL checking required.                                                                                                                                                                                                                                   |
| Revoked                      | User not authenticated                                                                                                                                                                                                                                                                                                                                          | No further CRL or OCSP checking required.                                                                                                                                                                                                                                                                             |
| No response/retrieval failed | <p>If a CDP extension is available, the Policy Server tries each distribution point in consecutive order until it successfully retrieves a CRL. If the status for the certificate is valid or revoked, refer to the descriptions for those states.</p> <p>If a CRL with all reason codes is not retrieved, the Policy Server defaults to Not Authenticated.</p> | <p>If a CDP extension is available, the Policy Server tries each distribution point in consecutive order until it successfully retrieves a CRL. If the status for a certificate is valid or revoked refer to the descriptions for those states.</p> <p>If a CRL with all reason codes is not retrieved, use OCSP.</p> |

## Configure Failover Between OCSP and CRLs

The Policy Server can use OCSP and CRLs as certificate validation mechanisms, enabling failover between the two. Before you enable failover, configure CRL checking in the Administrative UI and configure OCSP by creating the `SMocsp.conf` file. CRL checking and OCSP checking must be enabled for failover to work.

### Follow these steps:

1. Open the `SMocsp.conf` file in an editor. This file is in the directory `policy_server_home/config`.
2. Add or modify the following entries for each responder record:

#### **EnableFailover**

Enables CA SiteMinder to fail over from the primary validation method to the secondary method.

Set this value to Yes to enable failover.

Accept the default, No, to disable failover. If you do not configure failover and the OCSP responder cannot perform validation, the transaction fails.

**Limits:** YES or NO

**Default:** No

#### **PrimaryValidationMethod**

Indicates which certificate validation method the Policy Server uses first before trying the other method.

If `EnableFailover` is set to YES and the value for this setting is OCSP, the Policy Server uses OCSP validation first. If there is no response from the OCSP responder or the response indicator is "unknown," then the Policy Server fails over to a CRL.

If the value for this setting is CRL, the Policy Server ignores OCSP validation, even if it is configured, and uses a CRL. If the Policy Server cannot obtain the CRL or the CRL expires, the Policy Server fails over to OCSP.

**Limits:** OCSP, CRL

**Default:** OCSP

3. Save the changes to the `SMocsp.conf` file.
4. Restart the Policy Server.

## Troubleshooting Certificate Validation

Detailed trace logging is available to help you solve your X.509 certificate authentication and validation problems.

In addition to the typical OCSP and CRL messages, the Policy Server also logs information about failover events. If a failover event occurs, the Policy Server logs diagnostic messages specific to the certificate validation failure, followed by messages describing the failover. The message can indicate that OCSP could not be contacted and that it is using a CRL or that the CRL fetch failed and that the Policy Server is failing over to OCSP checking.

To view OCSP and CRL log message, enable authentication trace logging using the Profiler in the Policy Server Management Console.

You can determine which components and data fields the Policy Server includes for trace logging by modifying the default template file `smtracedefault.txt`.

The following `smtracedefault.txt` file shows some recommended components to include in the file for certificate validation diagnostics in the trace log.

```
components: Login_Logout/Authentication, Login_Logout/Certificates,  
Login_Logout/Receive_Request, IsAuthorized/Policy_Evaluation,  
IsAuthorized/Receive_Request, Directory_Access, LDAP/Ldap_Error_Messages
```

```
data: Date, PreciseTime, SrcFile, Function, ReturnValue,  
Message, User, Directory, SearchKey, ErrorString, ErrorValue,  
AuthStatus, AuthReason, CertSerial, SubjectDN, IssuerDN,  
CertDistPt, UserDN, Data, HexadecimalData, CallDetail, Returns, Result
```

For OCSP signing only, you can enable trace messages when trying to validate signatures.

### To enable tracing for OCSP signing:

1. Navigate to `policy_server_home/config`.  
*policy\_server\_home* is the directory where you installed the Policy Server.
2. Open the `JVMOptions` file in a text editor.
3. Add the setting `-DOCSP_PS_TRACE` and set it to true, as follows:  
`-DOCSP_PS_TRACE=true`

4. Save the file
5. Restart the Policy Server.

The trace file, named OcsCertKeyRetriever.log is written to the current working directory of the Policy Server, as follows:

**Windows:** system32

**Unix:** siteminder or siteminder/bin



# Chapter 12: Strong Authentication

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This section contains the following topics:

[Credentials Selector Introduction](#) (see page 393)

[Credentials Selector Use Case](#) (see page 393)

[Credentials Selector Solution for the Use Case](#) (see page 396)

[Establish a Front-End Authentication Scheme](#) (see page 397)

[Manage Unsuccessful Authentication Attempts](#) (see page 406)

[Set Up Back-end Processing](#) (see page 406)

[Protect the Sample Application](#) (see page 414)

[Test the Credentials Selector Solution](#) (see page 419)

## Credentials Selector Introduction

The Credentials Selector is a strong authentication solution. The Credentials Selector enables users to select the type of authentication credentials necessary to access protected resources. Based on the user authentication context, the Policy Server can make authorization decisions and then generate user responses in the same single sign-on environment.

The Credentials Selector functionality is implemented as a standalone component, which any CA SiteMinder-protected application can use.

## Credentials Selector Use Case

In this use case, the user is given a choice of different credentials to obtain different levels of access when they request access to a protected resource. When the user requests a protected sample application, the user is presented with the following login dialog:

|                                                                                                                                                                                                                                |                                                                                                                                                          |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Password And/Or Certificate</b><br><br>Username: <input type="text"/><br><br>Password: <input type="password"/><br><br><input type="checkbox"/> Use an X.509 client certificate<br><br><input type="button" value="Login"/> | <b>SecurID Authentication</b><br><br>Username: <input type="text"/><br><br>SecurID PIN: <input type="text"/><br><br><input type="button" value="Login"/> |
| <b>Windows Authentication</b><br><br><input type="button" value="Login"/>                                                                                                                                                      | <b>SafeWord Authentication</b><br><br>Username: <input type="text"/><br><br><input type="button" value="Login"/>                                         |

Each login button on the dialog submits different credentials. The user experience depends on the type of credentials that they provide. The user can choose from the following types of authentication:

- Password And/Or Certificate authentication
- Windows authentication
- SecureID authentication
- SafeWord authentication

After the user is successfully authenticated and authorized, the user is permitted access to the sample application, which displays a greeting that informs them of their authentication level and the type of authentication scheme they used to log in.

#### **More Information**

[Request Access with Password And/Or Certificate Authentication](#) (see page 394)

[Request Access with SafeWord Authentication](#) (see page 396)

[Request Access with SecurID Authentication](#) (see page 395)

[Request Access with Windows Authentication](#) (see page 395)

## **Request Access with Password And/Or Certificate Authentication**

In the Password And/Or Certificate section of the login dialog, the user can choose one of the following combinations of credentials to provide:

- Username and Password only entered in an HTML form
- X.509 client certificate only
- Username/Password and X.509 client certificate

If the user provides only their valid username and password, the following message is displayed:

```
Greetings, SampleUser!  
Your authentication level is 5  
You have used username/password authentication
```

If the user selects only the X.509 client certificate check box, they are prompted to select one of the client certificates that are configured with the browser. If the Policy Server recognizes the certificate, the following message is displayed:

```
Greetings, SampleUser!  
Your authentication level is 10.  
You have used X.509 client certificate authentication
```

The Password And/Or Certificate option offers the flexibility of providing a different authentication level depending on the credentials the user provides. The X.509 Cert Or Form authentication scheme, which can seem similar to the Password And/Or Certificate option, does not distinguish between the types of credentials that the user provides. The protection level is therefore the same regardless of what credentials the user provides.

If both Username and Password are provided and the X.509 client certificate check box is marked, the user is prompted for a client certificate. If the Policy Server recognizes the certificate and the certificate matches the username that the user provides, the following message is displayed:

```
Greetings, SampleUser!  
Your authentication level is 15  
You have used X.509 client certificate and username/password authentication
```

## Request Access with Windows Authentication

If the user is logged in to a Windows domain when they request a protected resource, the following message is displayed:

```
Greetings, SampleUser!  
Your authentication level is 5  
You have used the Windows domain authentication
```

If the user is not logged in to a Windows domain, the user is prompted for their Windows domain credentials.

## Request Access with SecurID Authentication

If the user provides a valid Username and SecurID PIN for SecurID authentication when they request a protected resource, the following message is displayed:

```
Greetings, SampleUser!  
Your authentication level is 20  
You have used the SecurID authentication
```

## Request Access with SafeWord Authentication

If the user provides only their username for SafeWord authentication, a two-step process occurs. CA SiteMinder passes the username to the SafeWord server and the server determines the credentials for which it challenges the user. SafeWord supports up to four authenticators per login. The authenticators can be fixed (using a password) or dynamic (using a token card pin).

Upon successful access, the following message is displayed:

```
Greetings, SampleUser!  
Your authentication level is 20  
You have used the SafeWord authentication
```

## Credentials Selector Solution for the Use Case

To set up the Credentials Selector for this use case, you configure the following components:

- The Forms Credential Collector (FCC) used by the front-end authentication scheme to render the login dialog that is presented to the user when they request the protected sample application. A sample FCC named selectlogin.fcc is supplied with the Web Agent installation.
- In the Administrative UI:
  - A front-end authentication scheme that is exposed to applications that uses the Credentials Selector.
  - Several back-end authentication schemes, one for each type of credentials that the user can choose. Back-end processing refers to functions only the Credentials Selector interacts with. The end user is not aware of these functions.
  - A specially configured policy domain, which includes a realm, rule, responses, and a policy, that represents the Credential Selector back-end processing.
- A Web Agent that serves as the entry point for the policy domain representing the back-end processing.
- A sample application that uses the front-end authentication scheme. For this use case, the sample application presents a greeting message to the user. This message changes depending on the credentials the user chooses when logging in.

## Establish a Front-End Authentication Scheme

The front-end authentication scheme uses the Forms Credential Collector (FCC), `selectlogin.fcc`, to generate the login selection screen that is used to request access to the protected resource. The FCC dynamically constructs the FCC directives for the agent so the agent can redirect the user as appropriate for any of the authentication scheme choices.

**Note:** The `selectlogin.fcc` is a sample for use by the Credentials Selector. The set of authentication choices and HTML formatting depends upon your particular situation.

### Use a Forms Credential Collector (FCC)

The FCC format is a proprietary format that Web Agent use to collect credentials and pass them to the Policy Server. An FCC consists of a header and a body.

#### FCC Header Description

An FCC header is a list of FCC directives, one per line. The FCC directives have the following syntax:

`@<directive>[=<value>]`

The values can contain % substitutions, formatted as `%parameter%`. The parameters are passed with the FCC file on a POST action when the credentials are submitted.

The set of FCC directives is limited. For the purposes of this example, the most important directives are:

**@target**

Resource URL that the Web Agent must pass to the Policy Server.

**@username**

Username that the Web Agent must pass to the Policy Server.

**@password**

Password that the Web Agent must pass to the Policy Server.

**@smagentname**

Agent name that the Web Agent must pass to the Policy Server. If the `EncryptAgentName` parameter in the agent configuration is set to yes, the name is encrypted.

Not all FCC directives must be listed in the header; many have implicit defaults, such as:

- @target=%target%
- @username=%username%
- @password=%password%
- @smagentname=%smagentname%

## FCC Body Description

The FCC body contains HTML or other web-browser readable format. The FCC body is rendered in the web browser when the user is challenged.

The body can contain substitutions, formatted as \$\$parameter\$\$\$. The parameter name must belong to a certain set of known parameters that are passed with the FCC file on a GET action.

For the purposes of this example, the important directives are:

\$\$target\$\$

Resource URL that the user has requested.

\$\$smagentname\$\$

The agent name. If the EncryptAgentName parameter in the agent configuration is set to yes, the name is encrypted.

## Configure the selectlogin.fcc File for Front-End Authentication

The selectlogin.fcc file is included with the Web Agent installation as a sample FCC. The front-end authentication scheme uses the selectlogin.fcc file to render the login dialog that is presented to the user when they request the protected resource.

When a user requests a resource, the Web Agent passes the requested URL to the Policy Server. In most cases, the resource URL that the Web Agent passes is the same one that the user requests. The FCC files that are defined for the authentication schemes ensure that the requested URL is sent by passing \$\$target\$\$ (the GET parameter) as %target% (the POST parameter), and using the @target=%target% directive. For example:

```
<!-- some HTML code -->
<form name="Login" method="POST">
<!-- some HTML code -->
<input type="hidden" name="target" value="$$target$$">
<!-- more HTML code -->
</form>
<!-- more HTML code -->
```

**Note:** The @target=%target% directive is used by default.

In this case, the `selectlogin.fcc` file works by replacing the value of the `%target%` parameter with the following value:

```
/path/redirect.ext?authtype=type&target=$$target$$
```

#### **redirect.ext**

A simple script that redirects to the URL provided in the `target` parameter. Example values are `redirect.asp` or `redirect.jsp`. Alternatively, you can use different redirect script files or different virtual directories that expose the same physical file as long as the URLs in the redirect script depend on the credentials provided.

#### **type**

A string that is determined by the credentials that the user chooses.

If different authentication schemes protect different redirect URLs, the chosen authentication scheme processes the credentials that the FCC collects. The chosen authentication scheme establishes the user session, including the user authentication level. After the user is authenticated and authorized for the redirect script resource, the user is redirected to the originally requested resource.

**Note:** If single sign-on is in effect and the user protection level is equal or higher than the protection level of the front-end authentication scheme, then the user session is validated against the original resource. Whether the user is authorized depends on the policy configuration, which can check for the user authentication context. For example, a minimal protection level or certain conditions can be required to access particular resource.

#### **More Information:**

[Selectlogin.fcc Configuration Details](#) (see page 399)

## Selectlogin.fcc Configuration Details

You can configure various authentication schemes in the `selectlogin.fcc` file. The following list shows configuration details for some schemes:

- The `cert-and-form` scheme requires posting over an SSL connection. If the front-end authentication scheme does not use an SSL connection, the agent cannot POST to the same `selectlogin.fcc` URL that the GET request obtains.

The following JavaScript code can be used to convert the URL to an SSL URL:

```
arr = document.URL.split("://");  
document.Login.action = "https://" + arr[1];
```

- To support SafeWord two-step authentication, the client side must remember the username that is collected from the first challenge form in time for the second challenge. The safeword.fcc file, also included in the agent installation, uses the @smtransient FCC directive to keep the username in a transient cookie. The same directive can be used in the selectlogin.fcc file too, but then the cookie is going to be created even if the user makes a different choice of credentials. A better alternative is to modify the action argument to POST to the safeword.fcc file, as follows:

```
document.Login.action = "safeword.fcc";
```

- The Windows authentication scheme does not use an FCC file. It uses a specific pseudo-resource URL, which does not exist on the web server but which the agent recognizes. To make Windows authentication work, set the *action* argument to this same pseudo-resource URL, as follows:

```
document.Login.action = "/siteminderagent/ntlm/creds.ntc";
```

- The SecurID authentication scheme does not use an FCC; however, the Agent can POST the SecurID credentials directly to the selectlogin.fcc file. No modification of the action argument is required.
- The action URL can be hosted by a different web server. However, the other web server must also be protected by an agent so that the CA SiteMinder-specific resource URLs (FCC, SCC, and NTC) are recognized and properly processed.

**Note:** SCC pseudo-resource URLs are used for certificate-only authentication.

### Sample selectlogin.fcc File

A simplified version of the selectlogin.fcc file (without the HTML formatting) follows. Hidden input fields for smquerydata and postpreservationdata are necessary for passing the GET and POST parameters, respectively.

The smauthreason parameter holds the reason code that the Policy Server provides together with the authentication challenge.



A sample selectlogin.fcc file follows:

```
@username=%USER%
@smretries=0

<html>
<head>
<script language="JavaScript">
    function submitForm(form)
    {
        authtype = "none";

        if (form == 1)
        {
            document.Login.USER.value      = document.Login.USER1.value;
            document.Login.PASSWORD.value = document.Login.PASSWORD1.value;

            if (!document.Login.UseCert.checked)
            {
                // username/password only
                authtype = "form";
            }
            else if (document.Login.USER.value == "" &&
                    document.Login.PASSWORD.value == "")
            {
                // certificate only
                authtype = "cert";
            }
            else
            {
                // username/password and certificate
                authtype = "certform";

                // This option requires posting over SSL.
                arr = document.URL.split("://");
                document.Login.action = "https://" + arr[1];
            }
        }
    }
}
```

```
else if (form == 2)
{
    // SecurID authentication
    authtype = "securid";
    document.Login.USER.value = document.Login.USER2.value;
    document.Login.PASSWORD.value = document.Login.PASSWORD2.value;
}
else if (form == 3)
{
    // SafeWord authentication
    authtype = "safeword";
    document.Login.USER.value = document.Login.USER3.value;
    document.Login.PASSWORD.value = "";

    // POST to safeword.fcc, for additional processing.
    // NOTE: This forces the web agent to POST to safeword.fcc
    // even if the authentication scheme's URL parameter
    // is set to selectlogin.fcc for redirection purposes.
    document.Login.action = "safeword.fcc";
}
else if (form == 4)
{
    // Authenticate with the current Windows login credentials
    authtype = "windows";
    document.Login.USER.value = "";
    document.Login.PASSWORD.value = "";

    // POST to creds.ntc (required by the Windows authentication scheme).
    document.Login.action = "/siteminderagent/ntlm/creds.ntc";
}
// Generate the target, depending on the user's choice of credentials.
// This sample uses redirect.asp, but it could also be redirect.jsp,
// redirect.pl, etc.
// This sample uses the following format:
// /auth/redirect.asp?authtype=<choice>&target=<original target>
// Other formats are also possible, e.g.:
// /auth-<choice>/redirect.asp?target=<original
// target>
// The helper realms' resource filters must be defined accordingly (see the tech
// note).
```

```

        // Check if the target is not already in the same format. The user may
        // have been redirected back to selectlogin.fcc upon authentication failure,
        // if the authentication scheme's URL parameter is set to selectlogin.fcc.
        if ("$$target$$.indexOf("/auth/redirect.asp?authtype=") == 0 &&
            "$$target$$.indexOf("&target=") > 0)
        {
            // This must be a redirect. Extract the original target, but not
            // the authtype parameter, because the user may have made a different
            // choice of credentials this time.
            trgarr = "$$target$$.split("&target=");
            document.Login.target.value = "/auth/redirect.asp?authtype=" + authtype +
"&target=" + trgarr[1];
        }
        else
        {
            // This is not a redirect. Pass $$target$$ as a URL query parameter.
            document.Login.target.value = "/auth/redirect.asp?authtype=" + authtype +
"&target=$$target$$";
        }

        document.Login.submit();
    }
    function resetCredFields()
    {
        document.Login.PASSWORD.value = "";
        document.Login.PASSWORD1.value = "";
        document.Login.PASSWORD2.value = "";
    }
</script>
</head>

<body onLoad="resetCredFields();">
    <center>
        <form name="Login" method="POST">
            <input type="hidden" name="USER">
            <input type="hidden" name="PASSWORD">
            <input type="hidden" name="smagentname" value="$$smagentname$$">
            <input type="hidden" name="smauthreason" value="$$smauthreason$$">
            <input type="hidden" name="smquerydata" value="$$smquerydata$$">
            <input type="hidden" name="postpreservationdata"
value="$$postpreservationdata$$">
            <input type="hidden" name="target">

```

```
<!-- Some table formatting throughout -->
<!-- Authentication Choice: Password And/Or Certificate -->
  <input type="text"      name="USER1">
  <input type="password" name="PASSWORD1">
  <input type="button"   value="Login" onClick="submitForm(1);">

<!-- Authentication Choice: Windows Authentication -->
  <input type="button"   value="Login" onClick="submitForm(4);">

<!-- Authentication Choice: SecurID Authentication -->
  <input type="text"      name="USER2">
  <input type="password" name="PASSWORD2">
  <input type="button"   value="Login" onClick="submitForm(2);">

<!-- Authentication Choice: SafeWord Authentication -->
  <input type="text"      name="USER3">
  <input type="button"   value="Login" onClick="submitForm(3);">
<!-- More table formatting -->
</form>
</center>
</body>
</html>
```

## Configure the Front-end Authentication Scheme

Configure a front-end authentication scheme that protects the sample application which generates the greeting. For this solution, you can configure the AuthChannel authentication scheme.

See the following illustration for an example of an AuthChannel authentication scheme.

| General                                                                           |                                     |
|-----------------------------------------------------------------------------------|-------------------------------------|
| <b>Name:</b> AuthChannel                                                          | <b>Description:</b> Auth scheme for |
| Scheme Common Setup                                                               |                                     |
| <b>Authentication Type Style:</b> HTML Form Template                              |                                     |
| <b>Protection Level:</b> 1                                                        | [1-1,000, higher i                  |
| <input type="checkbox"/> Password Policies enabled for this Authentication Scheme |                                     |
| Scheme Setup                                                                      |                                     |
| <b>Web Server Name</b> auth.sample.com                                            |                                     |
| <input type="checkbox"/> Use SSL Connection                                       |                                     |
| <b>Target</b> /siteminderagent/forms/selectlogin.fcc                              |                                     |
| <input type="checkbox"/> Allow this Scheme to save credentials                    |                                     |

The AuthChannel authentication scheme is set as follows:

#### Authentication Type Style

HTML Form Template

#### Protection Level

1

The Protection Level for the AuthChannel scheme is set to 1 because the front-end authentication scheme must have a lower protection level than any other scheme in the configuration. The authentication scheme the user chooses when logging in to access the protected resource determines the actual protection level for that user. When the user is redirected back to the originally requested resource, the low protection level of the front-end scheme ensures that the user is not rechallenged.

#### Web Server Name

auth.sample.com

Specifies the web server where the sample application resides.

#### Target

/siteminderagent/forms/selectlogin.fcc

This target points to the selectlogin.fcc file. The selectlogin.fcc file is a sample file that is included with the Web Agent installation.

## Manage Unsuccessful Authentication Attempts

If an authentication scheme rejects a user, the user is redirected to the URL specified in the Target parameter that is specified for the authentication scheme.

Configure the following behaviors that best suits your situation:

- Have the user prompted to resubmit their credentials for the same authentication scheme, instead of being presented with a choice of authentication schemes again.
- Allow the user to return to the original login screen to repeat the selection. To configure this behavior, specify selectlogin.fcc as the Target parameter for each authentication scheme, if applicable.

If a particular choice of credentials requires posting the credentials to an FCC file other than the selectlogin.fcc file, set the action parameter for the HTML form in the selectlogin.fcc to the desired FCC file URL. For example, this command sets the action parameter to the safeword.fcc file:

```
document.Login.action = "safeword.fcc";
```

If you are using a scheme that does not have a Target parameter (such as the basic authentication scheme) the user experience is the same for a successful authentication. However, if the user has to be rechallenged, the rechallenge is based on basic authentication scheme. That is, with a prompt dialog instead of an HTML form.

**Note:** The SafeWord basic scheme does not support two-step authentication and multiple authenticators, unlike the SafeWord HTML forms scheme.

## Set Up Back-end Processing

To use the Credentials Selector, the following components are required for back-end processing:

- Authentication schemes for each choice of login credentials.
- Policy domain that contains the back-end components.
- Realms that use each authentication scheme.
- Rules for each realm.
- Policies that set an authentication context and that authorize resource access.

## Set Up Authentication Schemes for Back-End Processing

Set up several authentication schemes for back-end processing, one for each choice of credentials made available to the user. These schemes enable a user to choose the type of credentials they provide to access a protected resource.

There is one authentication scheme for each type of credential:

- An HTML Form authentication scheme
- An X.509 Client Cert authentication scheme
- An X.509 Client Cert And Form authentication scheme
- A SecurID HTML Form authentication scheme
- A SafeWord HTML Form authentication scheme
- A Windows authentication scheme

**Note:** The Basic authentication scheme is a default scheme set up as part of the Policy Server installation.

## Set Up a Policy Domain for Back-End Processing

Configure a policy domain to represent the Credentials Selector back-end processing. In this solution, the policy domain is named BackendAuth.

## Configure Realms for the Back-end Policy Domain

Define one realm for each configured back-end authentication scheme. Each realm needs a resource filter that is defined as follows:

`/auth/redirect.asp?authtype=type&target=`

### **type**

Can be one of the following values:

|          |                                  |
|----------|----------------------------------|
| form     | username/password authentication |
| cert     | certificate authentication       |
| certform | cert-and-form authentication     |
| securid  | SecurID authentication           |
| safeword | SafeWord authentication          |
| windows  | Windows authentication           |

**Note:** These are the types that are chosen for the purposes of this use case. You are not restricted to these specific values, but the types must correspond to the `authtype` values in the `selectlogin.fcc` file, or any other FCC file that is based on the `selectlogin.fcc` template. Also, the realm resource filter must match the `redirect target` in the FCC file.

The following pane lists the realms.





The Web Agents protecting the realms can but do not need to be the same. This solution uses a single Web Agent; however, if multiple Web Agents are used, they must satisfy specific requirements.

The following requirements are necessary for agents that are protecting realms as part of the Credentials Selector functionality:

- Single sign-on must be configured between all Web Agents protecting realms. This means that they are in the same cookie domain or they use the same cookie provider.
- The value of the @smagentname directive in the FCC file must match the expected value for at least one of the Web Agents protecting the originally requested resource.

The expected value is the value of the AgentName parameter or the DefaultAgentName parameter, if the AgentName parameter is not assigned a value. If the EncryptAgentName parameter in the agent configuration is set to yes, the value must be encrypted.

One way of setting the @smagentname directive is by configuring each Web Agent with the same naming properties. They can even share an Agent Configuration Object. Another method is to configure the @smagentname directive programmatically in the FCC file, if the name is not encrypted.

**Important! If the @smagentname directive is misconfigured, you can see a “No realm received in request” error message in the Policy Server log.**

- The FCCForceIsProtected parameter must be set to yes to ensure that a second IsProtected call is made for the new target that the selectlogin.fcc file generates. Set the IgnoreQueryData parameter to No to prevent the agent from ignoring the URL query parameters.

## Create Rules for the Back-end Policy Domain

In each realm that you configure for the BackendAuth policy domain, configure the following two rules:

- An OnAuthAccept rule
- A Web Agent action rule (for the purposes of this example, use a GET action rule)

Configure an asterisk (\*) as the value for the Resource field for both rules.

For example, for the Form realm in the BackendAuth policy domain, the rules would be:

**OnAuthAccept**

Resource: /auth/redirect.asp?authtype=form&target=\*

Action: OnAuthAccept

**GetRule**

Resource: /auth/redirect.asp?authtype=form&target=\*

Action: Get

## Configure AuthContext Responses for the Back-end Policy Domain

Configure an AuthContext response for each authentication scheme in the BackendAuth domain. Each of these responses contains an AuthContext response attribute, which is evaluated only on an OnAuthAccept event. Its value is added to the CA SiteMinder session ticket as the value of the SM\_AUTHENTICATIONCONTEXT user attribute. The value is not, however, returned to the client as a user response.

For this example, the list of responses are as follows:

| Name        | Agent Type | Description                            |
|-------------|------------|----------------------------------------|
|             |            |                                        |
| Form        | Web Agent  | AuthContext for username/password auth |
| Certificate | Web Agent  | AuthContext for certificate auth       |
| CertandForm | Web Agent  | AuthContext for cert and form auth     |
| SecurID     | Web Agent  | AuthContext for SecurID auth           |
| SafeWord    | Web Agent  | AuthContext for SafeWord auth          |
| Windows     | Web Agent  | AuthContext for Windows auth           |

**Note:** The response attribute value is truncated to 80 bytes in length.

To configure an AuthContext response attribute, select the WebAgent-OnAuthAccept-Session-AuthContext response attribute type.

The following illustration shows the creation of an AuthContext response attribute using the WebAgent-OnAuthAccept-Session-AuthContext attribute type.

Attribute WebAgent-OnAuthAccept-Session-AuthContext

Value Type Text

Response Form Response

Attribute Setup

Attribute Kind

Static

User Attribute

DN Attribute

Active Response

Allow Nested Groups

Attribute Fields

Variable Name

Variable Value username/password

HTTP Variable Name

Response Variable Name

Advanced

Script username/password

As the illustration shows, the AuthContext response attribute type is static. When eTrust SiteMinder FSS is in use, you can specify a static attribute to define a constant or literal value for better encapsulation. Constant values include strings.

CA SiteMinder variables and active expressions add more flexibility to configuring AuthContext response attributes. They can also contain the authentication timestamp, a hash value, or both of a SAML assertion.

The following group box shows one of the resulting responses that are configured for this solution. This is the attribute for the Form response.

Domain BackendAuth

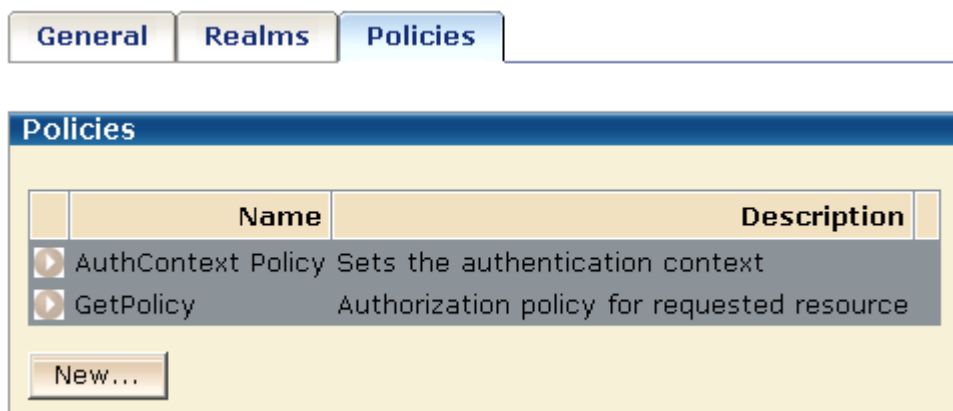
| Attribute List |                                           |                   |
|----------------|-------------------------------------------|-------------------|
|                | Agent Type Attribute Name                 | Value             |
|                | WebAgent-OnAuthAccept-Session-AuthContext | username/password |

## Configure Policies for Back-end Credential Selection

Configure two policies for the BackendAuth domain in this example:

- One for setting the user authentication context
- One for Web Agent actions

The following illustration shows the two policies.



### Create an Authentication Context Policy

The AuthContext policy sets the authentication context in the CA SiteMinder session ticket, which is used for authentication and validation. In this policy, the OnAuthAccept rules from each realm are paired with the corresponding responses to permit access to protected resources. For example, the OnAuthAccept Rule for the Form realm is paired with the Form response and the OnAuthAccept rule for the SafeWord realm is paired with the SafeWord response.

User authentication and user validation are OnAuthAccept events so the authentication context in the session ticket can be overwritten after each validation. The ability to update the authentication context attribute can be useful in some circumstances, for example, if the value of that attribute includes a counter. However, in this solution using the Credentials Selector, the AuthContext policy is configured to fire only if the authentication context is empty to ensure that the session ticket is not overwritten. The credentials that the user chooses are thus remembered.

Protect the authentication context from being overwritten by writing an active expression in the AuthContext policy to retrieve the SM\_AUTHENTICATIONCONTEXT attribute from the session ticket.

When eTrust SiteMinder FSS is in use, you can create a user context variable called AuthContext and can use it in the AuthContext policy to define an active expression that retrieves the SM\_AUTHENTICATIONCONTEXT attribute from the session ticket.

| General             |                                          |
|---------------------|------------------------------------------|
| • <b>Name:</b>      | <input type="text" value="AuthContext"/> |
| <b>Description:</b> |                                          |

| Attributes           |                                          |
|----------------------|------------------------------------------|
| <b>Variable Type</b> | <input type="text" value="UserContext"/> |

| Variable Information |                                     |
|----------------------|-------------------------------------|
| <b>Return Type</b>   | <input type="text" value="String"/> |

| Context Item         |                                                       |
|----------------------|-------------------------------------------------------|
| <b>Item</b>          | <input type="text" value="User Property"/>            |
| • <b>Property</b>    | <input type="text" value="SM-AUTHENTICATIONCONTEXT"/> |
| • <b>DN</b>          | <input type="text"/>                                  |
| • <b>Buffer Size</b> | <input type="text" value="80"/>                       |

Define an active expression using the AuthContext variable in the AuthContext policy:

| General | Users | Rules | Expression |
|---------|-------|-------|------------|
|         |       |       |            |

| Expression                          |                                                     |
|-------------------------------------|-----------------------------------------------------|
| <b>Expression</b>                   | <input ")"="" type="text" value="(AuthContext==\"/> |
| <input type="button" value="Edit"/> |                                                     |

## Create a Protection Policy

Authorizing an authenticated user for a requested resource requires a second policy in the BackendAuth domain. This policy protects the resources and is in addition to the authentication context policy in this domain.

Configure the protection policy to authorize the authenticated user for the redirection target, which is a GET action on the redirect.asp file. Name the policy GetPolicy.

The GetPolicy would contain the associated rules:

| Rule    | Realm       |
|---------|-------------|
| GetRule | Form        |
| GetRule | Certificate |
| GetRule | CertandForm |
| GetRule | SecureID    |
| GetRule | SafeWord    |
| GetRule | Windows     |

## Protect the Sample Application

To use the Credentials Selector, configure the protected realms of a CA SiteMinder application with the front-end authentication scheme of the component. The policies protecting the application can have restrictions that are based on the user authentication level and authentication context.

In this solution, the sample application generates the greeting message for the authenticated and authorized user.

The file that generates this greeting has the following code:

```
<html>
<head></head>
<body>

<h3>
<p>Greetings, <%=Request.ServerVariables("HTTP_USERNAME") %>!
<p>Your authentication level is <%=Request.ServerVariables("HTTP_AUTHLEVEL") %>
<p>You have used <%=Request.ServerVariables("HTTP_AUTHCONTEXT") %>
authentication
</h3>

</body>
</html>
```

The different authentication options in the login dialog result in different access levels and a different greeting, such as:

```
Greetings, SampleUser!
Your authentication level is 5
You have used username/password authentication
```

```
Greetings, SampleUser!
Your authentication level is 10.
You have used X.509 client certificate authentication
```

```
Greetings, SampleUser!
Your authentication level is 5
You have used Windows domain authentication
```

The sample application has four kinds of resources that are contained in different realms. The realms must each be configured with the front-end authentication scheme.

## Realms and Rules for the Sample Application

For this example, the following four realms protect the various resources that make up the sample application:

- A realm that contains public resources
- A realm that contains resources requiring at least a level 5 authentication
- A realm that contains resources requiring at least a level 15 authentication
- A realm that contains resources available only to users authenticated with SafeWord

The realms are shown in the following illustration.

### Modify Domain: *SampleApp*

The screenshot shows the 'Realms' tab of a configuration window. At the top are three tabs: 'General', 'Policies', and 'Realms'. Below the tabs is a table with the following data:

|  | Name      | Description                                  |  |
|--|-----------|----------------------------------------------|--|
|  | SampleApp |                                              |  |
|  | Limited   | Limited to users authenticated with SafeWord |  |
|  | Protected | Auth level must be 5 or higher               |  |
|  | Public    | Unprotected resources                        |  |

The protected realms are configured with the AuthChannel front-end authentication scheme, as shown in the following illustration.

The screenshot shows two configuration sections. The 'General' section has a 'Name' field with the value 'Protected'. The 'Resource' section has the following fields:

- Agent:** A dropdown menu showing 'sampleagent'.
- Resource Filter:** A text field containing '/protected/'.
- Effective Resource:** A text field showing 'sampleagent/protected/'.
- Default Resource Protection:** Two radio buttons, 'Protected' (selected) and 'Unprotected'.
- Authentication Scheme:** A dropdown menu showing 'AuthChannel'.

The SampleAgentGroup can contain any Web Agents that provide points of entry to the sample application.

The following requirements are necessary for agents that are protecting realms as part of the Credentials Selector functionality:

- Single sign-on must be configured between all Web Agents protecting realms. This means that they are in the same cookie domain or they use the same cookie provider.



- The value of the @smagentname directive in the FCC file must match the expected value for at least one of the Web Agents protecting the originally requested resource.

The expected value is the value of the AgentName parameter or the DefaultAgentName parameter, if the AgentName parameter is not assigned a value. If the EncryptAgentName parameter in the agent configuration is set to yes, the value must be encrypted.

One way of setting the @smagentname directive is by configuring each Web Agent with the same naming properties. They can even share an Agent Configuration Object. Another method is to configure the @smagentname directive programmatically in the FCC file, if the name is not encrypted.

**Important!** If the @smagentname directive is misconfigured, you can see a “No realm received in request” error message in the Policy Server log.

- The FCCForcelsProtected parameter must be set to yes to ensure that a second IsProtected call is made for the new target that the selectlogin.fcc file generates. Set the IgnoreQueryData parameter to No to prevent the agent from ignoring the URL query parameters.

## Rules for the Policy Protecting Sample Application

You can configure any type of rule for the realms that contain the sample application resources.

## Configure a Policy to Protect the Sample Application

The GetProtected policy requires a protection level of 5 or greater for access to protected resources. To enforce this protection level restriction, you can write an active expression in the GetProtected policy to retrieve the SM\_AUTHENTICATIONLEVEL attribute from the CA SiteMinder session ticket.

**Note:** This authentication level restriction is designed to protect applications from custom Web Agents that only support password authentication levels of one.

When eTrust SiteMinder FSS is in use, you can create a user context variable that is named `AuthLevel` and can use it in the `GetProtected` policy to define an active expression that retrieves the `SM_AUTHENTICATIONLEVEL` attribute from the session ticket.

**Create Policy: *GetProtected***

[Module Domain: \*BackendAuth\*](#) > Create Policy: *GetProtected*

**General** **Users** **Rules** **Expression**

**Expression**

**Expression**

## Configure Responses for the Sample Application

In this example, the sample application that displays the greeting message uses three HTTP header variables:

- `HTTP_USERNAME`
- `HTTP_AUTHLEVEL`
- `HTTP_AUTHCONTEXT`

These headers are returned to the client with the following response:

| General             |                                 |
|---------------------|---------------------------------|
| <b>Name:</b>        | SampleResponse                  |
| <b>Description:</b> | Username, Auth level, Auth Cont |

| Attributes                       |            |
|----------------------------------|------------|
| <b>Agent Type</b>                |            |
| <input type="radio"/>            | Radius     |
| <input checked="" type="radio"/> | SiteMinder |
| <b>Agent Type</b>                | Web Agent  |

**Domain** SampleApp

| Attribute List |                               |                                                     |
|----------------|-------------------------------|-----------------------------------------------------|
|                | Agent Type Attribute Name     | Value                                               |
| ▶              | WebAgent-HTTP-Header-Variable | UserName=<%userattr="SM_USERSESSIONUNIVID"%>        |
| ▶              | WebAgent-HTTP-Header-Variable | AuthContext=<%userattr="SM_AUTHENTICATIONCONTEXT"%> |
| ▶              | WebAgent-HTTP-Header-Variable | AUTHLEVEL=<%userattr="SM_AUTHENTICATIONLEVEL"%>     |

Attribute values are specified on the Response Attribute pane.

## Test the Credentials Selector Solution

If you have set up the various components that are described in this use case, you can test the Credentials Selector functionality. This test should show that you see different greetings depending on the credentials you specify.

### Follow these steps:

1. Try to access the sample application, for example, by clicking a link to it.  
You should be presented with the login screen defined by the selectlogin.fcc file.
2. Enter one type of credential to log in.  
You should see the greeting appropriate for the credentials you entered. For example, if you entered a username and SecurID PIN, you should see a greeting  
  
Greetings, SampleUser!  
Your authentication level is 20  
You have used the SecurID authentication

3. Exit the application and try accessing the sample application again.
4. Enter a different set of credentials than you did in the previous step.  
You should see a greeting message appropriate for the specified credentials.

You have successfully tested the Credentials Selector.

# Chapter 13: Securing Resources Using EPM Application Objects

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This section contains the following topics:

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[Use Cases for Defining Application Security Policies Using Application Objects](#) (see page 424)

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[Configure Advanced Policy Components for Applications](#) (see page 451)

## Secure Applications Using Enterprise Policy Management

Enterprise Policy Management (EPM) is an access management model that lets you protect business applications without an in-depth knowledge of CA SiteMinder-specific concepts and components.

EPM presents policy configuration in the context of securing an application. To protect an application, you create an *Application* object and are only required to provide data for configuration settings that do not have defaults. Modifying other settings is optional. EPM therefore makes policy configuration more straightforward. You can manipulate additional CA SiteMinder settings that allow you to define more fine-grained protection of an application; however, such manipulation is not required.

For the administrator already familiar with CA SiteMinder domain-based policies, there is a relationship between the application-oriented concepts and the underlying CA SiteMinder policy objects. This relationship is reflected in the Administrative UI and is shown in the following table:

| Application Dialogs and Group Boxes | Underlying SiteMinder Component |
|-------------------------------------|---------------------------------|
| General settings                    | Defines the policy domain       |
| Components                          | Defines the realm               |
| Resource                            | Specifies the rule              |
| Application Roles                   | Define the policy users         |

Application roles define the set of users who have access to a resource or group of resources defined in an Application object. Roles can include all users in configured user directories, be limited to selected groups, organizations, and users with matching user attributes, or specified using a named or unnamed expression.

EPM offers the following benefits:

- **Application-centric approach**  
The focus on applications relates closely to the view of access management by most businesses.
- **Consistent security enforcement model**  
The security enforcement model for EPM is no different than implemented by the more CA SiteMinder-centric model. However, the CA SiteMinder-specific components are hidden from configuration.
- **Simplified security**  
Securing resources is simplified—you name the application, the application resources that need protecting, and the application roles that are permitted access. You are not required to examine or modify every aspect of a component to establish a security policy.
- **Enhanced delegation**  
A CA SiteMinder administrator can grant access to an application without expert knowledge of CA SiteMinder. This ability enables a senior security administrator to delegate access management responsibilities to other administrators.

## How to Create Application Security Policies

To protect applications in your organization, you create application security policies. These policies define the resources you want protected and specify who is allowed access to the protected application.

To create application security policies, use the following process:

1. Define an application that you want to protect.
2. Create a new user directory or associate an existing user directory with the application.
3. Specify the resources (such as the parts of an application or web pages) that you want to protect.
4. Create application roles that identify the users that should have access to the protected resources.
5. (Optional) Configure responses to customize an application.
6. (Optional) Specify custom attributes to provide metadata about the application.

7. Repeat Steps 4 and 5 until all your resources and roles are defined.
8. Create policies by associating the application roles with the resources.

A series of [use cases](#) (see page 424) show the detailed configuration steps for protecting applications.

**Note:** You may want to have the Administrative UI open to follow along with the use cases.

## Administrative Rights to Create Application Security Policies

CA SiteMinder uses an administrative model that lets you determine what different administrators can view and manipulate.

To implement application security policies, you need to have the necessary administrative rights. An administrator can be assigned the following rights related to applications:

- application administration  
The application administration privilege lets you create, modify and delete an application and its components.
- policy administration  
The policy administration privilege lets you define the resources, roles, and policies associated with an application.

### Follow these steps:

1. Click Administration, Administrator.
2. Objects related to administrators appear on the left.
3. Click Administrators.  
The Administrators screen appears.
4. Click Create Administrator.  
The Create Administrator screen appears.
5. Enter a name for the administrator in the Name field.
6. Click Create in the Rights area.  
The Rights dialog appears.

7. In the table, choose one or more of the following:
  - application administration
  - policy administration
8. Click OK.

The administrator has been given application and policy administration privileges.

## Use Cases for Defining Application Security Policies Using Application Objects

Learn how to define application security policies using application objects by reviewing the following use cases:

- [Application Security Policy to Protect a Web Portal](#) (see page 424)
- [Application Security Policies Based on Roles](#) (see page 429)
- [Application Security Policies with User Mapping and Named Expressions](#) (see page 436)
- [Application Security Policy Based on CA DataMinder Content Classifications](#) (see page 444)

### Application Security Policy to Protect a Web Portal

In this use case, a software company, sample-software-company.com, has a web portal that provides information about the company and its products to the public.

Anyone can access the main home page and product information pages, such as promotional materials and white papers without restrictions. This area of the web portal does not require any security policy. Access to the software downloads area; however, is restricted to registered customers. Each customer is assigned a user name and password which is stored in an LDAP directory server.

The following use case shows how an application security policy protects the restricted software downloads area so that only registered customers have access.

**Given:**

- The CA SiteMinder environment contains a single LDAP directory server that stores the user names and passwords for all of the registered customers.
- Customers must authenticate with a user name and password before they can access the software downloads area.



**Solution:**

To solve this use case, use the following process:

1. Identify the web portal that needs protecting and select the directory containing the customer information.
2. Create separate resources for the software download area of the portal.
3. Create a registered customers role.
4. Associate the resources with the registered customers role to create an application security policy.

## Identify the Web Portal and Select the User Directory

An application security policy for a web portal must specify the top-level location of the resources that you want to protect, and a directory of users who are authorized to use the resources.

**Note:** The following procedure assumes that you are creating an object. You can also copy the properties of an existing object to create an object. For more information, see [Duplicate Policy Server Objects](#).

**Follow these steps:**

1. Click Policies, Application.
2. Click Applications.

The Applications page appears.

3. Click Create Application.

The Create Application page appears.

4. Enter the name and description of the application. Provide distinctive values that help you remember its purpose or function, as shown in the following examples:

**Name**

Sample Software Company Portal

**Description**

Allows access to all parts of the portal except the downloads area.

5. In Components, provide a name for the component and specify the directory that contains the resources you want to protect. For this web portal use case, use the following example:

**Component Name**

Downloads

**Agent Type**

Web Agent

**Agent**

PortalAgent

**Resource Filter**

/downloads

**Note:** A subcomponent can be created only after you save the main component.

6. Accept the defaults for the remaining settings.
7. In User Directories, click Add/Remove.  
The Choose User Directories page appears.
8. Select the directory that contains the relevant users then click the right arrow to move the directory from the Available members column to the Selected Members column.
9. Click OK.  
You return to the General tab.
10. Click Submit.  
The web portal application is identified and the directory selected.

## Create the Web Portal Resources

After the location of the resources and the user directory have been specified, the individual resources in the subdirectories of the web portal that you want to protect must be specified.

**Follow these steps:**

1. Click the Resources tab.  
A list of resources appears.
2. Click Create.  
The Create Application Resource pane opens.

3. Enter values for the fields in the General group box. Select distinctive values that help you remember its purpose or function, as shown in the following examples:

**Name**

Downloads Area

**Description**

Software downloads restricted to registered customers

**Resource**

\*

4. Verify that the Effective Resource matches what you want to protect. For this use case, the effective resource is:

**Effective Resource**

/downloads/\*

This string specifies that all resources in the downloads directory are protected.

5. Verify that the Web Agent actions option button in the action group box is selected, and then click the following items in the Action list:

- Get
- Post

6. Click OK.

The web portal resource is created and appears in the resources list.

## Create the Web Portal Roles

After the web portal resources have been specified, create a role for the registered customers of the web portal. A role associates resources with groups of users.

**Note:** The following procedure assumes that you are creating an object. You can also copy the properties of an existing object to create an object. For more information, see Duplicate Policy Server Objects.

**Follow these steps:**

1. Click the Roles tab.
2. Click Create Role.
3. Verify that the Create a new object of type Role button is selected, and then click OK.

The Create Role pane opens.

4. Enter values for the fields in the General group box. Choose distinctive values that help you remember its purpose or function, as shown in the following examples:

**Name**

Registered Customers

**Description**

Registered customers that are permitted to access software downloads.

**Role applies to**

All Users

**Note:** The Users Setup and Advanced group boxes do not apply when this option is set and are no longer displayed.

5. Click OK.

The registered customers role is created.

## Create the Web Portal Policy

After the resources and roles have been created, associate the resources of the web portal you want to protect with the roles of the users who will access the resources in the web portal. This creates the policies that protect your applications.

**Follow these steps:**

1. Click the Policies tab.

2. Select the Registered Customers role in the Software Downloads row.

By selecting this role, you indicate that only registered customers have access to the software downloads area of the web portal.

3. Click Submit.

A confirmation screen appears. The application security policy for the web portal is created.

### Displaying the List of Resources

You can sort how the list of resources is displayed by clicking one of the following radio buttons:

#### Name

Sorts resources according to the name you provided when you specified the resource.

**Example:** Software Downloads

#### Filter

Sorts resources according to the actual resource that is being protected.

**Example:** \* (asterisk indicates all resources)

## Application Security Policies Based on Roles

In this use case, a financial services company, acme-financial.com, has an internal human resources application that handles benefits and performance management. All employees gain access to the benefits portion of the application while only managers are permitted access to the performance management portion.

The following procedures detail how you can use the EPM model together with application roles to create a security policy for the human resources application.

#### Given:

- The CA SiteMinder environment contains one user LDAP directory, named AcmeLDAP.
- The user directory identifies all employees and employees who are managers. They are defined in the directory as follows:
  - group:cn=employees,ou=Groups,o=acme-financial.com
  - group:cn=managers,ou=Groups,o=acme-financial.com
- Employees, including managers, must authenticate with the Basic authentication scheme

#### Solution for application security that is based on roles:

To solve this use case, you complete the following steps:

1. Create an application.
2. Select the user directory where you locate the users that meet the role criteria.
3. Specify the resources that are the subcomponents of the main application.

4. Define the two roles that have access to the application.
5. Combine the resources and roles into an application policy.

## Identify the Application that Needs Protecting

In this use case, you establish different access privileges for different parts of the human resources application. To do this, identify the directories underneath the main application and configure the appropriate access.

### To protect the example human resources application

1. Click Policies, Application.
2. Click Applications.  
The Applications page appears.
3. Click Create Application.  
The Create Application page appears.
4. Click the General tab.
5. Enter values for the following fields in General. For this use case, the following data is specified:

**Name**

HR Application

**Description**

Identifies the internal human resources application

6. Enter values for the following fields in Components. For this use case, the following data is specified:

**Component Name**

Benefits

**Agent Type**

Web Agent

**Agent**

hrportal agent

**Resource Filter**

/benefits

### **Default Resource Protection**

Protected

### **Authentication Scheme**

Basic

**Note:** Click Help for descriptions of settings and controls, including their respective requirements and limits.

**Note:** A subcomponent can be created only after you save the main component.

7. Specify the user directory that is associated with the resources being protected. This directory is where CA SiteMinder locates users who meet the role criteria.
  - a. Click Add/Remove.
  - b. Select Employees from the Available Members box and click the right arrow to place this group in the Selected Members box.
  - c. Click OK.

The human resources application is now identified.

## **Designate the Application Resources**

After specifying the subareas of the main application that you want to protect, you can then designate the specific resources within that subdirectory that you want to protect with an application policy.

For this use case, there are two resources to protect:

- benefits management
- performance appraisals

### **To specify the specific resources or functions of the main application**

1. Click the Resources tab.
2. Click Create.

The Resource pane opens.
3. Enter values for the fields in the General group box. For this use case, enter the following values:

#### **Name**

Benefits Management

#### **Description**

Lets employees manage their benefits

4. Enter values for the fields in the Attributes group box. For this use case, enter the following values:

**Resource**

managebenefits.jsp

5. Repeat steps 2–4, but enter the following information:

**Name**

Performance Appraisals

**Description**

Lets a manager write an appraisal report and salary review for an employee

**Resource**

salaryincrease.jsp

**Note:** Click Help for descriptions of settings and controls, including their respective requirements and limits.

The resources that are associated with the performance management application are now defined.

## Create an Employee Role

After defining the specific components of an application that require protection, specify roles that define the set of users who have access to a particular resource. Create a role for all employees.

**Follow these steps:**

1. Click the Roles tab.
2. Click Create Role.  
The Create Role pane appears.
3. Verify that the Create option is selected, and click OK.



4. Enter values for the fields in the General group box. For this use case, enter the following values:

**Name**

Employees

**Description**

All employees of Acme Financial Services

**Role applies to**

All Users

**Note:** The Users Setup and Advanced group boxes do not apply when this option is set and are no longer displayed.

5. Click OK.

## Create a Manager Role

After defining the specific components of an application that require protection, specify roles that define the set of users who have access to a particular resource. Create a role for managers.

**Follow these steps:**

1. Click the Roles tab.
2. Click Create.  
The Create Role pane appears.
3. Verify that the Create option is selected, and click OK.
4. Enter values for the fields in the General group box. For this use case, enter the following values:

**Name**

Managers

**Description**

Managers at Acme Financial Services

**Role applies to**

Selected Users

5. Verify that the Role Applies to Selected Users option is selected and that the Users Setup and Advanced group boxes are visible.
6. Define the set of users in the Managers role by making selections in the Users Setup group box. For this use case, select the following entry in the Member Groups table:

cn=managers,ou=Groups,o=acme-financial.com

This entry specifies the managers group in the corporate user directory.

7. Click OK.

## Use a Response to Supply Data to the Application

To make the human resources application more user-friendly for employees of Acme Financial Services, you can configure a response that provides the employees ID on their benefit records.

### To create a response that provides the employee ID:

1. Click Response the Applications dialog.
2. Click Create Response.  
The Create Response dialog opens.
3. Complete the field as follows:  
**Name**  
Employee ID  
**Description**  
Lists the employee ID.
4. Click Create Response Attribute.  
The Create Response Attribute dialog opens.
5. Complete the fields as follows:  
**Attribute**  
WebAgent-HTTP-Header-Variable  
**Attribute Kind**  
User Attribute  
**Attribute Fields—Variable Name**  
Personnel\_Key  
**Attribute Fields—Variable Value**  
EmployeeID
6. Keep the defaults for all the other fields.
7. Click OK until you return to the main Response tab.

The Employee ID response is created. When an employee views her benefits information, the data from this response is returned to the human resources application and her customer ID will be displayed in the benefits record.

## Establish a Policy Based on Roles

After you have defined the resources and roles, you can group these objects into application security policies.

### Follow these steps:

1. Click the Policies tab.

The Policies pane opens and displays a table listing the configured resources and roles. This table lets you quickly see which roles can be granted access to which resources.

2. Do the following steps:

- a. To create a policy that allows all employees to manage their benefits, select the Employees role in the Benefits Management row.
- b. To create a policy that allows only managers to access the performance appraisals, select the Managers role in the Performance Appraisals row.

3. Click Submit.

You have created two security policies for the human resources application that is based on roles.

**Note:** To edit resources or roles, make the changes on the respective tabs and not on the Policies pane.

## Include Metadata that Describes the Application

Acme-financial.com wants to ensure that there is some descriptive information about the internal human resources application. Custom attributes can be used to define metadata that describes the application.

The information that Acme-financial wants for the application and the date the application was completed.

### Follow these steps:

1. Click the Custom Attributes tab.

The Custom Attributes dialog opens.

2. Click Create.

A table appears with Name and Value fields.

3. Enter values for the fields in the custom attributes table. For this use case, enter the following values:

**Name**

App\_Completed

**Value**

November\_22\_2007

4. Click Create to add another row to the table then enter the following values:

**Name**

Purpose

**Value**

Human\_Resource\_Mgmt

5. Click Submit.

## Application Security Policies with User Mapping and Named Expressions

In this use case, a retail clothing company wants to define a role preventing customers from making web-based credit purchases if they have exceeded their credit limit. The company policy dictates that customers have a \$1,000 credit limit, while company employees have a \$2,000 credit limit.

You can create an application security policy using attribute mapping, named expressions (virtual user attributes and user classes), and roles to satisfy the corporate credit policy.

**Given:**

- The CA SiteMinder environment contains two user directories.
- Directory A stores employees. Employees can also be customers. Therefore, Directory A identifies employees that are also customers that belong to:  
  
`group:cn=Customers,ou=Groups,o=acme.com`
- Directory B only stores customers. Directory B does not have a user attribute that identifies customers because to store a user in Directory B implies the user is a customer.

**Solution:**

1. Define an attribute mapping.
2. Establish a named expression.
3. Use the attribute mapping in an advanced expression to establish roles.
4. Create a response to customize the application further.
5. Create an application security policy.

**More information:**

[Named Expressions](#) (see page 215)

## Establish Mappings for the Two User Directories

The retail company maintains two directories. To create a universal schema that identifies customers in both user directories use attribute mappings, which you create in the Administrative UI.

**To create attribute mappings for this use case**

1. Create a group membership attribute for Directory A:
  - Name the attribute **IsCustomer**.
  - Define IsCustomer as: cn=Customers,ou=Groups,o=acme.com
2. Create a constant attribute for Directory B:
  - Name the attribute **IsCustomer**.
  - Define IsCustomer as **"TRUE"**.

IsCustomer results in a common view of the same user information. You can reference IsCustomer in an expression to determine whether a user is a customer.

Review the section [Define Attribute Mappings](#) (see page 232) for detailed procedures on how to configure attribute mappings.

## Define Named Expressions to Check the Credit Limit

Named expressions enable CA SiteMinder to calculate each users credit limit and account balances. An expression can also determine if customers are over their credit limit.

### To define named expressions for this use case

1. Define a virtual user attribute that calculates a \$1,000 dollar credit limit for customers and a \$2,000 credit limit for employees:
  - Name the attribute **#CreditLimit**.
  - Define #CreditLimit as:  
  
`IsCustomer?1000:2000`  
  
This calculation contains CA SiteMinder supported expression syntax.
2. Define a virtual user attribute that retrieves account balances from the accounting database:
  - Name the attribute **#Balance**
  - Define the attribute as:  
  
`(MyLibrary.GetBalance(""))`  
  
This attribute definition is an active expression that is defined by the clothing retailer.
3. Create a user class expression that determines if customers are over their credit limit:
  - Name the attribute **@IsUnderCreditLimit**
  - Define the attribute as:  
  
`(#Balance > #CreditLimit)`

Read [Define Named Expressions](#) (see page 216) for details on creating virtual user attributes and user class expressions.

## Protect the Online Shopping Application

In this use case, you want to establish access privileges with specific conditions for the web-based shopping application.

### To protect the web-based shopping application

1. Click Policies, Application.
2. Click Applications.  
The Applications page appears.
3. Click Create Application.  
The Create Application page appears.
4. Click the General tab.
5. Enter values for the following fields. For this use case, the following data is specified:

**Name**

Online Catalog

**Description**

Identifies the clothing stores Web-based shopping application

6. Enter values for the following fields in Components. For this use case, the following data is specified:

**Component Name**

Catalog

**Agent Type**

Web Agent

**Agent**

Web Retail Agent

**Resource Filter**

/webcatalog

**Default Resource Protection**

Protected

**Authentication Scheme**

Basic

**Note:** Click Help for descriptions of settings and controls, including their respective requirements and limits.

**Note:** A subcomponent can be created only after you save the main component.

7. Specify the user directory that is associated with the resources being protected. This directory is where CA SiteMinder locates users who meet the role criteria.
  - a. Click Add/Remove.
  - b. Select IsCustomer from the Available Members box and click the right arrow to place this group in the Selected Members box.  
  
IsCustomers maps to the users in both directories that are associated with the clothing store.
  - c. Click Submit.

You have now created an application that is named Online Catalog.

## Designate the Resource Requiring Protection

For this use case, you want to protect the checkout process so that users who exceed their credit limit cannot complete the transaction. Therefore, you add a resource to the Online Catalog application you previously created.

### To protect the specific resource of the web-based shopping application

1. Click Policies, Application.
2. Click Applications.  
The Applications page appears.
3. Specify search criteria and click Search.  
The Applications matching the criteria appear.
4. Click the name of the application you want to modify. For this use case, click Online Catalog.  
The View Application page appears.
5. Scroll down the page and click Modify.  
The settings and controls become active.
6. Select the Resources tab.
7. Click Create.  
The Create Resource page appears.
8. Enter values for the following fields. For this use case, enter the following values:  
**Name**  
Checkout  
**Description**  
Lets you total your purchases and pay for them.



9. Enter values for the following fields in Attributes. For this use case, enter the following values:

**Resource**

total\_charges.jsp

10. Select Web Agent actions in Action and select the actions Get and Post.
11. Click OK.

You have created a resource that is called Checkout.

**Note:** Click Help for descriptions of settings and controls, including their respective requirements and limits.

## Configure the Customer Role

After the web portal resource is defined, create an application role that lets customers make web-based purchases as long as they have not exceeded their credit limit.

**Note:** The following procedure assumes that you are creating an object. You can also copy the properties of an existing object to create an object. For more information, see Duplicate Policy Server Objects.

**To create this credit-based role**

1. Click the Roles tab.
2. Click Create Role.  
The Create Role dialog appears.
3. Verify that the Create option is selected, and click OK.  
The Create Role dialog opens.
4. Enter values for the fields in the General group box. For this use case, enter the following values:

**Name**

PurchasewithCredit

**Description**

Indicates that the customer uses credit to pay for their purchases.

**Role applies to**

Selected users

5. Enter an expression in the Advanced Expression group box. For this use case, enter the following:

**User Expression**

@IsUnderCreditLimit

The role expression is the product of the two virtual user attribute expressions #Balance and #CreditLimit, which calculate whether the user has exceeded their credit limit.

6. Click OK.

**Note:** Click Help for descriptions of settings and controls, including their respective requirements and limits.

You have created a role that is named PurchasewithCredit, whose value is the combination of two named expressions.

## Customize the Application with a Response

To provide a more personalized experience for the customer, the retail clothing company can configure a response that lets customers who are over their credit limit apply for increased credit. If a customer has exceeded their credit limit, this response redirects them to a credit application where they can apply for a higher credit limit.

**To create a response**

1. Click the Responses tab.
2. Click Create Response.

The Create Response dialog opens.

3. Complete the field as follows:

**Name**

CreditNotice

**Description**

Alerts users that they have exceeded credit limit.

4. Click Create Response Attribute.

The Create Response Attribute dialog opens.

5. Complete the fields and settings as follows:

**Attribute**

WebAgent-OnReject-Redirect

**Attribute Kind**

Static

**Attribute Fields—Variable Value**

http://catalog.retailcorp.com/credit\_notice.jsp

6. Keep the defaults for all the other fields.
7. Click OK.

The response named CreditNotice is created and will be sent to customers who exceed their credit limit.

## Configure the Security Policy for the Shopping Application

After you have defined the resource, role, and response, configure the policy that secures the web-based shopping application.

**Follow these steps:**

1. Click the Policies tab.  
The Policies dialog opens and displays a table listing the Checkout resource and the PurchaseWithCredit role displayed.
2. Select the PurchaseWithCredit role for the Checkout resource.  
This pairing establishes a policy that lets all customers make a purchase with the store credit card, if they have not exceeded their credit limit. Additionally, by checking the role the Responses grid becomes populated.
3. Select the CreditNotice response for the Checkout resource.

You now have security policies for the online catalog application that are based on roles that define a spending limit. Additionally, a response is associated with the policy and will be sent to those customers who continue to make purchases after exceeding their limit.

## Provide Metadata to Describe the Application

The retail clothing company wants to ensure that there is some descriptive information about the online catalog application. Custom attributes can be used to provide metadata that describes the application.

The retail clothing company wants to note that the application is only for the online catalog and the email address of the administrator of this application.

**To specify metadata for the online catalog application:**

1. Click the Custom Attributes tab.  
The Custom Attributes dialog opens.
2. Click Create.  
A table appears with Name and Value fields.
3. Enter values for the fields in the custom attributes table. For this use case, enter the following values:

**Name**

App\_Function

**Value**

online\_retail

4. Click Create to add another row to the table then enter the following values:

**Name**

Admin\_email

**Value**

jdoe@retailcorp.com

5. Click Submit.

You have completed all the available tasks that are related to creating an application security policy.

## Application Security Policy Based on CA DataMinder Content Classifications

In this use case, a financial services company, Forward Inc., has deployed Microsoft SharePoint. The company wants to:

- Give all employees access to SharePoint.
- Restrict access to documents that contain employee compensation information. Only employees that are in human resources can access documents that contain compensation information.

**Note:** Forward, Inc. is a fictitious company name that is used strictly for instructional purposes only and is not meant to reference an existing company.

The following details how to configure an application with CA DataMinder content classifications to create a security policy that protects employee compensation information.

**Given:**

- The CA SiteMinder environment contains one LDAP user directory. The name of the directory is ForwardLDAP.
- The user directory identifies all employees, including employees who work in human resources. The user directory identifies the human resources employees as follows:  
  
`cn=human resources,o=forwardinc.com`
- All employees must authenticate with the Basic authentication scheme.
- A single SharePoint site is deployed:
  - The root URL of the SharePoint site is:  
`usecase.forwardinc.com/SitePages/Home.aspx`
  - The URL of the shared documents directory is:  
`usecase.forwardinc.com/Shared Documents`

**Solution:**

1. Protect the shared documents directory.
2. Protect all document resources.
3. Create the human resources role.
4. Establish a policy that is based on the human resources role.

## Protect the Shared Documents Directory

For this use case, the highest point in the SharePoint environment that you want to protect is the shared documents directory. You leave the SharePoint site (`usecase.forwardinc.com/SitePages/Home.aspx`) unprotected to be sure that all employees have access.

**Follow these steps:**

1. Click Policies, Application.
2. Click Applications.
3. Click Create Application.
4. Select the Use DLP Server option.
5. Enter the required values for the General section. For this use case, the following data is specified:

**Name**

SharePoint Site

6. Enter the required values in the Component section. For this use case, the following data is specified:

**Component Name**

Shared Documents

**Agent**

SharePoint

**Resource Filter**

/usecase.forwardinc.com/Shared Documents

7. In the User Directories section, click Add/Remove to list all user directories available to the application policy.
8. Select a user directory and click OK. For this use case, the following user directory is specified:  
ForwardLDAP
9. In the DLP Classifications section, remove any content classifications that you do not want to add to the component. For this use case, do not remove any classifications.
10. Click Submit to save the application.

## Protect All Document Resources

For this use case, you want to protect all documents in the Shared Documents directory. You protect all document resources by adding a resource to the application.

**Follow these steps:**

1. Click Policies, Application.
2. Click Applications.
3. Specify search criteria and click Search.
4. Identify the application that you want to modify and click the modify icon. For this use case, modify the following application:  
SharePoint Site.
5. Select the Resources tab and click Create.
6. Enter values for the following fields. For this use case, enter the following values:

**Name**

All Documents

**Resource**

/\*

7. Select the type of event and action that must take place for the rule to fire. For this use case, select the following event types:
  - Web Agent actions
  - Connect
  - Delete
  - Get
  - Head
  - Options
  - Post
  - Put
  - Trace
8. Click OK to save the resource.
9. Click Submit to add the resource to the component.

## Create the Human Resources Role

For this use case, you want to create a role that only lets human resources employees access to documents that contain compensation information.

### Follow these steps:

1. Click Policies, Application.
2. Click Applications.
3. Specify search criteria and click Search.
4. Identify the application that you want to modify and click the modify icon. For this use case, modify the following application:  
SharePoint Site.
5. Select the Roles tab and click Create Role.
6. Select the following option:  
Create an object of type role
7. Click OK.
8. Enter values in the General section. For this use case, enter the following values:

#### **Name**

Human Resources

**Description**

A role that has access documents that contain employee compensation information.

9. Specify if the role is to apply to all or specific users in the available directories. For this use case, select the following option:  
Selected Users
10. Define the role members in the Users Setup section. For this use case, select the following organization in the Member Groups section:  
cn=human resources,o=forwardinc.com
11. Add content classifications to the role in the DLP Classifications section. For this use case, select the following values:
  - US Employee Compensation Information
  - UK Employee Compensation Information
12. Click OK to save the role.
13. Click Submit to add the role to the application.

**Establish a Policy Based on the Human Resource Role**

For this use case, you want to create a policy that protects documents that contain employee compensation information.

**Follow these steps:**

1. Click Policies, Application.
2. Click Applications.
3. Specify search criteria and click Search.
4. Identify the application that you want to modify and click the modify icon. For this use case, modify the following application:  
SharePoint Site.
5. Select the Policies tab.
6. Select the Human Resources role for the All Documents resource.
7. Click Submit.

A policy that only lets human resources employees access SharePoint documents that contain employee compensation information is created.



## Configure Confidence Levels in Applications

If CA SiteMinder is integrated with a supported risk analysis engine, a confidence level is available for use in application objects. Confidence levels extend applications to include the results of the risk evaluation that is completed as part of user authentication. The Policy Server can use these results when making authorization decisions.

You can apply a confidence level to the following objects:

- An application component.

A confidence level that you configure in an application component applies to all resources that are associated with the component. Confidence levels represent a higher level of granularity than the default application settings provide. Use the advanced settings of the application component to apply a confidence level.

**Note:** Applying a confidence level to an application component requires that you enable confidence level support. For more information, see the *CA SiteMinder Implementation Guide*.

- An application role.

A confidence level that you configure as part of an application role allows for more granular authorization decisions. A confidence level represents an active component that you can use to define further the user group or groups that can access the resources. Confidence levels represent a higher level of granularity than the default role memberships provide. To add a confidence level to a role, use a named expression that references the SM\_USER\_CONFIDENCE\_LEVEL CA SiteMinder generated attribute.

**Note:** Applying a confidence level to an application role remains supported from previous releases and is enabled by default.

### More information:

[CA SiteMinder-Generated User Attributes](#) (see page 508)  
[Named Expressions](#) (see page 215)

## Configure CA DataMinder Content Classifications in Applications

If CA SiteMinder is integrated with CA DataMinder, content classifications are available for use with application objects. Content classifications extend applications to include the type of content a user is requesting. The Policy Server can use the results of the CA DataMinder content analysis to make authorization decisions.

**Note:** Applying content classifications to an application component requires that you enable the environment for the CA DataMinder integration. For more information, see the *CA SiteMinder Implementation Guide*.

You can apply a CA DataMinder content classification to the following objects:

- An application component:
  - Content classifications that you apply to an application component apply to all resources that are associated with the component.
  - By default, the CA DataMinder Content Classification Service makes available all content classifications to an application component. If you want the Policy Server to ignore one or more classifications when making an authorization decision, remove them from the application.
  - A CA SiteMinder administrator cannot administer content classifications. If changes are required, coordinate the changes with the CA DataMinder administrator.
- An application role:
  - Content classifications that you apply to an application role allow for more granular authorization decisions. A content classification represents an active component that you can use to define further the user group or groups that can access the resources. Content classifications represent a higher level of granularity that the default role memberships provide.
  - The relationship between roles and content classifications is cumulative. If a user is a member of multiple roles on the same application, then the user can access any documents that are associated with the roles.

## Configure Advanced Policy Components for Applications

Application objects provide configuration options that let the following types of users modify CA SiteMinder components beyond the default settings:

- Those users who are familiar with the policy design and interface that is used in CA SiteMinder releases before r12 who want to fine-tune aspects of their policies.
- Users who want a higher level of granularity in their policies than the default settings provide.
- Auditors and others who want to determine if the policies implemented using an application object meet the requirements of the organization or of any regulations with which the organization must comply.

**Follow these steps:**

1. Click Applications.
2. Click Create Application.
3. Enter information in the General and Components sections and then click Advanced Settings.

The Modify Component page appears. The Modify Component page includes the session and advanced features of policy realms. For example, if confidence level support is enabled, you can add a minimum confidence level to the component.

4. Do one of the following steps:
  - Configure one or more of the advanced settings for the component.
  - Select the legacy authorization directory mapping.
  - To create a sub-component, click Create Sub-Component to open the Create Component screen. Creating a sub-component is the equivalent of creating a sub, or nested, realm.
5. When you are finished, click OK to save the changes and continue configuring the remaining parts of the application.

**More information:**

[Authentication Events](#) (see page 477)

[Rules Overview](#) (see page 473)

[Authorization Events](#) (see page 479)

[Realms Overview](#) (see page 461)

[Session Timeouts](#) (see page 106)



# Chapter 14: Domains

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This section contains the following topics:

[Policy Domain Overview](#) (see page 453)

[Domains and User Membership](#) (see page 454)

[How to Configure a Policy Domain](#) (see page 455)

[Add Identity Management Environments to a Domain](#) (see page 458)

[Disable Global Policy Processing for a Domain](#) (see page 459)

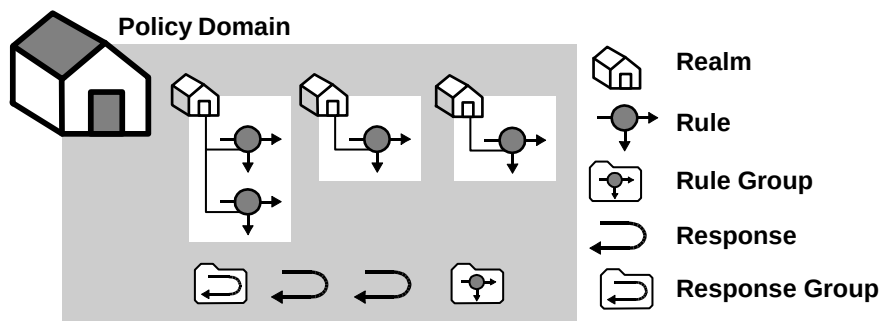
[Modify a Domain](#) (see page 459)

[Delete a Domain](#) (see page 459)

## Policy Domain Overview

A policy domain is a logical grouping of resources that are associated with one or more user directories. In addition, policy domains require one or more administrator accounts that can change the objects within the policy domain. Policy domains contain realms, rules, responses, and policies (and optionally, rule groups and response groups). An administrator with the appropriate privileges assigns a policy domain to one or more administrators.

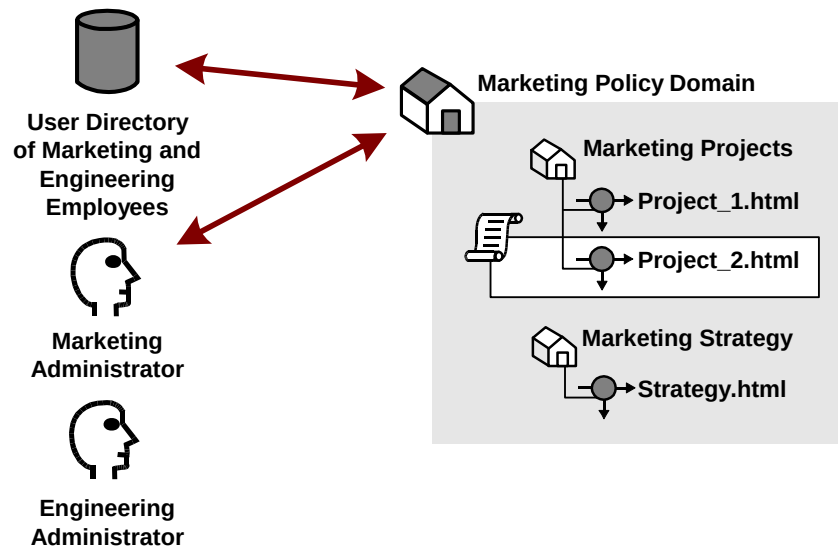
The resources in a policy domain can be grouped in one or more realms. A realm is a set of resources with a common security (authentication) requirement. Rules, which are associated with the realm that contains the resource control access to resources. The following diagram illustrates a small policy domain which contains realms and their associated rules, and a rule group, response group, and a pair of responses.



By grouping realms and rules in a policy domain, you can provide organizations with a secure domain for their resources. In the policies section, you learn how to create policies within a policy domain to control access to the policy domain resources.

In the sample diagram below, a Marketing policy administrator who is specified in the Marketing policy domain can manage the Marketing Strategy and Marketing Projects realms. The policy domain ensures that the Engineering administrator, who does not have administrative privileges to manage the Marketing policy domain, cannot control resources belonging to the Marketing department. However, the Marketing policy domain is associated with a user directory that contains engineering users.

If the administrator for the Marketing department creates a policy within the Marketing policy domain that allows Engineering staff to access the resource Project 2.html, engineering users can access the resource.



**More information:**

[Policies](#) (see page 517)

## Domains and User Membership

Besides acting as a container for domain objects, policy domains also connect to user directories. The Policy Server authenticates users based on the requirements of the realm in which the target resource resides. In order to authenticate a user, the Policy Server must find the user directory where a user is defined. The Policy Server does this by locating the policy domain to which a realm belongs. From the policy domain, the Policy Server queries the user directories specified in the policy domain's search order.

The search order is defined when you add user directory connections to a policy domain. The order in which you add directory connections determines the order that the Policy Server uses to search for a user. For example, if you set up policy domain for a company migrating user data from a WinNT directory to an LDAP directory, and you want the Policy Server to search in the new LDAP directory first, then look in the WinNT user directory, add the LDAP directory connection to the policy domain first, then add the WinNT user directory connection.

## How to Configure a Policy Domain

You configure a domain to create a logical grouping of resources with one or more user directories. Configuring a domain requires you to:

- Assign one or more user directories for user authentication
- Create one or more realms to group resources according to security policies

**Note:** You can edit a policy domain's properties if you need to add a realm in the future.

The following process lists the steps for configuring a new policy domain:

1. [Configure a policy domain](#) (see page 455)
2. [Assign user directories](#) (see page 456)
3. [Create a realm](#) (see page 456)

**More information:**

[Realms](#) (see page 461)

## Configure a Policy Domain

You create a policy domain to protect logical groupings of resources.

**Follow these steps:**

1. Click Policies, Domain, Domains.
2. Click Create Domain.
3. Type the name and a description of the policy.
4. Add User Directories and Realms.
5. Click Submit.

You have defined a policy domain.

## Assign User Directories

You can add one or more user directories to a policy domain. The Policy Server authenticates users by comparing the credentials that they enter to the credentials that are stored in the user directories. The Policy Server searches the user directories in the same order that they are listed in the policy domain.

**Follow these steps:**

1. Click Policies, Domain, Domains.

2. Specify the search criteria and click Search.

A list of domains that match the search criteria appears.

3. Click the name of the domain that you want to modify.

4. Click Modify.

The settings and controls become active.

5. In the General tab, click Add/Remove.

The Choose user directories page appears.

6. Select one or more user directories from the list of Available Members, and click the right-facing arrows.

The user directories are removed from the list of Available Members and added to the list of Selected Members.

**Note:** To select more than one member at one time, hold down the Ctrl key while you click the additional members. To select a block of members, click the first member and then hold down the Shift key while you click the last member in the block.

7. Click OK.

The selected user directories are listed under User Directories.

**Note:** To create a new user directory and add it to the domain, click Create.

8. Click Submit.

The selected user directories are added to the policy domain.

## Create a Realm

Realms are created in a domain and are associated with a Web Agent. Realms use resource filters to group resources that have similar security requirements and share a common authentication scheme.



**More information:**

[Realms](#) (see page 461)

## Configure a Realm with a SiteMinder Web Agent

When you create a domain, you can create one or more realms in the domain and associate them with a Web Agent or Agent group. Realms group resources that have similar security requirements and share a common authentication scheme.

**Follow these steps:**

1. Click Policies, Domain, Realms.
2. Click Create Realm.
3. Select a domain, and click Next.
4. Type the name and a description of the realm.
5. Click the ellipsis button to select an agent.
6. Select a Web Agent or Agent group, and click OK.
7. Specify the remaining resource properties.
8. Create new rules or delete existing rules.
9. Create new sub-realms or delete existing sub-realms.
10. Specify the session properties.
11. Specify the authorization directory mappings and types of events the realm must process.
12. Click Finish.

The Realm is created.

**More information:**

[Copy Policy Server Objects](#) (see page 55)

## Configure a Realm with a RADIUS Agent

When you create a domain, you can create one or more realms in the domain and associate them with a Radius Agent or Agent group. Realms group resources that have similar security requirements and share a common authentication scheme.

**Note:** The Administrative UI lets you configure realms protected by a RADIUS Agent. These realms do not require all of the same information that is required for a CA SiteMinder Web Agent realm.

**Follow these steps:**

1. Click Policies, Domain, Realms.
2. Click Create Realm.
3. Select a domain, and click Next.
4. Type the name and a description of the realm.
5. Click the ellipsis button to select an agent.
6. Select a RADIUS Agent or Agent group, and click OK.
7. Specify the remaining resource properties.
8. Create new rules or delete existing rules.
9. Specify the session properties.
10. Click Finish.

The Realm is created and associated with the selected RADIUS Agent or Agent group.

**More information:**

[Copy Policy Server Objects](#) (see page 55)

## Add Identity Management Environments to a Domain

Adding a Identity Management environment and the associated user directories to a domain makes available Identity Management roles to policies.

**Follow these steps:**

1. Click Policies, Domain, Domains.
2. Specify search criteria and click Search to locate the domain you want.
3. Click the name of the domain to which you want to add the environment.
4. Click Modify.

5. If the users that are associated with the environment are not bound to the domain, add the respective user directories.
6. Click Add/Remove in the IDM Environments section.
7. Select the IDM Environments you want and click OK.
8. Click Submit.

The Identity Management environments are added to the domain. The roles associated with the environments are available to all policies created in the domain.

## Disable Global Policy Processing for a Domain

Global policies let you associate responses with particular resources and events across all domains. By default, global policies apply to all of the resources in a policy domain.

### Follow these steps:

1. Open the domain.
2. Clear the Global Policies Apply check box, and then click Submit.

Global policies no longer apply to the resources in this domain.

### More information:

[Global Policies, Rules, and Responses](#) (see page 595)

## Modify a Domain

You can change the name, description, user directory connections and administrators associated with a policy or affiliate domain. All other features of a domain are a result of peripheral configuration.

## Delete a Domain

**Important!** Deleting a domain destroys all of the domain user directories, administrator connections, and objects bound to the domain, such as rules, realms, responses, policies, or affiliates.

It may take a short amount of time for all deleted objects to be removed from caches.



# Chapter 15: Realms

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This section contains the following topics:

[Realms Overview](#) (see page 461)

[Confidence Levels Introduced](#) (see page 462)

[Identify a Resource by Agent, Realm, and Rule](#) (see page 463)

[Nested Realms](#) (see page 465)

[Realms in Request Processing](#) (see page 467)

[Configure a Realm](#) (see page 467)

[Modify a Realm](#) (see page 470)

[Delete a Realm](#) (see page 470)

[Configure a Nested Realm](#) (see page 470)

[Flush a Single Realm from the Resource Cache](#) (see page 471)

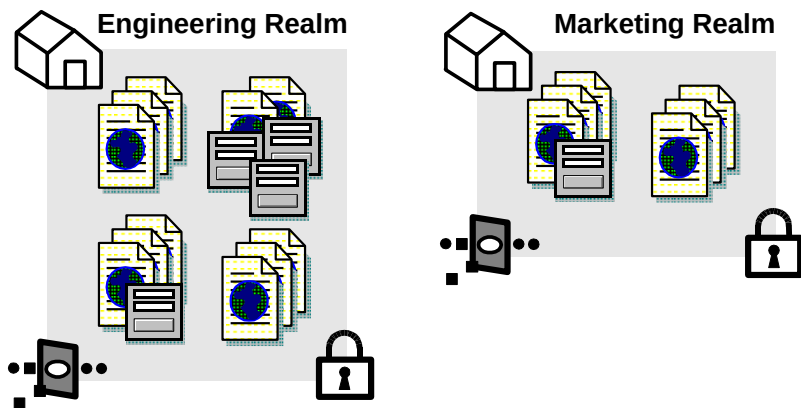
## Realms Overview

Complex sets of resources must be logically grouped so that security policies can be created. The basic CA SiteMinder groupings for resources are realms.

A realm is a cluster of resources within a policy domain grouped according to security requirements. A realm is usually defined for resources that reside in a common location on your network. For example, marketing information that resides in a /marketing directory on your network might be configured as a realm in a policy domain controlled by an administrator in your company's marketing organization.

The contents of a realm are protected by Agents. When users request resources within a realm, the associated Agent handles authentication and authorization of the user. The realm determines the method of authentication.

The following diagram shows the contents of two realms.



Each of the realms contains resources, such as HTML files, forms, or applications. In addition, each realm is associated with an Agent and an authentication scheme.

## Confidence Levels Introduced

If CA SiteMinder is integrated with a supported risk analysis engine, you can configure a realm with a confidence level. A confidence level represents credential assurance, which is the likelihood that the user requesting the protected resource is legitimate.

Consider the following items:

- A confidence level is based on a numeric scale (0–1000). A higher confidence level corresponds to a higher level of credential assurance.
- You can apply a confidence level to authorization decisions using both access management models. For more information, see [Confidence Levels in Policies](#) (see page 521) and [Confidence Levels in Applications](#) (see page 449).
- When an authentication scheme that generates a confidence level authenticates a user, the confidence level is inserted into the session ticket of the user. The user can access any resource requiring a confidence level equal to or greater than this value, as long as the policy or application applies to the user.
- The factors on which a confidence level is calculated are based on the data the risk analysis engine uses to determine credential assurance.

**Note:** CA SiteMinder supports an integration with an on–premise implementation of CA Arcot WebFort and CA Arcot Risk, and a hosted implementation of CA Arcot A–OK.

**More information:**

[Configure Advanced Policy Components for Applications](#) (see page 451)

## Identify a Resource by Agent, Realm, and Rule

The resources protected by CA SiteMinder are identified by the following:

[Agent] [Realm Resource Filter] [Rule Resource]

**Agent**

An Agent monitors a server that contains one or more realms of protected resources.

**Realm Resource Filter**

A string, such as a relative path to a directory, that specifies the resources covered by the realm. If the realm is a top-level realm, specify the resources relative to the server that serves up the files or application. If the realm is nested, specify the resources relative to the parent realm.

For example, the realm might cover the contents of a directory that is immediately below the document root of a Web server, such as:

```
<document_root>/HR
```

Here, you could specify the realm resource filter as:

```
/HR
```

**Rule Resource**

A string or regular expression that specifies the resources to which the rule applies. Specify the resources relative to the realm containing the resource. For example, if the realm resource filter ends with a directory name, the rule resource might include a subdirectory of the realm directory and even the name of a file in that subdirectory, such as:

```
/Managers/PayRanges.html
```

You can use wildcards to broaden the specification of a rule. For example:

```
/Managers/*
```

Combining the three elements, suppose that:

- The Agent called MyAgent protects a Web server on host MyHost, in domain myorg.org.
- You want the realm to cover the contents of the following Web Server directory:  
<document\_root>/HR
- The HR directory contains a subdirectory called Managers, and you want to protect all files in the subdirectory.

For the Policy Server, the following figure shows the effective resource.



You could configure the directory called Managers as a nested realm under the /HR realm.

To access the protected page PayRanges.html, under the Managers subdirectory, a user would need to:

1. Specify the resource:  
`http://MyHost.myorg.org/HR/Managers/PayRanges.html`
2. Provide credentials for a user authorized to access the resource. Administrators use policies to specify which users are authorized to access a resource.

**More information:**

[Configure a Realm](#) (see page 467)

[Agents and Agent Groups](#) (see page 113)

[Rules](#) (see page 473)



## Unprotected Realms, Rules, and Policies

By default a realm is created in a Protected state. In most cases, you should use protected realms instead of changing a realm to an Unprotected state. In a protected realm, all resources are protected against access. To allow access, a rule must be defined, then included in a policy.

When you create a realm in an Unprotected state, you must configure rules before CA SiteMinder protects the resources in the realm. If you create a rule for resources in the unprotected realm, only the specified resources are protected. Once the resource is protected, the rule must be added to a policy to allow users to access the resource. You may want to use an unprotected realm if only a subset of the resources in a realm need to be protected from unauthorized access.

The following is an example of the actions required when setting up an Unprotected realm:

| Action                                                                 | Protection State                                                                              |
|------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|
| Create unprotected realm called Realm1 with the Resource Filter: /dir. | Resources contained in /dir and subdirectories are not protected.                             |
| Create Rule1 in Realm1 for the resource: file.html.                    | The file /dir/file.html is protected, but the rest of the contents of /dir are not protected. |
| Create Policy1 and bind Rule1 and User1 to the Policy.                 | User1 can access /dir/file.html. All other users cannot access the protected file.            |

**Note:** If you want to track users for a realm with an Anonymous authentication scheme, the realm must be a protected realm. For information about the Anonymous scheme, see [Anonymous Authentication Schemes](#) (see page 347).

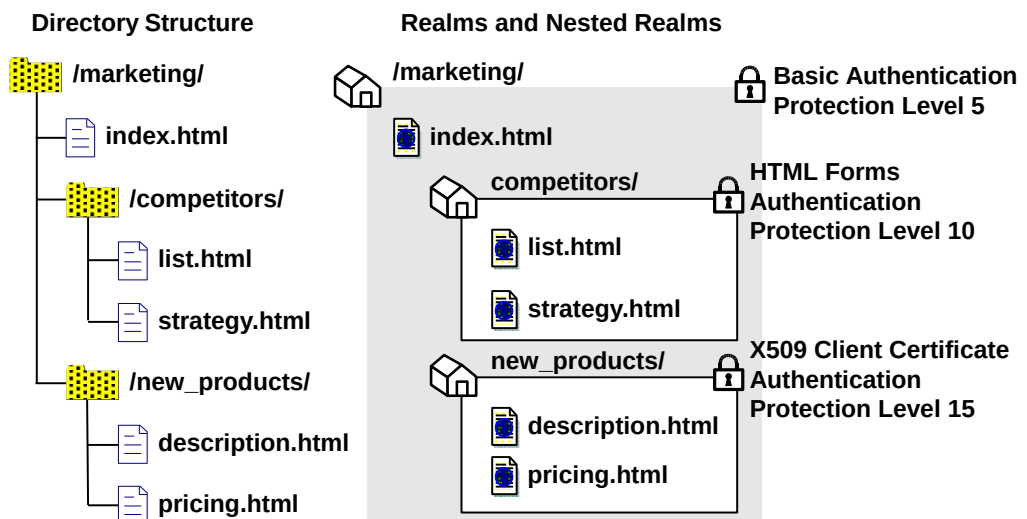
## Nested Realms

Realms represent groups of resources in much the same way that directories of files and folders represent a file system's contents. Nested realms allow you to increase the protection level of resources that are lower in a directory tree. Below any existing realm, you can create a nested realm. You can then assign an authentication scheme with a higher protection level to the nested realm.

By default, to access resources in the child realm, a user must be authorized for resources in the parent realm and for resources in the child realm. You can globally change the default behavior of the Policy Server and always allow access to the resources in the child realm for users who are authorized either for the parent realm or the child realm. However, we do not recommend changing from the and logic to the or logic, which is less secure. To change to the or logic, remove the check from the Enable Nested Security check box.

**Note:** Do not assign the anonymous authentication scheme to any realm in a nested structure, including the top-level realm. You can't authorize specific users for resources protected by an anonymous authentication scheme, so the and logic will fail.

The following example illustrates how nested realms can be used to provide increasing levels of security.



In the realm structure shown in the previous figure, the realms mimic the file structure of the resources. Each of the nested realms has a different authentication scheme than its parent realm. Since the authentication scheme for each child realm has a higher protection level than that of the parent realm, users will need to re-authenticate when they try to access resources at lower levels of the tree. To implement this example, for each realm, you need to create a rule. Then, you need to create corresponding policies so that each policy contains a rule and users that need to access resources in a child realm can also access resources in the parent realm.

**Note:** Only administrators with the Manage System and Domain Objects privilege may create, edit, and delete realms. However, administrators with the Manage Domain Objects privilege may create, edit, and delete nested realms underneath existing realms in their policy domains.

**More information:**[Rules](#) (see page 473)[Policies](#) (see page 517)

## Realms in Request Processing

When a user requests a resource, the Policy Server uses the longest matching realm to determine if a resource is protected, and if so, which authentication scheme must be used to establish the user's identity. The longest matching realm consists of the resource filter that can be located in the deepest level of any group of nested realms (or a single realm if nested realms are not used) that matches the requested path to a resource.

### Examples

Using the example from the previous section, a file called list2.html in the location /marketing/competitors/list2.html matches the nested realm /marketing/competitors/. When the Policy Server processes authentication for list2.html, the user authenticates via HTML Forms, since that is the authentication scheme associated with the /marketing/competitors/ realm.

In the same example, a file called current\_budget.html in the location /marketing/budgets/current\_budget.html. Since the /budget directory is not specifically called out in a nested realm, the longest matching realm for this resource is /marketing/. Therefore, the user authenticates via the Basic user name and password authentication scheme.

## Configure a Realm

Realms are groupings of resources in a specific location on your network. The contents of a realm are protected by Agents. When users request resources within a realm, the associated Agent handles authentication and authorization of the user. The realm specifies the method of authentication.

You can configure realms for any type of CA SiteMinder Agent, including Affiliate Agents.

## Configure a Realm Protected by a SiteMinder Web Agent

You can configure a realm to protect a group of resources that users access through a Web Server.

**Note:** The following procedure assumes that you are creating an object. You can also copy the properties of an existing object to create an object.

**Follow these steps:**

1. Click Policies, Domain, Realms.
2. Click Create Realm.
3. Select a domain from the Domain list, and click Next.
4. Type the name and a description of the realm.
5. Click the ellipsis button to select an agent.
6. Select a CA SiteMinder Web Agent or Agent group, and click OK.
7. Specify the remaining resource properties.
8. Create new rules or delete existing rules.
9. Create new sub-realms or delete existing sub-realms.
10. Specify the session properties.
11. Specify the directory mappings and types of events the realm must process.
12. Specify the minimum confidence level to apply to all resources in the realm.

**Note:** Applying a confidence level to a realm requires that you integrate CA SiteMinder with a supported risk analysis engine and enable confidence level support. For more information, see the *Implementation Guide*.

13. Click Finish.

The Realm associated with the selected CA SiteMinder Web Agent or Agent group is created.

**More information:**

[Copy Policy Server Objects](#) (see page 55)

## Configure a Realm Protected by a RADIUS Agent

You can configure a realm to protect a group of resources that users access through a Web Server.

**Note:** The Administrative UI lets you configure realms protected by a RADIUS Agent. These realms do not require all of the same information that is required for a CA SiteMinder Web Agent realm.

**Note:** The following procedure assumes that you are creating an object. You can also copy the properties of an existing object to create an object.

**Follow these steps:**

1. Click Policies, Domain, Realms.
2. Click Create Realm.
3. Select a domain from the Domain list, and click Next.
4. Type the name and a description of the realm.
5. Click the ellipsis button to select an agent.
6. Select a RADIUS Agent or Agent group, and click OK.
7. Specify the remaining resource properties.
8. Create new rules or delete existing rules.
9. Specify the session properties.
10. Click Finish.

The Realm associated with the selected RADIUS Agent or Agent group is created.

**More Information:**

[Copy Policy Server Objects](#) (see page 55)

## Modify a Realm

When you modify an existing realm you cannot make changes to the following:

- Agent

The Agent that protects a server where an existing realm is located cannot be changed. If you need to change the Agent, you must delete the realm and recreate it with the new Agent.

- Resource Filter

The resource filter of an existing realm cannot be changed. If you need to change the resource filter, you must delete the realm and recreate it with the new resource filter.

**Note:** More information about modifying and deleting Policy Server objects exists in [Manage Policy Server Objects](#) (see page 54).

## Delete a Realm

When you delete a realm, all nested realms that are associated with the realm are also deleted. In addition, all rules that are associated with the deleted realm and its nested realms are also deleted. Only delete the parent realm to remove all the associated nested realms. Do not select the individual nested realms for deletion.

**Note:** More information about modifying and deleting Policy Server objects exists in [Manage Policy Server Objects](#) (see page 54).

## Configure a Nested Realm

Administrators who have privileges to Manage Domain Objects can create a nested realm within a parent realm, as long as the parent realm is associated with a domain within the administrator's scope.

**Note:** You can only create nested realms under a realm that is protected by CA SiteMinder Web Agents.

**Follow these steps:**

1. Click Policies, Domain, Realms.
2. Specify search criteria, and click Search.
3. Click the name of a realm that you want to modify.
4. Click Modify.

The settings and controls become active.

5. In Sub-Realms, click Create Sub-Realm.
6. Type the name and a description of the realm.
7. Type the path of the resource filter.

**Note:** The resource filter of the nested realm is added to the resource filter of the parent realm. For example, if the parent realm's filter is /marketing, and the nested realm's filter is /data, the entire filter is:

<agent\_of\_the\_parent\_realm>/marketing/data.

**Note:** Asterisk (\*) and question mark (?) characters are treated as literal characters in resource filters, not wildcards.

8. Specify the session properties.
9. Specify the following advanced settings:
  - Authorization directory mapping
  - Events processing

10. Click OK.

The newly created Sub-Realm is added to the parent Realm.

11. Click Submit.

A Realm associated with the newly created sub-realm is created.

**More information:**

[Nested Realms](#) (see page 465)

## Flush a Single Realm from the Resource Cache

CA SiteMinder caches realm information when users access protected resources. This allows CA SiteMinder to improve network performance by keeping track of recently used resources. However, if you change the security requirements or contents of a realm, you must flush the realm from the CA SiteMinder resource cache.

**Note:** If you have the Manage System and Domain Objects administrative permission, you can flush all realms from the resource cache using the Cache Management dialog.

**Follow these steps:**

1. Click Policies, Domain, Realms.
2. Specify search criteria, and click Search.
3. Click the name of a Realm that you want to modify.

4. Click Modify.

The settings and controls become active.

5. In Flush Resources in Realm, click Flush.

CA SiteMinder flushes the realm from the resource cache.



# Chapter 16: Rules

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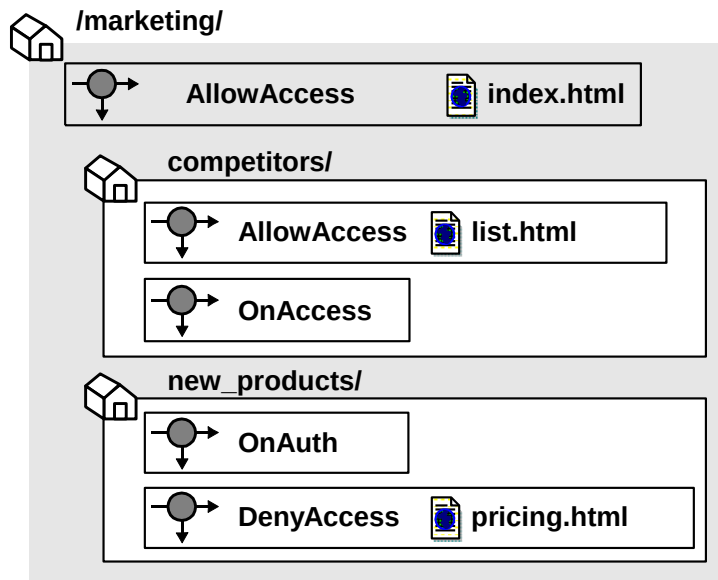
This section contains the following topics:

- [Rules Overview](#) (see page 473)
- [Configure a Rule for Web Agent Actions](#) (see page 480)
- [Configure a Rule for Authentication Event Actions](#) (see page 481)
- [Configure a Rule for Authorization Event Actions](#) (see page 482)
- [Configure a Rule for Impersonation Event Actions](#) (see page 484)
- [Resource Matching and Regular Expressions](#) (see page 485)
- [Enable and Disable Rules](#) (see page 486)
- [Advanced Rule Options](#) (see page 487)
- [Delete a Rule](#) (see page 488)

## Rules Overview

Rules identify specific resources and either allow or deny access to the resources. Rules can also be used to trigger responses when authentication or authorization events take place. When you create rules, you must associate rules with specific realms.

The following diagram illustrates a number of realms and nested realms and their associated rules.



In the diagram above, different realms and nested realms have specific rules associated with the resources in the realm. It is also possible to have a single rule associated with all of the resources in a realm, or a subset of resources in the realm. This is done by using resource matching or regular expressions to specify resources.

**More information:**

[Resource Matching and Regular Expressions](#) (see page 485)

## How Rules Work as Part of a Policy

Policies protect resources by binding together rules, users, and responses. Rules are the parts of policies that determine precisely which resources are protected, and which types of actions cause a rule to fire.

For example, a rule can specify all HTML files in a realm are protected for a GET action, which a Web server uses to respond to a request for an HTML page. When a user's browser attempts to access the resource, the rule fires and the policy containing the rule determines whether or not the user can view the selected resource.

## How the Policy Server Processes Rules

The Policy Server evaluates rules according to the relationships between users, rules, and responses defined in policies. When a user accesses a protected resource, the Policy Server must process rules included in policies to determine whether or not the user is authorized for the resource, if any authentication and authorization events must be processed, and if any responses should be generated and returned to CA SiteMinder Agents.

When the Policy Server processes an authorization event, it looks for the realm with the longest resource filter matching the protected resource. Then, the Policy Server fires only those rules associated with that realm. In this example, the user is a manager, who wants to access the following protected resource:

`/company/employees/managers/performance/`

The following realms have resource filters that match the protected resource:

| Realm Name        | Realm Description             | Resource Filter                           |
|-------------------|-------------------------------|-------------------------------------------|
| Company           | Customers, employees, vendors | <code>/company/</code>                    |
| Company Employees | All employees                 | <code>/company/employees/</code>          |
| Company Managers  | All managers                  | <code>/company/employees/managers/</code> |

| Realm Name             | Realm Description          | Resource Filter                           |
|------------------------|----------------------------|-------------------------------------------|
| Performance Management | Managers with team members | /company/employees/managers/performance / |

The realm with the longest matching resource filter is Performance Management. In response to the authorization event, the Policy Server fires all rules associated with the Performance Management realm.

In a deployment of nested realms, the Policy Server keeps a ranked list of matching realms for use during processing. If any matching rules deny access to a resource, processing stops, and the Policy Server returns any responses associated with the deny access rule to the CA SiteMinder Agent.

The Policy Server collects responses from all matching rules that fire. When the Policy Server finishes collecting responses based on rules, it deletes any duplicate responses.

In a deployment that uses nested realms, the Policy Server collects the entire list of accumulated responses for all matching rules. For OnAuthAccept rules, the Policy Server returns the entire list of responses to the CA SiteMinder Agent. For OnAuthReject rules, the Policy Server only returns the responses associated with the rule in the deepest nested realm to the CA SiteMinder Agent. OnAuthReject rules fire only for users bound to the policy.

## Rules and Nested Realms

Nested realms are realms created within an existing realm. A nested realm has a parent, or top level realm, and is considered a child of the parent realm. When you create nested realms, you can also create separate rules to protect the resources in the child realms. You may also copy an existing rule, attach the rule to another realm, and rename the rule.

### More information:

[Nested Realms](#) (see page 465)

## Rule Actions

A rule's action determines what must take place for the rule to fire. A rule fires when the Policy Server determines that an action specified in a rule occurs. The rule must be contained in an existing, enabled policy. For example, if a policy contains a rule that allows access to an HTML page, and the policy specifies users who exist in a particular directory, when one of the users listed in the directory attempts to access a resource, the Policy Server determines that the rule must fire in order to process the request.

When a rule fires, the Policy Server processes the action specified in the rule based on the way the policy that contains the rule is configured. For example, if a user is not in a group specified in a policy, a rule that allows an HTTP Get action for an HTML page will not allow the user to access the resource.

**More information:**

[Policy Overview](#) (see page 517)

## Web Agent Actions

Rules with a web agent action either allow or deny access to the resources specified by a rule when one of the HTTP actions specified in the rule occur.

When a rule that specifies Allow Access fires, CA SiteMinder allows the user to access the specified resource upon authenticating successfully. If a rule specifies Deny Access, CA SiteMinder denies access to the successfully authenticated user. Deny access rules can be added to policies to provide an additional layer of security by rejecting specific individuals or groups who cannot have access to a resource. Allow Access is the default.

Deny access rules take precedence over allow access rules. If a deny access rule and an allow access rule fire when a user attempts to access a resource, the presence of the deny access rule overrides all allow access rules.

The Web Agent rule actions are:

- HEAD
- GET
- POST
- PUT
- DELETE
- TRACE
- OPTIONS

## WSS Agent Actions

Two additional Web Agent rule actions are available for WSS Agent use:

**ProcessSOAP**

Supports incoming XML messages wrapped with a SOAP envelope.

**ProcessXML**

Supports incoming raw XML messages not wrapped with a SOAP envelope.

## Affiliate Agent Actions

Affiliate Agents are CA SiteMinder Agents that communicate with CA SiteMinder Web Agents installed on the Web servers of a portal Web site.

Affiliate Agent rules are very simple, since they do not protect the resources of an affiliate Web site. The Affiliate Agent processes responses sent from the portal site, so that applications on the affiliate Web site may take advantage of the information gathered about users on the CA SiteMinder protected portal Web site.

Affiliate Agent actions are only available in the place of Web Agent actions for realms associated with an Affiliate Agent. There is only one possible action:

### **Visit**

Allows a CA SiteMinder portal site to interact with an affiliate Web site

**Note:** For more information about Affiliate Agents, see the *Web Agent Configuration Guide*.

## Authentication Events

Authentication events occur as CA SiteMinder tries to establish a user identity. As a rule action, an authentication event causes the Policy Server to fire a rule at a particular point in the authentication process.

Authentication events occur when a user accesses a resource protected by a rule that includes an On-Auth event. Unlike Web Agent actions or authorization events, authentication events always apply to the entire realm. You cannot create an On-Auth rule that applies to a portion of a realm.

The following is a list of possible authentication events:

### **OnAuthAccept**

Occurs if authentication was successful. This event can be used to redirect a user after a successful authentication.

### **OnAuthAcceptCredentials**

Occurs only during the login stage. The user credentials are presented and generate the creation of a new session.

### **OnAuthReject**

Occurs if authentication failed for a user that is bound to a policy containing an On-Auth-Reject rule. This event may be used to redirect the user after a failed authentication.

OnAuthAccept and OnAuthReject events fire both at authentication time (when the user enters their username and password) and at validation time (when the user cookie is read for user information). However, there are certain special actions that only occur at authentication time:

#### **Realm timeout override (unless EnforceRealmTimeouts is used)**

Unless your Web Agent supports the EnforceRealmTimeouts option and that option is enabled, the user Idle and Max Timeouts remain at the values for the realm in which the user last authenticated. The values only change if the user has to reenter their credentials.

### **Redirects**

Redirects are only allowed at authentication time to prevent the possibility of infinite redirect loops.

### **Access to the user password**

The password is not stored in the SMSESSION cookie, so the only time it is available is when the user actually enters it (authentication time).

**Note:** OnAuth event results are per realm. So for example, if a user goes from realm A to realm B and the user has an OnAuthAccept header in realm A, it is not available in realm B. When the user goes back to realm A, the header is set again.

### **OnAuthAttempt**

Occurs if the user is rejected because CA SiteMinder does not know this user. For example, an unregistered user can be redirected to register first.

### **OnAuthChallenge**

Occurs when custom challenge-response authentication schemes are activated (for example, a token code).

### **OnAuthUserNotFound**

This event is only used to trigger Active Responses. Do not use this event to trigger any response other than an Active Response.

A rule with an authentication event action may be coupled with a CA SiteMinder response in a policy. When a user is authenticated (or rejected), the Policy Server passes any response that is associated with the applicable On-Auth rule back to the requesting Agent.

**Note:** You can optimize CA SiteMinder performance and can limit the number of times the Web Agent must retrieve static information from the Policy Server. To optimize performance, set up a rule that is based on the OnAuthAccept authentication event and create a response that returns the static information. When you bind the rule and response in a policy, the rule fires for users specified in the policy. The static response is only returned to users who successfully authenticate.

## Authorization Events

Authorization events occur as CA SiteMinder verifies whether or not a user is authorized to access a resource. As a rule action, an authorization event causes the Policy Server to fire a rule at a particular point in the authorization process.

The following is a list of possible authorization events:

### **OnAccessAccept**

Occurs as the result of successful authorization. This event may be used to redirect users who are authorized to access a resource.

### **OnAccessReject**

Occurs as the result of failed authorization. This event may be used to redirect users who are not authorized to access a resource.

A rule with an authorization event action may be coupled with a CA SiteMinder response in a policy. When a user is authorized (or rejected), the Policy Server passes any responses associated with the applicable On-Access rule back to the requesting Agent.

## Impersonation Events

Impersonation provides a method for a privileged user to assume the role of another user without ending the privileged user's session. Impersonation events are used to start impersonation sessions when resources are accessed.

Possible impersonation events:

### **ImpersonationStart**

When included in an appropriate policy, a rule that includes this event allows an impersonation session to begin.

### **ImpersonationStartUser**

When included in an appropriate policy, a rule that includes this event allows a set of users to be impersonated.

## Advanced Rule Options

Advanced options allow you to define additional rule settings:

### Time restrictions

Specify when a rule should and should not fire.

### Active rules

Allow dynamic authorization based on external business logic.

### More information:

[Add Time Restrictions to Rules](#) (see page 487)

## Configure a Rule for Web Agent Actions

You can create a rule that fires in response to specified Web Agent actions and that allows or denies access to the resource that the rule is designed to protect.

**Note:** You can also create a rule for the CA SOA Security Manager XML Agent. When creating a rule for this Agent type, two additional rule actions are available: ProcessSOAP and ProcessXML. For more information, see the *CA SOA Security Manager Policy Configuration Guide*.

### Follow these steps:

1. Click Policies, Domain, Rules.
2. Click Create Rule.
3. Select a domain from the list, and click Next.
4. Select the realm that includes the resources that you want the rule to protect, and click Next.

**Note:** If a realm does not exist for the resources that you want to protect, a rule cannot be created to protect those resources.

5. Type the name and a description of the rule.

**Note:** Click Help for descriptions of settings and controls, including their respective requirements and limits.

6. Type the resource that you want the rule to protect.  
The Effective Resource updates to include the resource.

7. Specify whether the rules should allow or deny access to the protected resource.



8. Select Web Agent actions.

The Action List is populated with HTTP actions.

9. Select one or more HTTP actions.
10. (Optional) In Advanced, specify time restrictions, an active rule, or both.
11. Click Finish.

The Rule for Web Agent actions is created.

**More information:**

[Regular Expressions for Resource Matching](#) (see page 485)

[Advanced Rule Options](#) (see page 480)

## Configure a Rule for Authentication Event Actions

You can configure a rule for authentication event actions to control actions that occur when users authenticate to gain access to a resource.

The realm in which the rule is to be created must be able to process authentication events. Verify that the Process Authentication Events option is selected.

**Follow these steps:**

1. Click Policies, Domain, Rules.
2. Click Create Rule.
3. Select a domain from the list, and click Next.
4. Select the realm that includes the resources that you want the rule to protect, and click Next.

**Note:** If a realm does not exist for the resources that you want to protect, a rule cannot be created to protect those resources.

5. Type the name and a description of the rule.

**Note:** Click Help for descriptions of settings and controls, including their respective requirements and limits.

6. Select Authentication events.

The Action List populates with authentication events.

**Note:** The Resource field is disabled because an authentication event applies to the entire realm. The Allow Access and Deny Access options are also disabled as they do not apply to authentication events.

7. Select one or more authentication events.

8. (Optional) In Advanced, set time restrictions and or active rule settings.
9. Click Finish.

The rule is saved and applied to the specified realm and resource.

## Configure a Rule for Authorization Event Actions

Authorization events occur after a user is authenticated. You configure a rule for authorization to let CA SiteMinder call responses based on whether a user is or is not authorized for the requested resource. When the user has been granted or denied access based on their privileges, the appropriate event is triggered.

The realm in which the rule is to be created must be able to process authorization events. Verify that the Process Authorization Events option is selected.

### Follow these steps:

1. Click Policies, Domain, Rules.
2. Click Create Rule.
3. Select a domain from the list, and click Next.
4. Select the realm that includes the resources that you want the rule to protect, and click Next.

**Note:** If a realm does not exist for the resources that you want to protect, a rule cannot be created to protect those resources.

5. Type the name and a description of the rule.

**Note:** Click Help for descriptions of settings and controls, including their respective requirements and limits.

6. Type the resource the rule is to protect.  
Effective Resource updates to include the resource.

7. Select Authorization events.  
The Action List populates with authorization events.

**Note:** The Allow Access and Deny Access options are disabled. These options do not apply to authorization events.

8. Select one or more authorization events.
9. (Optional) In Advanced, set time restrictions, an active rule, or both.
10. Click Submit.

The rule is saved and applied to the specified realm and resource.

**More information:**

[Configure a Realm](#) (see page 467)

[Regular Expressions for Resource Matching](#) (see page 485)

[Advanced Rule Options](#) (see page 480)

[Authorization Events](#) (see page 479)

## Policy Considerations for OnAccessReject Rules

Consider how the Policy Server processes global policies and the special circumstances created by OnAccessReject rules when creating global rules that include OnAccessReject events.

An OnAccessReject rule will not fire if it is in the same policy as a GET / POST rule. When a user is authenticated, CA SiteMinder resolves the identity of the user. Therefore, if the OnAccessReject rule and the GET / POST rule are in the same policy, then a user who is allowed access to a resource is the same user who should be redirected on an OnAccessReject event. Since the user is allowed access, the reject event never applies.

To resolve this discrepancy, create a separate policy for the OnAccessReject rule, which may include other event rules, and specify the users for which it should apply.

For example, in an LDAP user directory, User1 should have access to a resource and everyone else in the group, ou=People, o=company.com, should be redirected to an OnAccessReject page. Two policies are required:

**Policy1**

Includes a GET / POST rule that allows access for User1.

**Policy2**

Includes the OnAccessReject rule and a Redirect response, and specifies the group ou=People, o=company.com.

Since User1 is authorized, the OnAccessReject rule will not fire when User1 access the resource. However, the OnAccessReject rule will fire for all other users in the group, ou=People, o=company.com, because they are not authorized to access the resource.

## Configure a Rule for Impersonation Event Actions

You can configure a rule for impersonation events to start impersonation sessions when resources are accessed.

**Follow these steps:**

1. Click Policies, Domain, Rules.
2. Click Create Rule.
3. Select a domain from the list, and click Next.
4. Select the realm that includes the resources that you want the rule to protect, and click Next.

**Note:** If a realm does not exist for the resources that you want to protect, a rule cannot be created to protect those resources.

5. Type the name and a description of the rule.

**Note:** Click Help for descriptions of settings and controls, including their respective requirements and limits.

6. Type the resource the rule is to protect.

The Effective Resource updates to include the resource.

7. Select Impersonation events.

The Action List populates with impersonation events.

**Note:** The Allow Access and Deny Access options are disabled. These options do not apply to impersonation events.

8. Select one or more impersonation events.
9. (Optional) In Advanced, set time restrictions, an active rule, or both.
10. Click Finish.

The rule is saved and applied to the specified realm and resource.

**More information:**

[Impersonation](#) (see page 613)

[Regular Expressions for Resource Matching](#) (see page 485)

[Advanced Rule Options](#) (see page 480)

[Impersonation Realms and Events](#) (see page 616)

## Resource Matching and Regular Expressions

Rules may use resource matching and regular expression matching to specify resources in a realm.

### Standard Resource Matching

By default, resource matching for a rule is done with wildcards.

The following table describes the characters that are supported for resource matching.

| Character | Use                                                                                                                                                                                 |
|-----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| *         | The wildcard (*) is used to match all characters in the string. The expression *.html will match all files with a .html file extension, such as index.html, out.html, and so forth. |
| ?         | The question mark (?) will match a single character of the string. The expression lmn?p will match the sub-string lmnop, lmne, and so forth.                                        |

### Regular Expressions for Resource Matching

Regular expressions allow for greater flexibility in resource matching. To enable regular expression matching, in the CA SiteMinder Rule dialog, select the Regular Expression check box.

Regular expressions are text patterns used for string matching. Examples of the syntax used in regular expressions are shown in the following table:

| Characters | Results                                                                                            |
|------------|----------------------------------------------------------------------------------------------------|
| \          | Used to quote a meta-character (like '*')                                                          |
| \\         | Matches a single '\' character                                                                     |
| (A)        | Groups subexpressions (affects order of pattern evaluation)                                        |
| [abc]      | Simple character class (any character within brackets matches the target character)                |
| [a-zA-Z]   | Character class with ranges (any character range within the brackets matches the target character) |

| Characters | Results                                                               |
|------------|-----------------------------------------------------------------------|
| [^abc]     | Negated character class                                               |
| .          | Matches any character other than newline                              |
| ^          | Matches only at the beginning of a line                               |
| \$         | Matches only at the end of a line                                     |
| A*         | Matches A 0 or more times (greedy)                                    |
| A+         | Matches A 1 or more times (greedy)                                    |
| A?         | Matches A 1 or 0 times (greedy)                                       |
| A{n}       | Matches A exactly <i>n</i> times (greedy)                             |
| A{n,}      | Matches A at least <i>n</i> times (greedy)                            |
| A{n,m}     | Matches A at least <i>n</i> but not more than <i>m</i> times (greedy) |
| A*?        | Matches A 0 or more times (reluctant)                                 |
| A+?        | Matches A 1 or more times (reluctant)                                 |
| A??        | Matches A 0 or 1 times (reluctant)                                    |
| AB         | Matches A followed by B                                               |
| A B        | Matches either A or B                                                 |
| \1         | Backreference to 1st parenthesized subexpression                      |
| \n         | Backreference to <i>n</i> th parenthesized subexpression              |

**Limit:** Each regular expression can contain no more than 10 subexpressions, including the expression itself. The number of subexpressions equals the number of left or opening parentheses in the regular expression plus one more left parenthesis for the expression itself.

## Enable and Disable Rules

You enable a rule to ensure CA SiteMinder protects the specified resources. You disable a rule to prevent CA SiteMinder from protecting the specified resources.

If a rule is enabled, no one may access the protected resource(s) unless a policy that contains the rule has been created, and the user attempting to access the rule is part of a group specified in the policy. To allow access to resources before a policy is put into place, you can disable the rule.

**Follow these steps:**

1. Open the rule.
2. Select the Enabled check box to enable the rule; clear the Enabled check box to disable the rule.
3. Click Submit.

The rule is saved.

## Advanced Rule Options

The Advanced group box on the Rule pane is where you define additional rule settings. This group box lets you set time restrictions and active rules. Time restrictions and active rules are discussed in the following sections.

### Add Time Restrictions to Rules

You configure time restrictions to specify when SiteMinder should fire the rule.

Configuring a time restriction from 9am - 5 pm, Monday - Friday, for example, specifies that SiteMinder should only fire the rule during the specified time. Users have access to the resource when the rule is set to fire. The resource is not available outside of the specified time.

**Note:** More information about how CA SiteMinder handles time across multiple time zones exists in [How the Web Agent and Policy Server Calculate Time](#) (see page 59).

**Follow these steps:**

1. Click Set in the Time Restrictions group box.

**Note:** Click Help for descriptions of settings and controls, including their respective requirements and limits.

2. Specify starting and expiration dates.
3. Specify time restrictions in the Hourly Restrictions table.

**Note:** Each check box represents one hour. When a check box is selected, the rule fires during that hour, and the rule applies to the specified resources. When a check box is cleared, the rule does not fire during that hour, and the rule will not apply to the specified resources.

4. Click OK.

The time restrictions are saved, and the rule settings appear.

## Configure an Active Rule

You configure an active rule for dynamic authorization that is based on external business logic. The Policy Server invokes a function in a customer-supplied shared library. This shared library must conform to the interface specified by the Authorization API, which is available in the Software Development Kit.

**Follow these steps:**

1. Specify the library name, function name, and function parameters in the fields on the Active Rule group box.

The active rule string is displayed in the Active Rule field.

2. Click Submit.

The active rule is saved.

## Delete a Rule

If you delete a rule, the rule is automatically removed from the policies that included the rule. However, the policies remain on your system. Verify that the policies function without the deleted rule.

**Note:** Policies must contain at least one rule.

When you delete a rule that is included in a rule group, it may take several seconds before the deleted rule is removed from the rule group. It may also take a short amount of time for all deleted objects to be removed from caches.

**Note:** More information about modifying and deleting Policy Server objects exists in [Manage Policy Server Objects](#) (see page 54).



# Chapter 17: Rule Groups

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This section contains the following topics:

[Rule Group Overview](#) (see page 489)

[Create a Rule Group](#) (see page 490)

[Add Rules to a Rule Group](#) (see page 490)

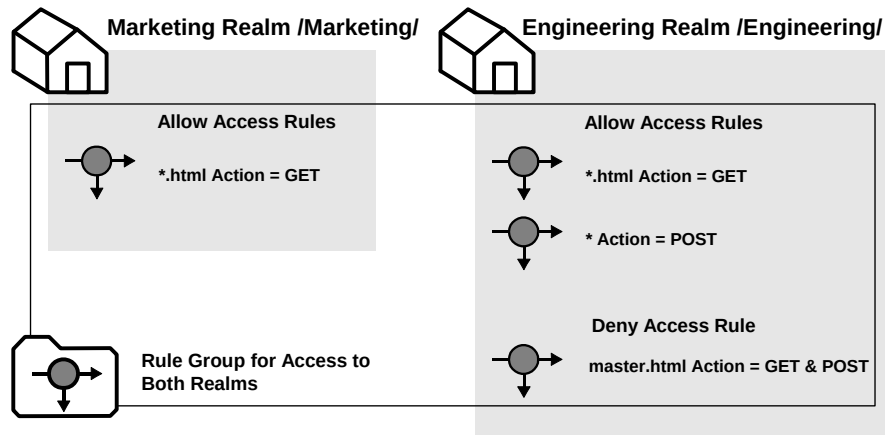
[Modify a Rule Group](#) (see page 491)

[Delete a Rule Group](#) (see page 491)

## Rule Group Overview

A rule group is a set of rules that can be bound to CA SiteMinder policies. You can use a rule group to combine groups of rules you will be applying to the same policy. For example, if you have a number of rules that allow a GET action for different resources of a Web site, you could then create a rule group that contains all of the resources. When you configure the policy that will include the rules, you can add a single rule group to the policy, rather than add all of the rules individually.

When you include a rule group in a policy, each rule in the group is evaluated and applied independently of other rules in the group.



The previous diagram illustrates a rule group that contains rules for both the Marketing realm and the Engineering realm. The rule group can be used in a policy rather than including all four rules separately.

### More information:

[Policy Overview](#) (see page 517)

## Create a Rule Group

You can create a rule group and add it to a domain.

**Follow these steps:**

1. Click Policies, Domain, Rule Groups.
2. Click Create Rule Group.
3. Click OK.
4. Select a domain and click Next.
5. Type the name and a description of the rule group.
6. Select Radius or CA SiteMinder and an Agent Type.
7. In Group Members, click Add/Remove.

The Available Members column lists all rules that are defined in the specified domain and in the realms associated with the specified Agent type. When the Agent type is Generic RADIUS, the Available Members column lists all rules that the RADIUS Agents support.

8. Select one or more rules from the list of Available Members and click the right-facing arrows.

To select more than one member at one time, hold down the Ctrl key while you click the additional members. To select a block of members, click the first member and then hold down the Shift key while you click the last member in the block.

9. Click OK.
10. Click Finish.

The Rule Group is created.

**More information:**

[Copy Policy Server Objects](#) (see page 55)

## Add Rules to a Rule Group

You can add rules to a rule group in the same domain and of the same Agent type.

**Follow these steps:**

1. Click Policies, Domain, Rule Groups.
2. Specify search criteria, and click Search.

3. Click the name of a rule group that you want to modify.

4. Click Modify.

The settings and controls become active.

5. In Group Members, click Add/Remove.

**Note:** The Available Members column lists all rules that are defined in the specified domain and in the realms associated with the specified Agent type. When the Agent type is Generic RADIUS, the Available Members column lists all rules that the RADIUS Agents support.

6. Select one or more rules from the list of Available Members and click the right-facing arrows.

**Note:** To select more than one member at one time, hold down the Ctrl key while you click the additional members. To select a block of members, click the first member and then hold down the Shift key while you click the last member in the block.

7. Click OK.

8. Click Submit.

The selected rules are added to the rule group.

## Modify a Rule Group

You can modify all of the properties of a rule group, except the Agent Type for CA SiteMinder Agents and the vendor type for RADIUS Agents. To change the Agent type or vendor type, delete the rule group and create a new one.

**Note:** More information about modifying and deleting Policy Server objects exists in [Manage Policy Server Objects](#) (see page 54).

## Delete a Rule Group

Deleting a rule group only deletes the grouping. The rules contained in the grouping are not deleted.

**Note:** More information about modifying and deleting Policy Server objects exists in [Manage Policy Server Objects](#) (see page 54).



# Chapter 18: Responses and Response Groups

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This section contains the following topics:

[Responses](#) (see page 493)

[How SiteMinder Processes Responses](#) (see page 494)

[Response Groups](#) (see page 514)

## Responses

A response passes static text, user attributes, DN attributes, customized active responses, or the runtime values of defined variables from the Policy Server to a CA SiteMinder Agent. Responses can be used by servlets, Web applications, or other custom applications to display customized content, change CA SiteMinder settings, or redirect users to different resources. When working with Web applications, responses can be used as privileges or entitlements for fine-grained access control.

A policy contains rules and responses which are bound to users and user groups. In a policy, responses are bound to specific rules or rule groups. When a rule fires, the associated response returns information to a CA SiteMinder Agent.

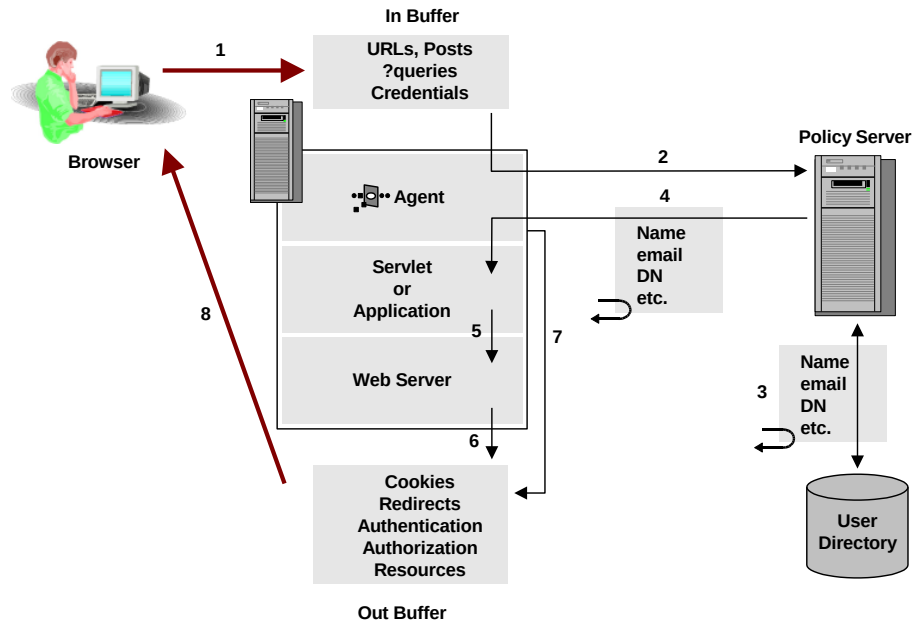
Responses take the form of name/value pairs. When a rule is triggered, the Policy Server returns the paired response to the CA SiteMinder Agent.

For example, if a user attempts to access a protected Web page, but is not authorized to view the contents of the page, a response can redirect the user to an HTML page that indicates the user does not have access, and provide details for contacting a system administrator.

For Web Agents, CA SiteMinder adds response attributes to HTTP header variables or HTTP cookie variables so that the responses are available to the Web resource or application named in the rule. In a RADIUS environment, the response is returned to the RADIUS client.

## How SiteMinder Processes Responses

The following diagram illustrates how CA SiteMinder uses responses when processing a user's request for resources.



In the previous diagram, CA SiteMinder processes responses using the following steps:

1. A user requests a resource that is protected by a CA SiteMinder Agent.  
The In Buffer represents the Web Server buffer where the requested URL, Post data or query strings reside during Web Server processing.
2. The CA SiteMinder Agent intercepts requests for protected resources, and communicates with the Policy Server to authenticate and authorize the user.  
Part of the authentication process binds the user to a record in a user directory.
3. The Policy Server uses the binding to retrieve attributes specified in a CA SiteMinder response from the user's entry in the user directory.
4. The Policy Server passes user attributes specified in the response back to the Web Agent.
5. The attributes returned to the Web Agent may be used by a servlet or application that has been customized to use the attributes specified in the response.  
The servlet or application executes its processes and passes its results to the Web Server.
6. The Web Server's Out Buffer contains the resulting information that must be returned to the user.

7. The Web Agent adds any CA SiteMinder specific information to the Web Server's Out Buffer.

The Web Agent may pass any of the following to the Out Buffer: CA SiteMinder cookies, URLs for redirection, and successful /unsuccessful authentications or authorizations.

8. The Web Server passes the contents of the Out Buffer to the user.

## Response Types

A response is a container for one or more response attributes. The response attributes are what a CA SiteMinder Agent receives after the Policy Server processes a response. The available response attributes differ based on the type of response.

The following types of responses are available:

- Web Agent responses
- RADIUS responses.

**Note:** You can create response types for custom Agents and response attributes using the CA SiteMinder APIs, which are available separately with the Software Development Kit. More information exists in the API Reference Guide for C.

### Web Agent Responses

Web Agent responses are CA SiteMinder responses that provide name/value pairs usable by a CA SiteMinder Web Agent. These responses can contain attributes for HTTP header variables, cookie variables, and URLs for redirections.

### Affiliate Agent Responses

Affiliate Agent responses are CA SiteMinder responses that provide name/value pairs usable by a CA SiteMinder Affiliate Agent. These responses can contain attributes for HTTP header variables or HTTP cookie variables.

**More information:**

[Affiliate Agent Response Attributes](#) (see page 498)

### RADIUS Responses

RADIUS responses are CA SiteMinder responses that provide values usable by a RADIUS Agent. These responses can contain response attributes for all supported RADIUS attributes.

**More information:**

[RADIUS Agent Response Attributes](#) (see page 499)

## Response Attributes

Each CA SiteMinder response contains one or more response attributes. These attributes differ based on the type of response. The following sections discuss the response attributes that are available for each type of response.

### Web Agent Response Attributes

Web Agent response attributes are response attributes that CA SiteMinder Web Agents can interpret and pass on to other applications. The following list describes the generally available Web Agent response attributes:

**WebAgent-HTTP-Authorization-Variable**

Indicates an attribute that is reserved for future use.

**WebAgent-HTTP-Cookie-Variable**

Generates a SetCookie header, which then sets a nonpersistent cookie in a web browser. The cookies only exist in the cookie domain where the agent is configured. You can enter multiple WebAgent-HTTP-Cookie-Variables.

**Limits:** Use in accept or reject responses. Multiple instances of this attribute are allowed per response.

**WebAgent-HTTP-Header-Variable**

Specifies an arbitrary dynamic name/value pair for use by a web application. You can enter multiple WebAgent-HTTP-Header-Variables.

The agent does not include header variables in the responses that it sends back to a web browser. Instead, these responses reside in the request headers of the web server.

Consequently, the header variables are not visible in the debug logs that you can enable from the Policy Server Management Console.

**Limits:** Use in accept or reject responses. Multiple instances of this attribute are allowed per response.



**WebAgent-OnAccept-Redirect**

Defines *one* of the following URLs, depending on the type of response in which it is used:

- In an authorization response, a URL to direct the user to if the user is allowed access to a resource.
- In an authentication response, a URL to direct the user to if the user was authenticated for a security realm.

To specify whether an authorization response or authentication response, include it in a policy with a rule that specifies an OnAuthAccept or OnAccessAccept event action.

**Limits:** Use in accept responses. Only one instance of this attribute is allowed per response.

**WebAgent-OnAccept-Text**

Specifies text that the Web Agent puts in the HTTP\_ONACCEPT\_TEXT environment variable when it redirects the user after a successful authorization or authentication attempt.

**Limits:** Use in accept responses. Only one instance of this attribute is allowed per response.

**Note:** When configuring a Web Agent OnAcceptText response, set the FCC Compatibility Mode parameter (fcccompatmode) corresponding to the Web Agent to yes. This action ensures that user authentication takes place at the Web Agent and that the text in the response is available for display in the browser. If the FCC Compatibility Mode parameter is set to no, user authentication takes place at the Forms Credential Collector (FCC). The response is triggered, but the text in the response is lost.

**WebAgent-OnAuthAccept-Session-Idle-Timeout**

Overrides the number of seconds a user session can be idle. When this limit is reached, the user is forced to authenticate again. Associate this response with a rule configured with an OnAuthAccept authentication event.

**Limits:** Use in accept responses. Only one instance of this attribute is allowed per response.

**WebAgent-OnAuthAccept-Session-Max-Timeout**

Overrides the total number of seconds a user session can be active. When this limit is reached, the user session is terminated and the user is forced to authenticate again. Associate this response with a rule configured with an OnAuthAccept authentication event.

**Limits:** Use in accept responses. Only one instance of this attribute is allowed per response.

#### **WebAgent-OnAuthAccept-Session-AuthContext**

Specifies an AuthContext response attribute for an authentication scheme. The value of this response attribute is added to the session ticket as the value of the SM\_AUTHENTICATIONCONTEXT user attribute. The value is not returned to the client as a user response.

**Note:** The response attribute value is truncated to 80 bytes in length.

**Limits:** Used in accept responses. Only one instance of this attribute is allowed per response.

#### **WebAgent-OnAuthAccept-Session-Variable**

Stores a particular Session Variable in the session store when an administrator has decided against persisting all authentication data.

**Limits:** Used in accept responses. Persistent Sessions are enabled.

#### **WebAgent-OnReject-Redirect**

Defines *one* of the following URLs:

- In an authorization response, a URL to direct the user to if the user is denied access to a resource.
- In an authentication response, a URL to direct the user to if the user has failed to authenticate for a security realm.

To specify an authorization response or authentication response, include it in a policy with a rule that specifies an OnAuthReject or OnAccessReject event action.

**Limits:** Use in reject responses. Only one instance of this attribute is allowed per response.

#### **WebAgent-OnReject-Text**

Specifies text that the Web Agent puts in the HTTP\_ONREJECT\_TEXT environment variable when it redirects the user after a failed authorization or authentication attempt.

**Limits:** Use in reject responses. Only one instance of this attribute is allowed per response.

### **Affiliate Agent Response Attributes**

Affiliate Agent response attributes are response attributes that SiteMinder Affiliate Agent can interpret and pass on to other applications at an affiliate Web site.

The following is a list of Affiliate Agent response attributes:

- AffiliateAgent-HTTP-Header-Variable
- AffiliateAgent-HTTP-Cookie-Variable

**Note:** For complete descriptions of the response attributes, see the *Web Agent Configuration Guide*.

## RADIUS Agent Response Attributes

RADIUS Agent response attributes are response attributes that RADIUS Agents can interpret. All of the response attributes supported by CA SiteMinder correspond to the attributes described in the Request for Comments (RFC) 2138, which describes attributes supported by the RADIUS protocol.

## Responses and Directory Mappings

Directory mappings let you specify a separate authorization user directory in application object component or a realm. When you define a separate authorization directory, a user is authenticated based on the information contained in one directory, but authorized based on the information contained in another directory.

When you create a response and associate it with a authentication (OnAuth) event, any information retrieved from a user directory is retrieved from the authentication directory. If you create an authorization (OnAccess) event, any information retrieved from a user directory is retrieved from the authorization directory.

## Configure a Response

You can create a response by specifying an agent type and an attribute list. A response contains the specified attributes and is sent to the specified agent.

### Follow these steps:

1. Click Policies, Domain, Responses.
2. Click Create Response.
3. Select a domain and click Next.
4. Type the name and a description of the response.
5. Select Radius or CA SiteMinder and an Agent Type.
6. (Optional) Click Create Response Attribute to create a response attribute and add it to the attribute list.
7. Click Finish.

The Response is created.

### More information:

[Configure a Web Agent Response Attribute](#) (see page 501)

[Configure a RADIUS Response Attribute](#) (see page 502)

[Configure an Affiliate Agent Response Attribute](#) (see page 503)

## Configure Response Attributes

Each CA SiteMinder response may contain one or more response attributes. Response attributes identify the pieces of information that the Policy Server passes to a CA SiteMinder Agent. Each CA SiteMinder Agent type can accept different response attributes.

**Note:** More information on configuring an smetssocookie Web Agent active response attribute, which is needed for enabling single sign-on from CA SiteMinder to CA Single Sign-On, exists in [Configure an smetssocookie Web Agent Active Response Attribute](#).

## Response Attribute Types

CA SiteMinder supports different types of response attributes. The type of response attribute determines how CA SiteMinder provides appropriate content for the attribute.

You can specify the following types of response attributes when you add response attributes to a CA SiteMinder response:

### Static

Returns data that remains constant.

Use a static attribute to return a string as part of a CA SiteMinder response. This type of response can be used to provide information to a Web application. For example, if a group of users has specific customized content on a Web site, the static response attribute, `show_button = yes` could be passed to the application.

### User Attribute

Returns profile information from a user entry in a user directory.

A user attribute can be retrieved from an LDAP, WinNT, Microsoft SQL Server, or Oracle user directory.

**Note:** In order for the Policy Server to return values from user directory attributes as response attributes, configure the user directories on the CA SiteMinder User Directory pane.

### DN Attribute

Returns profile information from a directory object in an LDAP, Microsoft SQL Server, or Oracle user directory.

User groups and Organizational Units (OUs) that are part of a user DN are examples of directory objects attributes that can be treated as DN attributes.

For example, you can use a DN attribute to return a company division for a user that is based on the user membership in a division.

**Note:** In order for the Policy Server to return values from DN attributes as response attributes, configure the user directories on the CA SiteMinder User Directory pane.

**Active Response**

Returns values from a customer supplied library that is based on the CA SiteMinder Authorization API.

An Active Response is used to return information from an external source. An Active Response is generated by having the Policy Server invoke a function in a customer-supplied shared library. This shared library conforms to the Authorization API (available separately with the Software Development Kit).

**Note:** Make sure that the returned value is valid. When you configure a response attribute, the correct Value Type for the response attribute is displayed on the Response Attribute pane.

**Variable Definition**

Returns the value of the specified variable at runtime.

Select Variable Definition when you want to select and use a variable from a list of already-defined variables.

**Session Variable**

Returns the value of a session variable.

CA SiteMinder retrieves the value from the session store, or from memory when the response is part of the authentication request.

**Expression**

Allows the administrator to provide an expression.

For example, the administrator can configure a Response Attribute to extract a certain string from the Certificate issuerDN attribute and store it as a new session variable.

## Configure a Web Agent Response Attribute

You can create a response attribute for a CA SiteMinder Web Agent by selecting CA SiteMinder and Web Agent on the Attributes group box on the Response pane. Web Agent response attributes support HTTP header variables, cookie variables, redirections to other resources, text, and timeout values.

**Note:** If you have purchased and installed SOA Security Manager, you can create a WebAgent-SAML-Session-Ticket-Variable response attribute. For more information, see the *CA SOA Security Manager Policy Configuration Guide*.

**Follow these steps:**

1. Click Create Response Attribute.
2. Select a response attribute.
3. Select an attribute type.

The details in the Attribute Fields are updated to match the specified attribute type.

4. Complete the details in the Attribute Fields.

**Note:** A list of automatically generated CA SiteMinder user attributes that you can use in responses exists in [SiteMinder Generated User Attributes](#) (see page 508).

5. (Optional) Edit the attribute in the Script field.

**Note:** The Attribute Setup section closes when you edit the attribute on the Advanced section.

6. Specify Cache Value or Recalculate value every ... seconds.

**Note:** The maximum time limit that can be entered is 3600 seconds.

7. Click Submit.

The Create Response Attribute Task is submitted for processing, and the response attribute is added to the Attribute List on the Response page.

## Configure a RADIUS Response Attribute

You can create a response attribute for a RADIUS Agent by selecting RADIUS and a RADIUS vendor on the Attributes group box on the Response pane. RADIUS response attributes support any of the attributes supported by the RADIUS protocol.

### Follow these steps:

1. Click Create Response Attribute.
2. Select a response attribute.
3. Select an attribute type.

The details in the Attribute Fields are updated to match the specified attribute type.

4. Complete the details in the Attribute Fields.

**Note:** A list of automatically generated CA SiteMinder user attributes that you can use in responses exists in [SiteMinder Generated User Attributes](#) (see page 508).

5. (Optional) Edit the attribute in the Script field.

**Note:** The Attribute Setup section closes when you edit the attribute on the Advanced section.

6. Specify Cache Value or Recalculate value every ... seconds.

**Note:** The maximum time limit that can be entered is 3600 seconds.

7. Click Submit.

The Create Response Attribute Task is submitted for processing, and the response attribute is added to the Attribute List on the Response page.

**More information:**

[Configure a Web Agent Response Attribute](#) (see page 501)

## Configure an Affiliate Agent Response Attribute

You can create a response attribute for a SiteMinder Affiliate Agent by selecting SiteMinder and Affiliate Agent on the Attributes group box on the Response pane. Affiliate Agent response attributes support HTTP header variables and cookie variables. More information on Agent types exists in the *Web Agent Configuration Guide*.

**Note:** The following procedure assumes that you are creating an object. You can also copy the properties of an existing object to create an object. For more information, see Duplicate Policy Server Objects.

**Follow these steps:**

1. Click Create Response Attribute.
2. Select a response attribute.
3. Select an attribute type.

The details in the Attribute Fields are updated to match the specified attribute type.

4. Complete the details in the Attribute Fields.

**Note:** A list of automatically generated CA SiteMinder user attributes that you can use in responses exists in [SiteMinder Generated User Attributes](#) (see page 508).

5. (Optional) Edit the attribute in the Script field.

**Note:** The Attribute Setup section closes when you edit the attribute on the Advanced section.

6. Specify Cache Value or Recalculate value every ... seconds.

**Note:** The maximum time limit that can be entered is 3600 seconds.

7. Click Submit.

The Create Response Attribute Task is submitted for processing, and the response attribute is added to the Attribute List on the Response page.

**More information:**

[Configure a Web Agent Response Attribute](#) (see page 501)

## Use Variable Objects in Responses

You can create responses that include variable objects by incorporating them in response attributes. Variable objects can be used in response attributes to include dynamic information evaluated during the authorization of a request.

**Note:** Variable objects included in responses are only evaluated during the authorization of a request and not during the authentication process. Responses that include variables are limited to authorization events.

Responses can contain any number of response attributes. Each response attribute contains one variable object. Like HTTP header and cookie variables, a CA SiteMinder variable object is a name-value pair. CA SiteMinder variable objects are different from HTTP header and cookie variables, however, in that the variable object name is used to look up the variable object value at runtime. Then, in the case of response attributes, the resulting name-value pair can be returned in an HTTP header or cookie variable.

### Configure a Response Attribute that Contains a Variable

A response can contain one or more response attributes whose values are determined by variable objects. Each response attribute contains one variable object. Each variable object is a name-value pair. The name of the variable object is used to look up the value of the variable object at runtime. CA SiteMinder passes the resulting name-value pair to the Web Agent.

#### Follow these steps:

1. Follow the instructions in [Configure a Response](#) to create a response.
2. Select SiteMinder and Web Agent as the Agent Type on the Attributes section.
3. Click Create Response Attribute on the Attribute List section.
4. Select a response attribute from the drop-down list on the Attribute Type section.
5. Select the type of response attribute on the Attribute Kind section.
6. Type the name of the variable object in the Variable Name field on the Attribute Fields section.

**Note:** When this field is required, CA SiteMinder passes this name to the Web Agent in the form of a name-value pair.

7. For the selected response attribute type, complete the following fields on the Attribute Fields group section:

#### Static

Specify the value of the static variable in the Variable Value field.

#### User Attribute

Specify the name of the user attribute in the Attribute Name field.



### **DN Attribute**

Specify the DN of the user or user group in the DN Spec field and the name of the user attribute in the Attribute Name field.

(Optional) Click Lookup to search for and select one set of users or user group in a specified user directory.

(Optional) Select the Allow Nested Groups check box.

### **Active Response**

Specify the name of your library, the name of a library function. Optionally, specify the names of parameters in the Library Name, Function Name, and Parameters fields.

**Note:** Your library must be based on the SiteMinder Authorization API.

### **Variable Definition**

Click Lookup to select an existing variable object for the Variable field.

### **Session Variable**

Specify the name of a session variable for which an administrator can retrieve the value.

### **Expression**

Specify an expression that extracts a value from an attribute and stores it as a new session variable.

**Note:** CA SiteMinder uses the information that you provide in the fields on the Attribute Fields section to determine the value that it passes to the Web Agent in the form of a name-value pair.

8. Click OK.

The response attribute is saved.

### **More information:**

[Response Attributes](#) (see page 496)

[Select a Variable Using Variable Lookup](#) (see page 506)

## Select Users for Inclusion in a Response Attribute

The User Lookup pane allows you to select one user directory and search a list of users and user groups in that directory, selecting one set of users or user group for inclusion in a response attribute.

### Follow these steps:

1. Select DN Attribute as the Attribute Kind on the Attribute Setup group box.  
The Attribute Fields group box expands to include the DN Spec field.
2. Click Lookup on the Attribute Fields group box.
3. Select the name of one user directory from the list, and click Search.
4. (Optional) Select a Search type, and click GO:

#### Attribute-value

Specify an attribute name and value in the fields on the Users/Groups dialog.

#### Expression

Specify a search expression in the Expression field on the Users/Groups dialog.

**Note:** You can click Reset to clear the search results.

5. Select one set of users or user group from the list, and click OK.
6. Click OK.

The Response Attribute pane reopens, and the set of users or user group is added to the DN Spec field in the Attribute Fields group box.

## Select a Variable Using Variable Lookup

The Select Variable pane allows you to select one variable object from a list of existing variable objects.

### Follow these steps:

1. Select Variable Definition as the Attribute Kind on the Attribute Setup group box.
2. Click Lookup on the Attribute Fields group box.
3. Select one variable object from the list, and click OK.

The Create Response Attribute pane reopens, and the name of the variable object is displayed in the Variable field on the Attribute Fields group box.

## Configure Response Attribute Caching

Responses return values to a requesting Agent. The data returned to the Agent can be a fixed value, or it may change over time. When you use a CA SiteMinder Agent to protect a resource, Agents can cache a value for fixed data, so that the value does not need to be recalculated each time the associated policy fires.

For example, a customer's account number is a fixed value, while the customer's account balance changes after each transaction. It would be more efficient to retrieve the account number once and then cache it. However, you probably want the balance to be recalculated at a regular interval to make sure the information is current.

**Note:** CA SiteMinder does not cache RADIUS response attributes.

### Follow these steps:

1. Open the response.  
The associated response attributes are listed in the Attribute List group box.
2. Click the edit icon to the left of the response attribute you want.
3. Specify the cache settings in the Attribute Caching group box.
4. Click Submit.  
The cache settings are saved.

## Edit a Response

You can edit all of the properties of a response, except the Agent Type. If you want to change the Agent Type, you must delete the response and create a new one.

**Note:** More information about modifying and deleting Policy Server objects exists in [Manage Policy Server Objects](#) (see page 54).

## Delete a Response

Deleting a response removes the response from any policies with which it is associated.

It may take a short amount of time for all deleted objects to be removed from caches.

**Note:** More information about modifying and deleting Policy Server objects exists in [Manage Policy Server Objects](#) (see page 54).

## CA SiteMinder-Generated User Attributes

The following list contains user attributes that CA SiteMinder generates automatically. These attributes can be specified as response attributes for Web Agent responses and are available to named expressions.

### **%SM\_USER**

The web agent places the username in an SM\_USER http header variable for all requests. The web agent does not set the value of the SM\_USER header variable when one of the following items are true:

- A user does not provide a user name, such as with certificate-based authentication.
- A user name is not known.

### **%SM\_USER\_CONFIDENCE\_LEVEL**

If a user is authenticated with an authentication scheme and the authentication scheme generates a confidence level, this attribute holds an integer (0–1000). The authentication scheme inserts the integer into the session ticket of the user. A higher confidence level corresponds to a higher level of credential assurance. A confidence level of zero represents no credential assurance. No credential assurance results in CA SiteMinder denying access to the requested resource.

**Note:** For more information, see [Confidence Levels Introduced](#) (see page 462).

### **%SM\_USERDN**

For an authenticated user, the web agent populates this http header variable with the DN that the Policy Server determines. For certificate-based authentication, this attribute can be used to identify a user.

### **%SM\_USERNAME**

For an authenticated user, this attribute holds the user DN that CA SiteMinder disambiguates. For an unauthenticated user, this attribute holds the user ID that a user specifies during a login attempt.

### **%SM\_USERIMPERSONATORNAME**

If the authentication scheme performs impersonation, this attribute holds the user DN that CA SiteMinder authenticates.

### **%SM\_USERLOGINNAME**

This attribute holds the user ID that a user specifies during a login attempt.

### **%SM\_USERIPADDRESS**

This attribute holds the IP address of the user at the time of authentication or authorization.

**%SM\_USERPATH**

For an authenticated user, this attribute holds a string that represents the directory namespace and directory server (both as specified in the user directory definition), and user DN (as CA SiteMinder disambiguates). For example:

`"LDAP://123.123.0.1/uid=scarter,ou=people,o=airius.com"`

For an unauthenticated user, this attribute holds the same value as SM\_USERNAME.

**%SM\_USERPASSWORD**

This attribute holds the password that the user specifies in the login attempt. This attribute is only available after a successful authentication through the OnAuthAccept event. The value is returned only on authentication, not on authorization.

**%SM\_TRANSACTIONID**

This attribute holds the transaction ID that the agent generates.

**%SM\_USERSESSIONSPEC**

The session ticket of the user.

**%SM\_USERSESSIONID**

This attribute holds the session ID of a user who has already been authenticated, or the session ID that CA SiteMinder is to assign to the user upon successful authentication.

**%SM\_USERSESSIONIP**

This attribute holds the IP address that was used during the original user authentication (upon establishment of a session).

**%SM\_USERSESSIONUNIVID**

This attribute holds the universal ID of the user. If no universal ID directory attribute is specified in the user directory definition, the value defaults to the DN of the user.

**%SM\_USERSESSIONDIRNAME**

This attribute holds the name of the user directory that the Policy Server is configured to use.

**%SM\_USERSESSIONDIROID**

This attribute holds the object ID of the user directory that the Policy server is configured to use.

#### **%SM\_USERSESSIONTYPE**

This attribute holds the session type of the user. The value is one of the following values:

- 2 - session
- 1 - identity

#### **%SM\_USERLASTLOGINTIME**

This attribute holds the time, using GMT, that the user last logged in and was authenticated. This response attribute is only available for an OnAuthAccept authentication event. This attribute has value only when both of the following conditions are true:

- Password Services is enabled.
- The user has logged in through CA SiteMinder at least once.

#### **%SM\_USERPREVIOUSLOGINTIME**

This attribute holds the time, using GMT, of the successful login before the last. This response attribute is only available for an OnAuthAccept authentication event. This attribute has a value only when Password Services is enabled.

#### **%SM\_USERGROUPS**

This attribute holds the groups to which the user belongs. If the user belongs to a nested group, this attribute contains the group furthest down in the hierarchy. For all nested groups to which the user belongs, use SM\_USERNESTEDGROUPS.

##### **Example:**

If a user belongs to the group Accounts Payable and Accounts Payable is contained in the group Accounting, SM\_USERGROUPS contains Accounts Payable. If you want both Accounting and Accounts Payable, use SM\_USERNESTEDGROUPS.

#### **%SM\_USERNESTEDGROUPS**

This attribute holds the nested groups to which the user belongs. For only the group furthest down in the hierarchy, use SM\_USERGROUPS[.

##### **Example:**

If a user belongs to the group Accounts Payable and Accounts Payable is contained in the group Accounting, SM\_USERNESTEDGROUPS contains Accounting and Accounts Payable. If you want only Accounting, use SM\_USERGROUPS.

#### **%SM\_USERSCHEMAATTRIBUTES**

This attribute holds the user attributes associated with the DN or properties that are associated with the user. If the user directory is a SQL database, then SM\_USERSCHEMAATTRIBUTES holds the names of the columns in the table where the user data is stored. For example, using the SmSampleUsers schema, SM\_USERSCHEMAATTRIBUTES holds the names of the columns in the SmUser table.

**%SM\_USERPOLICIES**

When a user is authorized for a resource and there are policies exist to give the user authorization, this attribute holds the names of the policies.

**Example:** To purchase an item, you are required to be a user that is associated with the Buyer policy. If the Policy Server authorizes me to buy an item, then SM\_USERPOLICIES contains Buyer.

**%SM\_USERPRIVS**

When a user is authenticated or a user is authorized for a resource, SM\_USERPRIVS holds all of the response attributes for all policies that apply to that user, in all policy domains.

**%SM\_USERREALMPRIVS**

When a user is authenticated or a user is authorized for a resource under a realm, SM\_USERREALMPRIVS holds all the response attributes for all rules under that realm.

**Example:**

A realm exists named Equipment Purchasing. Under that realm, there is a rule named CheckCredit. The rule is associated with a response that returns the credit limit of the buyer, as a response attribute such as:

```
limit = $15000
```

If the buyer attempts to purchase equipment worth \$5000, rule fires. SM\_USERREALMPRIVS would contain all of the response attributes for all of the rules under the Equipment Purchasing realm.

#### **%SM\_AUTHENTICATIONLEVEL**

When a user is authenticated for a resource, this attribute holds an integer number (of 0 to 1000) that represents the protection level of the authentication scheme under which the user was authenticated.

#### **%SM\_USERDISABLEDSTATE**

This attribute holds a decimal number that represents a bit mask of reasons that a user is disabled. The bits are defined in SmApi.h under the Sm\_Api\_DisabledReason\_t data structure, which is part of the SDK.

For example, a user may be disabled as a result of inactivity, Sm\_Api\_Disabled\_Inactivity. In Sm\_Api\_DisabledReason\_t, the reason Sm\_Api\_Disabled\_Inactivity, corresponds to the value 0x00000004. So, in this case, SM\_USERDISABLEDSTATE is 4.

A user can be disabled for multiple reasons.

#### **%SM\_USER\_APPLICATION\_ROLES**

If you have purchased CA Identity Manager, this attribute may be used in responses. It contains a list of all roles assigned or delegated to a user. If an application name is specified, only the roles associated with the application are returned in the response attribute.

The response attribute name is typed in the Variable Name field on the Response Attribute pane. The response attribute name has the following syntax:

SM\_USER\_APPLICATION\_ROLES[:*application\_name*]

where *application\_name* is an optional name of an application defined in Identity Manager.

The value for *application\_name* must be communicated to the Policy Server administrator. Application names are not automatically passed to the Administrative UI.

**Note:** For more information about Identity Manager roles, see the *CA Identity Manager Operations Guide*.

#### **%SM\_USER\_APPLICATION\_TASKS**

If you have purchased CA Identity Manager (Identity Manager ), this attribute may be used in responses. It contains a list of all tasks assigned or delegated to a user. If an application name is specified, only the tasks associated with the application are returned in the response attribute.

The response attribute name is typed in the Variable Name field on the Response Attribute pane. The response attribute name has the following syntax:

SM\_USER\_APPLICATION\_TASKS[:*application\_name*]

where *application\_name* is an optional name of an application defined in Identity Manager .



The value for *application\_name* must be communicated to the Policy Server administrator. Application names are not automatically passed to the Administrative UI.

**Note:** For more information about Identity Manager tasks, see the *CA Identity Manager Operations Guide*.

**More information:**

[Configure a Web Agent Response Attribute](#) (see page 501)

## Availability of CA SiteMinder-generated Response Attributes

The following table shows the availability of CA SiteMinder generated response attributes during authentication, authorization and impersonation events:

| Response Attribute       | Authentication and Authorization Events |                |                |                  |                  | Impersonation Events   |
|--------------------------|-----------------------------------------|----------------|----------------|------------------|------------------|------------------------|
|                          | GET/PUT                                 | On Auth Accept | On Auth Reject | On Access Accept | On Access Reject | Impersonate Start User |
| SM_USER_CONFIDENCE_LEVEL | Yes                                     | Yes            | Yes            | Yes              | Yes              | No                     |
| SM_USERNAME              | Yes                                     | Yes            | Yes            | Yes              | Yes              | No                     |
| SM_USERPATH              | Yes                                     | Yes            | Yes            | Yes              | Yes              | No                     |
| SM_USERIPADDRESS         | Yes                                     | Yes            | Yes            | Yes              | Yes              | No                     |
| SM_USERPASSWORD          | No                                      | Yes            | Yes            | No               | No               | No                     |
| SM_TRANSACTIONID         | Yes                                     | No             | No             | Yes              | Yes              | No                     |
| SM_USERSESSIONID         | Yes                                     | Yes            | No             | Yes              | Yes              | No                     |
| SM_USERSESSIONSPEC       | Yes                                     | No             | No             | Yes              | Yes              | No                     |
| SM_USERSESSIONIP         | Yes                                     | Yes            | Yes            | Yes              | Yes              | No                     |
| SM_USERSESSIONUNIVID     | Yes                                     | Yes            | No             | Yes              | Yes              | No                     |
| SM_USERSESSIONDIRNAME    | Yes                                     | Yes            | No             | Yes              | Yes              | No                     |
| SM_USERSESSIONDIROID     | Yes                                     | Yes            | No             | Yes              | Yes              | No                     |
| SM_USERSESSIONTYPE       | Yes                                     | Yes            | No             | Yes              | Yes              | No                     |
| SM_USERLASTLOGINTIME     | No                                      | Yes            | No             | No               | No               | No                     |
| SM_USERGROUPS[           | Yes                                     | Yes            | No             | Yes              | Yes              | No                     |

| Response Attribute      | Authentication and Authorization Events |                |                |                  |                  | Impersonation Events   |
|-------------------------|-----------------------------------------|----------------|----------------|------------------|------------------|------------------------|
|                         | GET/PUT                                 | On Auth Accept | On Auth Reject | On Access Accept | On Access Reject | Impersonate Start User |
| SM_USERNESTEDGROUPS     | Yes                                     | Yes            | No             | Yes              | Yes              | No                     |
| SM_USERSCHEMAATTRIBUTES | Yes                                     | Yes            | Yes            | Yes              | Yes              | No                     |
| SM_USERLOGINNAME        | No                                      | Yes            | Yes            | No               | No               | No                     |
| SM_USERIMPERSONATORNAME | No                                      | No             | No             | No               | No               | Yes                    |
| SM_USERDISABLEDSTATE    | Yes                                     | Yes            | No             | Yes              | Yes              | No                     |
| SM_USERPOLICIES         | No                                      | No             | No             | Yes              | No               | No                     |
| SM_USERREALMPRIVS       | Yes                                     | No             | No             | No               | No               | No                     |
| SM_USERPRIVS            | Yes                                     | No             | No             | No               | No               | No                     |

## Response Groups

A response group is a collection of responses that are logically grouped so they can be applied to a single rule within a policy. All relevant responses in a response group will fire when a rule paired with the response group fires.

Response groups allow you to combine multiple responses in a single object. When you create policies, you can more easily associate multiple responses with a single rule within those policies.

## Configure a Response Group

You can create a response group that applies a set of responses to one rule in a policy.

### Follow these steps:

1. Click Policies, Domain, Response Groups.
2. Click Create Response Group.
3. Click OK.
4. Select a domain and click Next.
5. Type the name and a description of the response group.

6. Select Radius or CA SiteMinder and an Agent Type.

**Note:** The specified Agent type must correspond to the Agent type of the responses in the group. Only responses with the specified Agent type are available for inclusion in the group.

7. In Group Members, click Add/Remove.

**Note:** The Available Members column lists all responses that are defined in the specified domain for the specified Agent type. When the Agent type is Generic Radius, the Available Members column lists all responses that the Radius agents support.

8. Select one or more responses from the list of Available Members, and click the right-facing arrows.

The responses are removed from the list of Available Members and added to the list of Selected Members.

**Note:** To select more than one member at a time, hold down the Ctrl key while you click the additional members. To select a block of members, click the first member and then hold down the Shift key while you click the last member in the block.

9. Click OK.

The selected responses are added to the response group.

10. Click Finish.

The Response Group is created.

**More information:**

[Copy Policy Server Objects](#) (see page 55)

## Add Responses to a Response Group

You can add responses of the same Agent type to a response group. All of the responses must exist in the same domain.

**Follow these steps:**

1. Open the response group.
2. Click Add/Remove in the Group Members group box.

The Choose responses group box opens. The Available Members column contains responses available from the selected domain and with the specified Agent type or RADIUS vendor type.

**Note:** The Available Members column lists all of the responses supported by RADIUS agents if you specified Generic RADIUS.

3. Move responses to the Selected Members column to include them in the group, and click OK.

The Response Group pane opens. The selected rules open in the Group Members group box.

4. Click Submit.

The response group is saved.

## Modify a Response Group

You can modify all of the properties of a response group, except Agent type.

To change the Agent type, delete the response group and create a new one.

**Note:** More information about modifying and deleting Policy Server objects exists in [Manage Policy Server Objects](#) (see page 54).

## Delete a Response Group

Deleting a response group only deletes the grouping, not the individual responses contained in the group.

**Note:** More information about modifying and deleting Policy Server objects exists in [Manage Policy Server Objects](#) (see page 54).

# Chapter 19: Policies

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This section contains the following topics:

[Policy Overview](#) (see page 517)  
[How to Configure a Policy](#) (see page 522)  
[Exclude a User or Group from a Policy](#) (see page 528)  
[Allow Nested Groups in Policies](#) (see page 529)  
[AND Users/Groups Check Box](#) (see page 529)  
[Specify AND/OR Relationships between Users/Groups](#) (see page 531)  
[Add Users by Manual Entry](#) (see page 532)  
[Enhance Policy Server's LDAP Authorization Performance](#) (see page 533)  
[Add an LDAP Expression to a Policy](#) (see page 534)  
[Enable and Disable Policies](#) (see page 535)  
[Advanced Policy Options](#) (see page 535)  
[Policy Binding Establishment](#) (see page 540)  
[Delete a Policy](#) (see page 551)  
[Bind Policies to SQL Queries](#) (see page 552)  
[Policy Processing](#) (see page 552)

## Policy Overview

Policies define how users interact with resources. To create a policy in the Administrative UI, you link together (bind) objects that identify the following properties:

- Users
- Resources
- Actions that are associated with the resources

Policies are stored in policy domains. When you configure a policy, you can select users and groups from the user directories available in the policy domain.

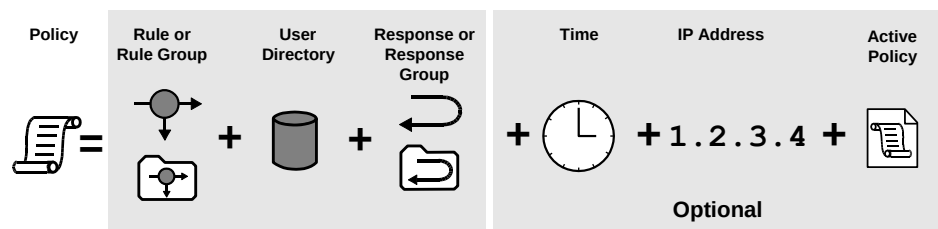
The Policy Server identifies resources through rules. When you create a policy, you can select rules that specify the resources you want to include in a policy.

Once you identify users and resources in a policy, you can specify actions to take place when those users access the specified resources. These actions take the form of responses. Policies can include responses that do the following things:

- Allow or deny access to a resource
- Customize user session time
- Redirect the user to other resources
- Customize the content that the user receives based on attributes that are contained in a user directory.\

More advanced policies can be restricted to certain time periods or certain user IP addresses. This allows administrators of a group of resources a finer control over their resources.

The following diagram illustrates all of the possible parts of a policy.



### Rules/Rule Groups

A policy must contain at least one rule or rule group. A rule identifies a specific resource or resources that are included in the policy.

### Users

A policy must specify the users or groups of users that are affected by the policy. Connections to these users or groups of users must be configured on the User Directory screen. Only users or user groups for directories that are included in the policy domain in which the policy is located may be associated with a policy.

### Responses

A response defines the action that is triggered when a user accesses a resource specified in a rule. Responses can return attributes from a user directory for use by other applications or to customize content. Responses can also trigger actions based on authentication and authorization events.

### (Optional) IP Addresses

A policy may be limited to specific user IP addresses. Once you add an IP address restriction to a policy, if a user attempts to access a resource from an IP address that is not specified in the policy, the policy will not fire for the user, and therefore will not allow/deny access or process any responses.

**(Optional) Time Restrictions**

A policy may be limited to specific days or ranges of hours. A policy with a time restriction will not fire outside specified times, and therefore will not allow/deny access to protected resources or process any responses.

**(Optional) Active Policies**

An Active policy allows business logic external to CA SiteMinder to be included in a policy definition. Active policies allow CA SiteMinder to interact with custom software created using the CA SiteMinder APIs.

**More information:**

[User Directories](#) (see page 149)

[Rules](#) (see page 473)

[Responses and Response Groups](#) (see page 493)

[Time Restrictions for Policies](#) (see page 538)

[Configure an Active Policy](#) (see page 539)

[Allowable IP Addresses for Policies](#) (see page 536)

[Domains](#) (see page 453)

## Policies Explanation

Policies bind other Policy Server objects together into a logical group that determines how the objects interact. By linking together users that are accessible through directory connections, rules that point to specific resources, and responses that define actions, policies define who is authorized to access resources. Responses included in policies can also provide personalization by retrieving directory attributes when a user accesses a resource.

When one of the users that is specified in a policy attempts to access a resource that is identified in a rule, the Policy Server uses the information that is contained in the policy to resolve whether the user can access the resource, and if any personalization should take place.

More advanced policies can be restricted to certain time periods or certain user IP addresses. This allows administrators of a group of resources a finer control over their resources.

## Policy Bindings

A policy binding is the method used to link a user with a policy. The Policy Server only resolves policies for users who are part of a policy binding created by the users or groups contained in a policy.

Before the Policy Server can resolve a user's attempt to access a protected resource, the user must be authenticated. When CA SiteMinder authenticates a user, it establishes a context for the user. The user context provides information about who the user is and what privileges the user has when accessing resources.

For example, if a user is part of the group in a user directory called Employees, when the user authenticates, the Policy Server creates a policy binding for the user's membership in the group Employees. When the user attempts to access a resource protected by a rule in a policy that allows access for Employees group members, the user's policy binding allows CA SiteMinder to authorize the user.

**More information:**

[Authentication Schemes](#) (see page 269)

[Policy Binding Establishment](#) (see page 540)

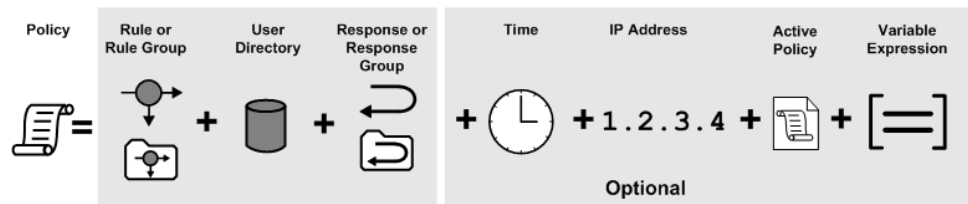
## Expressions in Policies

eTelligent Rules makes available a set of variables for use in policy expressions.

Expressions extend policies to include dynamic information evaluated at runtime. Variable objects may be used in expressions to create a boolean set of conditions that determines entitlements for the resources protected by the policy.

To use variable objects in an active policy expression, you must configure a policy object and build the appropriate boolean expression using the Expression dialog. The interface is similar to the LDAP Search Expression editor described in [Add LDAP Expressions to Policies](#) (see page 534).

**Note:** Expressions may be added to other data supported by policy objects as shown in the following figure.





**Note:** Active expressions and named expressions are not the same. While both types of expressions are evaluated at run-time, they differ in the following ways:

- While active expressions are Boolean expressions, named expressions can return a string, number, or Boolean value.
- While active expressions are referenced as is and must be reentered each time that they are used, named expressions are referenced by name and can be referenced from anywhere and reused.

**More information:**

[Variables](#) (see page 561)

## Confidence Levels in Policies

If CA SiteMinder is integrated with a supported risk analysis engine, a confidence level is available for use in policies. Confidence levels extend policies to include the results of the risk evaluation that is completed as part of user authentication. The Policy Server can use these results when making authorization decisions.

You can apply a confidence level to the following objects:

- A policy realm.  
A confidence level that you configure in a realm applies to all resources (rules) that are associated with the realm. Applying a confidence level to a policy realm requires that you enable confidence level support.
- An active policy expression.  
A confidence level that you configure as an active policy expression applies only to those resources (rules) that are bound to the policy. The active policy expression allows for more granular authorization decisions. Using an active policy expression to apply a confidence level remains supported from previous releases and is enabled by default.

**Note:** CA SiteMinder supports an integration with an on-premise implementation of CA Arcot WebFort and CA Arcot Risk, and a hosted implementation of CA Arcot A-OK.

**More information:**

[Confidence Levels Introduced](#) (see page 462)

## How to Configure a Policy

The following process lists the steps for configuring a policy.

**Note:** You can also create policies using the Scripting Interface for Perl. For more information, see the *Programming Guide for Perl*.

### To configure a policy

1. Create the policy.
2. [Add users to the policy](#) (see page 523).
3. [Add one or more rules to the policy](#) (see page 524).
4. (Optional) [Associate responses or response groups with rules](#) (see page 524).
5. (Optional) [Associate global responses with rules](#) (see page 525).
6. (Optional). [Configure advanced policy options](#) (see page 535).

## Create the Policy

You can create a policy by adding it to a new or existing domain. Policies define relationships between users and resources.

### To create a policy and add it to an existing domain

1. Click Policies, Domain.
2. Click Domains.  
The Domains page appears.
3. Specify search criteria, and click Search.  
A list of domains that match the search criteria appears.
4. Click the name of the domain you want to modify.  
The View Domain page appears.
5. Click Modify.  
The settings and controls become active.
6. Click the Policies tab.  
The Policies page appears.
7. Click Create.  
The Create Policy page appears.
8. Type the name and a description of the policy.

9. Click the Users tab.

The User Directories page appears.

10. Add users, user groups, or both to the policy, and click Submit.

The Modify Domain: *Name* page re-appears.

11. Click Submit.

The Modify Domain Task is submitted for processing.

## Add Users to a Policy

You can add individual users, user groups, or both to a policy and create a policy binding between the added users and the policy. When a user tries to access a protected resource, the policy verifies that the user is part of its policy binding and then fires the rules included in the policy to see if the user is allowed to access the resource.

### Follow these steps:

1. Navigate to the Users page.

2. Add users or groups from the user directory to the policy.

From within each user directory group box, you can choose Add Members, Add Entry, Add All. Depending on which method you use to add users to the policy, a dialog box will open enabling you to add users.

**Note:** If you select Add Members, the User/Groups pane opens. Individual users are not displayed automatically. Use the search utility to find a specific user within one of the directories.

You can edit or delete a user or group by clicking the right arrow (>) or minus sign (-), respectively.

3. Select individual users, user groups, or both using whatever method and click OK.

The User Directories page reopens and lists the new users..

The task of binding users to the policy is complete.

### More information:

[View User Directory Contents](#) (see page 213)

[Policy Binding Establishment](#) (see page 540)

## Add Rules to a Policy

Rules indicate the specific resources included in a policy and whether to allow or deny access to the resources when the rule fires. Responses indicate the actions you want to occur when the rule fires.

**Note:** Add at least one rule or rule group to a policy.

**Follow these steps:**

1. Navigate to Policy, Rules.  
The Rules page opens.
2. Click Add Rule.  
The Available Rules pane opens.
3. Select the individual rules, rule groups, or both that you want to add to the policy, and click OK.  
The Rules section lists the added rules and groups.
4. (Optional) Associate the rule with a response or response group.

**Note:** To remove a rule or rule group from a policy, click the minus sign (-) to the right of the rule on the Rules section. To create a rule, click New Rule on the Available Rules pane.

## Associate a Rule with a Response or Response Group

You can associate a response or response group with a rule in a policy. When the rule fires, the associated response also fires.

**Follow these steps:**

1. Click Add Response for the rule or rule group for which you want to associate a response.  
The Available Responses pane opens and lists the responses and response groups that have been configured for the policy domain.
2. Select a response or response group, and click OK.  
The response opens in the Rules group box, and is associated with the respective rule.

**Note:** If the response you require does not exist, click New Response to create the response.

## Associate a Rule with a Global Response

You can associate a rule with an existing global response.

**Follow these steps:**

1. Navigate to Policy, Rules.
2. Click the Add Response button next to the rule that you want to modify.

The Available Responses pane opens.

**Note:** Global responses, responses, and group responses are listed in that order on the Available Responses pane.

3. Select a global response, and click OK.

The Rules group box reopens, and the selected response is added to the rule.

4. Click Submit.

The Modify Policy Task is submitted for processing.

**More information:**

[Global Policies, Rules, and Responses](#) (see page 595)

## Add an Expression to a Policy

You can create a Boolean expression and add it to a policy. Boolean expressions operate on variables, and the values of the variables at the time that the policy is processed affect the outcome of the processing. Thus, Boolean expressions influence policy decisions.

**Follow these steps:**

1. Click Policy, Expressions.
2. Click Edit.
3. Type variable names in the fields on the Condition group box, or click Variable Lookup, select an operator from the drop-down list, and click Add.

The condition is added to the Infix Notation group box.

**Note:** To create multiple conditions, repeat this step.

4. Select the conditions and click the buttons on the Infix Notation group box to create an expression.

5. Click OK.
6. Click Submit.

The Modify Policy task is submitted for processing.

## Add a Confidence Level to a Policy

Adding a confidence level to a policy lets you apply the results of an RiskMinder risk score evaluation to an authorization decision. Using an active expression limits the confidence level to only those resources (rules) bound to the policy. For RiskMinder risk scores, lower numbers indicate less risk and a safer transaction. For CA SiteMinder confidence levels, higher numbers indicate less risk and a safer transaction.

### Follow these steps:

1. From the Administrative UI, click Policies, Domain, Domains.
2. Click the Edit icon for the policy domain you created for your RiskMinder environment.
3. Click the Policies tab.
4. Click Create.
5. Click the Policies tab.
6. Click the edit icon for the policy.
7. Complete the following steps in the Active Policy Expression area:
  - a. Enter the following library name:  
`smriskactiveexpr`
  - b. Enter the following function name:  
`CheckConfidenceLevel`
  - c. Enter a confidence level in the Function Parameters field. The valid range is 1 through 1000.
8. Click OK.
9. Click Submit.

The confidence level is applied to the resources (rules) bound to the policy.

### More information:

[Confidence Levels Introduced](#) (see page 462)

## Add Identity Management Roles

If CA SiteMinder is integrated with a Identity Management, a Identity Management role is available for use in policies. Roles let the Policy Sever make authorization decisions for users who are members of Identity Management roles.

**Follow these steps:**

1. Click Policy, Users.
2. Click Add Roles from the IDM Environment you want.
3. Select the roles you want and click OK.
4. Click Submit.

The Identity Management roles are added to the policy.

## Exclude Identity Management Roles

If a user who is a member of an excluded Identity Management role tries to access a protected resource, the Policy Server:

- Verifies that the user is a member of the excluded role.
- Blocks access to the resource.

**Follow these steps:**

1. Click Policy, Users.
2. Locate the roles you want to exclude in the IDM Environments section.
3. For each role, click Exclude.
4. Click Submit.

The Identity Management roles are excluded from the policy.

## Exclude a User or Group from a Policy

The Administrative UI allows you to exclude a user or group of users from a policy. This feature is very useful if you have a large user group that should be included in a policy, but you want to exclude a small subset of the group from the policy.

**Follow these steps:**

1. Click Policy, Users.
2. In the User Directory section click *one* of the following:
  - Add Members
  - Add Entry
  - Add All
3. Choose the task from the following list that corresponds to the item you clicked in Step 2:
  - If you clicked Add Members, search from the Current Members list shown in the Users/Groups pane and select the check box of the user or group that you want.
  - If you clicked Add Entry, use the User Directory Search Expression Editor to create a search expression that locates the item you want to exclude.
  - If you clicked Add All, the entire group appears in the User Directory group box. Go to Step 5.

4. Click OK.

The User Directories page re-opens showing the user or group you chose, along with an Exclude button.

5. To exclude the selected user or group, click Exclude.

A check mark appears to the right of the user or group in the Current Members list to indicate that the user or group is excluded from the policy. An Include button replaces the Exclude button.

When you exclude a group from a policy, the exclusion indicates that anyone included in the policy who is a member of the excluded group (or the specifically excluded user), is not included in the policy. For example, if a policy contained the group Employees, and the excluded group Marketing, anyone who is a member of the Employees group, and not part of the Marketing group is included in the policy.

6. Click Submit.

Your changes are submitted. The user or group will be excluded from the policy.



## Allow Nested Groups in Policies

LDAP user directories can contain groups that contain other groups. In very complex directories, a hierarchy of nested groups is one way to organize tremendous amounts of user information.

For each LDAP user directory, you can specify that the policy allow nested groups. When nested groups are allowed in an LDAP directory, each user group in the directory and all sub-groups are searched when the policy is processed. When nested groups are not allowed, each user group in the directory is searched, but no sub-groups can be searched, when the policy is processed.

### To allow nested groups in a policy that contains an LDAP user directory

1. Click Policy, Users.

The User Directories page opens, containing sections that correspond to the user directories associated with the policy domain.

2. Select the Allow Nested Groups check box for each user directory that contains nested groups, and click Submit.

The Modify Policy Task is submitted for processing, and nested groups are allowed for the specified LDAP user directories.

## AND Users/Groups Check Box

The AND Users/Groups check box lets you restrict authorization to users who are members of more than one user group or to a particular user who is a member of one or more user groups. When adding individual users and user groups in a user directory to a policy, you can specify AND relationships between them by selecting the check box. Alternately, you can specify OR relationships between them by clearing the check box.

When you specify AND relationships and apply the resulting policy to a user, the user must meet the following requirements to be authorized:

- The user must be a member of each user group that is bound to the policy.
- If an individual user is bound to the policy, the user must be that individual.

**Note:** A user who is excluded from the policy or is a member of a group that is excluded from the policy cannot be authorized.

**Example:** Assume that User1, Group1, and Group2 are all bound to a policy and that AND relationships are specified. In this case, test\_user must be User1 and a member of Group1 and Group2 to be authorized.

**Example:** Assume that User1, User2, and Group1 are all bound to a policy and that AND relationships are specified. In this case, test\_user cannot be both User1 and User2. Therefore, test\_user cannot be authorized.

**Important!** Do not add two or more individual users to a policy and specify AND relationships. Because no single user can be more than one individual, the policy always fails.

To specify both AND and OR relationships, choose one of the following configurations:

- A Single Policy and Multiple User Directories

In this configuration, two or more user directories are available to a single policy. The relationship between individual users and user groups in a single directory can be AND or OR. The relationship between individual users and user groups in different directories is always OR.

**Example:** There are two user directories and a single policy. In each directory, there are two user groups, and an AND relationship is specified. Assume that Directory1 contains Group1 and Group2 and that Directory2 contains Group3 and Group4. In this case, test\_user must be a member of Group1 and Group2 or a member of Group3 and Group4 to be authorized.

This can be expressed logically as follows:

Directory1(Group1 AND Group2) OR Directory2(Group3 and Group4)

**Use Case:** There are two user directories and a single policy. Directory1 contains the user groups Facilities and Human\_Resources, and an AND relationship is specified. Directory2 contains the user groups Marketing and Sales, and an OR relationship is specified. In this case, the user must be a member of Facilities and Human\_Resources or a member of Marketing or a member of Sales to be authorized. This can be expressed logically as follows:

Directory1(Facilities AND Human\_Resources) OR Directory2(Marketing OR Sales)

- Multiple Policies and a Single User Directory

In this configuration, two or more policies in a shared domain have access to a single user directory. The relationship between individual users and user groups in the user directory can be AND in one policy and OR in another policy. The relationship between different policies in a shared domain is always OR.

**Example:** There are two policies and one user directory. The user directory contains four user groups. Assume that Group1 and Group2 are bound to Policy1 and that Group3 and Group4 are bound to Policy2. AND relationships are specified between the user groups in both policies. In this case, test\_user can be authorized by the application of Policy1 or Policy2. This can be expressed logically as follows:

Policy1(Group1 AND Group2) OR Policy2(Group3 AND Group4)

**Use Case:** There are two policies and one user directory. The user groups Human\_Resources, Marketing, and Sales are bound to Policy1, and an OR relationship is specified. The user groups Facilities and Human\_Resources are bound to Policy2, and an AND relationship is specified. In this case, the user must be a member of Human\_Resources, Marketing, or Sales or a member of Facilities and Human\_Resources to be authorized. The second policy only authorizes members of Facilities who are also members of Human\_Resources.

This can be expressed logically as follows:

Policy1(Human\_Resources OR Marketing OR Sales) OR Policy2(Facilities AND Human\_Resources)

## Specify AND/OR Relationships between Users/Groups

The AND Users/Groups check box lets you restrict authorization to users who are members of more than one user group or to a particular user who is a member of one or more user groups. When adding individual users and user groups in a user directory to a policy, you can specify AND relationships between them by selecting the check box. Alternately, you can specify OR relationships by clearing the check box.

When you specify AND relationships and apply the resulting policy to a user, the user must meet the following requirements to be authorized:

- The user must be a member of each user group that is bound to the policy.
- If an individual user is bound to the policy, the user must be that individual.

**Important!** Do not add two or more individual users to a policy and specify AND relationships. Because no single user can be more than one individual, the policy always fails.

### To specify AND relationships between a user and one or more user groups or between multiple user groups in one user directory

1. Click Policy, Users.

The User Directories page opens, and each user directory is displayed in a separate section.

2. Select the AND Users/Groups check box corresponding to each user directory for which you want to specify AND relationships.
3. Click Submit.

The task is submitted for processing.

## Add Users by Manual Entry

In addition to using the Available Members list in the Policy Users/Groups Dialog to specify the users and groups to include in a policy, you can specify a user or search string in the Manual Entry group box.

**Follow these steps:**

1. Navigate to Modify Policy.  
The search window appears.
2. (Optional) Fill out the search form to narrow your search criteria.
3. Click Search.  
A list of policies appears.
4. Click the option button on the left of the policy you want, and then click Select.  
The Modify Policy: *Name* pane appears.
5. Click Users.  
The user directories associated with the domain appear in the User Directories group box.
6. In the Policy Users/Groups Dialog, do one of the following:

- For Active Directory user directories, specify the following settings:

**Manual Entry Field**

Specifies a search filter for the Active Directory user directory.

**Validate Entry Check Box**

Specifies whether the search filter is validated before the entry is added to the Active Directory user directory.

**Note:** If validation of the Active Directory search filter fails, clear this check box.

**Default:** Selected

- For LDAP directories, select *one* of the following search types from the Where to Search drop-down list:

**Validate DN**

Locates the DN in the directory.

**Search Users**

Limits search to matches in user entries.

**Search Groups**

Limits search to matches in group entries.

**Search Organizations**

Limits search to matches in organization entries.

**Search Any Entry**

Limits searches to matches in user, group, and organization entries.

- For Microsoft SQL Server, Oracle, and WinNT directories, type a user name in the Manual Entry field.

**Note:** For Microsoft SQL Server and Oracle, you can type a SQL query in the Manual Entry field instead of a user name.

**Example:** `SELECT NAME FROM EMPLOYEE WHERE JOB = 'MGR';`

The Policy Server executes the query as the database user specified in the Username field in Credentials and Connections for the user directory. Before constructing the SQL statement for the Manual Entry field, become familiar with the database schema for the user directory. For example, if you are using the SmSampleUsers schema and want to add specific users, you could select from the SmUser table.

**Note:** For an LDAP directory, you can enter "all" in the Manual Entry field to bind the policy to the entire LDAP directory.

7. Click Add to Current Members.

The Administrative UI adds the user or query to the Current Members list.

8. Click OK to save your changes and return to the Modify Policy: *Name* pane.

## Enhance Policy Server's LDAP Authorization Performance

You can enhance the Policy Server's authorization performance for users stored in LDAP user directories by limiting the role-based authorization to a specific user record rather than the user's role, as follows:

**To enhance the policy server's performance**

1. Navigate to Modify Policy, Users.

The User Directories pane opens and contains the group boxes that correspond to the user directories associated with the policy domain.

2. If the directory on which you want to enhance the authorization performance already appears in a group box, go to Step 8.

3. If the directory you want does not appear, click Add Members on the directory's group box.

The Users/Groups pane opens and lists the users and groups in the selected user directory.

4. Select a Search type from the drop-down list:

**Attribute-value**

Specifies a user attribute name and value pair.

**Expression**

Specifies a CA SiteMinder expression.

5. Type the user attribute name and value required for authorization in the Attribute and Value fields on the Users/Groups group box.
6. Click GO to search the directory.  
A list of directories appears.
7. Select the check box of the directory you want to add, and then click OK.  
The Users/Groups pane closes and the User Directories pane appears. The directory you selected appears in the group box.
8. Click the Edit (arrow) icon to the left of the directory.  
The User Directory Search Expression Editor appears.
9. Ensure that Validate DN appears in the Where to Search drop-down list, and then click OK.  
The User Directory Search Expression Editor closes. The Policy Server's LDAP search is done within the context of the current user and not in the LDAP server's base DN. This optimization decreases the load on the LDAP server and Policy Server, which allows quicker authorization responses.

## Add an LDAP Expression to a Policy

Bind an LDAP search expression to a policy in a policy domain that contains connections to an LDAP user directory using the User Directory Search Expression Editor. A search expression can bind users to a policy based on attributes that appear in user, group, and organization profiles.

**Follow these steps:**

1. Click Policies, Domains, Modify Policy.
2. (Optional) Fill out the search form to narrow your search criteria.
3. Click Search.
4. Click the option button on the left of the policy you want, and then click Select.
5. Click the Users tab.

The user directories that are associated with the domain appear in the User Directories section.

6. Click Add Entry for the user directory on which the LDAP search expression is to apply.
7. In the User Directory Search Expression Editor, build an LDAP expression that binds a particular user, group, or organization attribute to your policy.
8. Click OK.

The expression appears in the user directory table.

## Enable and Disable Policies

By default, policies are enabled when they are created. If a policy is enabled, its rules fire when users attempt to access the resources that those rules specify.

If you disable a policy, the rules that are contained in the policy still fire but no user is authorized. Any resources that are specified in rules that are contained in the policy are still protected. Users cannot access resources that are associated with the rules specified in the policy until you enable the policy. However, if another enabled policy allows access to a resource in the disabled policy, users that are associated with the enabled policy can access the resource.

### Follow these steps:

1. Open the policy in the Administrative UI.
2. Select or clear the Enabled check box.

If the check box is selected, the policy is enabled. If the check box is cleared, the policy is disabled. A disabled policy does not fire.

3. Click Submit.

The policy is saved.

## Advanced Policy Options

You can use the following advanced features when setting up policies in the Administrative UI:

### ■ IP Addresses

This feature lets you specify certain IP addresses that a user must be using for a policy to fire.

### ■ Time Restrictions

This feature lets you specify times during which the policy fires. If you add a time restriction to a policy, the policy is effectively disabled outside of the specified times.

- Active Policies

This feature allows you to invoke a function call in a shared library that is created with the CA SiteMinder API. The function call determines whether the policy fires.

**More information:**

[Enable and Disable Policies](#) (see page 535)

## Allowable IP Addresses for Policies

You can restrict a policy to fire only for users who access the policy resources from a specific:

- IP address
- host name
- subnet mask
- range of IP addresses

For example, if a policy that specifies a range of allowable IP addresses, only users who log in from one of the specified IP addresses are allowed access to the protected resources.

## Specify a Single IP Address

Specify a single IP address to ensure that the policy only fires for users who access the policy resources from the specified IP address.

**Follow these steps:**

1. Open the policy.
2. Click Add in the IP Address group box.
3. Select the Single Host option button.  
Settings specific to a single host appear.
4. Enter the IP Address, and click OK.

The IP address appears in the IP Address group box.

**Note:** If you do not know the IP address, click DNS Lookup and enter a fully qualified host name to look up the IP address.

5. Click Submit.

The policy is saved.



## Specify a Host Name

Specify a host name to ensure the policy only fires for users who access the policy resources from the specified host.

**Follow these steps:**

1. Open the policy.
2. Click Add in the IP Address group box.
3. Select the Host Name option button.  
Settings specific to a host name appear.
4. Enter the host name, and Click OK.  
The host name appears in the IP Address group box.
5. Click Submit.  
The policy is saved.

## Add a Subnet Mask

Specify a subnet mask to ensure the policy only fires for users who access the policy resources from the specified subnet mask.

**Follow these steps:**

1. Open the policy.
2. Click Add in the IP Address group box.  
Settings for IP Addresses appear.
3. Select the Subnet Mask option button.  
Settings specific to the subnet mask appear.
4. Enter an IP address in the IP Address field.  
**Note:** If you do not know the IP address, click DNS Lookup and enter a fully qualified host name to look up the IP address.
5. Enter a subnet mask in the Subnet Mask field.
6. Click OK.  
The subnet mask appears in the IP Address group box.
7. Click Submit.  
The policy is saved.

## Add a Range of IP Addresses

Specify a range of IP addresses to restrict access to users who attempt to access policy resources from one of the IP addresses that are included in that range.

**Follow these steps:**

1. Open the policy
2. Click Add in the IP Address group box.  
Settings IP Addresses appear.
3. Select the Range option button.  
Settings specific to a range of IP addresses appear.
4. Enter a starting IP Address in the From field.  
**Note:** If you do not know the IP address, click DNS Lookup and enter a fully qualified host name to look up the IP address.
5. Enter an ending IP address in the To field.
6. Click OK.  
The range of IP addresses appears in the IP Address group box.
7. Click Submit.  
The policy is saved.

## Time Restrictions for Policies

The Administrative UI lets you add time restrictions to a policy. When you add a time restriction, the policy only fires during the period that the time restriction specifies. If a user attempts to access a resource outside of the period that the time restriction specifies, the policy does not fire.

Say that you create a time restriction for a policy that secures access to a resource, and specifies that the policy can only fire from 9am - 5 pm, Monday - Friday. A user is only authenticated and authorized during the times that are indicated in the time restriction. The resources that the policy protects are not available outside the times indicated.

**Note:** Time restrictions are based on the system clock of the server on which the Policy Server is installed.

**More information:**

[How the Web Agent and Policy Server Calculate Time](#) (see page 59)

[Add Time Restrictions to Rules](#) (see page 487)

## How Rule and Policy Time Restrictions Interact

If a policy has a time restriction and the policy contains a rule with a time restriction, the policy fires only during times that both restrictions allow.

For example, if a policy has a time restriction of 9AM to 5PM, and a rule has a time restriction of Monday through Friday, the policy only fires between 9AM and 5PM Monday through Friday.

## Add Time Restrictions to a Policy

Add time restrictions to a policy to ensure that the policy only fires at specific times.

### Follow these steps:

1. Open the policy.
2. Click Set in the Time group box.

The Time Restrictions pane appears.

**Note:** Click Help for descriptions of settings and controls, including their respective requirements and limits.

3. Specify starting and expiration dates.
4. Specify time restrictions in the Hourly Restrictions table.

**Note:** Each check box represents one hour. When a check box is selected, the rule fires during that hour, and the rule applies to the specified resources. When a check box is cleared, the rule does not fire during that hour, and the rule does not apply to the specified resources.

5. Click OK.

The time restrictions are saved.

## Configure an Active Policy

An active policy is used for dynamic authorization that is based on external business logic. An active policy is included in the authorization decision by having the Policy Server invoke a function in a customer-supplied shared library.

This shared library must conform to the interface specified by the Authorization API, which is available separately with the Software Development Kit.

### Follow these steps:

1. Open the global policy.
2. Select the Edit Active Policy check box in the Advanced Group box.

Active policy settings appear.

3. Enter the name of the shared library in the Library Name field.
  4. Enter the name of the function in the shared library that is to implement the active policy.
  5. Click Submit.
- The policy is saved.

## Policy Binding Establishment

The following sections describe the methods for establishing different types of policy bindings. Supported policy binding types differ based on the type of user directory in which user information is located.

### Policy Bindings for LDAP Directories

When CA SiteMinder authenticates a user, it establishes a user context. Then, access control policy decisions are based on the user context matching one of the criteria that are shown in the following table.

| User Namespace      | Description                                                                                                                                                                                   |
|---------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| User                | The user's Distinguished Name (DN) must match the DN specified in the policy.                                                                                                                 |
| User Attribute      | The search expression specifying conditions related to user attributes must be true.                                                                                                          |
| User Group          | The user's DN must be a member of the user group specified in the policy.                                                                                                                     |
| Group Attribute     | The search expression specifying conditions related to the group attribute must be true.                                                                                                      |
| Organizational Role | The user must occupy the organizational role specified in the policy.                                                                                                                         |
| Organization Unit   | The user must be a member of the organizational unit specified in the policy. The Organizational Unit must be a part of a user's DN, group, or role (group and role are not used by default). |
| Organization        | The user must be a member of the organization specified in the policy. The Organization must be a part of a user's DN, group, or role (group and role are not used by default).               |

| User Namespace         | Description                                                                                     |
|------------------------|-------------------------------------------------------------------------------------------------|
| Organization Attribute | The search expression specifying conditions related to the organization attribute must be true. |
| Custom Object Classes  | CA SiteMinder can be configured to associate Policies with custom directory objects.            |

Generally, you bind users or user attributes to policies on the CA SiteMinder Policy pane by selecting an entry from the list of available directory entries. Individual users are not visible in the list of available directory entries. However, you can search for specific users within a directory and add the users directly to the policy.

**More information:**

[Add Users to a Policy](#) (see page 523)

## Bind Policies to Users with the Manual Entry Field

You can bind individual users to a policy using two methods. The first is by using the Manual Entry field in the CA SiteMinder Policy Users/Groups dialog. The second is by using the Search feature in the CA SiteMinder Policy Users/Groups dialog.

**Follow these steps:**

1. Navigate to Policy, Users.
2. Locate the group box with the user directory that you want to search, and then click Add Entry.

The User Directory Search Expression Editor opens.

3. Click the Where to Search drop-down list, and then select Search Users.
4. In the Manual Entry field, specify a user DN.

For example: uid=JSmith, ou=people, o=myorg.org

**Note:** The supplied user DN must match exactly the distinguished name of the user. This feature does not match a subset of information that is contained in the user DN.

5. Click OK.

The User Directory Search Expression Editor closes and the user DN you entered appears in the group box of the directory.

6. Click Submit to save your changes.

**More information:**

[Add Users to a Policy](#) (see page 523)

[Add Users by Manual Entry](#) (see page 532)

## Bind Policies to Users with the Search Feature

On the User Directories pane, there are two ways to bind individual users to a policy. You can click Add Members on a user directory group box and use the attribute-value feature on the Users/Groups pane. Or you can click Add Entry on a user directory group box and use the User Directory Search Expression Editor.

**Follow these steps:**

1. Navigate to Policy, Users.

A list of the user directories that are associated with the domain opens on the User Directories pane.

2. Click Add Members on a user directory group box.

The Users/Groups pane opens.

3. Specify search criteria, and click Go.

A list of users that match the search criteria opens.

4. Select the users that you want, and click OK.

The User Directories pane reopens, and the selected users are added to the user directory group box.

5. Click Submit.

The Create or Modify Policy task is submitted for processing.

## Bind Policies to User Attributes

To bind a policy to user attributes, specify an LDAP search expression that defines conditions related to user attributes that must be true. For example, to bind a policy to all people whose location (*l*) is *westcoast* or whose mail address (*mail*) ends with *string.com*, insert the following search expression (using a pipe (*|*) at the beginning) in the Manual Entry field:

```
(| (l=westcoast)(mail=*string.com))
```

**More information:**

[Add an LDAP Expression to a Policy](#) (see page 534)

## Bind Policies to User Groups

Bind policies to user groups open in the Users/Groups pane.

**Follow these steps:**

1. Click the Users tab.

The user directories associated with the domain open in the User Directories group box.

2. Click Add Members.

The Users/Groups pane opens.

3. Select the user group.

4. Click OK.

The User Directories section opens. The respective user directory table lists the user group to which the policy should apply.

## Bind Policies to Organizational Roles

When you bind a policy to an organizational role, users must be a member of the role for the policy to fire.

**Follow these steps:**

1. Navigate to Policy, Users.

2. Locate the group box with the user directory that you want to search, and then click Add Entry.

The User Directory Search Expression Editor opens.

3. Click the Where to Search drop-down list, and then select Search Users.

4. In the Manual Entry field, specify an organizational role.

5. Click OK.

The User Directory Search Expression Editor closes and the organizational role you entered appears in the group box of the directory.

6. Click Submit to save your changes.

The organizational roles are bound to the policy.

## Bind Policies to Group Attributes

To bind a policy to group attributes, specify an LDAP search expression that defines conditions related to group attributes that must be true.

**Follow these steps:**

1. Navigate to Policy, Users.
2. Locate the group box with the user directory that you want to search, and then click Add Entry.

The User Directory Search Expression Editor opens.

3. Click the Where to Search drop-down list, and then select Search Users.
4. In the Manual Entry field, specify a group. For example, to bind a policy to all groups located in the state of Massachusetts in the USA, insert the following search expression in the Manual Entry field:

`(&(c=USA)(s=Massachusetts))`

5. Click OK.

The User Directory Search Expression Editor closes and the group you entered appears in the group box of the directory.

6. Click Submit to save your changes.

**More information:**

[Add an LDAP Expression to a Policy](#) (see page 534)

## Bind Policies to Organization Units

To bind a policy to an organizational unit, specify an LDAP search expression that defines an organizational unit.

**Follow these steps:**

1. Navigate to Policy, Users.
2. Locate the group box with the user directory that you want to search, and then click Add Entry.

The User Directory Search Expression Editor opens.

3. Click the Where to Search drop-down list, and then select Search Organizations.
4. In the Manual Entry field, specify an organization unit. For example, to bind a policy to all people whose organization unit (ou) is marketing, insert the following search expression in the Manual Entry field:

`ou=Marketing`



5. Click OK.

The User Directory Search Expression Editor closes and the user DN you entered appears in the group box of the directory.

6. Click Submit to save your changes.

The organization unit is bound to the policy.

## Bind Policies to Organizations

To bind a policy to an organization, specify an LDAP search expression that defines an organization.

### Follow these steps:

1. Navigate to Policy, Users.
2. Locate the group box with the user directory that you want to search, and then click Add Entry.

The User Directory Search Expression Editor opens.

3. Click the Where to Search drop-down list, and then select Search Organizations.
4. In the Manual Entry field, specify an organization.

For example, to bind a policy to all people whose organization (*o*) is *myorg.org*, insert the following search expression in the Manual Entry field:

`o=myorg.org`

5. Click OK.

The User Directory Search Expression Editor closes and the organization you entered appears in the group box of the directory.

6. Click Submit to save your changes.

The organization is bound to the policy.

## Bind Policies to Organization Attributes

To bind a policy to organization attributes, specify an LDAP search expression that defines conditions that are related to organization attributes that must be true.

### Follow these steps:

1. Navigate to Policy, Users.
2. Locate the group box with the user directory that you want to search, and then click Add Entry.

The User Directory Search Expression Editor opens.

3. Click the Where to Search drop-down list, and then select Search Organizations.

4. In the Manual Entry field, specify an organization attribute. For example, to bind a policy to all organizations located in the state of Massachusetts in the USA, insert the following search expression in the Manual Entry field:

`(&(c=USA)(s=Massachusetts))`

5. Click OK.

The User Directory Search Expression Editor closes and the organization attribute you entered appears in the group box of the directory.

6. Click Submit to save your changes.

The policy is bound to the organization attributes.

**More information:**

[Add an LDAP Expression to a Policy](#) (see page 534)

## Binding Policies to Custom Object Classes

You can bind policies to custom object classes that you create with the CA SiteMinder Software Development Kit.

## Policy Bindings for WinNT User Directories

When CA SiteMinder authenticates a user, it establishes a user context. Then, access control policy decisions are based on the user context matching one of the criteria that are shown in the following table:

| User Namespace | Description                                                            |
|----------------|------------------------------------------------------------------------|
| User           | The user's user name must match the user name specified in the policy. |
| User Group     | The user must be a member of the user group specified in the policy.   |

Generally, you bind users to policies on the Policy pane by selecting an entry from the list of available directory entries. However, individual users are not visible in the list of available directory entries.

**More information:**

[Add Users to a Policy](#) (see page 523)

## Bind Policies to Users with the Manual Entry Field

On the User Directories pane, there are two ways to bind individual users to a policy. You can click Add Members on a user directory group box and use the attribute-value search feature on the Users/Groups pane. Or you can click Add Entry on a user directory group box and use the User Directory Search Expression Editor.

### Follow these steps:

1. Navigate to Policy, Users.  
A list of the user directories that are associated with the domain opens on the User Directories pane.
2. Click Add Entry on a user directory group box.  
The User Directory Search Expression Editor pane opens.
3. Specify a user DN on the Condition and Infix Notation group boxes.
4. Click OK.  
The User Directories pane reopens, and the specified users are added to the user directory group box.
5. Click Submit.  
The Create or Modify Policy task is submitted for processing.

### More information:

[Add Users to a Policy](#) (see page 523)

[Add Users by Manual Entry](#) (see page 532)

## Bind Policies to Users with the Search Feature

On the User Directories pane, there are two ways to bind individual users to a policy. You can click Add Members on a user directory group box and use the attribute-value feature on the Users/Groups pane. Or you can click Add Entry on a user directory group box and use the User Directory Search Expression Editor.

### Follow these steps:

1. Navigate to Policy, Users.  
A list of the user directories that are associated with the domain opens on the User Directories pane.
2. Click Add Members on a user directory group box.  
The Users/Groups pane opens.

3. Specify search criteria, and click Go.

A list of users that match the search criteria opens.

4. Select the users that you want, and click OK.

The User Directories pane reopens, and the selected users are added to the user directory group box.

5. Click Submit.

The Create or Modify Policy task is submitted for processing.

**More information:**

[Search User Directories](#) (see page 213)

[Add Users to a Policy](#) (see page 523)

[Add Users by Manual Entry](#) (see page 532)

## Bind Policies to User Groups

You can bind a policy to a user group.

**Follow these steps:**

1. Navigate to Policy, Users.

A list of the user directories that are associated with the domain opens on the User Directories pane.

2. Click Add Members on a user directory group box.

The Users/Groups pane opens.

3. Select a user group.

4. Click OK.

The User Directories pane reopens, and the selected user group is added to the user directory group box.

**More information:**

[Add Users to a Policy](#) (see page 523)

## Policy Bindings for Microsoft SQL Server and Oracle User Directories

When CA SiteMinder authenticates a user, it establishes a user context. After, access control policy decisions are based on the user context matching one of the criteria that are shown in the following table:

| User Namespace | Description                                                                          |
|----------------|--------------------------------------------------------------------------------------|
| User           | The user's name must match the user name specified in the policy.                    |
| User Group     | The user must be a member of the user group specified in the policy.                 |
| User Attribute | The search expression specifying conditions related to user attributes must be true. |
| SQL query      | The SQL query specifying conditions related to the user must be true.                |

Generally, you would bind users or user attributes to policies on the Policy Users/Groups pane by selecting an entry from the list of available directory entries. However, individual users may not be visible in the list of available directory entries (depending on the setup of Query Enumerate in the SQL query scheme for the user directory).

### More information:

[Add Users to a Policy](#) (see page 523)

## Bind Policies to Users with the Manual Entry Field

On the User Directories pane, there are two ways to bind individual users to a policy. You can click Add Members on a user directory group box and use the attribute-value search feature on the Users/Groups pane. Or you can click Add Entry on a user directory group box and use the User Directory Search Expression Editor.

### Follow these steps:

1. Navigate to Policy, Users.  
A list of the user directories that are associated with the domain opens on the User Directories pane.
2. Click Add Entry on a user directory group box.  
The User Directory Search Expression Editor pane opens.
3. Specify a user DN on the Condition and Infix Notation group boxes.

4. Click OK.

The User Directories pane reopens, and the specified users are added to the user directory group box.

5. Click Submit.

The Create or Modify Policy task is submitted for processing.

**More information:**

[Add Users to a Policy](#) (see page 523)

[Add Users by Manual Entry](#) (see page 532)

## Bind Policies to Users with the Search Feature

On the User Directories pane, there are two ways to bind individual users to a policy. You can click Add Members on a user directory group box and use the attribute-value feature on the Users/Groups pane. Or you can click Add Entry on a user directory group box and use the User Directory Search Expression Editor.

**Follow these steps:**

1. Navigate to Policy, Users.

A list of the user directories that are associated with the domain opens on the User Directories pane.

2. Click Add Members on a user directory group box.

The Users/Groups pane opens.

3. Specify search criteria, and click Go.

A list of users that match the search criteria opens.

4. Select the users that you want, and click OK.

The User Directories pane reopens, and the selected users are added to the user directory group box.

5. Click Submit.

The Create or Modify Policy task is submitted for processing.

**More information:**

[Search User Directories](#) (see page 213)

[Add Users to a Policy](#) (see page 523)

[Add Users by Manual Entry](#) (see page 532)

## Bind Policies to User Groups

You can bind a policy to a user group.

**Follow these steps:**

1. Navigate to Policy, Users.

A list of the user directories that are associated with the domain opens on the User Directories pane.

2. Click Add Members on a user directory group box.

The Users/Groups pane opens.

3. Select a user group.

4. Click OK.

The User Directories pane reopens, and the selected user group is added to the user directory group box.

**More information:**

[Add Users to a Policy](#) (see page 523)

## Bind Policies to User Attributes

To bind policies to user attributes, specify a search expression that defines conditions that are related to user attributes that must be true.

For example, to bind a policy to all people whose area code is 555, insert the following expression in the Manual Entry field: (areacode='555').

## Delete a Policy

When deleting a policy, remember that all of the elements in the policy still exist. Deleting the policy only removes the grouping (or binding) of those elements.

**More information:**

[Manage Policy Server Objects](#) (see page 54)

## Bind Policies to SQL Queries

You can specify a SQL query to bind policies to users.

**Follow these steps:**

1. Navigate to Policy, Users.
2. Locate the group box with the user directory that you want to search, and then click Add Entry.

The User Directory Search Expression Editor opens.

3. Click the Where to Search drop-down list, and then select Search Users.
4. In the Manual Entry field, specify a user DN.

For example: uid=JSmith, ou=people, o=myorg.org

**Note:** The user DN must match exactly the distinguished name of the user. This feature does not match a subset of information that is contained in the user DN.

5. Click OK.

The User Directory Search Expression Editor closes and the user DN you entered appears in the group box of the directory.

6. Click Submit to save your changes.

For example, to bind a policy to all people whose account balance is greater than \$1000, a query could look like the following:

```
SELECT name FROM customers WHERE balance, 1000
```

The contents of the SQL query depend on your database schema.

**More information:**

[How to Configure a Policy](#) (see page 522)

## Policy Processing

The Policy Server uses policies to authorize access to resources and provide entitlements to authorized users. The resources that a policy protects are typically stored in a hierarchy that mimics security, organizational, and business requirements and takes advantage of CA SiteMinder hierarchical or “nested” realms.

**More information:**

[Nested Realms](#) (see page 465)

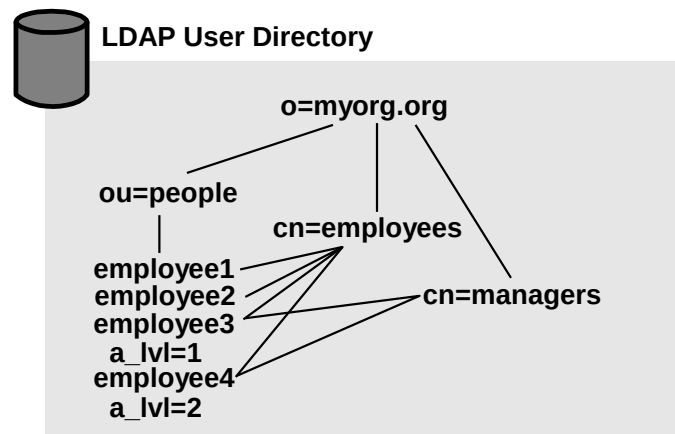


## Sample SiteMinder Configuration with Nested Realms

This section explains the sample configuration that will be used in examples in the remainder of this chapter.

### User Directory

Assume that the policy domain that contains the policies and other relevant Policy Server objects includes a connection to the LDAP user directory in the following diagram.



The sample user directory contains the following elements:

#### **o=myorg.org**

An organization.

#### **ou=people**

An organizational unit that contains information for all employees.

#### **employee<n>**

Directory entries for each employee. Note that `a_lvl` is a user attribute that indicates an access level. In the examples in this section, assume that `employee1` and `employee2` have an access level of zero (`a_lvl=0`).

#### **cn=employees**

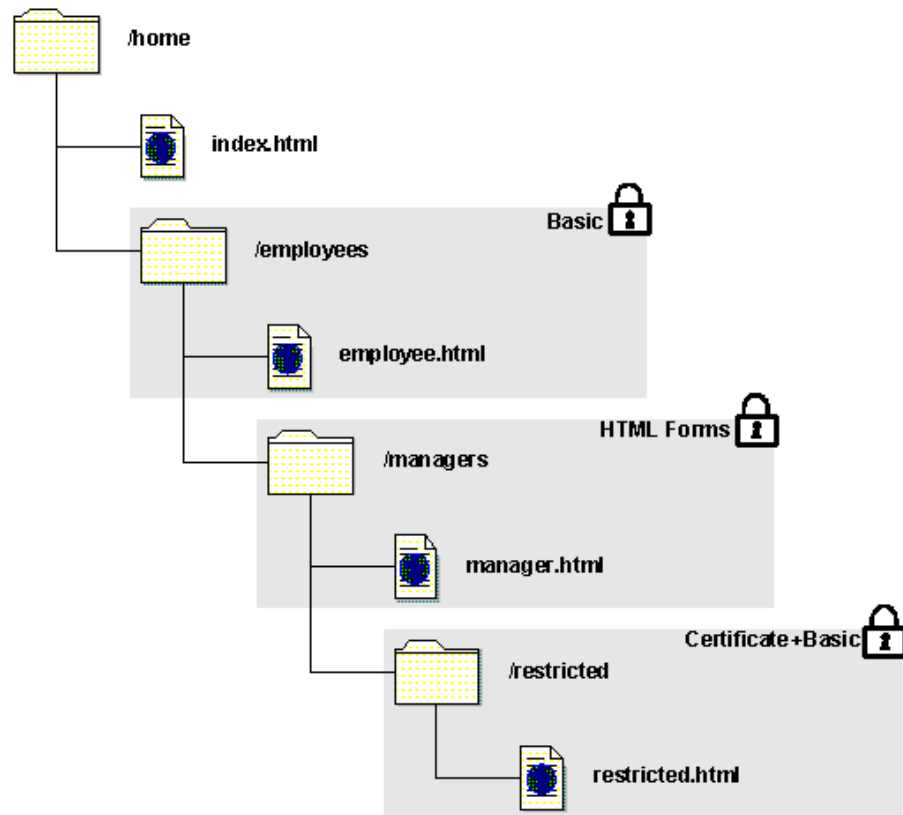
A group that contains all company employees as its members.

#### **cn=managers**

A group that contains all employees with a managerial title as its members. Note that `employee3` and `employee4` are the only employees in this group, and their respective access levels are greater than zero.

## Nested Realms and Resources

The structure of nested realms and resources that are used in the examples in this section are illustrated in the following diagram. The shaded areas indicate realms that are protected by an authentication scheme.



The nested realms are made up of the following directories and resources:

### **/home**

This directory is the top level of the sample nested realm. This realm specifies `/home/` as its resource filter, and contains the unprotected resource of `index.html`. The `index.html` file is not protected by an authentication scheme.

### **/employees**

This directory, contained in the `/home` directory, is protected by a Basic authentication scheme, which requires a user name and password as credentials. The realm that is associated with this directory uses a resource filter of `employees/` and contains the `employee.html` file. The total Resource Filter for this realm is `/home/employees/`.

**/managers**

This directory, contained in the /employees directory, is protected by an HTML Forms authentication scheme which requires a user name, password, and more personal information as credentials. The realm that is associated with this directory uses a resource filter of managers/ and contains the manager.html file. The total Resource Filter for this realm is /home/employees/managers/.

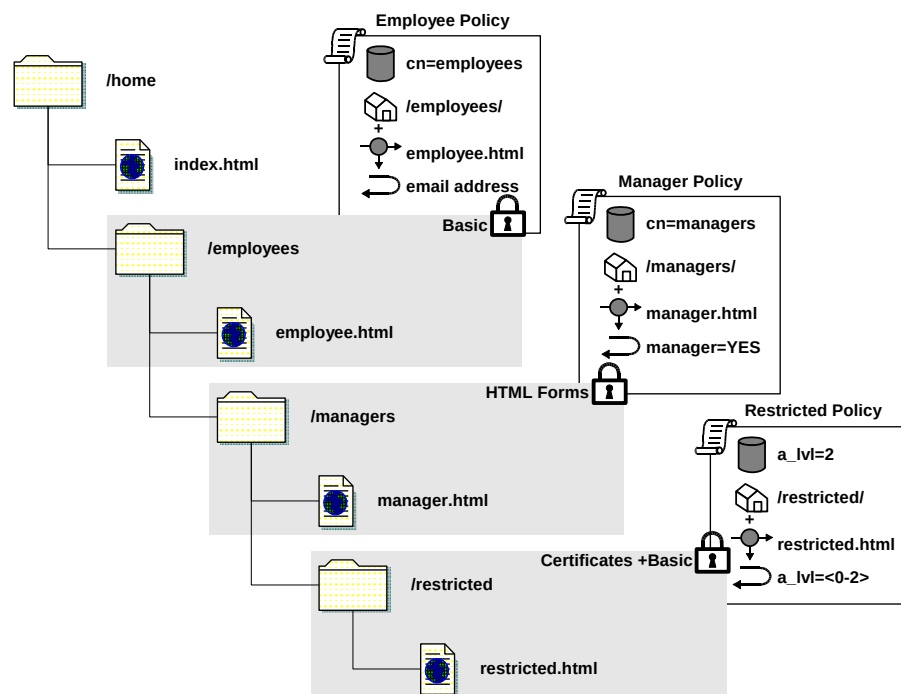
**/restricted**

This directory, contained in the /managers directory, is protected by an X.509 Certificate + Basic authentication scheme which requires user name, password, and a valid X509 certificate as credentials. The realm that is associated with this directory uses a resource filter of restricted/ and contains the restricted.html file. The total Resource Filter for this realm is /home/employees/managers/restricted/.

In these examples, the protection level of the /employees realm is less than the protection level of the /managers realm, which is less than the protection level of the /restricted realm.

## Policies and Responses

The policies and responses that are used in the examples in the remainder of the chapter are illustrated in the following diagram:



The following is a description of each of the sample policies and the objects that are contained in each policy.

### Employee Policy

This policy contains a Get rule that protects the employee.html resource. This resource is located in the /employees realm. The policy binds the user group cn=employees, so that all employees in the LDAP directory can access the resource once they are successfully authenticated. When an authenticated user is authorized by this policy, CA SiteMinder returns a response of the user email address. For example, if employee1 attempts to access /home/employees/employee.html and is successfully authenticated, the Policy Server allows employee1 to access the resource and returns the email address:

employee1@myorg.org

A Web application can use this response for customization when accessing other company resources.

### Manager Policy

This policy contains a Get rule that protects the manager.html resource. This resource is located in the /manager realm. The policy binds the user group cn=managers so that only employees contained in cn=managers group can access the resource once they are successfully authenticated. When an authenticated manager is authorized by this policy, CA SiteMinder returns a static response. In the example, if employee3 attempts to access /home/employees/managers/manager.html and is successfully authenticated, the Policy Server allows employee3 to access the resource and returns the following response:

manager=YES

An application can use this response to activate features that are only available to company managers.

### Restricted Policy

This policy contains a Get rule that protects the restricted.html resource. This resource is located in the /restricted realm. The policy binds only the employees in the directory who have an access level user attribute of two (a\_lvl=2). Managers with the correct access level can access the resource once they are successfully authenticated. When a user attempts to access the restricted.html resource, CA SiteMinder returns a response of a\_lvl=<0-2>. For example, if employee4 attempts to access /home/employees/managers/restricted/restricted.html and is successfully authenticated, the Policy Server allows employee4 to access the resource and returns the following response:

a\_lvl=2

An application can use this response to activate features that are only available employees with an access level of two.

## Authentication Processing for Hierarchical Policies

Policies must contain rules. Rules can include authentication and authorization events. Based on how rules are configured, one of four authentication events can occur when the Policy Server attempts to identify a user based on credentials.

### **OnAuthAccept**

The authentication is successful.

### **OnAuthAttempt**

The authentication fails because the user is not found in any directory in the policy domain's search order.

### **OnAuthReject**

The user *is found in a directory*, but the authentication fails because the credentials supplied by the user are incorrect. If this occurs, the Policy Server looks in the next directory in policy domain's directory search order. If the user's credentials cannot be verified in any of the directories in the search order, the Policy Server processes OnAuthReject events.

The user must be found in a directory for an OnAuthReject rule to fire. If the user is not found in any directory, an OnAuthReject rule will not fire.

### **OnAuthUserNotFound**

The authentication server has a valid session ticket, yet it cannot find the user directory. This situation should only occur in a single sign-on environment that uses multiple directories, though it may take place if a user was idle long enough to be removed from the Agent's cache, and the user was removed from the directory. When this event occurs, the Policy Server evaluates the user's existence in the directory rather than relying on the session ticket.

The Policy Server attempts to authenticate users based on the longest matching realm. For example, if a user attempts to access `/home/employees/managers/manager.html`, the Policy Server uses the `/managers` realms to determine the required credentials. In the example in the previous figure, the user must complete a browser-based form required by the HTML Forms authentication scheme associated with the realm.

**Note:** The longest matching realm also determines the timeouts for the user's session. If a timeout is associated with the realm in which the user successfully authenticated, that timeout is used. You can use responses to override a realm timeout for a specific resource or group of resources.

### **More information:**

[Configure Response Attribute Caching](#) (see page 507)

## Successful Authentications

OnAuthAccept rules fire when all of the following are satisfied:

- A user enters credentials that satisfy the requirements of the longest matching realm.
- The Policy Server finds the user in a user directory.
- The Policy Server verifies the user's credentials.

At this point, the Policy Server collects OnAuthAccept entitlements from the longest matching realm, and any realms above it in the hierarchy of nested realms. In the example in the previous figure, if a user is successfully authenticated for the resource `/home/employees/managers/manager.html`, the Policy Server collects any OnAuthAccept entitlements for the `/managers` realm, then the `/employees` realm, and finally the `/home` realm.

## Rejected Authentication Attempts

Policy domains are configured with a directory search order. When the Policy Server attempts to authenticate a user, it searches each user directory in the search order until it finds the user and verifies the supplied credentials. If the Policy Server locates a user in a directory, but the credentials supplied by the user do not match, the Policy Server looks at the next directory in the search order. If the Policy Server does not find a match for the user in any directory, the user's authentication attempt fails in the context of the realm that contains the requested resource.

For example, if a user attempts to access `/home/employees/managers/manager.html`, and the user is located in a user directory, but fails to provide valid credentials for any directory in the search order, the authentication event fails in the `/managers` realm. The Policy Server then processes any events for a rejected authentication attempt in that realm (OnAuthReject).

### More information:

[Domains and User Membership](#) (see page 454)

## Unsuccessful Authentication Attempts

If the Policy Server cannot find the user who attempts to authenticate in any of the directories in the directory search order, the authentication fails in the context of the realm that contains the requested resource. The Policy Server then processes any events for a failed authentication attempt (OnAuthAttempt).

## Authorization Processing for Hierarchical Policies

Policies can contain rules that allow access to resources and may also include rules that trigger CA SiteMinder events. The possible authorization events include the following:

### **OnAccessAccept**

This type of event occurs when a user is successfully authorized.

### **OnAccessReject**

This type of event occurs when an authenticated user is denied access to a resource.

If a rule does not specify an authorization event, the rule either allows or denies access to the resource.

## Policy Processing for Authorized Users

For the Policy Server to authorize a user to access a resource in a nested realm, the user must be authorized in each realm from the top of the hierarchy to the realm that contains the resource. Once a user is authenticated, the Policy Server checks the policies governing each realm above the resource to make sure the user is authorized. In the previous example, if employee3 wants to access `/home/employees/managers/manager.html`, the Policy Server verifies that employee3 is authorized in `/home`, `/employees`, and finally, `/managers`.

Once the Policy Server determines that the user is authorized, it collects entitlements for the user from each of the nested realms. Next, the Policy Server processes `OnAccessAccept` events starting at the top of the realm hierarchy and moving through the longest matching realm. In the previous example, the responses returned by the Policy Server would include employee3's email address, as well as the static response `manager=YES`.

## Policy Processing for Unauthorized Users

Policy processing for unauthorized users is the same, whether or not the user is explicitly denied access by a policy, or simply not contained in a policy that allows access. Any entitlements collected so far for that user are lost and the Policy Server processes `OnAccessReject` events in the context of the rejecting realm where the requested resource is located.

In the previous example, if employee1, who is not a member of the `cn=managers` group, attempts to access `/home/employees/managers/manager.html`, the Policy Server only processes `OnAccessReject` events for the `/managers` realm.

## Directory Mapping for Hierarchical Policies

In a CA SiteMinder configuration that contains nested realms, each realm may contain a directory mapping which specifies an authorization directory to be used which is different from the authentication directory. This allows companies to use a single directory for authenticating users, while distributing authorization directories throughout an enterprise. When the Policy Server processes entitlements in a group of nested realms, the it checks for directory mappings for each realm in the hierarchy. If there is no directory mapping, the Policy Server uses the authentication directory as the authorization directory.



# Chapter 20: Variables

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This section contains the following topics:

[eTelligent Rules](#) (see page 561)

[Variables Overview](#) (see page 565)

[Web Service Variables](#) (see page 570)

[Create a Variable](#) (see page 574)

## eTelligent Rules

Use eTelligent Rules to define variables that enable fine-grained access-control criteria that are known as policy expressions.

Policy expressions are implemented as policy attributes. They include operators and customer-defined variables that are evaluated at runtime, when a user attempts to access a protected resource on a web site.

Variables can store local information that is within the enterprise or remote information that a web service provides.

The variables that eTelligent Rules provides are available in the Administrative UI. You can define variable objects and can incorporate them into policy logic through policy expressions. You can also include variables in CA SiteMinder response objects.

## Component Requirements for eTelligent Rules

The following components are required to use eTelligent Rules:

- A Web Agent
- (Optional) The Web Agent Option Pack

The Web Agent Option Pack is required only if you plan on using POST variables.

## eTelligent Rules Benefits

eTelligent rules provides the following benefits:

- Reduce complexity and eliminate the need for custom code.

The CA SiteMinder administrator defines authorization access in policy expressions, using graphical tools rather than application code. It is not necessary to integrate and reconcile backend business application access control information, because that information is centralized in the CA SiteMinder Policy Server.

- Use business data dynamically in security policies.

Defining access control to secure resources is based on local user information and incoming information, such as the amount of a purchase order that a user places an order.

- Combine various types of information for authorization decisions.

Web browser forms data, user-context data (stored locally in the Policy Server), and remote data (obtained through a service bureau) can be flexibly combined in policy expressions.

- Make transactional decisions online.

It is not necessary to go back to a backend business application each time authorization is required to access a protected resource.

- Rely on XML-based third-party security data.

eTelligent Rules use a standard XML protocol to communicate with trusted service bureaus, thus increasing the choice of web services providers.

- Use Boolean logic.

CA SiteMinder security administrators define policy expressions using variables together with logical operators.

- Minimize the number of policies required.

Due to the use of policy expressions that are based on logic, fewer policies are necessary, thus keeping policy administration to a minimum.

## How to configure eTelligent Rules

To configure eTelligent Rules, do the following tasks:

1. Configure the following eTelligent Rules properties files:
  - JVMOptions.txt
  - LoggerConfig.properties
2. Configure variables.
3. Configure policy expressions that use the eTelligent Rules variables.

**More information:**

[Policies](#) (see page 517)

[Variables Overview](#) (see page 565)

[eTelligent Rules Properties Files](#) (see page 563)

## eTelligent Rules Properties Files

The following properties files are required for eTelligent Rules:

- **JVMOptions.txt**

This file is required to configure the JVM for eTelligent Rules. The installed location of this file is: *policy\_server\_home/config/*

- **LoggerConfig.properties**

This file is required to configure logging for eTelligent Rules. The installed location of this file is:

*policy\_server\_home/config/properties*

**More information:**

[JVMOptions.txt File](#) (see page 563)

[Modify the LoggerConfig.properties File](#) (see page 564)

## JVMOptions.txt File

The JVMOptions.txt file contains the settings that the Policy Server uses when creating the Java Virtual Machine that is used to support eTelligent Rules.

If you encounter errors that are related to missing classes, you can modify the classpath directive in the JVMOptions.txt file. For complete information about the settings that are contained in the JVMOptions.txt file, see your Java documentation.

## Modify the LoggerConfig.properties File

On the Policy Server, the LoggerConfig.properties file allows you to specify logging features that are used when you start the SiteMinder service from a command line. The properties that are contained in this file are not used when the service is started from the Policy Server Management Console. Modify this file to obtain more output for debugging purposes.

The following shows an example of a LoggerConfig.properties file.

```
// LoggingOn can be Y, N
LoggingOn=Y

// LogLevel can be one of LOG_LEVEL_NONE, LOG_LEVEL_ERROR,
LOG_LEVEL_INFO, LOG_LEVEL_TRACE
LogLevel=LOG_LEVEL_TRACE

// If LogFileName is set Log output will go to the file named
LogFileName=affwebserv.log

// AppendLog can be Y, N. Y means append output to LogFileName if
specified
AppendLog=Y

// AlwaysWriteToSystemStreams can be Y, N.
// Y means log messages are written to System.out
// or System.err regardless of what the logger streams are
// set to. If the logger streams are set to System.out
// or System.err log messages will be written multiple times.
// This facilitates logging messages to System.out/System.err
// and a file simultaneously.
AlwaysWriteToSystemStreams=N

// DateFormatPattern can be any valid input to java.text.DateFormat
constructor.
// See the Java documentation for java.text.DateFormat for details
// If not specified, the default format for the default locale is used
DateFormatPattern=MMM d, yyyy h:mm:ss.S a
```

The settings in this file are:

### **LoggingOn**

Enables or disables logging. Set this parameter to Y to enable logging. Set this parameter to N to disable logging.

**LogLevel**

Indicates the level of detail that is contained in logs. The LogLevel can be one of the following values:

**LOG\_LEVEL\_NONE**

No messages are logged.

**LOG\_LEVEL\_ERROR**

Only records error messages.

**LOG\_LEVEL\_INFO**

Records error messages and warnings.

**LOG\_LEVEL\_TRACE**

Records error messages, warnings, and general processing information that is useful for tracking problems.

**LogFileName**

If LogFileName is set, all log output goes to the file named in this parameter.

**AppendLog**

Indicates whether logging information is appended to an existing file at startup or if a new file is created at startup. To append output to the file specified in the LogFileName parameter, set this parameter to Y. To create a new file at startup, set this parameter to N.

**AlwaysWriteToSystemStreams**

To log messages to System.out or System.err regardless of what the logger streams are set to, set this parameter to Y. If the logger streams are set to System.out or System.err, log messages are written multiple times. This facilitates logging messages to System.out/System.err and a file simultaneously.

**DateFormatPattern**

DateFormatPattern can be any valid input to java.text.DateFormat constructor. See the Java documentation for java.text.DateFormat for details.

If not specified, the default format for the default locale is used.

## Variables Overview

The Policy Server resolves variable objects to a value which you can incorporate into the authorization phase of a request. The value of a variable object is the result of dynamic data and is evaluated at runtime. Variables provide a flexible tool for expanding the capabilities of policies and responses.

## Variable Types

The following types of variables are available:

- [Static Variables](#) (see page 566)
- [Request Context Variables](#) (see page 566)
- [User Context Variables](#) (see page 567)
- [Form Post Variables](#) (see page 567)
- [Web Services Variables](#) (see page 567)

### Static Variables

Static variables consist of a simple name/value pair of a particular type, such as string, boolean, and others. The key benefit of a static variable is to implement good programming practices. Instead of repeating the value of a constant each time it's used in a policy, a static variable provides a single piece of data that can be used throughout multiple policies.

### Request Context Variables

Each request that is processed establishes a request context. This context identifies the following properties:

**Action**

Indicates the type of action that is specified in the request, such as GET or POST.

**Resource**

Indicates the requested resource, such as /directory\_name/.

**Server**

Indicates the full server name that is specified in the request, such as server.example.com.

A request context variable can capture any of this information and can make it available for inclusion in a policy expression or response. The key benefit of this type of variable is to provide fine-grained request context information without any programming logic.

## User Context Variables

When the Policy Server authenticates a user against an entry in a directory, a user context is created. The user context consists of information about the user directory and the contents of the directory that pertain to the authenticated user.

User context variables can be based on an attribute of a directory connection, or based on the contents of the directory. The key benefit of this type of variable is to provide flexibility in defining rules that are based on particular user context without any programming logic.

## Form Post Variables

HTML forms are often used to collect information that back-end applications require. Form Post variables can be used to capture any information that is entered in an HTML form and POSTed. For example, if the business logic associated with an application requires a purchase order amount that is specified on an HTML login form, create a Form Post variable object to collect the value of the purchase order that the user supplies. The variable can then be used in policies.

**Important:** EJB and Servlet Agents do not support Form Post variables. Do not use Form Post variables in policies that are enforced by EJB or Servlet Agents.

The key benefit of this type of variable is that it allows the Policy Server to use POST data as a part of a policy expression rather than forcing enterprises to build security logic into HTML forms. HTML forms are often used to collect information that back-end applications require. Form Post variables can be used to capture any information that is entered in an HTML form and POSTed. For example, if the business logic associated with an application requires a purchase order amount that is specified on an HTML login form, create a Form Post variable object to collect the value of the purchase order that the user supplies. The variable can then be used in policies. server applications. Using HTTP POST variables results in efficient network usage between Agents and Policy Servers. The Agent extracts the HTTP variable information from the HTTP stream so that the information can be used during authorization processing by the Policy Server.

## Web Services Variables

Web Services variables can be used to capture information retrieved from a Web Service for use in policies or responses. The key benefit of this type of variable is to allow a Policy Server administrator to define a policy based on the dynamic customer information provided in real time by a Web Service.

### More information:

[Web Service Variables](#) (see page 570)

## Variable Use in Policies

Variables allow you to include business logic in policies by capturing a wide range of dynamic data that can be built into policy expressions. When you define variable objects in the Administrative UI, you can use those variables in expressions in the Policy dialog on the Expression tab. You can build expressions that use multiple variable objects and boolean operators to capture complex business logic in your policies.

For example, a policy can contain an expression that requires the value of a user account type and a credit score to allow access to an application. An expression can be defined in the policy so that only users whose account type is “gold”, and whose credit score is greater than a specific value can have access to a resource. This example requires two variables, which must be combined in an expression.

### **More information:**

[Expressions in Policies](#) (see page 520)

## Variable Use in Responses

Variables can be used in responses. When you define variable objects in the Administrative UI, you can use those variables in responses. The value of the response is created at runtime by the Policy Server as it resolves the value of a variable object.

## How the Policy Server Processes Variables

Variables are evaluated when the Policy Server processes an authorization for a request and determines that a user is authorized for the requested resource. The details of variable processing are slightly different based on whether the variable objects are contained in a response or in a policy expression.

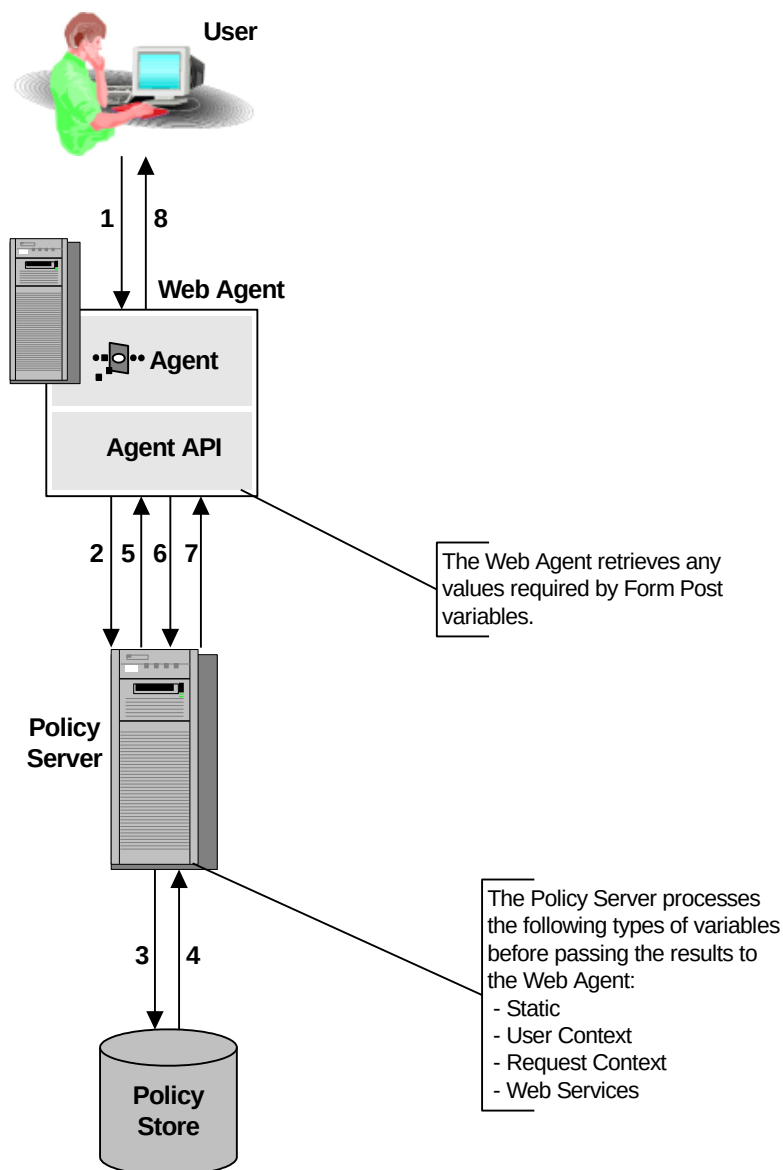
### How the Policy Server Processes Variables Contained in Policy Expressions

As part of policy evaluation, the variables contained in a policy expression are placed in an unresolved variable list during the authorization of a request. As the Policy Server resolves variables, they are moved to a resolved variables list. When all variables in a policy expression have been resolved, the Policy Server grants or denies access based on the entire policy.

The following figure illustrates how the authorization of a user’s request is processed by a Web Agent and the Policy Server when the policy for the requested resource contains variables. This diagram does not include Web Service variables.



**Note:** The process in the following figure assumes that the user has already been authenticated by CA SiteMinder. For unauthenticated users, the authentication process must occur before the authorization.



1. The user requests a resource from a server that is protected by a CA SiteMinder Web Agent.
2. The Agent verifies that the resource is protected and the Policy Server begins authorization processing.
3. The Policy Server retrieves policy information from the Policy Store about the requested resource.

4. The Policy Server receives a list of unresolved variables contained in the policy expression associated with the requested resource. The Policy Server evaluates static, user context, and request context variables contained in the unresolved variables list.
5. If all variables and variable expressions have been resolved, the Policy Server indicates to the Web Agent whether or not the user may access the requested resource.
6. If the unresolved variables list still contains unresolved variables, the list is passed to the Agent API layer with a Not Resolved indicator. The values of any Form Post variables are resolved by the Web Agent and passed to the Policy Server in a new request that includes the Form Post variable value in the resolved variables list.
7. If the policy contained Form Post variables, the Policy Server processes the policy with the newly resolved values extracted from the POST data.
8. The user is either allowed or denied access to the requested resource.

**More information:**

[Web Service Variables](#) (see page 570)

### How the Policy Server Processes Variables contained in Responses

CA SiteMinder processes variables contained in responses as described in the previous section. Since Form Post variables cannot be used for responses, all variables are resolved by the time a response fires at the Policy Server.

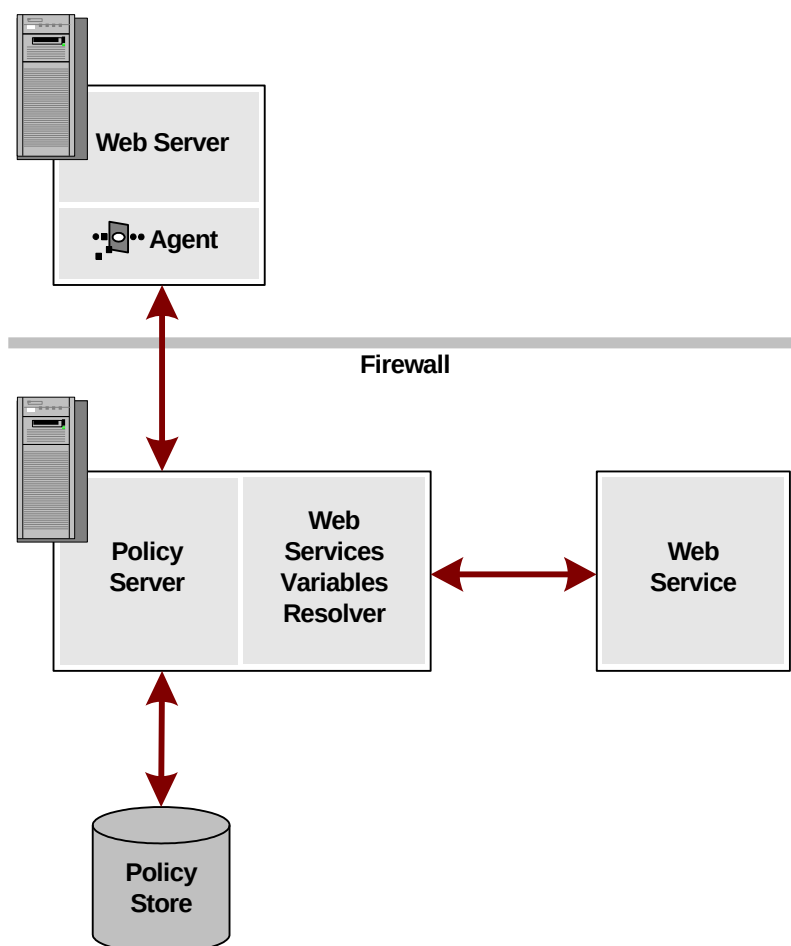
## Web Service Variables

Web service variables provide a method for including dynamic data from a web service in a CA SiteMinder policy. Web service variables are resolved by calling a web service. The Policy Server sends a SOAP request document, as specified in the web service variable definition, and receives a SOAP response document as a reply. The Policy Server extracts the value of the web services variable from the SOAP response document.

The Simple Object Access Protocol (SOAP) is a lightweight, XML-based protocol that consists of three parts:

- An envelope that defines a framework for describing message contents and how to process it.
- A set of encoding rules for expressing instances of application-defined data types.
- A convention for representing remote procedure calls and responses.

The following figure shows how a CA SiteMinder deployment resolves a web services variable for a web service inside an Intranet. The web service is on the same side of the firewall as the Policy Server.



In this scenario, if a Web Service variable is associated with an authorization request, it is resolved on the Policy Server side by calling the Web Service Variables Resolver. The Web Service Variables Resolver runs in the same process space.

When defining the Web Service variable, the user specifies the SOAP document to send to the Web Service, the authentication credentials, and other parameters.

The resolver sends the specified SOAP document to the web service, extracts the value of the variable from the response and forwards it to the Policy Server to complete the authorization request.

Even if there is a firewall between the Policy Server and the web service, it can be configured to allow communication between the two. The Policy Server issues the request and reads the response, so the firewall is only required to allow outbound requests from the Policy Server to the web service.

A secure SSL connection can be configured between the Policy Server and the web service to allow for the inbound responses to come from the Web Service to the Policy Server. The SSL connection uses the server-side certificates on the web service and a list of trusted certificate authorities that are configured on the Policy Server side.

### Component Requirements for Web Service Variables

Web service variables require a session store.

**Note:** More information about configuring a session store, see the *Policy Server Installation Guide*. For more information about upgrading a session store, see the *CA SiteMinder Upgrade Guide*.

### Security Requirements When Resolving Web Services Variables

Security for Web Services Variables requires an SSL connection between the Policy Server and the Web Service. You can also include a WS-Security header with a username token that the Web Service has been configured to recognize. WS-Security is a standard set of SOAP extensions that provides security token propagation, message integrity, and confidentiality through signing and encryption.

For a secure resolution of a Web Services Variable:

- The Policy Server must make a SOAP request to a Web Service on behalf of a known identity (a Web Service account). The model is similar to the model that CA SiteMinder uses to access attributes in a user directory.
- The WS-Security header containing the Web Services credentials can be configured to include a base-64-encoded SHA-1 digest of the password.
- A Web Service variable can be configured to use an SSL connection with a server-side certificate, which means that the Policy Server must be configured with the list of trusted CAs.

**Note:** For SSL connections, configure server-side certificates for the Web Service. Configure a list of trusted CAs on the Policy Server. To configure trusted CAs, use the certificate data store described in *Certificate Authorities and Web Services Variables*.

## Configure the Web Service Variable Resolver

For the Policy Server to resolve a Web Service variable, configure the Web Service Variable Resolver to connect to the web service. There are two categories of web service connections:

- Both the Policy Server and the web service are on the same side of a firewall.
- A firewall exists between the Policy Server and the web service, but it is configured to allow one-way communication between the two (outbound requests from the Policy Server to the web service).

Before being able to use the Web Service Variables functionality, the Policy Server must be configured with a list of trusted CAs, using the SmKeyTool command-line utility. If several Policy Servers are used in a load balancing or failover configuration, each of them must be configured with the same list of trusted CAs.

Default configuration settings are provided in the WebServiceConfig.properties file in the SiteMinder/Config/properties directory. You can modify these properties.

## Sample WebServiceConfig.properties Configuration File

```
# Netegrity Web Service Variable Resolver properties configuration file:
# This file must be in the classpath that is used when the policy server runs.
# ResolutionTimeout is the amount of time the resolver will at most wait to resolve
# all Web Service variables related to a given request.
#
# This setting is intended to end sessions that are waiting on a web service that is
# not responding. The time that the Web Agent will typically wait before responding is
# typically 60 sec (but may be changed # in the future), which means this setting should
# be 60000 or greater to cancel transactions that cannot be returned.
ResolutionTimeout=75000
# MaxThreadCount is the maximal number of active threads running within the Web Service
# variables resolver.
MaxThreadCount=10
```

## Certificate Authorities and Web Services Variables

To use SSL connections when resolving web services variables, configure a list of trusted Certificate Authorities (CAs). The Policy Server uses the CAs when it establishes a connection to a Web Service.

To configure the list in the certificate data store, use the Administrative UI.

## Create a Variable

You create a variable to make it available for use in policies or responses. Variables are domain objects. You create them within a specific policy domain, or import them into a domain using the smobjimport tool.

More information about importing objects into policy domains exists in the *Policy Server Administration* guide.

**More information:**

[Domains](#) (see page 453)

## Create a Static Variable

You can create a static variable to make it available for use in policies or responses.

**Note:** The value of the resolved variable must not be greater than 1 K.

**Follow these steps:**

1. Click Policies, Domain.
2. Click Variables.
3. Click Create Variable.

Verify that the Create a new object of type Variable option is selected.

4. Click OK.
5. Select a domain from the list and click Next.
6. Type the variable name in the Name field.
7. Select Static from the Variable Type list.

Static variable settings open.

**Note:** Click Help for descriptions of settings and controls, including their respective requirements and limits.

8. Specify the data type and value of the variable in Variable Information.
9. Click Submit.

The variable appears in the Variables tab of the domain. The variable can now be used in policy expressions or responses.

## Create a Request Context Variable

You can create a request context variable to make it available for use in policies or responses.

**Note:** The value of the resolved variable must not be greater than 1 K.

**Follow these steps:**

1. Click Policies, Domain.
2. Click Variables.
3. Click Create Variable.

Verify that the Create a new object of type Variable option is selected.

4. Click OK.
5. Select a domain from the list and click Next.
6. Type the variable name in the Name field.

**Note:** Request Context variable names must begin with the percent character (%).

**Example:** %REQUEST\_ACTION

7. Select Request Context from the Variable Type list.  
Request context settings open.
8. Select the variable value from the Property list.
9. Click OK.

The variable appears in the Variables tab of the domain. The variable can now be used in policy expressions or responses.

## Create a User Context Variable

You create a user context variable to make it available for use in policies or responses.

**Note:** The value of the resolved variable must not be greater than 1 K.

**Follow these steps:**

1. Click Policies, Domain.
2. Click Variables.
3. Click Create Variable.

Verify that the Create a new object of type Variable option is selected.

4. Click OK.
5. Select a domain from the list and click Next.

6. Type the variable name in the Name field.

**Note:** User Context variable names must begin with the percent character (%).

**Example:** %SM\_USERPATH

7. Select User Context from the Variable Type list.

User context settings open.

8. Select the portion of the user context that provides the value of the variable from the Item list.

9. (Required for Session Variable) Specify the type of data that is represented by the variable (Boolean, Number, String, or Date) in the Return Type field.

For other Item list selections, the Return Type value is preset as String or Boolean as appropriate and not user-configurable.

10. (Required for User Property, Directory Entry, and Session Variable) Enter the name of the directory or user attribute that provides the variable value in the Property field.

11. (Required for User Property, Directory Entry, and Session Variable) Enter the size of the buffer (in bytes) that is to store the variable in the Buffer field.

12. (Required for Directory Entry) Enter the distinguished name of the directory entry in the DN field.

13. Click Submit.

The variable appears in the Variables tab of the domain. The variable can now be used in policy expressions or responses.

## Create a Form Post Variable

You can create a Form Post variable to make it available for use in policies.

**Note:** The value of the resolved variable must not be greater than 1 K.

### Follow these steps:

1. Click Policies, Domain.
2. Click Variables.
3. Click Create Variable.

Verify that the Create a new object of type Variable option is selected.

4. Click OK.
5. Select a domain from the list and click Next.
6. Type the variable name in the Name field.



7. Select Post from the Variable Type list.

Form post settings open.

8. Enter the name of the POST variable that is contained in the form in the Form Field Name field.
9. Click OK.

The variable appears in the Variables tab of the domain. The variable can now be used in policy expressions.

## Create a Web Services Variable

You create a Web Services variable to make it available for use in policies or responses.

**Note:** The value of the resolved variable must not be greater than 1 K.

**Follow these steps:**

1. Click Policies, Domain.
2. Click Variables.
3. Click Create Variable.  
Verify that the Create a new object of type Variable option is selected.
4. Click OK.
5. Select a domain from the list and click Next.
6. Type the variable name in the Name field.
7. Select Web Service from the Variable Type list.  
Web Service settings appear.
8. Select the data type from the Return Type list.
9. Type the web service URL in the URL field.
10. Type the XPath query in the XPath field.

**Note:** The Policy Server uses this query to extract the value of the Web Service variable from the SOAP document that is returned by the Web Service.

11. (Optional) Select the Require Credentials option in Web Service Credentials and specify the user name and password that the Policy Server is to use when connecting to the web service.
12. (Optional) Click the following button in the SOAP Document section to add existing variables to the SOAP message:

Variable

13. (Optional) Click Add in HTTP Headers to associate an HTTP header with the Web Service variable.

14. Click Finish.

The variable appears on the Variables tab of the domain and can now be used in policy expressions or responses.

# Chapter 21: Key and Certificate Management

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## Certificate and Private Key Usage

Private keys and certificates are required for the following tasks:

- Federation components use private key/certificate pairs for signing, verification, encryption, and decryption of entire assertions, or specific assertion content.
- Federation components employ client certificates for back-channel authentication for artifact single sign-on.
- For establishing SSL connections (SSL server certificates).

Private key/certificate pairs and single certificates for federation functions are stored in the certificate data store (CDS). The certificate data store is collocated with the policy store. All Policy Servers that share a common view into the same policy store have access to the same keys, certificates, CDS-configured certificate revocation lists (CRL), and OCSP responders.

SSL server certificates are stored on the web server where they are installed. SSL server certificates are not stored in the certificate data store.

Each key/certificate pair, client certificate, and trusted certificate in the certificate data store must have a unique alias. The alias allows any private key/certificate pair or single certificate in the certificate store can to be uniquely referenced. The certificate data store can store multiple key/certificate pairs and single certificates. In a federated environment, you can have multiple partners. For multiple partners, you can use a different pair for each partner.

If a signing alias is configured for signing assertions, the assertion generator uses the key that is associated with that alias to sign assertions. If no signing alias is configured, the assertion generator uses the key with the *defaultenterpriseprivatekey* alias to sign assertions. If the assertion generator does not find a default enterprise private key, it uses the first private key it finds to sign assertions.

**Important!** If you are going to store multiple keys, define the first key that you add with the *defaultenterpriseprivatekey* alias before adding subsequent keys.

A given Policy Server can sign or sign and verify responses. You can add keys and certificates for signing and validation to the same certificate data store.

You manage the contents of the certificate data store using the Administrative UI.

The following types of key/certificate pairs and single certificates are stored in the certificate data store:

| Function                                                                                  | Private Key/Cert Pair | Certificate (public key) | CA Certificates | Client Certificate |
|-------------------------------------------------------------------------------------------|-----------------------|--------------------------|-----------------|--------------------|
| Signs assertions, authentication requests, SLO requests and responses                     | X                     |                          |                 |                    |
| Verifies signed assertions, authentication requests, and SLO requests/responses           |                       | X                        |                 |                    |
| Encrypts assertions, Name ID and attributes (SAML 2.0 only)                               |                       | X                        |                 |                    |
| Decrypts assertions, Name ID and attributes (SAML 2.0)                                    | X                     |                          |                 |                    |
| Serves as a credential for client certificate authentication of the artifact back channel |                       |                          |                 | X                  |
| Validates other certificates and certificate revocation lists                             |                       |                          | X               |                    |
| Use SSL connections to resolve web services variables                                     |                       |                          | X               |                    |

**More information:**

[Signing and Verification Operations](#) (see page 581)

[Encryption/Decryption Operation](#) (see page 581)

[Certificates for SSL Connections](#) (see page 581)

## Signing and Verification Operations

The Policy Server uses a private key/certificate pair for signing and verification tasks. The private key/certificate pair signs the assertion, the assertion response, or authentication request. The specific message that is signed depends on the transaction taking place and the federation profile in use.

Before any signing transaction, the partner signing the assertion sends the certificate (public key) associated with the private key/certificate pair to the partner. This exchange is done as part of an out-of-band communication. The partner uses the certificate to verify the signature.

When a transaction occurs, the asserting party includes the certificate in the assertion, by default. During the verification process, however, the partner uses the certificate that it stores at its site to validate the signature.

For SAML 2.0 single logout, the side that initiates the logout signs the request, and the side receiving the request validates the signature. Conversely, the receiving side signs the SLO response and the initiator validates the response.

## Encryption/Decryption Operation

For SAML 2.0, you can configure CA SiteMinder to encrypt an entire assertion, the NameID, or other attributes. If you enable encryption, the asserting party uses the certificate (public key) the relying party sends to encrypt data. Before any transaction, the relying party sends the certificate to the asserting party in an out-of-band exchange. The relying party uses the private key/certificate pair to decrypt the data.

**Note:** SAML 1.1 does not support encryption of assertion data.

## Certificates for SSL Connections

The Policy Server uses SSL connections in the following ways:

- For federated communication.

You can enable SSL for the SAML HTTP-Artifact back channel or for general federated communication. Establishing the SSL connection requires the relying party to associate the CA certificate with the signed SSL server certificate.

The SSL server certificate secures the SSL connection. The CA certificate verifies that the SSL server certificate is trusted.

- For ICAS

You enable an SSL connection to protect the forms credential collector file at the relying party. Import the SSL server certificate from the relying party website into the certificate data store. The server certificate secures the SSL connection.

- For web services variables.

You can enable SSL connections for resolving web services variables.

**Note:** SSL server certificates are stored on the web server where they are installed. SSL server certificates are not stored in the certificate data store.

## Certificates To Secure the Artifact Back Channel

To implement single sign-on using the artifact binding, the relying party sends a request for an assertion to CA SiteMinder at the asserting party. The assertion request goes to the Assertion Retrieval Service (SAML 1.1) or the Artifact Resolution Service (SAML 2.0). The retrieval service takes the artifact supplied by the relying party and uses it to retrieve the assertion. CA SiteMinder sends the response back to the relying party over a back channel. The back channel is a secured connection between the asserting and relying party. In contrast, web browser communication occurs over the front channel.

Secure the back channel and the retrieval service from unauthorized access using one of the following authentication methods:

- Basic
- Basic over SSL
- X.509 Client Certificate

If you use X.509 client certificate as the authentication method, the relying party must provide a client certificate as its credential. This credential lets the relying party gain access to the service at the asserting party that retrieves the assertion.

Consider the following items when choosing an authentication method:

- Consider using an SSL connection for the back channel. Secure the SSL connection with an SSL server certificate signed by a trusted CA.

A default set of common root and intermediate CA certificates are shipped with the certificate data store. To use another server certificate signed by a CA, import the CA certificate into the store as a trusted CA certificate.

Federation uses an SSL-client when processing back channel requests. You can configure the web server at the asserting party to use SSL versions TLSV1\_1 and TLSV1\_2 with the following ciphers:

- RSA\_With\_AES\_128\_CBC\_SHA256
- RSA\_With\_AES\_256\_CBC\_SHA256

These ciphers are supported in both FIPS and non-FIPS mode. The determination whether to use SHA256 is made on the SP server side. Federation has no configuration for selecting the algorithm. Administrators must verify that the server at the asserting party is configured appropriately.

- If an X.509 client certificate is required to establish a connection, the relying party must have the key/certificate pair or client certificate authentication fails. Verify that the client certificate exists in the certificate data store at the asserting party. When the relying party sends the request for the assertion, the client certificate serves as the relying party credentials to access the retrieval service.

## Check Certificate Validity with CRLs

A Certificate Revocation List (CRL) is issued by a Certificate Authority to its subscribers. The list contains serial numbers of certificates that are invalid or have been revoked. When a request to access a server is received, the server allows or denies access based on the CRL.

Federation can leverage CRLs for its certificate functions. For CA SiteMinder to use a CRL, the certificate data store must point to a current CRL. If CA SiteMinder tries using a revoked partner certificate, you see an error message. For eTrust SiteMinder FSS, the error message is in the SAML assertion. The message indicates that authentication failed.

**Note:** Federation features implement the use of CRLs differently than X.509 authentication schemes. The authentication schemes use an independent LDAP directory that stores CRLs. The authentication schemes do not use the certificate data store.

CA SiteMinder supports the following CRL features:

- File-based CRLs or LDAP CRLs

CA SiteMinder stores CRLs in the certificate data store. File-based CRLs must be in Base64 or binary encoding. LDAP CRLs must be in binary encoding. Additionally, LDAP CRLs must include CRL data in one of the following attributes:

- `certificateRevocationList;binary`
- `authorityRevocationList;binary`

When a Certificate Authority publishes an LDAP CRL, it must return the CRL data in binary format, in accordance with RFC4522 and RFC4523. Otherwise, CA SiteMinder cannot use it.

- PEM and DER encoding formats for a file CRL
- DER encoding format for an LDAP CRL

CA SiteMinder does not validate an SSL server certificate against a CRL. The web server where the CA SiteMinder web agent is installed manages the SSL server certificate.

You are not required to have a CRL for each root CA in the system. If there is no CRL for the root CA, it is assumed that all certificates signed by that CA are trusted certificates.

## Add a CRL for Certificate Management

Help ensure that only valid certificates are used for PKI functions by using CRLs. Verify the validity of certificates against a CRL.

**Important!** CA SiteMinder explicitly requests LDAP CRLs in binary encoding. Additionally, CRL data must be stored in the LDAP attribute named *certificateRevocationList;binary* or *authorityRevocationList;binary*. When a Certificate Authority (CA) publishes an LDAP CRL, it must return the CRL data in binary format, in accordance with RFC4522 and RFC4523. Otherwise, CA SiteMinder cannot use it.

The CRL location is required to use a CRL.

### Follow these steps:

1. Log in to the Administrative UI.
2. Select Infrastructure, X509 Certificate Management, Certificate Validity.
3. Click Add.  
The Configure Revocation List dialog opens.
4. Specify an alias for the CRL and the location (URL) of the certificate revocation list.  
The location has to be a file path for a file CRL and an LDAP search path for an LDAP CRL.
5. Click Save.

The CRL is added to the certificate data store.

## Update a CRL

Update a CRL to verify that the certificate data in use is current.

### Follow these steps:

1. Log in to the Administrative UI.
2. Select Infrastructure, X509 Certificate Management, Certificate Validity.



3. Delete a CRL from the list.
4. Do one of the following steps to add a CRL:
  - Click Add and complete the settings for the new CRL file or LDAP location. Click Save.
  - Navigate back to the Certificate Management dialog. Specify a value for the Default CRL Update Period setting. At the time of the next CRL update, the certificate data store automatically goes to the configured file or LDAP location and reloads the CRL.

## Check Certificate Validity with OCSP

Some features require certificate validation for certificates in the certificate data store. In [insert SiteMinder version number], federation features use the certificate data store. These features include protecting the HTTP-Artifact back channel, verifying SAML messages, and encrypting SAML messages.

To check the validity of certificates, the certificate data store can use an OCSP service. OCSP uses an HTTP service that a Certificate Authority (CA) provides to supply certificate validation on demand.

**Note:** Federation features implement the use of OCSP differently than X.509 authentication schemes. The authentication schemes use an independent LDAP directory to store OCSP responder certificates. The authentication schemes do not use the certificate data store.

By default, the revocation status of a certificate in the certificate data store is not checked. To check the revocation status through an OCSP responder, use the OCSP updater utility (OCSPUpdater). When enabled, the OCSPUpdater checks the revocation status for configured OCSP responders every 5 minutes. This default frequency is configurable.

Configuration of the OCSPUpdater relies on the following components:

- SMocsp.conf File

The OCSPUpdater uses the SMocsp.conf file for OCSP responder configuration. Each Certificate Authority (CA) that issues certificates has its own OCSP responder. In the SMocsp.conf file, include every OCSP responder for each CA certificate in the certificate data store.

An SMocsp.conf file must exist to use the OCSPUpdater.

**Note:** The SMocsp.conf file is the same file that the X.509 certificate authentication scheme uses to configure its own OCSP implementation.

- XPSConfig utility

XPSConfig lets you customize the behavior of the OCSPUpdater, such as enabling it and setting the frequency of updates. The customization is local to the Policy Server running the OCSPUpdater. Enable an OCSPUpdater on only one Policy Server in a deployment.

## Failover Between OCSP and CRL Checking

The certificate data store supports failover from OCSP to CRL validation. If you configure CRLs and OCSP checking, you can enable failover between the two.

Federation features do not support certificate distribution point extensions with failover configured, even if the extensions are in a certificate.

**More information:**

[Certificate Validity Checking for X.509 Client Certificate Authentication](#) (see page 370)

## Formats Supported by the Certificate Data Store

The certificate data store supports the following formats:

- Private keys are supported in the following format and must be DER or PEM encoded:
  - PKCS1
  - PKCS5
  - PKCS8
  - PKCS12

Only RSA keys are supported.

- Public certificates are supported in the following X.509 certificate format:
  - V1
  - V2
  - V3
- Public certificates are supported in the following encoding formats:
  - DER
  - Base64
  - PEM

## Import Trusted Certificates and Key/Certificate Pairs

Key/certificate pairs and trusted certificates affect a number of federated SSO and other functions. To execute tasks that use keys and certificates, these items must be in the certificate data store.

If you do not have a key/certificate pair in the certificate data store, you have two options:

- Import a key/certificate pair from an existing file (.p12 or .pfx).
- Generate a key/certificate pair.

To generate a new key/certificate pair, request a certificate from a trusted Certificate Authority and then import the signed certificate response that the authority returns.

### More information:

[Certificate and Private Key Usage](#) (see page 579)

[Import a Key/Certificate Pair from an Existing File](#) (see page 587)

[How to Generate a Key/Certificate Pair](#) (see page 588)

## Import a Key/Certificate Pair from an Existing File

If you do not have a key/certificate pair in the certificate data store, import one from an existing .p12 or .pfx file.

The Policy Server treats an imported certificate as a trusted certificate. The exceptions are self-signed certificates, which get treated according to the following guidelines:

- The Policy Server identifies a V3 self-signed certificate as a CA certificate. In this case, it treats it as a CA certificate. This behavior occurs even though you initiate the import from the Certificate/Private Key dialog.

- The Policy Server treats the certificate as a trusted certificate when:
  - The Policy Server does not identify a V3 self–signed certificate as a CA.
  - The certificate is a V1 self–signed certificate.

**Follow these steps:**

1. Log in to the Administrative UI.
2. Select Infrastructure, X509 Certificate Management, Trusted Certificates and Private Keys.
3. Click Import New and follow the wizard.
4. Be aware of the following items as you complete the wizard:
  - You can import a single file with a key and certificate in it or separate key and certificate files. Select the appropriate option button for the file you are using.
  - To import a self-signed certificate as a Certificate Authority certificate, set the Use as CA option button to Yes. The certificate is imported as a CA certificate and is not available for when configuring partnerships (for example, for signing or encryption).

Otherwise, accept the default No setting to import the certificate as a trusted certificate that is available when configuring partnerships.
  - For a trusted certificate file in DER (binary) format, the file can contain one or more certificate entries. For a trusted certificate file in PEM (base 64) format, expects one certificate per file is required.
  - If you are using a .p12 file, you are required to fill in a password.
  - For each entry you plan to add to the certificate data store, enter the alias you want to associate with that entry. If you select multiple entries, each requires a unique alias.
5. At the Confirm step, review the information and click Finish.

The key/certificate pair is imported into the certificate data store.

## How to Generate a Key/Certificate Pair

If you do not have a key/certificate pair in the certificate data store, you can generate a new key/certificate pair.

**Follow these steps:**

1. Generate a certificate request and send the request to a trusted Certificate Authority.
2. Import the signed certificate response from the authority.

## Generate a Certificate Request

If you do not have a key/certificate pair in the certificate data store, request one from a trusted Certificate Authority. When the CA returns a signed certificate response, import it into the certificate data store.

When you generate a certificate request, the Policy Server generates a private key and a self-signed certificate pair. The Policy Server stores this pair in the certificate data store. Using the generated request, contact a Certificate Authority and fill out the CA certificate request form. Paste the contents of the generated request into the form.

The CA issues a signed certificate response, usually in PKCS #7 format. You can import the signed certificate response into the certificate data store. After the signed certificate response is imported, the existing self-signed certificate entry of the same alias is replaced.

### Follow these steps:

1. Log in to the Administrative UI.
2. Select Infrastructure, X509 Certificate Management, Trusted Certificates and Private Keys.
3. Click Request Certificate.
4. Complete the required fields.
5. Click Save.

A file that conforms to the PKCS #10 specification is generated.

The browser prompts you to save or open the file, which contains the certificate request. If you do not save this file (or open it and extract the text), the Policy Server still generates the private key and self-signed certificate pair. To get a new request file for the private key, generate a new certificate signing request using the Generate CSR feature.

## Import a Signed Certificate Response

After completing a certificate request and sending it to the Certificate Authority, the Certificate Authority issues a signed certificate response.

Import the signed certificate into the certificate data store to replace the existing self-signed certificate entry of the same alias.

### Follow these steps:

1. Select Infrastructure, X509 Certificate Management, Trusted Certificates and Private Keys.
2. In the list, locate the self-signed certificate that you want to update.

3. Select Action, Update Certificate next to the self-signed entry.
4. Browse to the file you want. You can use a:
  - .p7 or .p7b file that contains the signed certificate and the corresponding certificate chain.
  - .cer or .crt file (base64 PEM file) with the signed certificate without the certificate chain.
5. Select the appropriate entry.
6. Review the certificate information and click Finish.

The signed certificate is imported into the certificate data store and the self-signed certificate is replaced.

## Generate a New Certificate Signing Request

A certificate signing request (CSR) is a message that you send to a Certificate Authority to apply for a digital identity certificate. After you create a private key, you can generate a CSR. The CSR contains the public key.

You can generate a new CSR for a self-signed or CA-signed private key/certificate pair. The private key always generates an identical CSR without modifying the existing private key. You generate a new request for an existing private key for the following reasons:

- You no longer have the original request that was generated for the private key/self-signed certificate pair.
- You need a new certificate for an expiring one, which requires a new copy of a CSR to submit to a Certificate Authority.

### Follow these steps:

1. Log in to the Administrative UI.
2. Select Infrastructure, X509 Certificate Management, Trusted Certificates and Private Keys.
3. Select Action, Generate CSR for the private key entry for which you want a new CSR.

A file that conforms to the PKCS #10 specification is generated.
4. Save the CSR when prompted.
5. (Optional) If you require a CA-signed certificate, contact a Certificate Authority. Follow the procedure the Certificate Authority requires for submitting a request. Use the PKCS#10 file you saved in the previous step for the request.

After you complete the certificate request process, the Certificate Authority issues a signed certificate response that you import into the certificate data store. The Policy Server replaces the existing certificate entry of the same alias with the newly imported certificate.

## Update Certificates in the Certificate Data Store

You can update key/certificate pairs and standalone certificates in the following ways:

- Update an expiring trusted certificate by deleting the existing certificate and importing a new trusted certificate. The new certificate must match the expiring certificate in the certificate data store.
- Update the certificate by importing a signed trusted certificate or a PKCS7-signed response. The new certificate must match the expiring certificate in the certificate data store.
- Update a certificate with a certificate from a PKCS#12 file. The new private key and certificate pair must match the expiring key/certificate pair in the certificate data store.

The new certificate must be valid before the Policy Server can use it to update an expiring certificate. Certificates are updated and become available immediately after they are imported. If the new certificate is not valid, as determined by its validity interval, the Policy Server cannot use the new certificate.

For importing only a trusted certificate, use a file containing the certificate in a PEM or DER encoding. The standard extension for files of these types is \*.crt or \*.cer. If the file ends in .p12 or .pfx, it is processed as a certificate data store file containing key/certificate pairs. Finally, if a file ends in .p7 or .p7b, it is processed as a signed response file. Anything else is treated as a certificate file, and CA SiteMinder tries to load a certificate from it.

**Note:** If you update certificates for a federated environment, you do not have to update any federation objects that use the expiring certificates.

## Export Certificate and Key Data

You can export a private key/certificate pair and can send it to your federation partner. The partner can use the certificate to verify the digital signature created with the associated private key of the certificate.

**Important!** If you export the private key as part of a backup, never share it with anyone else.

**Follow these steps:**

1. Log in to the Administrative UI.
2. Select Infrastructure, X509 Certificate Management, Trusted Certificates and Private Keys.
3. Select Action, Export for the entry you want to export.
4. Select the format of the file you want to create from the exported data.
5. Select the file format.
6. Click Export.

You are prompted to open or save the file on the local system.

The encoded file content representing the key or certificate is created.

## Certificate Authority (CA) Certificate Usage

The federation system uses Certificate Authority certificates to verify the following items:

- Whether an SSL server certificate for an SSL connection that secures the SAML HTTP-Artifact back channel is trusted.
- For HTTP-Artifact single sign-on, secure the back channel with an SSL connection. The embedded web server for the federation system can verify that the SSL connection is secured by a trusted certificate by validating the certificate of the Certificate Authority. This certificate must be stored in the certificate data store.
- Whether a certificate revocation list is valid.

CRLs are acquired from a Certificate Authority. The certificate of the corresponding CA is required to validate the CRL before it can be trusted. The CRL is stored in the data store for use at runtime.

A default set of common root and intermediate CA certificates are shipped with the product for these purposes.



## Import a CA Certificate

A set of common root and intermediate CAs are included with the product. To use CA certificates that are not in the certificate data store, import them.

Any certificate that you import is treated as a CA certificate. The exceptions are self-signed certificates:

- If the system identifies a V3 self-signed certificate as a non-CA certificate, the certificate is treated as a trusted certificate. This behavior occurs even though you initiated the import from the Import CA Certificate dialog.
- If the system identifies a V1 self-signed certificate, the certificate is treated as a CA certificate.

**Follow these steps:**

1. Log in to the Administrative UI.
2. Select Infrastructure, X509 Certificate Management, Certificate Authorities.
3. Click Import New.
4. Follow the wizard to import a new entry.
5. Review the certificate information and click Finish.

The CA certificate is imported into the certificate data store. The change takes place directly after the import is complete.

**Important!** You cannot delete a CA certificate that is part of a trust chain for other certificates in use on the system. If you try to delete a CA certificate in use, an error message states that the certificate cannot be deleted.



# Chapter 22: Global Policies, Rules, and Responses

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This section contains the following topics:

[Global Policies](#) (see page 595)

[How to Configure Global Policies](#) (see page 599)

[Enable and Disable Global Policies](#) (see page 608)

[Configure a Global Active Policy](#) (see page 608)

[Allowable IP Addresses for Global Policies](#) (see page 609)

[Add and Remove Global Policy Time Restrictions](#) (see page 612)

## Global Policies

Standard policies are created in the context of a single policy domain. Large production environments can contain thousands of domains. For these environments, it can be useful to define types of behavior (represented by policies) that are common for many domains. Using standard policies, the same policy must be recreated for each domain that requires the same behavior. The global policies allow you to configure policies (and their associated rules and responses) as system level objects, that are applied across all domains.

The following terms are used for discussing global policies:

### **Access Rule**

An access rule allows or denies access to a resource. The global policies do not include access rules. Only event rules are added to global policies.

### **Event Rule**

An event rule is invoked when an authentication or authorization event occurs. Behaviors that are commonly implemented across all domains are associated with event rules, and can be included in global policies.

### **Global Policy**

A policy which is defined as a system object.

### **Global Rule**

A rule which is defined as a system object.

### **Global Response**

A response which is defined as a system object.

### Policy Link

A logical entity that is used for policy definition. This entity consists of a rule-response pair. A policy can contain one or more policy links.

### More information:

[Policies](#) (see page 517)

[Authentication Events](#) (see page 477)

[Authorization Events](#) (see page 479)

## Global Policy Object Characteristics

The following sections discuss the characteristics of global policy objects, outlining the basic similarities and differences when compared to their standard (nonglobal) counterparts.

### Global responses compared to standard responses

Differences:

- Defined at the system level. Only system level administrators can define a global response.
- These responses cannot use variables-based attributes.
- Used in any global or domain-specific policies.
- Associated with the specific agent type.
- These responses cannot be added to response groups. Global response groups are prohibited.

Similarities:

- These responses can use active expressions.
- A response is only returned if it is specified in a particular policy.

### Global rules compared to standard rules

Differences:

- Defined at the system level. Only system level administrators can define a global rule.
- The filter for the global rule is not bound to a specific realm. The filter for the global rule is an absolute filter. Regular expressions are allowed.
- Bound to a specific agent or agent group. The agent is explicitly specified when the rule is created.

- Available only for CA SiteMinder agents. You cannot associate a global rule with a RADIUS Agent because RADIUS Agents do not support authentication and authorization events.
- Only defined for an authentication or authorization event.
- Only used in global policies.
- These rules cannot be added to rule groups. Global rule groups do not exist
- These rules can fire for resources on any domain for which global policy processing is enabled.

### Global policies compared to standard policies

Differences:

- Defined at the system level. Only system level administrators can define a global policy.
- Bound to all users. Any specific users cannot be included or excluded from a global policy.

**Note:** Any Individual domains can be explicitly enabled or disabled for global policy processing.

- Defined using only global rules, global responses, and groups of these global objects.
- These policies cannot use variable-based attributes or variable expressions.
- These policies cannot contain allow/deny access rules. Only event rules are allowed in global policies.
- These policies cannot include or exclude a particular resource/realm from the global policy. These global policies apply to all resources matching at least one rule filter that is defined for the policy, on the related domain.
- Are not supported through the Java Policy Management API.

Similarities:

- These policies can use active expressions.
- Associated with the specific Agent. However, it is possible to create a group containing all the Agents of the same type and bind a global rule to such group.

When the global policy is processing, the responses that are defined for the fired global rules are added to the list of other responses. A global rule fires when the following conditions are true:

- The resource being accessed matches the absolute resource filter that is defined for the global rule.
- The event that occurs is as defined for the global rule.

- The same agent/agent group that is specified for the rule protects the resource.
- The resource/realm being accessed belongs to a domain for which global policies processing is enabled.

**Important!** Standard policies take precedence over global policies when the following conditions are met:

- Global policy processing is enabled for the domain
- Both standard rule and global rule are bound to the same agent or group.

**More information:**

[Disable Global Policy Processing for a Domain](#) (see page 459)

## SiteMinder Global Policy Concept

The product uses a policy-based access control model. A policy defines the type of access a user has to a particular resource and what happens when the user accesses the resource. Each standard policy is a linkage between a set of users and a set of resources. Policies are designed to protect resources by binding together users, rules, and responses. Every policy must specify the users or groups of users to which the policy applies. Users can be either included or excluded from the policy.

A standard policy must contain at least one rule or rule group. Rules determine which resources are protected the type of action that causes a rule to fire. A rule identifies a resource or resources that are included in the policy using a combination of a string-based *resource filter* and *action*. The filter in turn consists of *realm filter* and *rule filter*.

Policy objects can be of two types: system level and domain level. In a standard (non-global) policy, all policy objects must be created in the context of a specific domain. However, global policies are system level policies that can apply across all domains in a product deployment. An administrator with system level privileges can define global policies, that include global rules and global responses. These global policies can be applied to any resource in any domain.

The global objects are similar to their standard, domain-specific counterparts. The roles of global objects in a global policy definition are different from domain-specific policy objects. However, there are no global domain or global realm objects.

**More information:**

[Policies Explanation](#) (see page 519)

## Global Policy Processing

Any global rules that are contained in global policies fire when the following conditions are met:

- The requested resource belongs to a domain on which global policy processing was not disabled
- The requested resource matches the absolute resource filter that is defined for the global rule. Filters for global rules are obtained from the rule (not from the realm).
- The event that occurs is the same as the one that is defined for the global rule.
- The same agent or agent group protects the requested resource which was specified for the rule.

Whenever an authentication or an authorization event happens, the defined responses for the fired global rules are added to the list of other responses.

## How to Configure Global Policies

A global policy is comprised of global rule objects and global response objects, including response attributes. The following process lists the procedures for creating a global policy:

1. Create a Global Rule for Authentication Events or Create a Global Rule for Authorization Events
2. Configure a Global Response
3. [Configure a Global Web Agent Response Attribute](#) (see page 606)
4. [Configure the Global Policy](#) (see page 607)

**Important!** You can configure both global policies and domain-specific policies that affect the same resources. For example, you can configure domain-specific policies for access control, and global policies that provide a standard set of responses. However, in order for global policies to function, the realms included in the domain-specific policies must be configured to allow event processing.

## Global Rules

The global rules are the part of a global policy that defines a resource and events that trigger the processing of a global policy. These global rules are similar to domain-specific rules. A global rule must be associated with an authentication or authorization event. No global allow/deny access rules are allowed.

## Global Rules for Authentication Events

Global rules that include authentication events let you control what occurs when users authenticate to gain access to a resource (On-Auth event).

**Note:** OnAuth event results are per realm, so for example, if a user goes from realm A to realm B and had an OnAuthAccept header in realm A, it will not be available in realm B. When the user goes back to realm A, the header will be set again.

The following is a list of possible On-Auth events:

### On-Auth-Accept

Occurs if an authentication was successful. This event can be used to redirect a user after a successful authentication.

### On-Auth-Reject

Occurs if an authentication failed for a user that is bound to a policy containing an On-Auth-Reject rule. This event can be used to redirect the user after a failed authentication.

OnAuthAccept and OnAuthReject events fire both at authentication time (when the user enters a username and password) and at validation time (when the cookie of the user is read). However, there are certain special actions that only occur at authentication time:

#### Realm timeout override (unless EnforceRealmTimeouts is used).

Unless you have a version of the Web Agent that supports the EnforceRealmTimeouts option and that option is enabled, the Idle and Max Timeouts for the user will stay at the values for the realm in which the user last authenticated (only changes if the user has to reenter credentials).

#### Redirects.

Redirects are only allowed at authentication time for a number of reasons, but one of the most practical is that it would be very easy to configure an infinite loop of redirection if OnAuth redirection were allowed at validation time as well.

#### Access to the user password.

The password is not stored in the SMSESSION cookie, so the only time it is available is when the user actually enters it (authentication time).

### On-Auth-Attempt

Occurs when the user was rejected since the product does not know this user (an unregistered user, for example, can be redirected to register first).

### On-Auth-Challenge

Occurs when custom challenge-response authentication schemes are activated (for example, a token code).



When a user is authenticated (or rejected), the Policy Server passes any global responses that are associated with the applicable On-Auth rule back to the requesting Agent.

**More information:**

[Global Response Objects](#) (see page 605)

## Create a Global Rule for Authentication Events

You can create a global rule for authentication events to control actions that occur when users authenticate to gain access to a resource.

**Follow these steps:**

1. Click Policies, Global.
2. Click Global Rules.
3. Click Create Global Rule.
4. Enter the global rule name.
5. Specify agent and resource settings in Realm and Resource.

**Note:** If you specify an Agent Group with domain-specific rules that are associated with the same resource, you can adversely affect system performance. Consider domain-specific rules that duplicate the responses that are generated by global rules. Only one response is returned to the Agent because the Policy Server automatically deletes duplicate responses before passing information back to the requesting Agent.

6. Select Authentication events.
7. Select an OnAuth event from the Action List.
8. Click Submit.

The global rule is saved.

## Global Rules for Authorization Events

Global rules that include CA SiteMinder authorization events allow CA SiteMinder to call responses based on whether a user is or is not authorized for the resource the user requested. Authorization events occur after a user is authenticated, if a rule that protects a resource contains an On-Access event. When the user has been granted or denied access based on their privileges, the appropriate event is triggered.

The following is a list of possible On-Access events:

**On-Access-Accept**

Occurs as the result of successful authorization. This event may be used to redirect users who are authorized to access a resource.

**On-Access-Reject**

Occurs as the result of failed authorization. This event may be used to redirect users who are not authorized to access a resource.

When a user is authorized (or rejected), the Policy Server passes any responses associated with the applicable On-Access rule back to the requesting Agent.

## Policy Considerations for OnAccessReject Rules

Consider how the Policy Server processes global policies and the special circumstances created by OnAccessReject rules when creating global rules that include OnAccessReject events.

An OnAccessReject rule will not fire if it is in the same policy as a GET / POST rule. When a user is authenticated, CA SiteMinder resolves the identity of the user. Therefore, if the OnAccessReject rule and the GET / POST rule are in the same policy, then a user who is allowed access to a resource is the same user who should be redirected on an OnAccessReject event. Since the user is allowed access, the reject event never applies.

To resolve this discrepancy, create a separate policy for the OnAccessReject rule, which may include other event rules, and specify the users for which it should apply.

For example, in an LDAP user directory, User1 should have access to a resource and everyone else in the group, ou=People, o=company.com, should be redirected to an OnAccessReject page. Two policies are required:

**Policy1**

Includes a GET / POST rule that allows access for User1.

**Policy2**

Includes the OnAccessReject rule and a Redirect response, and specifies the group ou=People, o=company.com.

Since User1 is authorized, the OnAccessReject rule will not fire when User1 access the resource. However, the OnAccessReject rule will fire for all other users in the group, ou=People, o=company.com, because they are not authorized to access the resource.

## Create a Global Rule for Authorization Events

You create a global rule for authorization events to control actions that occur when users authenticate to gain access to a resource.

**Follow these steps:**

1. Click Policies, Global.
2. Click Global Rules.
3. Click Create Global Rule.
4. Enter the global rule name.
5. Specify agent and resource settings in Realm and Resource.

**Note:** If you specify an Agent Group with domain-specific rules that are associated with the same resource, you can adversely affect system performance. Consider domain-specific rules that duplicate the responses that are generated by global rules. Only one response is returned to the Agent because the Policy Server automatically deletes duplicate responses before passing information back to the requesting Agent.

6. Select Authorization events.
7. Select an OnAccess event from the Action List.
8. Click Submit.

**More information:**

[Responses and Response Groups](#) (see page 493)

[Resource Matching and Regular Expressions](#) (see page 485)

## Enable and Disable Global Rules

You enable a global rule to ensure the rule fires when a user accesses the specified resource. Disable a global rule prevent the rule from firing the rule when a user accesses the specified resource.

**Follow these steps:**

1. Open the global rule.
  2. Do one of the following tasks:
    - Enable the rule by selecting the Enabled check box.
    - Disable the rule by clearing the Enabled check box.
  3. Click Submit.
- The rule is saved.

## Add Time Restrictions to Global Rules

Add time restrictions to a global policy enforce it at specific times. When a user attempts to access a resource outside of the specified time period, the policy is not enforced.

### Follow these steps:

1. Open the global policy.
2. Click Set in the Time Restrictions group box.
3. Specify starting and expiration dates.
4. Specify time restrictions in the Hourly Restrictions table.

**Note:** Each check box represents one hour. Selecting a check box fires the rule during that hour. The rule applies to the specified resources. Clearing a check box means that the rule does not fire during that hour. The rule does not apply to the specified resources.

5. Click OK.

### More information:

[Add Time Restrictions to Rules](#) (see page 487)

## Configure an Active Global Rule

You configure an active rule for dynamic authorization that is based on external business logic. The Policy Server invokes a function in a customer-supplied shared library. This shared library must conform to the interface specified by the Authorization API, which is available in the Software Development Kit.

### Follow these steps:

1. Specify the library name, function name, and function parameters in the fields on the Active Rule group box.

The active rule string is displayed in the Active Rule field.

2. Click Submit.

The active rule is saved.

## Delete a Global Rule

Deleting global rules automatically removes the rule from any global policies that use it. The global policies remain on your system. Verify that the global policies function without the deleted rule.

All global policies must contain at least one global rule.

## Global Response Objects

The global responses are parts of global policies that define the attributes to be returned to a user. These attributes are returned after a user triggers the authentication or authorization event that is specified in a global rule.

**Note:** You can use global responses in domain policies. In order to be returned, a global response must be added to a domain-specific or global policy. Within the policies, the global response is processed like a domain-specific response.

## Configure a Global Response

You can configure a global response to define the attributes that are returned after the authentication or authorization event occurs in an associated global rule.

**Follow these steps:**

1. Click Policies, Global.
2. Click Global Responses.
3. Click Create Global Response.
4. Enter the global response name.
5. Select an Agent type from the Agent type list.
6. Click Submit.

The global response is saved. You can now add response attributes to the response.

## Response Attributes for Global Responses

Each CA SiteMinder global response may contain one or more response attributes. Response attributes identify the pieces of information that the Policy Server passes to a CA SiteMinder Agent. Each CA SiteMinder Agent type can accept different response attributes.

## Global Response Attribute Types

CA SiteMinder supports different types of response attributes. The types of response attributes determine where the Policy Server finds the proper values for the response attributes. The types of response attributes that you can configure for a global response are identical to the types of response attributes you can configure for a domain-specific response.

## Configure a Global Web Agent Response Attribute

You can configure a response attribute to store the pieces of information that the Policy Server passes to a CA SiteMinder Agent. Web Agent response attributes support HTTP header variables, cookie variables, redirections to other resources, text, and timeout values. More information on Web Agent response attribute types exists in the *Web Agent Configuration Guide*.

**Note:** If you have purchased CA SOA Security Manager, you can find information about the WebAgent-SAML-Session-Ticket-Variable response attribute type in the CA SOA Security Manager Policy Configuration Guide.

### Follow these steps:

1. Click Create Response Attribute.
2. Select a response attribute.
3. Select an attribute type.

The details in the Attribute Fields are updated to match the specified attribute type.

4. Complete the details in the Attribute Fields.

**Note:** A list of automatically generated CA SiteMinder user attributes that you can use in responses exists in [SiteMinder Generated User Attributes](#) (see page 508).

5. (Optional) Edit the attribute in the Script field.

**Note:** The Attribute Setup section closes when you edit the attribute on the Advanced section.

6. Specify Cache Value or Recalculate value every ... seconds.

**Note:** The maximum time limit that can be entered is 3600 seconds.

7. Click Submit.

The Create Response Attribute Task is submitted for processing, and the response attribute is added to the Attribute List on the Response page.

## How to Configure Global Policy Objects

Configuring a global policy requires you to complete the following procedures:

1. Create the Global Policy
2. [Add Global Rules to the Global Policy](#) (see page 607)
3. (Optional) [Associate a Global Rule with a Response](#) (see page 608)

### Create the Global Policy

You can create a global policy to define how users interact with resources.

**Follow these steps:**

1. Click Policies, Global.
2. Click Global Policies.
3. Click Create Global Policy.
4. Enter the global policy name.
5. Add global rules and global responses.
6. Click Submit.

### Add Global Rules to a Global Policy

The global rules indicate the specific resources that are included in a global policy. Add at least one global rule to a global policy.

**Follow these steps:**

1. Click the Rules tab.

The Rules group box opens.

2. Click Add Rule.

The Available Rules pane opens and lists the available global rules.

**Note:** If the global rule you require does not appear, click New Rule. Rules that you create in this manner are added to the global policy.

3. Select the global rules that you want to add, and click OK.

The Rules group box lists the selected rules and rule groups.

4. (Optional) Associate the rule with a response or response group.

## Associate a Global Rule with a Response

The global responses indicate the actions that occur when the rule fires. When the rule fires, the associated response also fires.

**Follow these steps:**

1. Click Add Response for the global rule for which you want to associate a response.
2. Select a response, response group, or global response, and click OK.

**Note:** If the response you require does not exist, click New Response to create the response.

## Enable and Disable Global Policies

The Administrative UI allows you to enable and disable global policies. By default, when you create a global policy, the policy is enabled. Any Global rules that are contained in the global policy fire when users attempt to access the resources that are specified in those rules.

If you disable a global policy, the rules that are contained in the policy do not fire.

**Follow these steps:**

1. Open the policy in the Administrative UI.
2. Select or clear the Enabled check box.

If the check box is selected, the policy is enabled. If the check box is cleared, the policy is disabled. A disabled policy does not fire.

3. Click Submit.

The policy is saved.

## Configure a Global Active Policy

An active policy is used for dynamic authorization based on external business logic. An active policy is included in the authorization decision by having the Policy Server invoke a function in a customer-supplied shared library.

This shared library must conform to the interface specified by the Authorization API (available separately with the Software Development Kit).

**Note:** More information exists in API Reference Guide for C.



The process for configuring active policies for global policies is identical to the process for configuring active policies for domain-specific policies.

**Follow these steps:**

1. Open the global policy.
2. Select the Edit Active Policy check box in the Advanced Group box.  
Active policy settings appear.
3. Enter the name of the shared library in the Library Name field.
4. Enter the name of the function in the shared library that is to implement the active policy.
5. Click Submit.  
The policy is saved.

**More information:**

[Configure an Active Policy](#) (see page 539)

## Allowable IP Addresses for Global Policies

You can configure global policies to fire when users who access the protected resources from any of the following items:

- IP address
- host name
- subnet mask
- range of IP addresses

For example, specifying a range of IP addresses allows only those users who log in from those IP addresses access to the protected resources.

**More information:**

[Allowable IP Addresses for Policies](#) (see page 536)

## Specify a Single IP Address for a Global Policy

Specifying a single IP address fires the global policy only for users who access resources from the specified IP address.

**Follow these steps:**

1. Open the policy.
2. Click Add in the IP Address group box.
3. Select the Single Host option button.  
Settings specific to a single host appear.
4. Enter the IP Address, and click OK.

The IP address appears in the IP Address group box.

**Note:** If you do not know the IP address, click DNS Lookup and enter a fully qualified host name to look up the IP address.

5. Click Submit.  
The policy is saved.

## Add a Host Name for a Global Policy

You specify a host name to ensure the global policy only fires for users who access the protected resources from the specified host.

**Follow these steps:**

1. Open the policy.
2. Click Add in the IP Address group box.
3. Select the Host Name option button.  
Settings specific to a host name appear.
4. Enter the host name, and Click OK.  
The host name appears in the IP Address group box.
5. Click Submit.  
The policy is saved.

## Add a Subnet Mask for a Global Policy

You specify a subnet mask to ensure the global policy only fires for users who access the protected resources from the specified subnet mask.

**Follow these steps:**

1. Open the policy.
2. Click Add in the IP Address group box.  
Settings for IP Addresses appear.
3. Select the Subnet Mask option button.  
Settings specific to the subnet mask appear.
4. Enter an IP address in the IP Address field.  
**Note:** If you do not know the IP address, click DNS Lookup and enter a fully qualified host name to look up the IP address.
5. Enter a subnet mask in the Subnet Mask field.
6. Click OK.  
The subnet mask appears in the IP Address group box.
7. Click Submit.  
The policy is saved.

## Add a Range of IP Addresses for a Global Policy

Specifying a range of IP addresses fires the policy only for users who access the protected resources from the IP addresses in the range.

**Follow these steps:**

1. Open the policy
2. Click Add in the IP Address group box.  
Settings IP Addresses appear.
3. Select the Range option button.  
Settings specific to a range of IP addresses appear.
4. Enter a starting IP Address in the From field.  
**Note:** If you do not know the IP address, click DNS Lookup and enter a fully qualified host name to look up the IP address.
5. Enter an ending IP address in the To field.

6. Click OK.

The range of IP addresses appears in the IP Address group box.

7. Click Submit.

The policy is saved.

## Add and Remove Global Policy Time Restrictions

You can add time restrictions to a global policy. When you add a time restriction, the global policy only fires during the period that is specified in the time restriction. If a user attempts to access a resource that is associated with the policy outside of the period that is specified by the time restriction, the global policy does not fire.

**Note:** Time restrictions are based on the system clock of the server on which the Policy Server is installed.

### Follow these steps:

1. Open the policy.
2. Click Set in the Time group box.

The Time Restrictions pane appears.

**Note:** Click Help for descriptions of settings and controls, including their respective requirements and limits.

3. Specify starting and expiration dates.
4. Specify time restrictions in the Hourly Restrictions table.

**Note:** Each check box represents one hour. When a check box is selected, the rule fires during that hour, and the rule applies to the specified resources. When a check box is cleared, the rule does not fire during that hour, and the rule does not apply to the specified resources.

5. Click OK.

The time restrictions are saved.

### More information:

[How the Web Agent and Policy Server Calculate Time](#) (see page 59)  
[Time Restrictions for Policies](#) (see page 538)

# Chapter 23: Impersonation

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This section contains the following topics:

[Impersonation Overview](#) (see page 613)

[Impersonation Process](#) (see page 614)

[Security Considerations for Impersonation](#) (see page 615)

[Configure Impersonation](#) (see page 617)

[Sample Implementation of Impersonation](#) (see page 629)

## Impersonation Overview

Impersonation provides a method for a privileged user to assume the role of another user without ending the privileged user's session. This feature facilitates the following:

- Customer service representatives (CSRs) impersonate customers to investigate access problems.
- Helpdesk representatives impersonate employees to investigate access problems.
- Employees impersonate co-workers who are on vacation or out of the office.
- Any other situation in which one user must temporarily assume the identity, of another user.

Impersonation provides a secure solution in the preceding situations. In all cases, passwords are not disclosed to allow one user to impersonate another user.

The following terms are used when describing impersonation:

### **Impersonated session**

A user session created for the purpose of assuming another user's identity.

### **Impersonatee**

The user whose identity is assumed by a privileged user.

### **Impersonator**

The privileged user that is able to assume the identities of other users.

### **Impersonation authentication scheme**

A method for authenticating a user that allows a privileged user to assume the identity of another user while preserving the identity of the impersonator.

### **Session**

Also known as user session. This term is the time between authenticating and logging out.

### Session Specification

Also known as the Session Ticket or Session Spec, this term is the information held in a proprietary format on the Policy Server that describes a user and the characteristics of the current session.

### SMSESSION

The name of the Web Agent cookie that contains the Policy Server's Session Specification.

## Impersonation Process

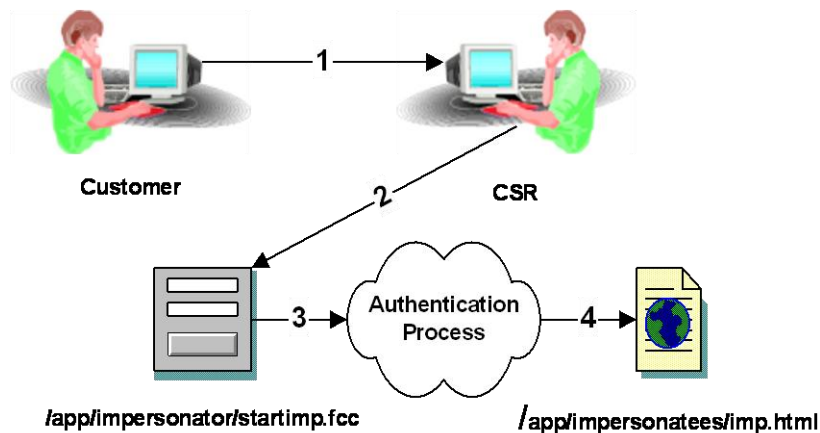
The process of impersonating another user consists of the following:

- A privileged user (impersonator) establishes a session by accessing a resource that a policy is protecting.
- The impersonator, using the currently established identity, accesses a form that lets the impersonator specify the user to be impersonated (impersonatee). The impersonator does require the credentials of the impersonatee. The form is an FCC file with special logic to enable the impersonated session.
- The impersonator submits information about the impersonatee.

The Policy Server determines whether the impersonator can be impersonated using a series of policies.

- Determines whether the impersonator has sufficient rights to impersonate the impersonatee.
- Uses the established session of the impersonator when granting as the impersonatee.
- Audits all impersonator activity.

The following diagram shows an example of impersonation:



1. A customer with a problem calls a CSR. The CSR determines that the best way to solve the problem is to impersonate the customer.
2. The CSR accesses the impersonation start page (/app/impersonators/startimp.fcc) to begin the impersonation process. The FCC presents a form to the CSR. The CSR provides the name of the customer to be impersonated and other attributes for disambiguation. Within the FCC are directives (not shown) that collect the session specification of the CSR for use by the authentication scheme. The impersonation authentication scheme is invoked on the Policy Server because the target of the FCC resides in a realm that is protected by the impersonation authentication scheme.
3. The Policy Server takes the information gathered by the FCC and uses it to determine if the customer to be impersonated can be found in any of the configured user directories. If found, the Policy Server determines if the CSR can impersonate the customer, and if the customer may be impersonated. If both are allowed, the Policy Server authenticates the impersonator and the CSR acts as the customer for the duration of the impersonated session.
4. The Policy Server directs the CSR (impersonating the Customer) to the target of the FCC.

## Security Considerations for Impersonation

The session specification of the impersonator is treated like the session specification of any customer. The major difference is that the distinguished name of the impersonator and the user directory in which the impersonator originally authenticated are present as extra fields. The extra fields let:

- All impersonated access to resources to be passed through additional checks.
- The Policy Server record impersonated activities for auditing.

The impersonated session specification is also used to prevent impersonation chaining. If the Policy Server determines that the fields for the impersonator DN and user directory are in use, it does not allow further impersonation and rejects the login attempt. This action stops impersonators from stacking one impersonation on top of another to gain access to otherwise restricted resources.

## Effects of Authentication Scheme Protection Levels

The protection level at which an impersonator originally authenticated is not checked during impersonation. Normally, when accessing resources in a new realm that an authentication scheme is protecting at a higher level, the user is challenged for new credentials. However, an impersonator is a privileged user, so these types of challenges do not occur during an impersonation session. Protection levels are meant to indicate the strength of the credentials that are used to access resources in a realm. There are no credentials specific to the user being impersonated during impersonation. As a result, protection levels are not considered.

**Note:** When the impersonated session ends, protection levels are enforced as expected.

## Session Idle Timeouts

During an impersonated session, the original session of the impersonator can possibly idle out. This depends on the idle timeout value for the realm in which the impersonator originally authenticated. If the impersonator exceeds the original idle timeout value, the impersonation session ends with the original session of the impersonator. To avoid this situation, increase the session idle timeout for realms in which impersonators commonly authenticate.

## Restricting Impersonation

For an impersonation to take place, the impersonator and impersonatee must be bound to policies in an impersonation realm. The impersonator policy must have a rule that fires for the ImpersonateStart event and the impersonatee policy must fire for the ImpersonateStartUser event.

## Impersonation Realms and Events

Impersonation starts in a realm that is configured to begin the impersonation process. When an impersonator requests a resource in the impersonation realm, the impersonator is challenged by an impersonation authentication scheme. The scheme prompts the impersonator for credentials with a form. Instead of prompting for a user name and a password as is usual, the form prompts the impersonator to supply the user name of an impersonatee. Within the FCC file for the form, there is logic that sets the password to the current Session Specification of the impersonator.

The Policy Server uses the impersonation authentication scheme to verify that the current session of the impersonator is valid. Then the Policy Server attempts to find the user to be impersonated in the directories included in the policy domain that is associated with the impersonation realm. If the Policy Server finds the user, authentication proceeds.



If the Policy Server locates the impersonatee in a directory, it verifies that the impersonator has the right to impersonate, and that the impersonatee can be impersonated. These rights are configured and enforced using policies, rules, and two impersonation events.

Impersonation events are similar to authentication and authorization events, but are not passively invoked. Policies must specifically bind both the impersonator and the impersonatee to Impersonator event rules. If policies do not exist, or do not include impersonator event rules for the impersonator and for the impersonatee, impersonation is not allowed.

Impersonation can be allowed or disallowed in any realm using policies and rules with impersonation events. Realms can be configured to disallow all impersonation, or to restrict possible impersonators and impersonatees.

## Configure Impersonation

In order to implement impersonation in an enterprise, a number of Policy Server objects must be configured. The combination of objects provides the authentication and policy entitlements that are required to enable one user to impersonate another. The following objects are required for impersonation:

### Infrastructure Objects:

#### Agent

Impersonation requires a Web Agent and its associated Policy Server Agent object.

**Note:** To implement impersonation, you must have at least one web agent that is installed in your deployment.

#### Authentication Scheme

Impersonation requires an authentication scheme object that is based on the Impersonation Template.

#### User Directory

Impersonation requires one or more user directory objects that point to user stores that contain impersonators and impersonatees. The two populations of users should be distinguishable due to an attribute value or group membership.

### **Domain**

Impersonation requires a policy domain object that includes the user directory object or objects.

### **Domain Objects:**

#### **Realms**

Impersonation requires a minimum of two configured realm objects. One realm contains the resources accessible by the impersonatees. The other realm is the impersonation realm and contains the resources and rules that are required to initialize an impersonation session.

#### **Rules**

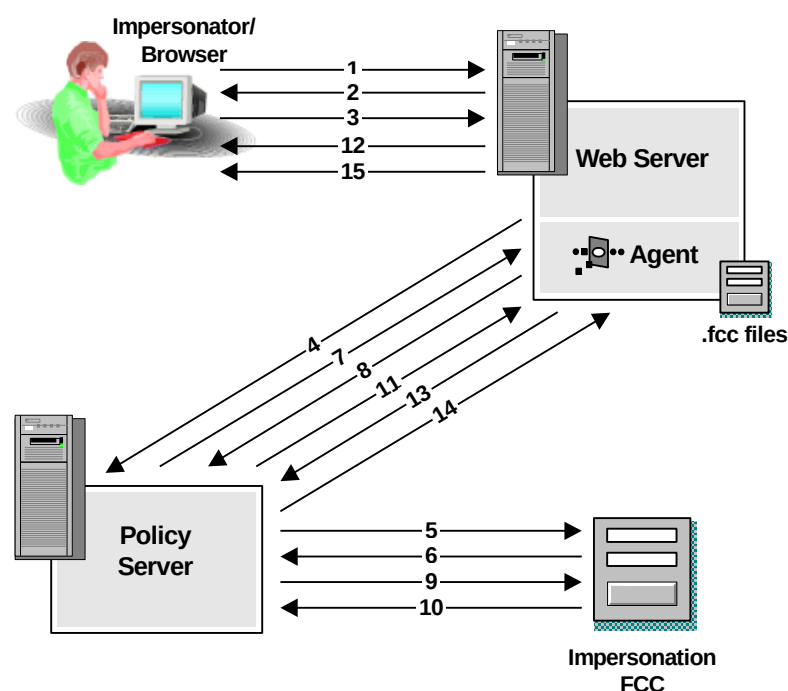
Impersonation requires access control rules to be in place. In addition, a rule with the ImpersonateStart event must exist for impersonators to begin an impersonation session. A rule with the ImpersonateStartUser event must exist in to allow a user to be impersonated.

#### **Policies**

In addition to policies that protect resources, impersonation requires extra policies to allow access to resources in the impersonation realm. These policies qualify users as impersonators and to limit the set of impersonatees.

## How an Impersonation Session is Initiated

The following figure is a detailed process flow for how a privileged user initiates an impersonation session.



1. A previously authenticated impersonator attempts to impersonate a user by accessing an Impersonation .fcc file.
2. The .fcc is not protected, or the CSR is allowed access (decision not shown). The Web Agent presents the form (.fcc) that was requested in Step . The FCC has a hidden form field configured to indicate that the target is in a realm protected by the Impersonation authentication scheme.
3. The impersonator indicates the name of the user to be impersonated.
4. The Web Agent uses the target field of the .fcc to determine the realm.
5. The Policy Server determines the credentials required by the Impersonation authentication scheme.
6. The required credentials are returned.
7. The Policy Server indicates the realm that is being used to protect the .fcc target.
8. The Web Agent attempts to authenticate the impersonated user using the impersonator's session spec as a password.

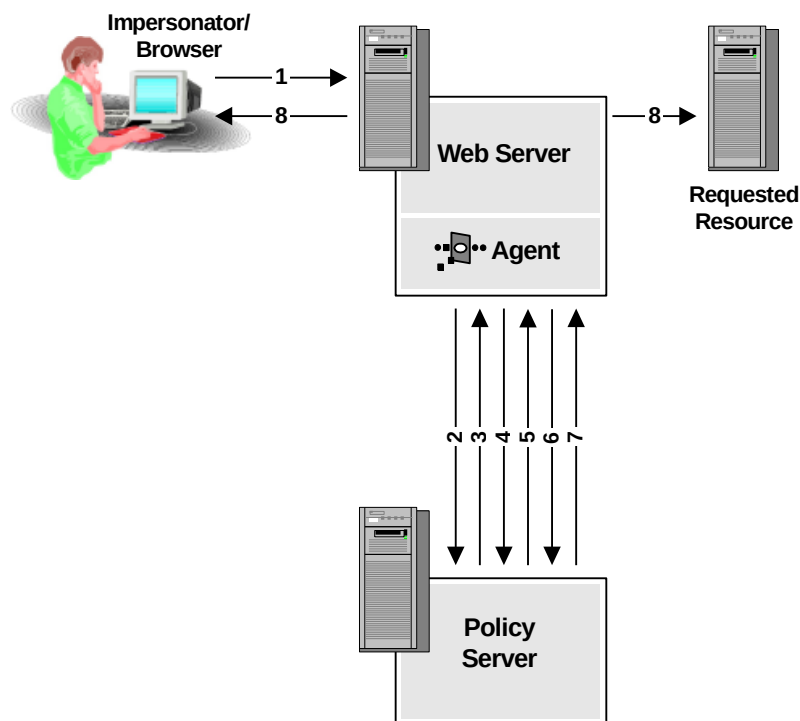
9. The Impersonation authentication scheme's functionality is invoked to authenticate the user given the supplied credentials (the impersonatee name and the impersonator's session spec). The impersonator's session spec is validated. The Policy Server disambiguates the user and authenticates the impersonation session.
10. The Policy Server verifies that there is an event policy tied to the ImpersonateStart event. If there is a policy that applies to the impersonator, a similar check is performed to determine if there is an ImpersonateStartUser event bound to a policy that applies to the impersonatee. Responses can be tied to rules in either policy.
11. Once the impersonator has been authenticated using the impersonation authentication scheme, he can now attempt to impersonate the user in any application.

**Note:** Since the impersonator has not accessed any resources, no impersonation has taken place.

The session specification, is returned to the Web Agent. It contains the DN of the impersonatee and the DN of the impersonator, as well as the directories where both the impersonator and the impersonatee were located.

The Web Agent moves the existing SMSESSION to SMSAVEDSESSION and sets a new SMSESSION cookie equal to the new session spec due to a @pushsession directive in the FCC.

12. The Web Agent attempts to determine if the impersonatee is authorized for the .fcc target resource.
13. The Policy Server indicates that the impersonatee is authorized for the .fcc target resource.
14. The impersonator accesses the resource that was indicated in the impersonation .fcc. For example, this can be a .jsp page that will indicate the DN of the impersonator and of the impersonatee.



1. The impersonator (now impersonating a user) navigates to a new application.
2. The Web Agent calls the Policy Server to determine if the resource is protected.
3. The impersonator access the requested resource.
4. Since the resource is protected and an SMSESSION cookie exists in the impersonator's Web Browser for this cookie domain, the Web Agent calls the Policy Server to validate the session spec.
5. The session spec is validated according to current authentication logic except that additional checks are made against the impersonator and the user because the validation logic can determine that impersonation is occurring due to the contents of the session spec. The impersonator must be bound to an event policy in the current realm that has a rule for an ImpersonateStart event. The user must be bound to a similar policy for the ImpersonateStartUser event that applies to users that can be impersonated.
6. The Web Agent asks the Policy Server if the user is authorized for the resource.

7. The Policy Server responds with an authorization response. The authorization response can indicate that the access is allowed or that the access is denied for a multitude of reasons (no rule fired for this resource or access was explicitly forbidden for the user, auth level was too low, session timed out, etc). All of these access reject reasons mirror the user experience. However, Protection Levels are not enforced for impersonated sessions.
8. The requested resource is returned.

### Configure an Agent to Use startimp.fcc

To invoke an impersonation session, an FCC file, such as the sample startimp.fcc must be specified in the Impersonation authentication scheme and it must be processed by a Web Agent. By default, Web Agents do not protect files with the .fcc file extension.

One of the following two options is required for Web Agents to allow the initialization an Impersonation session:

- The Web Agent must be configured so that the .fcc extension is not ignored.
- The .fcc file used to invoke impersonation must use a different (not ignored) file extension, (for example, .ifcc).

### Configure an Impersonation Authentication Scheme

Impersonation requires an Impersonation authentication scheme. This scheme is used as a method for an impersonator to initiate the impersonation process. To begin an impersonation session, an Impersonator directly accesses an .fcc file, which is a resource that Impersonation authentication scheme protects.

#### **More information:**

[Impersonation Authentication Schemes](#) (see page 360)

### Enable Impersonation through an .fcc File

A critical part of impersonation is that the authentication process is using an appropriate authentication scheme and .fcc files. The .fcc files that enable the impersonation authentication scheme are installed with the web agent. The files must end in the extension: .fcc. Files with this extension can take advantage of special processing by the Web Agent. The impersonation authentication scheme is similar to an HTML forms authentication scheme.

An impersonator can invoke the impersonation authentication scheme by directly accessing the .fcc file for the scheme. The proper authentication scheme is invoked through the .fcc file's target parameter. This value can be hard-coded in the .fcc file using the @target directive, or by setting the target (hidden form post variable) to the appropriate web page.

**Note:** The target resource must reside in a realm that the impersonation authentication scheme is protecting.

**More information:**

[HTML Forms Authentication Schemes](#) (see page 282)

## Basic .fcc Requirements for Impersonation

The FCC that begins the impersonation process must also include the @smpushsession=true directive, which instructs the Web Agent to save the current session cookie contents in another cookie so that the session cookie can now hold the session spec of the impersonated user.

The proper credentials must be presented to the Web Agent processing the impersonation authentication scheme to let authentication take place. The username should be the username of the user to be impersonated. The password should be set to the session spec of the impersonator, pre-pended, if necessary, with additional attributes. The FCC's facility for substituting the contents of cookies or headers into directives at the time the form is posted should be used for this purpose. Using this facility, the FCC sets the @password directive to the Users Session Specification, with other data if necessary.

To end the impersonation process, another .fcc file can be included in the realm protected by the impersonation authentication scheme. This .fcc file should set the @target directive to point to a resource in the restricted realm that was used to begin the impersonation process. In addition, the @smredirect directive should be set to the same resource in order force an end for the authentication process. Finally, the @smpopsession=true directive should be used to restore the original session cookie.

## FCC Directives for Impersonation

When constructing an .fcc file for impersonation, the following directives should be used in the file:

### **@logout**

This directive logs the user out of CA SiteMinder and removes the SMSESSION cookie.

### **@smheaders**

This directive adds HTTP request headers to the FCC namespace. For impersonation, this directive provides the contents of the session specification header, SMSERVERSESSIONSPEC (or SM\_SERVERSESSIONSPEC; see Note about SMSERVERSESSIONSPEC and LegacyVariables), to the FCC namespace so that it is available for use as a password.

### **@smpushsession**

This directive allows a user to “impersonate” another user and then return to the original session. This directive must be set to "true".

### **@smpopsession**

This directive returns to the original session after @smpushsession has been used. This setting must be set to "true".

### **@smredirect**

This directive redirects requests to the specified target.

### **@target**

This directive tells the FCC where to redirect to after processing a URL.

### **@password**

This directive specifies the contents of the password to be passed to the Policy Server.

### **@smaltcreds**

Allows custom authentication schemes to send credentials larger than 4KB. This may be used in the same manner that the @password directive is used. When credentials are posted to an FCC using @smaltcreds, its value is sent to the Policy server during login as a byte buffer avoiding the password field which is restricted to 4k bytes. The @smaltcreds directive may *not* be used with existing out-of-the-box authentication schemes, but it may be used for custom authentication. Developers of custom authentication schemes must code their authentication scheme libraries to look for the @smaltcreds credentials in the lpszCertBinary field of the user credential struct passed through the Agent API during login.



**@username**

This directive specifies the user name to be passed to the Policy Server.

**% and \$ replacement functionality**

The "%" and "\$\$" functionality is used for data replacement similar to scalar variables in Perl. "%NAME%" is used to replace "NAME" with the data associated with "NAME" on a post. "\$\$NAME\$\$" is used to replace "NAME" with the data associated with "NAME" on a get.

**Obtain the Session Specification using an FCC**

The Web Agent includes the session specification in the set of headers that it includes with every request. The session specification header can be submitted as a password using several FCC directives. The @smheaders directive is used to include the SMSERVERSESSIONSPEC header in the namespace of the FCC. The @password directive is used to set the password to the contents of the SMSERVERSESSIONSPEC header.

The SM\_SERVERSESSIONSPEC/SMSERVERSESSION header is only available if DisableSessionVars is set to its default value of false in the Web Agent configuration file.

**Note:** If the LegacyVariables Web Agent parameter is set to Yes, then the header should be SM\_SERVERSESSIONSPEC. If the LegacyVariables Web Agent parameter is set to No, then the header should be SMSERVERSESSIONSPEC. The LegacyVariables parameter is not supported for Web Agents on IIS 6.0 web servers. For Web Agents on IIS 6.0, SMSERVERSESSIONSPEC is always the correct header.

## Example .fcc Files for Impersonation

The following .fcc file is invoked directly by an impersonator, or called by the impersonation authentication scheme to begin the impersonation process:

```
@username=%USER%
@smheaders=%SMSERVERSESSIONSPEC%
@password=%SMSERVERSESSIONSPEC%
@smpushsession=true

<html>
<head><title>Sample Impersonation Form</title></head>
<body>
<h3> Please enter your Impersonation Information</h3>
<form method=post><table>
<tr>
<td>User Name:</td>
<td><input type=text name=USER></td>
</tr>
<tr>
<td colspan=2><input type=hidden name=target value="server.example.com/app/
impersonatee/successimp.htm ">
</td>
</tr>
<tr><td><input type=submit></td></tr>
</table></form></body>
</html>
```

The following .fcc file is invoked by impersonators to return to their original sessions.

```
@smpopsession=true
@target=/impersonators/end.htm
@smredirect=/impersonators/end.htm
```

## Effects of FCCCompatMode

While traditional Web Agents set fcccompatmode to yes by default, framework Web Agents set fcccompatmode to no. When the mode is set to yes, the Web Agent can process impersonation requests. However, when the mode is set to no, the following two requirements must be met in order for the Web Agent to process impersonation requests:

- The Web Agent configuration parameter EncryptAgentName must be set to false.
- The Web Agent configuration parameter AgentName must be coded in the fcc file that initiates impersonation or in the query data that is sent to the Agent when an impersonation session is initiated.

## Impersonation Event Configuration

Impersonation events are rule events that must be configured and included in policies in order to allow a privileged user to impersonate another user.

You must configure at least one of each of the following impersonation events in order to enable impersonation:

**ImpersonateStart**

When included in an appropriate policy, a rule that includes this event allows an impersonation session to begin.

**ImpersonateStartUser**

When included in an appropriate policy, a rule that includes this event allows a set of users to be impersonated.

## Configure Policies for Impersonation

In order for impersonation to function correctly, multiple policies must be configured.

The following is required for the resource that initiates impersonation:

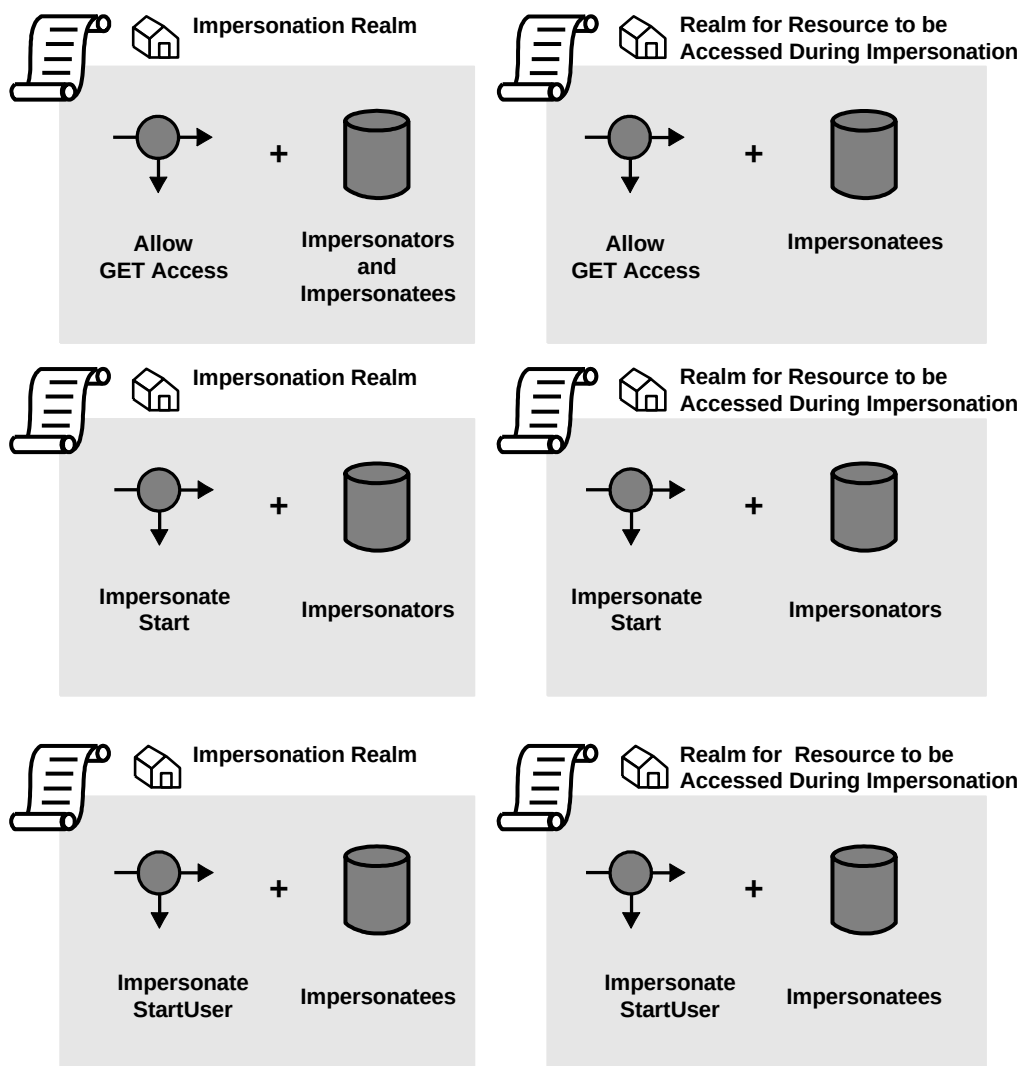
- Access control policy for both impersonators and impersonatees. For example, a policy that includes a GET access rule for both impersonators and impersonatees.
- Impersonation policy that includes an ImpersonationStart rule and impersonators.
- Impersonation policy that includes an ImpersonationStartUser rule and impersonatees.

The following is required for an impersonator to access the resource:

- Access control policy for impersonatees. For example, a policy that includes a GET access rule for impersonatees.
- Impersonation policy that includes an ImpersonationStart rule and impersonators.
- Impersonation policy that includes an ImpersonationStartUser rule and impersonatees.

**Note:** Policies must be in place for each resource that an impersonator can access.

The following figure shows the minimum policies that are required for an impersonator to access a resource:



More information:

[Policies](#) (see page 517)

## Multiple Cookie Domain Support

If a site is composed of multiple cookie domains, the identity of the Impersonator could be confused while moving between resources in separate cookie domains. To avoid this problem the SMSESSION cookies in all of the cookie domains other than the current one must be cleared. This must be accomplished by modifying the forms that are used to begin and to end Impersonation. These forms should be augmented by HTML or script that calls server-side code to clear the SMSESSION cookies in all of the cookie domains other than the current one.

For example, consider Web Agents that are installed at yourcompany.com, subsidiaryA.com, and subsidiaryB.com. A Web Agent that carries out Impersonation could be located in the yourcompany.com domain. The .fcc files to start and end impersonation would need to call server-side functionality (JSP pages possibly) in subsidiaryA.com and subsidiaryB.com to clear out the SMSESSION cookies in those cookie domains for Impersonation to function correctly.

## Sample Implementation of Impersonation

This section contains a description of a simple implementation of impersonation. The minimum Policy Server objects required to implement impersonation are:

### Infrastructure Objects:

#### Agent

Impersonation requires a Web Agent and its associated Policy Server Agent object.

**Note:** To implement impersonation, you must have at least one CA SiteMinder Web Agent installed in your deployment. More information on installing a Web Agent exists in the *Web Agent Installation Guide*.

#### Authentication Scheme

An impersonation authentication scheme based on the Impersonation Authentication Scheme Template is required. For the sample defined in this section, the authentication scheme is named "Impersonation Auth".

#### User Directory

Impersonation requires one or more user directory objects that point to user stores which contain impersonators and impersonatees. The two populations of users should be distinguishable due to an attribute value or group membership.

### Domain

A policy domain is required. For the sample defined in this section, the policy domain is named "Impersonation Domain".

### Domain Objects:

#### Realms

For the sample described in this section, two realms are required: "Impersonation" and "App1". The "Impersonation" realm should use the "Impersonation Auth" authentication scheme. The "App1" realm can use any authentication scheme.

#### Rules

For the sample described in this section, you must configure a rule under the "Impersonation" realm that allows access to all resources for the "Get" action. In other words, an asterisk should be entered in the Resource field for the rule. You must also configure the rules for the impersonation events. One rule allows impersonation if the impersonator is included in an applicable policy, and the other rule allows an impersonatee to be impersonated if included in a different, applicable policy.

#### Rules

A similar set of rules to those in the "Impersonation" Realm should be created under the "App1" realm.

#### Policies

For the sample described in this section, six policies are needed. One policy must be defined for each rule in the "Impersonation" realm, and one policy must be defined for each rule in the "App1" realm.

## Sample Impersonation Implementation Assessment

Once all of the required Policy Server objects are in place, an administrator initiates an impersonation session by:

1. The administrator who will become the impersonator logs in to a protected network.
2. The administrator provides credentials and is authenticated and authorized.
3. The administrator accesses the imp.fcc file using a Web browser.
4. The administrator is prompted to enter a user ID for the person to be impersonated. The administrator may also be required to provide extra information about the user to be impersonated.
5. The administrator submits the information.

6. The Policy Server uses the policies that are defined for impersonation to determine:
  - Is the administrator allowed to act as an impersonator?
  - Is the user allowed to be impersonated?
7. If both are true, the impersonator impersonates the impersonatee.

**Note:** Without custom development, .jsp page or servlets for example, the impersonation session can be tracked using audit logging. However, it can be beneficial for an enterprise to create some custom web applications to monitor and track impersonation sessions.

## Sample Forms for Impersonation

Impersonation requires a number of Web-based forms that must be customized for an appropriate interface for an enterprise.

### Forms for Initiating the Impersonation Process

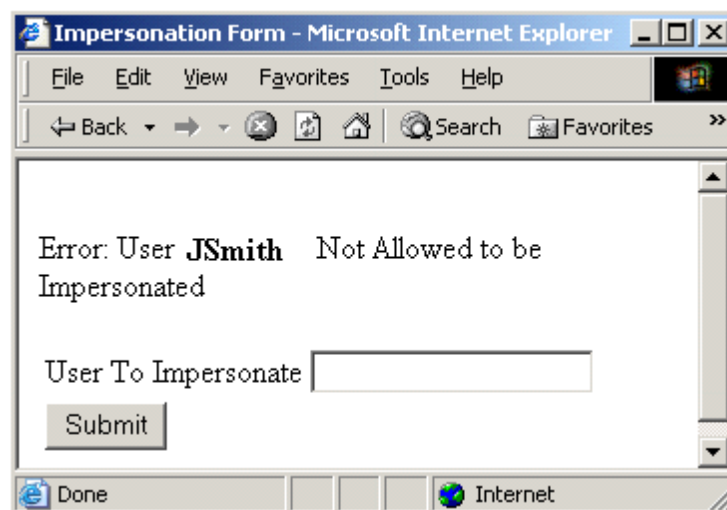
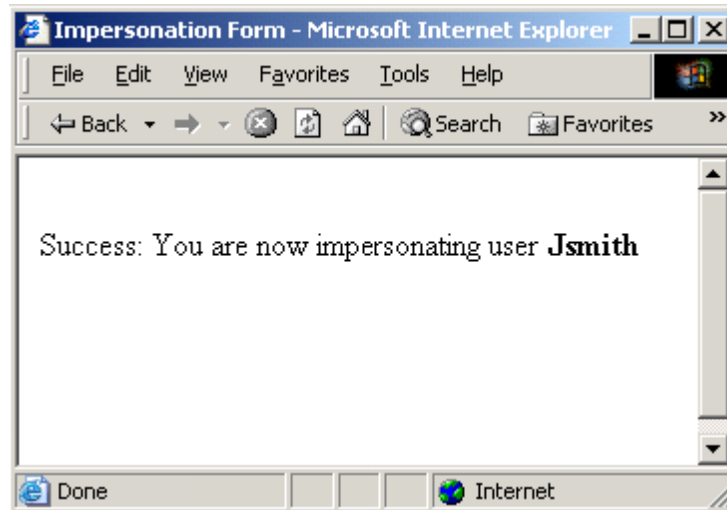
Impersonation requires a number of Web-based forms that must be customized for an appropriate interface for an enterprise. Forms contain the basic elements that should be presented by the .fcc file that invokes the impersonation process.

The hint field indicates that it is possible to configure impersonation to require additional attributes which can be used for disambiguating an impersonatee. The hint is configurable in the impersonation authentication scheme as a list of additional attributes, which can include information such as an employee number, or any other user attribute that uniquely defines a user in the user directory.

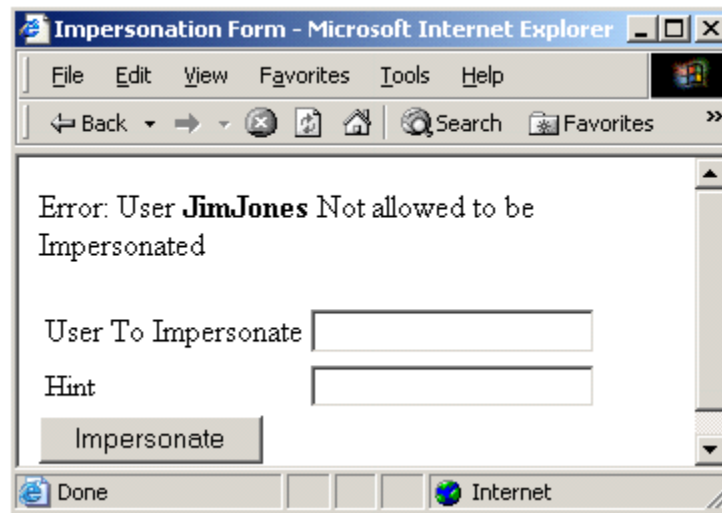
### Impersonation Result Forms

The results of an impersonation attempt must be communicated in a form to represent both successful and failed impersonation attempts.

**Note:** The following forms are provided to illustrate the basic requirements for each form. All impersonation forms must be customized and referenced from the .fcc file.







Impersonation Form - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Forward Stop Home Search Favorites

Error: User **JimJones** Not allowed to be Impersonated

User To Impersonate

Hint

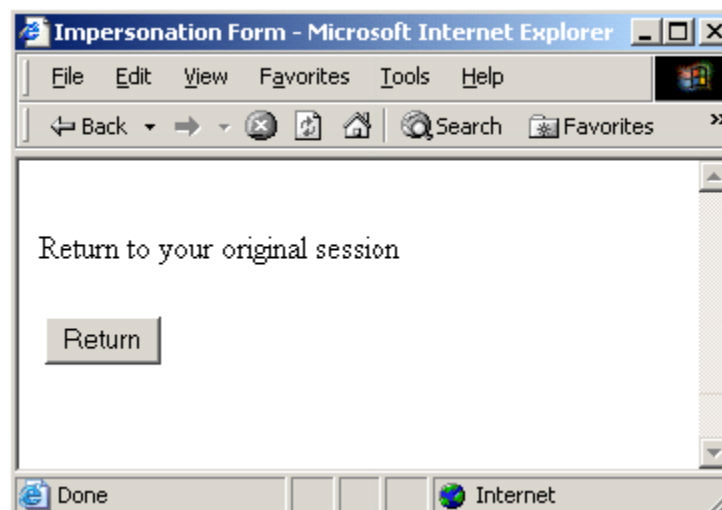
Impersonate

Done Internet

## Impersonation Logoff Forms

A form for ending an impersonation session must be configured.

**Note:** The following form is provided to illustrate its basic requirements. Impersonation forms must be customized and referenced from the .fcc file.



Impersonation Form - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Forward Stop Home Search Favorites

Return to your original session

Return

Done Internet



# Chapter 24: Password Policies

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This section contains the following topics:

[Password Services Overview](#) (see page 635)  
[Create Password Policies](#) (see page 638)  
[Configure Password Expiration](#) (see page 639)  
[Configure Password Composition](#) (see page 640)  
[Password Regular Expressions](#) (see page 641)  
[Configure Password Restrictions](#) (see page 643)  
[Configure Advanced Password Options](#) (see page 644)  
[User-initiated Password Changes](#) (see page 645)  
[Remove the Login ID When Redirecting for Password Services](#) (see page 645)  
[Enable Password Change Failure Messages](#) (see page 646)  
[Password Policy Troubleshooting](#) (see page 647)

## Password Services Overview

Password Services provide an additional layer of security to protected resources. Password Services uses a forms credential collector (FCC) and customizable HTML forms to manage user passwords in:

- A user directory
- Part of a user directory

**Note:** For more information about the stores Password Services supports, see the [insert SiteMinder version number] CA SiteMinder Platform Support Matrix. For more information about agents and Password Services, see the *Web Agent Configuration Guide*.

You use password policies to manage user passwords and to, optionally, enable user-initiated password changes.

- Password policies define rules and restrictions that govern the following:
  - password expiration
  - composition
  - usage

**Note:** You can apply multiple password policies to all or part of a user directory. CA SiteMinder applies the policies according to the priorities you specify for each.

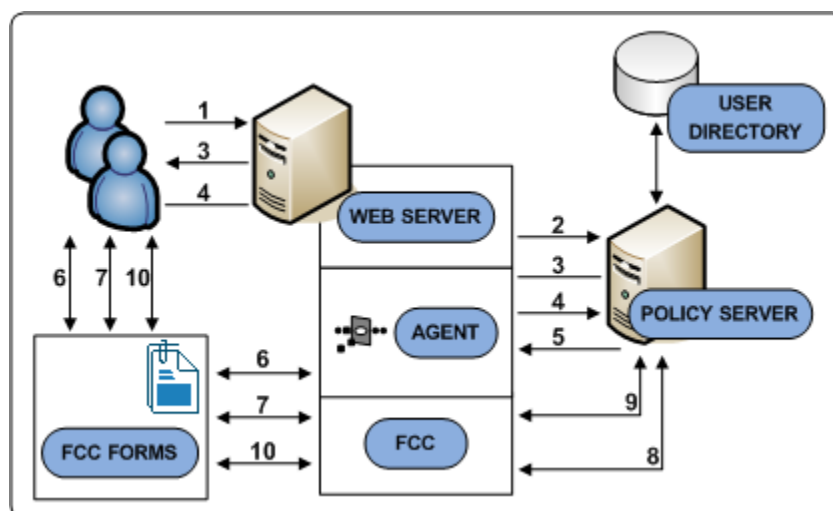
- CA SiteMinder invokes a password policy when a user attempts to access a protected resource and evaluates the credentials of the user. If the policy determines that the password is expired, CA SiteMinder can:
  - Disable the user account to prevent unauthorized access. If disabled, a CA SiteMinder administrator must re-activate the account.
  - Force the user to change the password.

You can use password policies to enforce password composition rules without administrative intervention. Password Services lets you:

- Force users to change a password at time you specify.
- Enable user-initiated password changes.

## How Password Services Work

The following illustrates how Password Services works, including what happens when user password is expired and must be changed:



1. The user requests a resource.
2. The agent intercepts the request and checks with the Policy Server to see if the resource is protected.
3. If the resource is protected, the Policy Server requests user credentials from the browser.
4. The user sends the credentials to the Policy Server.

5. The Policy Server:
  - a. Authenticates the user.
  - b. Determines if the user is stored in a user directory that is bound to a password policy.
  - c. Uses the password policy criteria to verify that the password is valid.
6. If the password has expired:
  - a. The Policy Server sends a redirection URL to the agent. The URL points to the FCC.
  - b. The agent uses the URL to redirect the browser to request the FCC.
7. The FCC determines which form to present to the user from a set of HTML templates. The FCC displays the form in the browser. A message provides a reason for the redirection and prompts the user to change the password.
8. The FCC passes the password to the Policy Server.

The Policy Server:

  - a. Uses the password policy to verify that the new password meets the composition criteria.
  - b. Changes the password, if the password is valid.
9. The Policy Server sends a request to the agent to redirect the browser to the FCC.
10. The FCC displays a message that states that the password change has succeeded.

After the user reads the message, the user is redirected to the requested resource.

## Password Policy Considerations

If you plan to implement password policies in your enterprise, consider the following:

- CA SiteMinder requires read/write access to the user directory, including exclusive use of several attributes within that directory to store passwords and password-related information.
- Password policies can affect CA SiteMinder performance because of the additional user directory searches required to validate passwords. Password policies that are configured to search only part of a user directory, instead of the entire directory, can also affect performance.
- If your user directory has a native password policy, this policy must be:
  - Less-restrictive than the CA SiteMinder password policy or
  - Disabled

Otherwise the native password policy accepts or rejects passwords without notifying CA SiteMinder. Consequently, CA SiteMinder cannot manage those passwords.

- By default, if a user enters incorrect information when changing a password, CA SiteMinder returns a generic failure message. This message does not specify the failure reason. Create and enable the DisallowForceLogin registry key to change the default behavior and explicitly tell users why the change failed.
- If you use password policies on multiple Policy Servers, synchronize the system times of all servers. Synchronizing times helps to avoid the disabling of accounts or forcing password changes prematurely.

**Note:** For more information, see the *CA SiteMinder [set the co variable for your book]*.

## Create Password Policies

You can create a password policy to provide an extra layer of security to protected resources.

### Follow these steps:

1. Click Policies, Password.
2. Click Password Policies.
3. Click Create Password Policy.

Password policy settings appear.

**Note:** Click Help for descriptions of settings and controls, including their respective requirements and limits.

4. Enter a policy name.
5. Select the user directory to which the policy applies from the Directory list.
6. Specify if the policy applies to the entire directory or part of the directory.

7. (Optional) If the policy only applies to part of the directory, click Lookup to specify which part.
8. (Optional) Specify the location of the FCC to which users are redirected if they enter a password that is deemed invalid by the password policy in the Redirection URL field.

**To host the redirection FCC on the same server as the agent, accept the default:**

`/siteminderagent/forms/smpwservices.fcc`

**To host the redirection FCC for all hosts on a specific server:**

`http://server_name:port/siteminderagent/forms/smpwservices.fcc`

**To host the redirection FCC for all hosts on a specific server over SSL:**

`https://server_name:port/siteminderagent/forms/smpwservices.fcc`

9. Configure the policy to reflect the password logic you want by configuring expiration, composition, expression, restriction, or advanced settings.

**Note:** For information about configuring agents to redirect to a specific server using a fully qualified domain name (FQDN) and customizing or localizing the redirection FCC, see the *Web Agent Configuration Guide*.

## Configure Password Expiration

You configure password expiration settings to define events, that when triggered, the Policy Server disables the user account and optionally redirects the user to a new Web page. Examples of such events include multiple failed login attempts and account inactivity.

**Note:** Expiration settings are optional. If you do not want to enable an expiration setting, leave the respective fields blank.

### To configure password expiration

1. Click the Expiration tab.

Password expiration settings open.

**Note:** Click Help for descriptions of settings and controls, including their respective requirements and limits.

2. Specify user login tracking settings by selecting the Track successful logins, Track failed logins, and Authenticate on Login Tracking Failure check boxes in the Expiration group box.

**Note:** You must select the Track successful logins check box if you want to disable accounts based on account inactivity. You must select the Track failed logins check box if you want to disable accounts based on failed login attempts.

3. Specify the settings that determine how often a password must be changed in the Password expires if not changed group box.
4. Specify the settings that determine how many incorrect password attempts are permitted in the Incorrect Password group box.
5. Specify the settings that determine how long a password can remain inactive in Password expires from inactivity group box.

**Note:** If you do not need to configure passwords to expire from inactivity, we recommended that you do not set this option for performance reasons.

6. Click Submit to save the password policy or click another tab to continue working with the password policy.

## Configure Password Composition

You configure password composition rules to control the character composition of newly created passwords.

**Note:** Composition rules are optional. If you do not want to enable a composition rule, leave the respective fields blank.

### To configure password composition restrictions

1. Click the Composition tab.  
Password composition settings open.  
**Note:** Click Help for descriptions of settings and controls, including their respective requirements and limits.
2. Enter the minimum and maximum character length for passwords in the Minimum Length and Maximum Length fields.
3. Enter the maximum number of characters that can appear consecutively in a password in the Maximum field.
4. Specify the permissible characters types and the minimum requirements for each in the Content Minimum group box.
5. Click Submit.



## Password Regular Expressions

Regular expression matching for passwords allows you to specify text patterns used for string matching that each password must match or not match to be considered valid.

For example, if you require the first character in the password be a digit but not be the last character, you can configure a regular expression to enforce this requirement and all passwords will be checked against it.

### Regular Expressions Syntax

The following table describes the characters you can use for constructing regular expressions for password matching. This syntax is consistent with the regular expression syntax supported for resource matching when specifying realms.

All closure operators (+, \*, ?) are greedy by default, meaning that they match as many elements of the string as possible without causing the overall match to fail. If you want a closure to be reluctant (non-greedy), follow it with a '?. A reluctant closure matches as few elements of the string as possible when finding matches.

The regular expression syntax is as follows:

| Characters | Results                                                                                            |
|------------|----------------------------------------------------------------------------------------------------|
| \          | Used to quote a meta-character (like '*')                                                          |
| \\         | Matches a single '\ ' character                                                                    |
| (A)        | Groups subexpressions (affects order of pattern evaluation)                                        |
| [abc]      | Simple character class (any character within brackets matches the target character)                |
| [a-zA-Z]   | Character class with ranges (any character range within the brackets matches the target character) |
| [^abc]     | Negated character class                                                                            |
| .          | Matches any character other than newline                                                           |
| ^          | Matches only at the beginning of a line                                                            |
| \$         | Matches only at the end of a line                                                                  |
| A*         | Matches A 0 or more times (greedy)                                                                 |
| A+         | Matches A 1 or more times (greedy)                                                                 |
| A?         | Matches A 1 or 0 times (greedy)                                                                    |

| Characters | Results                                          |
|------------|--------------------------------------------------|
| A*?        | Matches A 0 or more times (reluctant)            |
| A+?        | Matches A 1 or more times (reluctant)            |
| A??        | Matches A 0 or 1 times (reluctant)               |
| AB         | Matches A followed by B                          |
| A B        | Matches either A or B                            |
| \1         | Backreference to 1st parenthesized subexpression |
| \n         | Backreference to nth parenthesized subexpression |

**Limit:** Each regular expression can contain no more than 10 subexpressions, including the expression itself. The number of subexpressions equals the number of left or opening parentheses in the regular expression plus one more left parenthesis for the expression itself.

## Configure Regular Expression Matching

You configure regular expressions to specify text patterns that are used for string matching. A password must match or not match the expression to be valid. Each regular expression entry is a name/value pair consisting of a descriptive tag and expression definition.

Regular expression matching for passwords is optional. If you decide to use regular expression, you only specify entries for expressions that passwords must match or must not match. If you have no expression matching requirements, do not create any regular expression entries.

### To configure regular expressions for passwords

1. In the Password Policy dialog, select the Regular Expressions tab.

You will see an empty table in the Regular Expressions group box.

2. Click Add to add an expression.

The Password Regular Expression dialog opens.

3. Select one of the following radio buttons:
  - **MUST Match**  
If you select this option, define a regular expression that passwords must match.
  - **MUST NOT Match**  
If you select this option, add an entry for each regular expression that passwords must not match.
4. Enter values for the fields.  
**Note:** Click Help for descriptions of settings and controls, including their respective requirements and limits.
5. Click OK.  
The regular expression is added to the table. If you selected MUST NOT match, you will see a checkbox in the NO Match column.

## Configure Password Restrictions

You configure password restrictions to place restrictions on password usage. Restrictions include:

- how long a user must wait before reusing a password
- how different the password must be from ones previously used

You can also prevent users from specifying words that you determine are a security risk or contain users' personal information.

**Note:** Restrictions are optional. If you do not want to enable a restriction, leave the respective fields blank.

### To configure password restrictions

1. Click the Restrictions tab.  
Password restriction settings open.  
**Note:** Click Help for descriptions of settings and controls, including their respective requirements and limits.
2. Specify how much time must pass and/or how many new passwords must be created before an old password can be reused in the Reuse group box.  
**Note:** If you specify both criteria, each must be satisfied before a user can reuse a password.

**Example:** A password policy requires users to wait 365 days and specify 12 passwords before reusing a password. After a year, if a user only supplied six passwords, the user would have to supply another six passwords before reusing the first password.

3. Specify how much a new password must differ from the previous password in the Change Required group box.
4. Specify the number of consecutive characters the password policy compares to personal information stored in user profiles in the Profile Attributes group box.
5. Specify the path to a user-defined dictionary of forbidden passwords and the length of the string compared against values in the dictionary in the Dictionary group box.
6. Click Apply to save the changes or click OK to save the changes and return to the Administrative UI.

## Configure Advanced Password Options

You configure advanced password policy options to specify that submitted passwords be pre-processed before validation and storage. Advanced password policies let you assign a priority to a policy, which allows the predictable evaluation of multiple password policies that apply to the same user directory or namespace.

**Note:** Pre-processing options are optional. You should specify a unique password policy evaluation priority for each password policy that may be assigned to the user directory or namespace.

### To configure advanced password options

1. Click the Advanced tab.

Advanced password policy settings open.

**Note:** Click Help for descriptions of settings and controls, including their respective requirements and limits.

2. Specify options to process submitted passwords prior to evaluation and storage in the Password Pre-Processing group box.

**Note:** You should specify identical pre-processing options for each password policy that is applied to the same user directory or namespace.

3. (Optional) If the password policy is one of multiple policies that applies to the same user directory or namespace, specify a the password policy priority in the Password Policy Priority group box.

**Note:** Evaluation priorities range from 0-999, where 999 is the highest.

## User-initiated Password Changes

User-initiated password changes allow end users to change their passwords without any intervention from an administrator. Users can elect to change their passwords by clicking a link to access the Password Change Request form.

### Add a Change Password Link

To enable user-initiated password changes, the Policy Server administrator must add a Change Password link to an HTML page. For example, administrators might add this link to a login page so users can opt to change their password at login.

**Note:** For more information, see the *Web Agent Configuration Guide*.

### Password Self-Changes

When users want to change their passwords they must:

1. Click Change Password.

The Administrative UI displays the Password Change Request form.

2. Enter the requested information, then click the Change Password button.

The Administrative UI displays another Password Change Information page, indicating that the user's password has been changed.

## Remove the Login ID When Redirecting for Password Services

During password services processing, a user request is redirected multiple times. When the request is redirected, the login ID (typically the username) which was entered by the user is appended to the request URL by default. To modify the default behavior so that the login ID (username) is not appended to redirects, you can do one of the following procedures.

### To remove the login ID when redirecting for password services in Windows

1. Add the following registry key:  
HKEY\_LOCAL\_MACHINE\SOFTWARE\Wow6432Node\Netegrity\SiteMinder\CurrentVersion\PolicyServer\DisallowUsernameInURL
2. Set the DWORD value to one of the following values:
  - 0 — Applies the default behavior of appending the UID to the request URL.
  - 1 — Changes the default behavior so that the UID is not appended to the request URL.

**To remove the login ID when redirecting for password services in UNIX**

1. Navigate to:  
`<policy-server-install-dir>/registry/`
2. In a text editor, open the following file:  
`sm.registry`
3. Add the following registry key:  
`HKEY_LOCAL_MACHINE\SOFTWARE\Wow6432Node\Netegrity\SiteMinder\CurrentVersion\PolicyServer\DisallowUsernameInURL`
4. Set the DWORD value to one of the following values:
  - 0 — Applies the default behavior of appending the UID to the request URL.
  - 1 — Changes the default behavior so that the UID is not appended to the request URL.

## Enable Password Change Failure Messages

By default, if a user enters incorrect information when changing a password, CA SiteMinder returns a generic failure message. This message does not specify the failure reason.

You can change the default behavior and explicitly tell users why the change failed.

**Follow these steps:**

1. Access the Policy Server host system and do one of the following:
  - a. (Windows) Open the Registry Editor and navigate to `HKEY_LOCAL_MACHINE\Software\Wow6432Node\Netegrity\SiteMinder\CurrentVersion\PolicyServer`.
  - b. (UNIX) Open the `sm.registry` file. The default location of this file is `siteminder_home/registry`.

***siteminder\_home***

Specifies the Policy Server installation path.

2. Create `DisallowForceLogin` using the following settings:

**KeyType:** REG\_DWORD

**Value:** 0 or 1

**0**

(default) CA SiteMinder returns a generic failure message. This behavior is consistent with the default CA SiteMinder behavior.

1

CA SiteMinder Returns an explicit failure reason.

**Note:** A value other than 1 or 0 is not supported.

3. Do one of the following:
  - (Windows) Exit the Registry Editor.
  - (UNIX) Save the registry file.
4. Restart the Policy Server.

## Password Policy Troubleshooting

The following sections describe and provide solutions to problems that may occur when implementing password policies.

### New User Passwords are Rejected

**Symptom:**

User-specified passwords are always rejected.

**Solution:**

The password policy may be too strict or improperly configured. Check the content minimums and the password length composition settings for consistency.

### User Accounts are Mistakenly Disabled

**Symptom:**

Users accounts that have not exceeded the number of permitted failed login attempts are becoming disabled.

**Solution:**

Check the incorrect password settings. The setting for disabling an account after a specific number of consecutive incorrect password attempts may be too low.

Setting this value too low causes a problem when two or more users, which are located in different user directories, have the same user name. When the Policy Server attempts to authorize a user, it checks all user names that correspond to the login and then attempts to match the password. If the Policy Server finds a user name that the password does not match, it records a failed attempt for that user. If this happens more than the number of times specified by the in the incorrect password settings, the account is disabled.

## User Accounts are Prematurely Disabled

**Symptom:**

User accounts are prematurely disabled in a multi-Policy Server environment.

**Solution**

Check that there is no time differential between the Policy servers.

## Password Changes are Forced

**Symptom:**

User accounts are forced to changed passwords too soon in a multi-Policy Server environment.

**Solution:**

Check that there is no time differential between the Policy servers.

## LDAP Users Do Not Disable

**Symptom:**

Password policies do not disable LDAP users.

**Solution:**

Check the following:

- The LDAP directory to which the policy is bound is writable. You must be able to save passwords in each user's record in the LDAP directory.
- The user directory setting is valid for password attribute, password data, and disable flag user profile attributes. More information on configuring the password attribute, password data, and disabled flag user profile attributes exists in [Directory Attributes Overview](#) (see page 151).



## Active Directory Users Cannot Change Passwords

**Symptom:**

Users stored in Active Directory user directories cannot change their passwords.

**Solution:**

Check the following:

- The Active Directory user directory to which the policy is bound is configured with a secure (SSL) connection.
- The Active Directory user directory to which the policy is bound is configured to use the unicodePWD Password Attribute.

## Incorrect Password Message Does Not Appear

**Symptom:**

When a user submits a password change request that contains an invalid current password, the Password Change Information screen does not open with a message stating that the current password is incorrect. Rather, the Policy Server redirects the user to:

- The login screen without the message if an On-Auth-Reject-Redirect response is not bound to the policy configured with the user directory
- The URL associated with the On-Auth-Reject-Redirect response bound to the policy configured with the user directory

**Solution:**

Enable the DisallowForceLogin registry key, which is located at HKEY\_LOCAL\_MACHINE\SOFTWARE\Wow6432Node\Netegrity\SiteMinder\CurrentVersion\PolicyServer.

**DisallowForceLogin**

Redirects users to the Password Change Information screen to re-enter the current password when the change request contains an invalid current password.

**KeyType:** REG\_DWORD

**Value:** 0 (disabled) or 1 (enabled)

**Default:** 0 (disabled)

**Note:** If the registry key is enabled, values other than 0 or 1 are unsupported and have undefined behavior.



# Chapter 25: SiteMinder Test Tool

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This section contains the following topics:

[Test Tool Overview](#) (see page 651)

[Configure Your Test Environment Agent](#) (see page 652)

[Run a Functionality Test](#) (see page 657)

[Perform a Regression Test](#) (see page 661)

[Run a Stress Test](#) (see page 662)

[Certificate-based Authentication Tests](#) (see page 666)

## Test Tool Overview

The CA SiteMinder Test Tool is a utility that simulates the interaction between Agents and Policy Servers. It tests the functionality of the Policy Server. During testing, the Test Tool acts as the Agent, making the same requests to the Policy Server as a real Agent. This allows you to test your CA SiteMinder configuration before deploying it.

The CA SiteMinder Test Tool is only available on Windows systems. It can be used to emulate Windows-based Web Agents and RADIUS Agents without limitations. The CA SiteMinder Test Tool can create connections with any Policy Server on all platforms, however, post 4.x Web Agents on Solaris cannot be tested with the CA SiteMinder Test Tool. To test policies for CA SiteMinder 5.x and later Web Agents, do one of the following:

- Use the Perl scripting interface for Web Agent registration and testing.
- Install and configure the CA SiteMinder Web Agent and test it manually.

The CA SiteMinder Test Tool performs three types of tests:

### Functionality

Tests policies to ensure they are configured correctly.

### Regression

Tests whether or not changes, such as migrating a policy store or implementing a new feature, affect CA SiteMinder.

### Stress

Tests the performance of the Policy Server as it receives multiple requests.

**Note:** You can also test policies using the Scripting Interface. See the Programming Guide for Perl.

## Configure Your Test Environment Agent

You can configure the Agent that the Test Tool simulates during a test in the CA SiteMinder Agent group box.

The Agent that the Test Tool simulates must be configured in the Administrative UI.

To configure Agent information, specify the following options

### Agent Type

Specify one of the following Agent Types:

#### Version 4

Simulates CA SiteMinder 4.x Agents.

#### Version 5

Simulates CA SiteMinder 5.x Agents.

**Note:** If you want to use the Test Tool on a system to simulate a CA SiteMinder 5.x Web Agent, you must run the smreghost.exe application on the system where you will run the Test Tool. The smreghost.exe file is included with your Web Agent, and described in the Web Agent Installation Guide. The file is also located in <Policy Server install dir>/siteminder/bin.

### RADIUS

Simulates RADIUS devices.

### Agent Name

Enter the name of the Agent as it appears in the Administrative UI. This field is required for both Version 4 and Version 5 Agent simulations.

### Secret

Enter the Agent's shared secret. This must match the shared secret entered when the Agent was created. A Secret is required for Version 4 and RADIUS Agent simulations.

### (Optional) Server

Enter the full name of the server on which the Agent resides. For example, to test the Policy Server for http://www.myorg.org, enter www.myorg.org in this field. This field may be used for Version 4 Agent simulations.

### SmHost.conf Path

Enter the path to the SmHost.conf file that contains the settings for the Version 5 Agent you want to simulate. You can use the Browse button to search for the SmHost.conf file.

## Policy Server Identification

The test tool requires information about the Policy Server that will be used when simulating the interaction with the Agent described in the CA SiteMinder Agent group box. The required information differs slightly depending on the type of Agent you selected.

### Set Up the Policy Server for Version 4 Agents and RADIUS Agent Simulations

For Version 4 Agents and RADIUS Agent simulations, you must specify the IP address and port information of the Policy Server(s) used in the test. If you want to simulate a multiple Policy Server environment, you can specify how those Policy Servers operate.

#### To set up Policy Server(s) for Version 4 Agent and RADIUS Agent simulations

1. Specify the following Policy Server options, as necessary:

##### **Policy Server**

Indicates whether you are specifying the primary or secondary Policy Server.

##### **IP Address**

Specifies the IP address of the Policy Server. By default, this field contains the IP address of the local system.

##### **Authorization, Authentication, and Accounting Ports**

Specifies the TCP ports used for authorization, authentication, and accounting requests. These fields are populated with the Policy Server's default port numbers.

##### **Timeout**

Displays the time (in seconds) that the Test Tool should wait for a response from the Policy Server.

2. Select one of the following operation modes:

##### **Failover**

Enables failover. During failover, the Test Tool directs requests to the initial Policy Server. If the initial Policy Server fails, the Test Tool redirects requests to the secondary Policy Server.

##### **Round Robin**

Enables round robin load balancing. Round robin load balancing divides requests between the primary and secondary Policy Servers. For each connection, the Test Tool alternates between Policy Servers.

3. Click Connect to make sure that the Test Tool can connect to the Policy Server.

If the Test Tool makes a connection, the IsProtected and DoManagement stop lights turn green.

**Note:** You must specify an Agent before testing the Policy Server connection.

## Policy Server Information for Version 5 Agents

For Version 5 Agents simulations, you may specify the IP address and port information of the Policy Server(s) used in the test, or you may use the Policy Server information contained in the Host Configuration Object contained in the policy store.

By default, the Policy Server information will be retrieved from the policy store when the Test Tool uses the SmHost.conf file to establish an initial connection to the Policy Server. To specify Policy Server information manually, select the Override check box and fill in Policy Server information as described in [Set Up the Policy Server for Version 4 Agents and RADIUS Agent Simulations](#) (see page 653).

You can configure the Agent that the Test Tool simulates during a test in the CA SiteMinder Agent group box.

## Select a Test Mode

Use one of the test modes in the following list to determine how tests are run and results are displayed. Depending on the test mode that you select, you may also have to specify script information.

### Interactive

Allows you to enter data, run tests, and see the results displayed immediately in the Server Response section.

### Record

Combines Interactive operation with a script generation feature that writes test results to a plain-text command script file.

### Basic Playback

Uses Command Script files created in the Record mode to automate sequential tests. Ideal for regression testing.

### Advanced Playback

Uses a manually configured Thread Control File to automate complex tests. Ideal for stress testing.

### More information:

[Perform a Regression Test](#) (see page 661)

[Run a Stress Test](#) (see page 662)

## Specify Resource Information

You can specify the resource against which you want to conduct tests. Providing a resource simulates a user entering a URL in a browser.

To specify resource information, provide values for the following options

### **Resource**

Enter the relative path of the resource that CA SiteMinder is protecting as it is configured in the realm. The path is relative to the Web server's publishing directory. For example, /protected/.

### **Action**

Enter the Agent action, Authentication event, or Authorization event specified in the rule that you are testing.

You can configure the Agent that the Test Tool simulates during a test in the CA SiteMinder Agent group box.

## Specify User Credentials

The Test Tool requires user credentials to test whether or not a policy can authenticate or authorize a user.

To specify user credentials, complete the following fields:

### **User Name**

Enter the user name you want to use to access the resource.

### **Password**

Enter the password for the user entered in User Name.

### **CHAP Password**

If you are using a RADIUS CHAP authentication scheme, select this check box.

### **Certificate File**

If the protected resource requires certificates to authenticate users, you must provide a certificate file so that the Test Tool can simulate certificate authentication.

You can configure the Agent that the Test Tool simulates during a test in the CA SiteMinder Agent group box.

## Set the Encoding Spec

The encoding spec field allows you to specify a language encoding parameter. The Test Tool uses this parameter to encode headers in the same manner as a Web Agent. It then displays the encoded response attribute data in the Attributes field.

For more information about language encoding, see the Web Agent Configuration Guide.

To set the encoding spec, enter a value for the encoding spec as follows:

encoding\_spec, wrapping\_spec

where:

- encoding\_spec is a text string that represents one of the following encoding types: UTF-8, Shift-JIS, EUC-J, or ISO-2022 JP
- wrapping\_spec is the wrapping specification, which must be RFC-2047.

**Note:** If you leave this field blank, the default is UTF-8 with no wrapping.

You can configure the Agent that the Test Tool simulates during a test in the CA SiteMinder Agent group box.

## Save and Load Test Configurations in a Test Tool Settings File

To avoid reentering user-supplied information, such as Agent, resource, and user information, you can save these values into a Test Tool Settings file. You can then reload those values at any time.

### To save the current values that are specified in the Test Tool:

1. Click the Save Settings button.
2. Enter a location and name for the Test Tool Settings in the Save As dialog and click Save.

The file is saved with a .ini file extension.

### To retrieve the saved values from the Test Tool Settings file:

1. Click the Load Settings button.
2. Enter the location and name of the Test Tool Settings File in the Open dialog and click Open.

**Note:** You can also load the Test Tool Settings file from a Command Script.



## Run a Functionality Test

The CA SiteMinder Test Tool allows you to test the functionality of policies in a simulated real-world environment. To perform a functionality test, you must have the following:

- A Policy Server that is configured and running
  - A CA SiteMinder Agent that is configured in the Administrative UI
- Note:** If the Test Tool is simulating a CA SiteMinder Agent v5.x, that Agent must have 4.x support enabled.
- A policy domain configured with any type of user directory
  - A policy that pairs a rule with a user(s)

CA SiteMinder allows you to perform the following functionality tests:

### **IsProtected**

Indicates whether or not a policy is protecting the resource you specified.

### **IsAuthenticated**

Indicates whether or not the Policy Server can authenticate a set of user credentials against a user directory.

When user credentials are authenticated, the Policy Server compares the credentials to entries in a user directory. If the credentials match an entry, the Policy Server creates a session ticket and authenticates the user.

In a "real" CA SiteMinder deployment, CA SiteMinder confirms that a user's session ticket is valid instead of rechecking the user's credentials against a directory when an authenticated user makes additional requests. By default, the Test Tool authenticates the user each time the IsAuthenticated test is run, regardless of whether or not the user has a session ticket.

You can configure the Test Tool to validate a user's session ticket by entering Validate in the Comment field in the Test Tool before running an IsAuthenticated test; however, CA SiteMinder must authenticate the user before validating the session ticket.

**Note:** You can specify Validate when you run multiple tests in Interactive mode (using the Repeat count field), and in Playback mode.

### **IsAuthorized**

Indicates whether or not the Policy Server can authorize a user based on a policy.

These tests must be run in the order they appear above. For example, you must run IsProtected before running IsAuthenticated. The order reflects the steps that CA SiteMinder uses to determine a user's access rights.

While running functionality tests, you can also use the Test Tool to perform the following tasks:

### **DoAccounting**

Logs the most recent accounting server transactions.

### **DoManagement**

Requests Agent commands, such as cache flush commands that clear the Agent cache. Running DoManagement ensures that the Test Tool receives current information from the Policy Server.

### **To run a functionality test**

1. Configure a test environment.

**Note:** You can also test policies using the Scripting Interface. See the *Programming Guide for Perl*.

2. (Optional) Specify the number of times you want the Test Tool to run your test in the Repeat Count field in the Command group box.
3. In the Command group box, select one of the following tests to run:
  - IsProtected
  - IsAuthenticated
  - IsAuthorized
4. If you are running an IsAuthenticated test and you want the Test Tool to validate an authenticated user's session ticket instead of authenticating the user's credentials against a user directory, enter Validate in the Comment field.

**Note:** Before validating a user's session ticket, the user must be authenticated. Once the user is authenticated, CA SiteMinder creates a session ticket for the user.

### **More information:**

[Calculate an Average Elapsed Time](#) (see page 661)

[Configure Your Test Environment Agent](#) (see page 652)

## Functionality Test Results

The tables in this section describe the results of each type of functionality test.

| If isProtected... | Then...                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|-------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Succeeds          | <p>The Test Tool displays Protected in the Message field. This means that the Test Tool made a successful connection to the Policy Server and a policy is protecting the resource.</p> <p>The Test Tool also populates the following fields with values returned by the Policy Server:</p> <p><b>Realm Name</b><br/>Name of the realm that contains the resource</p> <p><b>Realm OID</b><br/>The realm object identifier</p> <p><b>Credentials</b><br/>The authentication scheme used to protect the resource</p> <p><b>Redirect</b><br/>The redirect string used by the authentication scheme, if one is specified. All certificate and HTML forms-based schemes return this string, which typically instructs the Agent where to display a form.</p> |
| Fails             | <p>The Test Tool displays Error or Not Protected in the Message field. Error indicates that the Test Tool could not connect to the Policy Server; Not Protected indicates that the specified resource is not protected by a policy.</p> <p>If the test fails:</p> <p>Make sure that the policy is configured correctly.</p> <p>Check the Authentication server log for debugging information.</p>                                                                                                                                                                                                                                                                                                                                                      |

| If isAuthenticated... | Then...                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |              |                            |              |                    |       |     |         |                            |
|-----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|----------------------------|--------------|--------------------|-------|-----|---------|----------------------------|
| Succeeds              | <p>The Test Tool displays Authenticated in the Message field and populates the following fields with values returned by the Policy Server:</p> <p><b>Session ID</b></p> <p>A unique CA SiteMinder-assigned session ID. The Policy Server uses this ID to identify the cookie where session information is stored.</p> <p><b>Attributes</b></p> <p>The attributes the Policy Server sends back in the response. For example:</p> <table><tr><td>ID</td><td>Length</td><td>ASCII Format</td><td>Hexidecimal format</td></tr><tr><td>4&gt; id</td><td>215</td><td>len 005</td><td>'LDAP:' - '4c 44 41 50 3a'</td></tr></table> <p>The response indicates the name of the user directory where the user was authenticated.</p> <p><b>Note:</b> Click Reset to clear responses displayed in the Attributes field without removing user-supplied information.</p> <p><b>Reason</b></p> <p>The reason code associated with the outcome of the test. This field is used to supply information to developers using the CA SiteMinder SDK. Reason codes are listed in SmApi.h.</p> | ID           | Length                     | ASCII Format | Hexidecimal format | 4> id | 215 | len 005 | 'LDAP:' - '4c 44 41 50 3a' |
| ID                    | Length                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | ASCII Format | Hexidecimal format         |              |                    |       |     |         |                            |
| 4> id                 | 215                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | len 005      | 'LDAP:' - '4c 44 41 50 3a' |              |                    |       |     |         |                            |
| Fails                 | <p>The Test Tool displays Not Authenticated in the Message field.</p> <p>If the test fails:</p> <p>Make sure that you are using valid user credentials.</p> <p>Check the Authentication server log for debugging information.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |              |                            |              |                    |       |     |         |                            |
| If IsAuthorized...    | Then...                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |              |                            |              |                    |       |     |         |                            |
| Succeeds              | <p>The Test Tool displays Authorized in the Message field and the CA SiteMinder-assigned Session ID in the Session ID field. This ID identifies the cookie where session information is stored.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |              |                            |              |                    |       |     |         |                            |
| Fails                 | <p>The Test Tool displays Not Authorized in the Message field.</p> <p>If the test fails:</p> <p>Make sure that the policy is configured correctly.</p> <p>Check the Authorization server log for debugging information.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |              |                            |              |                    |       |     |         |                            |

## Calculate an Average Elapsed Time

After performing a test, the Test Tool displays the amount of time the test took to run in the Elapsed Time field of the Command group box. Because of fluctuations in the system, averaging the elapsed time of multiple tests provides more accurate results.

### To get an average elapsed time

1. In the Repeat Count field, specify the number of times you want to run the test.  
The Test Tool runs the test the specified number of times and then displays the total elapsed time.
2. Divide the elapsed time by the number of times the test was run to determine the average elapsed time.

## Perform a Regression Test

Regression tests allow you to test whether or not changes made to CA SiteMinder, such as upgrading the policy store or implementing a new feature, affect policies. To run a regression test, you run one test with the current environment, make changes, then run the test again. By comparing the results of the tests, you can determine if the changes affect CA SiteMinder.

### To perform a regression test

1. Run functionality tests in Record mode. Optionally, enter a comment in the Comment field. The comment appears in the output file.
2. When the test is complete, select Basic Playback in the Mode group box.
3. In the Script Information group box, enter the name of the text file in the Input Script field.  
This file name should match the name of the Output Script file you created in Record mode.
4. In the Output Script field, specify an output file name.
5. In the Command group box, click Run Script.  
The Test Tool runs the input script and creates the output script file.
6. Compare the input and output script files.

## Run a Stress Test

The Test Tool allows you to test CA SiteMinder's performance when the Policy Server receives more than one request at a time. Using stress tests, you can simulate multiple agents talking to the Policy Server simultaneously or a single agent communicating with the Policy Server on multiple threads.

Stress tests are run in Advanced Playback mode. The Test Tool receives instructions from a Thread Control file that specifies which tests to run and how many times to run them. After executing the instructions in the thread control file, the results of the test are written to an output file.

### More information:

[Configure a Thread Control File](#) (see page 662)

## Configure a Thread Control File

Configure a Thread Control file to define the Command Script files to run, number of repetitions, threads, and so on to automate complex tests for stress testing. A Thread Control file contains multiple instruction lines in the Test Tool's own scripting language and comments, indicated by the # symbol at the beginning of a line.

The basic instructions are in the following format:

*command\_script\_file\_name, repetition\_count, thread\_count, [max\_time\_in\_seconds]*

### ***command\_script\_file\_name***

Specifies the pathname of the previously recorded command script file.

### ***repetition\_count***

Specifies the number of times that the Test Tool runs the Command Script.

### ***thread\_count***

Specifies how many simultaneous threads the Test Tool initiates to run the Command Script.

### ***max\_time\_in\_seconds***

(Optional) Specifies a limit (in seconds) for the duration of the test. If elapsed test time exceeds this limit then playback halts, regardless of whether the configured number of repetitions are complete.

For example:

```
# c:\temp\test_data.txt, 8, 6, 120
```

This line specifies that:

- The input Command Script is c:\temp\test\_data.txt
- The Test Tool runs the script eight times
- Six simultaneous threads run the script
- The test ends after 120 seconds, regardless of whether eight repetitions are complete

The Test Tool writes the output of the test to a file. The output file name is the name of the input file with `_out#` appended to it, where `#` is the incremented thread number. For example, the output files for the test above are c:\temp\test\_data.txt\_out1 to c:\temp\test\_data.txt\_out6.

The Test Tool scripting language includes the commands in the following table to control the script file output. See the following figure for a sample thread control file.

| Command      | Description                                                                                                                                                                |
|--------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| .report      | Generates a final report (as an output file) summarizing the test results. The report does not include the status of each server request. This is the default.             |
| .reportsread | Generates a file containing a response time spread report. The file name is <i>command_script_stats_spread</i> (for example, <i>isprotected-record.txt_stats_spread</i> ). |
| .output      | Generates a final report (as an output file) summarizing the overall results including the status of each server request.                                                  |
| .viewstats   | Displays final statistics in a text editor.                                                                                                                                |
| .verbose     | Generates output files containing the details of each server request.                                                                                                      |
| .brief       | Generates output files containing the brief results of each server request. This option is only valid when used with the .output command.                                  |
| .sleep       | Lets the Test Tool pause for a specified amount of time (in milliseconds). This simulates intermittent server requests.                                                    |

| Command                                    | Description                                                                                                                                                                                                                                                                                                                                    |
|--------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <code>.userselectionmode</code>            | Determines whether usernames are used sequentially or selected randomly. Valid values are 0 (sequential) and 1 (random).<br><br>For more information, see (Optional) Configure How the Test Handles Usernames.                                                                                                                                 |
| <code>.randomseed</code>                   | Allows the pseudo-random sequence of names to be repeated (up to thread ordering) for each test.<br><br>For more information, see (Optional) Configure How the Test Handles Usernames.                                                                                                                                                         |
| <code>.connect <i>settings_file</i></code> | Initializes the Test Tool using information from the Test Tool Settings file to set up a multi-threaded test with one simulated Agent. The default multi-threaded test comprises multiple simulated Agents with one simulated Agent per thread. You can also set up a test with one simulated Agent and multiple threads by using this option. |
| <code>.disconnect</code>                   | Un-initializes the Test Tool to indicate the end of one simulated Agent multi-threaded test.                                                                                                                                                                                                                                                   |

#### Example Thread Control File

```
.output  
  
.connect c:\test\smtest.ini  
.brief  
c:\temp\test_data1.txt, 2, 3  
.verbose  
.sleep 5000  
c:\temp\test_data1.txt, 2, 2  
.brief  
c:\temp\test_data1.txt, 3, 4  
.connect smtest.ini  
c:\temp\test_data1.txt, 5, 6  
.disconnect
```

## Report Viewing

When you run a stress test, the Test Tool generates a report summarizing the results. This report contains the following information:

- Time the test started and finished
- Total elapsed time
- Minimum, maximum, and average request time



- Total number of requests
- Throughput
- The number of tests run and their results

The report is saved in the directory where the thread control file is located. The name of the report is the name of the thread control file with `_stats` appended to it. For example, the thread control file, `thread.txt`, yields a report named `thread.txt_stats`.

---

```
Control File:  C:\temp\control.txt
Started at:    0:02:05.481
Finished at:   0:03:22.672
Total Elapsed: 0:00:01.396
```

```
Minimum Request Time:  0:00:00.400
Maximum Request Time:  0:00:05.498
Average Request Time:  0:00:01.396
```

```
Total Requests      234
Throughput (Req/Sec): 3.241
```

| Request         | Count | Yes | No | Timeout | Error |
|-----------------|-------|-----|----|---------|-------|
| IsProtected     | 78    | 72  | 0  | 0       | 6     |
| IsAuthenticated | 78    | 78  | 0  | 0       | 0     |
| IsAuthorized    | 78    | 72  | 0  | 6       | 0     |
| Total:          | 234   | 222 | 0  | 6       | 6     |

---

## Certificate-based Authentication Tests

The CA SiteMinder Test Tool simulates user authentication and authorization. Certificate-based authentication schemes require additional configuration.

Different certificate-generation tools sometimes affect the format of the Issuer DN and other attributes of a certificate.

For example, the Issuer DN for a certificate generated with certutil.exe on an IIS web server could use ST= to represent the state. However, the Issuer DN for a certificate generated with OpenSSL tools on an Oracle iPlanet web server could possibly use S= to represent the state.

**Note:** For more information about the actual values used by a specific certificate-generation tool, see the documentation provided by the vendor of your certificate-generation tool.

To test certificate-based authentication schemes, configure certificate mappings in the Policy Server to accommodate certificates created with different certificate-generation tools.

## Certificate Attributes that Require Custom Mappings

Some common certificate attributes differ slightly according to the third-party tool (such as certutil.exe or OpenSSL) used to generate the certificate. Differences between the following attributes could possibly cause errors in the CA SiteMinder Test Tool:

### Email Address

Represented by E or Email depending on the vendor of the certificate-generation tool.

### US State

Represented by S or ST depending on the vendor of the certificate-generation tool.

### User ID Number

Represented by UID or UserID depending on the vendor of the certificate-generation tool.

**Note:** For more information about the actual values used by a specific certificate-generation tool, see the documentation provided by the vendor of your certificate-generation tool.

## Custom Attribute Mappings for Testing

Using the CA SiteMinder Test Tool for a certificate authentication scheme sometimes fails, even if it works typically (through a browser and the web server). The authentication log shows that the Test Tool expects a different format of the Issuer DN than the Issuer DN format used in the certificate.

This situation occurs when the Issuer DN and other attributes differ according to the type of certificate-generation tool used. For example, the certutil.exe program on an IIS web server could possibly use ST= to abbreviate the name of the state in the Issuer DN. The OpenSSL tools on an Oracle iPlanet web server, however, could possibly use S= to abbreviate the name of the state.

**Note:** For more information about the actual values used by a specific certificate-generation tool, see the documentation provided by the vendor of your certificate-generation tool.

The situation is similar for the other attributes listed in [Certificate Attributes that Require Custom Mappings](#) (see page 666).

To resolve this problem, have an administrator create mappings for each Issuer DN format in the Policy Server. Then, the Policy Server can accept the Issuer DN formats created by different certificate-generation tools.

## Issuer DN Mapping

Different certificate-generation tools (such as certutil.exe and OpenSSL) create the Issuer DN in slightly different ways. For example, one tool could possibly create an Issuer DN like the following:

```
CN=Personal Freemail RSA 2000.8.30, OU=Certificate Services, O=Thawte, L=Cape Town, S=Western Cape, C=ZA
```

Another tool could possibly create an Issuer DN like the following:

```
CN=Personal Freemail RSA 2000.8.30, OU=Certificate Services, O=Thawte, L=Cape Town, ST=Western Cape, C=ZA
```

To support multiple possibilities, have your administrator create mappings in the Policy Server for all Issuer DN formats in your environment.

**Note:** For more information about the actual values used by a specific certificate-generation tool, see the documentation provided by the vendor of your certificate-generation tool.

## Create Custom Certificate Mappings

You can use the certificate-mapping feature of the CA SiteMinder Policy Server to provide custom mappings for certificates.

**Note:** The following procedure assumes that you are creating an object. You can also copy the properties of an existing object to create an object. For more information, see [Duplicate Policy Server Objects](#).

### To create and use a custom attribute in a certificate mapping

1. Click Infrastructure, Directory.
2. Click Certification Mapping, Create Certificate Mapping.  
The Create Certificate Mapping pane opens.
3. Verify that Create a new object is selected, and click OK.  
Certificate mapping settings open.

**Note:** Click Help for descriptions of settings and controls, including their respective requirements and limits.

4. Enter the full issuer DN in the Issuer DN field.
5. Select the Custom radio button in the Mapping group box.  
The Mapping Expressions field opens.
6. Enter a custom mapping expression.

This notation is used to specify two different attributes that are acceptable for a certificate mapping.

- For Email:  
    %{E/Email}
- For ST:  
    %{S/ST}
- For User Id:  
    %{UID/UserID}

**Note:** More information about custom mapping expressions exists in [Certificate Attributes that Require Custom Mappings](#) (see page 666).

7. Click Submit.

The custom mapping is saved. The Policy Server now handles requests from different types of certificate-generation tools (such as certutil.exe and OpenSSL) and the CA SiteMinder Test tool where the Email attribute is represented differently in the issuer DN. You can use this process for any of the other attributes mentioned in [Certificate Attributes that Require Custom Mappings](#) (see page 666).

**More Information:**

[Certificate Mapping for X.509 Client Certificate Authentication Schemes](#) (see page 363)



# Appendix A: Troubleshooting SSL Authentication Schemes

---

This section contains the following topics:

[Overview](#) (see page 671)

[SSL Configuration](#) (see page 672)

[SSL Troubleshooting](#) (see page 675)

## Overview

Configuring the SSL Advanced Authentication Schemes requires Web Servers to be properly configured to use SSL. Many problems with configuring Authentication Schemes over SSL connections are likely to be SSL configuration issues. Therefore, the first step in troubleshooting Authentication Schemes over SSL is to verify that SSL is properly configured and working. Verify the configuration without the interaction of the agent so that these components can be individually analyzed.

## Determine SSL Connection Ability

The first step in troubleshooting Authentication Schemes over SSL is to verify that SSL is properly configured and working.

### Follow these steps:

1. Disable the agent protecting the realm for which you want to use an authentication scheme over SSL.
2. Using your browser, go to one of the following URLs (using a browser with a certificate):
  - [https://web\\_server\\_name:port](https://web_server_name:port) (Netscape web servers)
  - [https://web\\_server\\_name:port/<SSL Virtual Directory>](https://web_server_name:port/<SSL Virtual Directory>) (IIS web servers)
  - [https://web\\_server\\_name:port](https://web_server_name:port) (Apache-based web servers)

If this SSL connection is configured to require certificates, you are to select a certificate.

## SSL Configuration

Configure SSL and verify that it works properly before using the product. In order to make an SSL connection, you must be able to trust the certificate authority of an incoming certificate. For example, if a browser presents a certificate that is signed by VeriSign, you must have a VeriSign Certificate Authority that is installed and trusted in the web server. In addition to trusting client certificates that are presented, the server itself must have a certificate to present to the clients. The clients have to trust the Certificate Authority that issued the certificate. This setting allows mutual authentication. Once these certificates have been installed, you can configure the Web Server to use SSL and *require* certificates, if desired.

For detailed SSL configuration information, see the documentation that is provided with your web server software. This section contains step-by-step instructions for configuring your web server and browser to establish an SSL connection.

### Enable the Web Server to Trust Client Certificates in Netscape

If a certificate authority is already installed in the Web Server, go on to the next section. Otherwise, install a certificate for the Certificate Authority on the SSL Web Server.

**Follow these steps:**

1. Obtain the Certificate Authority certificate and either keep it on your screen or save it to a file.
2. In Netscape Server Administration, select Keys & Certificates.
3. Click Install Certificate.
4. In the Certificate For field, fill out the Server Security Chain.
5. In the Certificate Name field, enter a description.
6. If you saved your Certificate Authority certificate to a file, enter the file name in the Message is in this file field. Otherwise, select the Message text (with headers) option button and paste the certificate in the Message text (with headers) field.
7. Click OK and restart the Web Server.

### Configure the Netscape Web Server to use SSL

Configure the Netscape Web Server for SSL by requiring certificates.

**Follow these steps:**

1. In Netscape Server Administration, click Admin Preferences.
2. Click Encryption On/Off and ensure that Encryption is on.



3. If you are running the Certificate or Certificate with Basic Authentication Scheme, require certificates. See the Encryption Preferences setting where Require Certificates must be set to On. From a browser with an installed certificate, verify that you can get to `https://servername:port`.

**Note:** Do not turn on Required Certificates for the Certificate or Basic Authentication Scheme.

## Establish Trust for the Netscape Certificate Authority

If a certificate authority is installed in the Web Server, you can establish trust between the two.

### Follow these steps:

1. In Netscape Server Administration, select Keys & Certificates.
2. Select Manage Certificates.
3. Select the Certificate Authority. The system displays a dialog detailing the certificate.
4. Select Trust.
5. Click OK and restart the Web Server.

## Enable the Web Server to Trust Client Certificates in Windows

Trust your client certificates by installing the appropriate Certificate Authority Certificates.

SSL Web Servers must have certificates for each Certificate Authority. Major certificate authorities could possibly have been installed. You can configure certificates in Windows operating environments by using the Certificates snap-in.

## Configure the IIS Web Server to use SSL

Be sure that a secure port has been enabled on the Web Server. Generally this is port 443. You can verify this through the Management Console by right-clicking on the Web Server and in the Web site tab you will see an SSL Port. Be sure a port number has been installed.

The advanced authentication schemes will create virtual directories in the Web Server. These directories will automatically be configured to require SSL and certificates as required by the specific authentication scheme. However, for testing purpose, you may want to create a test virtual directory. You can configure this virtual directory to require certificates through the Directory Security tab, Secure Communications.

https://servername:port/virtual directory - Ensure that the browser is asked for a certificate.

## Install the IIS Web Server Certificate

If you have not already done so, you will need to generate a key for your Web server. This is done through the Management Console, Key Manager. Access the Key Manager by doing the following:

**Note:** Note this process may be slightly different for IIS 3 and IIS 4.

### To install the IIS Web Server Certificate

1. In the Management Console, right-click the Web Server and select Properties.
2. Click the Directory Security tab.
3. In the Secure Communications panel, click Key Manager.
4. Under Key, select Create New Key and a Wizard will guide you through the process.  
  
Once you create a key, you can request a certificate using the file created in the steps mentioned earlier. Go to the Certificate Authority and request a certificate for this server. You will need to paste the certificate request information generated in Step 1 in order to receive a certificate. Once you received a certificate, go back to Management Console, Directory Security and click Key Manager to install the certificate for the key described in the next step.
5. Right-click the key name and select Install Certificate.
6. Restart the Web Server.

## Enable the Web Server to Trust Client Certificates in Apache

If a certificate authority is already installed on your web server, go on to the next section. Otherwise, install a certificate for the Certificate Authority on the SSL web server as follows.

**Follow these steps:**

1. Download and build the following Apache components:
  - Apache
  - OpenSSL
  - Mod\_SSL
  - Mod\_so - This module is included as part of Apache, but it must be enabled during the build of the web server.
  - RSAREf-2.0
2. Copy the Certificate Authority certificate into the `apache/conf/ssl.crt` directory in x509 b64 format.
3. Run `make` in the `apache/conf/ssl.crt` directory.
4. Restart the web server.

## Installing the Apache Web Server Certificate

The process for installing a certificate on an Apache Web Server varies with individual configurations. Consult the documentation for Mod\_SSL and OpenSSL for details about how to configure these components.

## SSL Troubleshooting

The following sections detail the most common problems encountered when dealing with SSL authentication schemes.

## There Was No Prompt for a Certificate

If a certificate prompt did not appear, verify that SSL is configured appropriately. If the agent is installed, disable the agent. The first step is to verify a simple SSL connection.

**Follow these steps:**

1. Disable the agent protecting the realm for which you want to use an authentication scheme over SSL.
2. Using your browser, go to one of the following URLs (using a browser with a certificate):
  - `https://web_server_name:port` (Netscape Web Servers)
  - `https://web_server_name:port/<SSL Virtual Directory>` (IIS Web Servers)
  - `https://web_server_name:port` (Apache Web Servers)

If this SSL connection is configured to require certificates, you are to select a certificate.

## After Following Previous Procedure, Still No Certificate Prompt

Perform the following steps if you are still not receiving a certificate prompt.

- Verify that all Firefox browsers are configured to ask every time.
- Verify that all web servers are configured to use SSL and require certificates.
- Verify the following settings for each Virtual Directory that is used by the product.
- Verify the web server certificate expiration.
- Verify that the browser certificate is valid.

## Verify That All Firefox Browsers Are Configured to Ask Every Time

The Firefox web browsers can be configured to pass the same certificate automatically. This setting establishes the SSL connection using a certificate without prompting users to select a certificate.

**Follow these steps:**

1. In the Firefox browser, select Options from the Firefox menu.
2. Click Advanced.
3. Click the Encryption tab.
4. In the Certificates section, verify that the Ask me every time option is set.

## Verify That All Web Servers Are Configured to Use SSL and Require Certificates

### For Netscape Web Servers

1. In the Netscape Server Administration, click Admin Preferences.
2. Click Encryption On/Off and verify that the encryption is on, then click OK.
3. Click Encryption Preferences and verify that Required Certificates is set.
4. Restart the Web Server.

### For IIS Web Servers

Verify that the virtual directories SMGetCredCert, SMGetCredCertOptional, SMGetCredNoCert are created and have the correct settings.

- SMGetCredCert - Require Certificates will be selected
- SMGetCredCertOptional - Accept Certificates will be selected
- SMGetCredNoCert - Do not accept certificates will be selected

**Note:** As part of the CA SiteMinder SSL Authentication setup, CA SiteMinder configures SSL virtual directories based on the type of SSL connection required by the authentication scheme.

## Verify the Following Settings for each SiteMinder Virtual Directory

### Follow these steps:

#### For IIS web servers

1. In the Management Console, right-click a virtual directory and select Properties.
2. Click the Directory Security tab.
3. Click Edit Secure Communications.

#### For Apache web servers

In the httpd.conf file, be sure to set SSLVerifyClient as follows:

- For Basic over SSL: SSLVerifyClient none
- For Certificate or Basic: SSLVerifyClient optional
- For Certificate/Certificate and Basic: SSLVerifyClient require

**Note:** For Apache-based web servers where Certificates are required or optional, the "SSL Verify Depth 10" line in the httpd.conf file must be uncommented.

## Check the Web Server's Certificate Expiration

### **Netscape Servers**

1. In the Netscape Server Administration, click Keys & Certificates.
2. Click Manage Certificates.
3. Click ServerCert.
4. Verify that it is trusted, and has not expired.

### **IIS Servers**

1. In the Management Console, right-click the Web Server and select Properties.
2. Click the Directory Security tab.
3. In the Secure Communications panel, click Key Manager.
4. Select a key. View its properties and verify that the key has not expired.
5. Restart the Web Server.

### **Apache Servers**

If an Apache Web Server certificate expires, you receive an error message at server startup.

## Verify Browser Certificate Validity

A missing certificate or an invalid certificate can prevent you from receiving a certificate prompt.

Open your Web browser and verify the validity of the browser certificate.

## After Certificate Prompt, Authentication Failure Received

### Apache Web Servers

- Verify that the SSL Web Server contains the certificate authority of the certificate supplied.
- Verify that the SSL Web Server Trusts the certificate authority of that certificate.
- Ensure the SSL Verify Depth 10 is uncommented.

### Netscape Web Servers

Verify that the Certificate Authority for the certificate is listed and that the Trust for the certificate has not expired. If it is missing or expired, install a new Certificate Authority certificate.

### IIS Web Servers

Verify that the certificate is listed and that it is valid. If it is missing or expired, install a new certificate. If you are able to get to the destination directory, then certificates are installed correctly.

## Verify Correct Policy Server and Web Agent Configuration

Verify your policy server and web agent configuration.

### Follow these steps:

1. Check that the Policy Server is created correctly.
2. Check that the Web Agent contains the correct Policy Server information.
3. Verify that the Web Agent is enabled.
4. Restart the Web Agent and Policy Server.

## SiteMinder Policy Should Allow Access, but SSL-Authentication Failed Message Received

This situation can result from a number of configuration errors. Some common errors include:

- The SSL Server is not configured to Require Client Certificates. Therefore, the client is not passing a certificate; hence disabling the authentication process of the product. Verify this situation by enabling the logging option in the Web Agent. A proper log indicates that the user is unknown. To correct this problem, turn on Require Certificates in the SSL Web Server.
- The Policy was not created properly. Check the users that are associated with the policy.

- For Apache Web server, ensure that the SSL Verify Depth is set properly and uncommented.

**More information:**

[Certificate Mapping for X.509 Client Certificate Authentication Schemes](#) (see page 363)  
[How to Configure a Policy Domain](#) (see page 455)

## Error Not Found Message Received

This error occurs when the Authentication Scheme Parameter being configured improperly. The redirect is not configured properly so the web server is unable to find the SSL Web Agent component.

**More information:**

[Authentication Schemes](#) (see page 269)

## Running Certificate or Basic but Cannot Enter Basic credentials.

On Netscape Web Servers, the *Certificate or Basic* scheme requires the Web Server to have encryption that is turned on, but does not require certificates. Be sure that in the Encryption Preferences section of the Netscape Server Administration, the Require Certificate setting is set to No.



# Appendix B: LanMan User Directories

---

This section contains the following topics:

[About LanMan User Directories](#) (see page 681)

[LanMan Directory Connection Prerequisites](#) (see page 681)

[Configure a LanMan Directory Connection](#) (see page 682)

[Failover for Windows User Directories](#) (see page 684)

[LanMan User Directory Search Criteria](#) (see page 684)

## About LanMan User Directories

In a Windows environment, the Policy Server enumerates and manages the resources in a directory service through the Microsoft Active Directory Service Interface (ADSI) layer. This layer abstracts the capabilities of directory services from different network providers in a distributed computing environment. However, the current version of ADSI has its own limitations which can adversely affect the performance of the Policy Server.

With ADSI, every Windows directory request must always pass through the Primary Domain Controller (PDC) first. This process compounds the network traffic that the PDC must handle. A custom solution to this dilemma is for the Policy Server to channel Windows directory requests to Backup Domain Controllers (BDCs) while bypassing the PDC. The Policy Server handles this sort of custom solution by using LanMan directory connections.

The LanMan user directory connection option allows you to specify a failover list of BDCs used for each user directory lookup in the Windows Registry. Using a LanMan directory connection, the Policy Server sends Windows directory requests to the first active BDC in the Registry list. The LanMan connection bypasses the PDC.

## LanMan Directory Connection Prerequisites

The following conditions must be met before the Policy Server can use a LanMan directory connection to access user data in a Windows directory:

- The file SmDsLanman.dll must reside in the Policy Server installation directory. The default location is:  
*installation\_directory\netegrity\siteminder\bin\*
- Configure a connection to the LanMan directory.

**More information:**

[Configure a LanMan Directory Connection](#) (see page 682)

## Configure a LanMan Directory Connection

You can configure a LanMan user directory. The following process lists the steps for creating a user directory connection to the Policy Server.

1. [Configure Registry Keys for a LanMan Directory Connection](#) (see page 683).
2. Configure a LanMan User Directory Connection.

## Configure Registry Keys for a LanMan Directory Connection

The first procedure in configuring a LanMan directory connection is configuring the appropriate registry keys.

**Follow these steps:**

1. Select Run from the Windows Start menu.
2. Enter **regedit**, and click OK.
3. Modify the following registry key:
  - In `HKEY_LOCAL_MACHINE\SOFTWARE\Wow6432Node\Netegrity\SiteMinder\CurrentVersion\Ds`, the NameSpaces key is set to the following string value:  
`"LDAP;:ODBC;:OCI;:WinNT;:Custom;:AD:"`
  - Add the following string to the value data for the NameSpaces registry key:  
Lanman.
4. Create the following registry key:  
`\HKEY_LOCAL_MACHINE\SOFTWARE\Wow6432Node\Netegrity\SiteMinder\CurrentVersion\Ds\Lanman_DC`
5. Create a registry key of the NT Domain Name under the Lanman\_DC key:  
`\HKEY_LOCAL_MACHINE\SOFTWARE\Wow6432Node\Netegrity\SiteMinder\CurrentVersion\Ds\Lanman_DC\<NT_domain_name>`  
For example:  
`\HKEY_LOCAL_MACHINE\SOFTWARE\Wow6432Node\Netegrity\SiteMinder\CurrentVersion\Ds\Lanman_DC\MyDomain`
6. Create a registry value that is named NumUserDir of type DWORD under the newly created NT Domain key. For the value data, enter the actual number of separate sets of user directories (maximum 16) in this NT domain.
7. Create String registry values of UserDir0, UserDir1, ..., UserDirN, in sequential order starting from 0, for each failover list of BDCs.
8. Enter comma delimited strings for each failover list. SmDsLanman reads the lists and finds the first active BDC in each failover list to look up NT users and groups.
9. Repeat steps 5 through 7 for other NT domains.
10. Restart the Policy Server services.

## Configure a LanMan User Directory Connection

You can configure a user directory connection that lets the Policy Server communicate with a LanMan Directory user store.

**Follow these steps:**

1. Click Infrastructure, Directory.
2. Click User Directories.
3. Click Create User Directory.
4. Type the name and a description of the user directory.
5. Select LanMan from the Namespace list.
6. Type the name of the NT Domain that you configured in the registry keys in the Domain Controller Key field.
7. Click Submit.

**More information:**

[User Directories](#) (see page 149)

[Configure Registry Keys for a LanMan Directory Connection](#) (see page 683)

## Failover for Windows User Directories

The list of registry keys you create for the LanMan user directory connection determines failover order.

## LanMan User Directory Search Criteria

LanMan directory connections are a type of Windows user directory connection. A LanMan directory connection functions similarly to a regular Windows connection. The only difference is which actual Domain Controller handles requests. This configuration does not affect the procedure for executing a user directory search.

**More information:**

[Search User Directories](#) (see page 213)

# Appendix C: CA SSO/WAC Integration

---

This section contains the following topics:

[CA SSO/WAC Integration Overview](#) (see page 685)

[SiteMinder and CA SSO Integration Architectural Examples](#) (see page 686)

[CA SiteMinder and CA SSO Integration Prerequisites](#) (see page 691)

[Configure Single Sign-On from SiteMinder to CA SSO](#) (see page 692)

[Configure Single Sign-On from CA SSO Client to SiteMinder](#) (see page 694)

[Configure Single Sign-On from CA SSO to SiteMinder](#) (see page 696)

[Configure an smetssocookie Web Agent Active Response Attribute](#) (see page 698)

[Configure an smauthetssso Custom Authentication Scheme](#) (see page 699)

## CA SSO/WAC Integration Overview

This product provides single sign-on to the CA SSO environments. Users log in to an environment with either product. Once authenticated, they can access both environments. Any authenticated users can access protected resources in either environment without having to reenter credentials, as long as they are authorized. User authorization is based on the policies in effect within each environment.

When allowing users to access secure resources, both products each maintain user credentials in their own session stores. They also have their own proprietary session credentials which are maintained separately. Since these credentials reside in different stores, the Policy Server and CA SSO Policy Server must be part of the same cookie domain. They also must share a user or authentication store.

In a single sign-on configuration, both Policy Servers can be on the same or on different machines. The product can contain a Web Agent, the CA SiteMinder® SPS, or both. You use an Agent or CA SiteMinder® SPS based on your own environment. The CA SSO product uses the eTrust Web Access Control (WAC) agent. You do not need to modify your current environment to enable single sign-on with the product.

### More information:

[SiteMinder and CA SSO Integration Architectural Examples](#) (see page 686)

## SiteMinder and CA SSO Integration Architectural Examples

The following examples demonstrate single sign-on between CA SiteMinder and CA SSO environments:

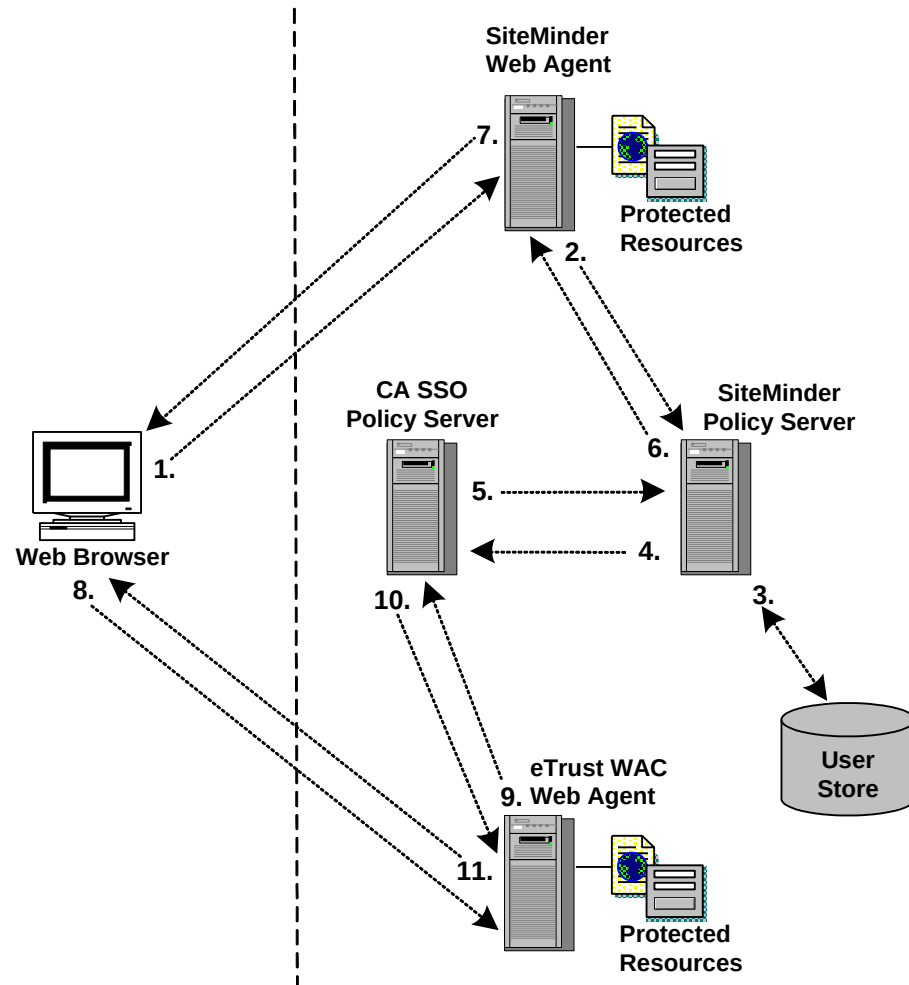
1. A user authenticates to CA SiteMinder using a Web browser and then accesses an CA SSO-protected resource (see [Example 1: User Accesses SiteMinder-Protected Resource Before CA SSO](#) (see page 687)).
2. A user authenticates to CA SSO through a desktop CA SSO Client and then accesses a CA SiteMinder-protected resource using a Web browser (see [Example 2: Authenticated CA SSO Client User Accesses SiteMinder Resource](#) (see page 688)).
3. A user authenticates to CA SSO using a Web browser and then accesses a CA SiteMinder-protected resources (see [Example 3: User Accesses CA WAC-Protected Resource Before SiteMinder](#) (see page 690)).

**More information:**

[Configure Single Sign-On from CA SSO Client to SiteMinder](#) (see page 694)

## User Accesses SiteMinder-Protected Resource Before CA SSO

The following example illustrates a user accessing CA SiteMinder-protected resource before a WAC-protected resource:

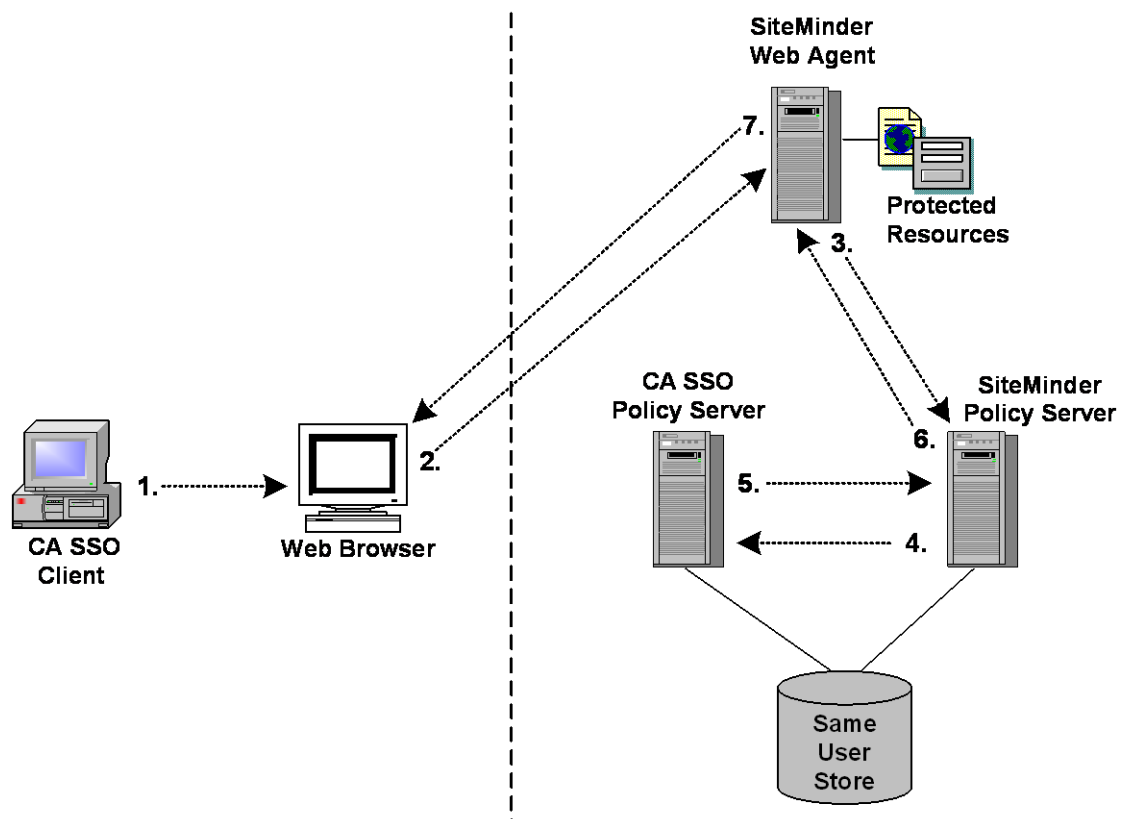


1. The user tries to access a CA SiteMinder-protected resource and the CA SiteMinder Web Agent/CA SiteMinder® SPS intercepts the request. The user provides the Agent/SPS with authentication credentials.
2. The Web Agent/CA SiteMinder® SPS forwards the credentials to the Policy Server for validation.
3. The Policy Server verifies that the credentials of the user are valid.
4. After successful authentication, the Policy Server requests the CA SSO Policy Server to issue and return a CA SSO cookie for the user.
5. The CA SSO Policy Server validates the user and forwards the CA SSO web authentication credentials of the user to the Policy Server.

6. The CA SiteMinder Policy Server forwards the CA SSO web authentication credentials to the CA SiteMinder Web Agent/CA SiteMinder® SPS.
7. The CA SiteMinder Web Agent/CA SiteMinder® SPS sets the CA SSO web authentication and CA SiteMinder cookies in the browser of the user. The resource appears to the user.
8. The user tries to access a CA SSO resource and the eTrust WAC Web Agent intercepts the request.
9. The eTrust WAC Web Agent validates the CA SSO web authentication cookie credentials of the user with the CA SSO Policy Server.
10. The CA SSO Policy Server tells the eTrust WAC Web Agent that the user has valid credentials.
11. The eTrust WAC Web Agent allows the user to access the CA SSO-protected resource.

## Authenticated CA SSO Client User Accesses SiteMinder Resource

The following example illustrates an authenticated CA SSO client user accessing a CA SiteMinder protected resource:



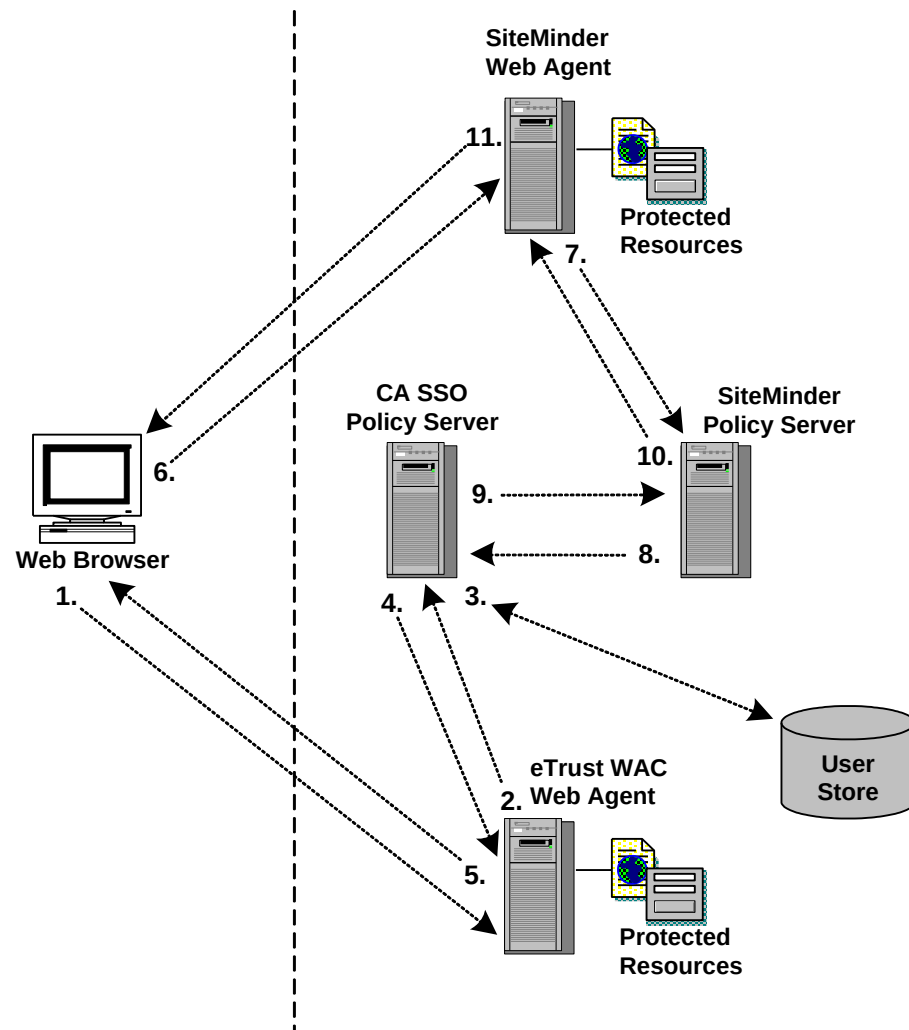


1. An authenticated CA SSO Client user launches a Web browser. While this is happening, the CA SSO Client places an CA SSO Web authentication cookie into the browser.
2. The user tries to access a CA SiteMinder-protected resource using the Web browser and the request is intercepted by the CA SiteMinder Web Agent/CA SiteMinder® SPS.
3. The CA SiteMinder Web Agent/CA SiteMinder® SPS forwards the CA SSO Web authentication cookie to the CA SiteMinder Policy Server.
4. The CA SiteMinder Policy Server forwards the CA SSO Web authentication cookie to the CA SSO Policy Server.
5. The CA SSO Policy Server validates the CA SSO Web authentication cookie and returns the user name to the CA SiteMinder Policy Server.
6. The CA SiteMinder Policy Server verifies the returned user name in the CA SiteMinder user store, then issues a corresponding CA SiteMinder cookie and returns it to the CA SiteMinder Web Agent/CA SiteMinder® SPS.
7. The CA SiteMinder Web Agent/CA SiteMinder® SPS returns the requested resource to the user, who now has the authentication cookie credentials necessary for CA SiteMinder and CA SSO environments.

## User Accesses eTrust WAC-Protected Resource Before SiteMinder

The following example illustrates a user accessing a WAC-protected resource before the product.

**Note:** The example assumes that the environment is using an IIS6 WAC Agent. An IIS6 WAC Agent is the only platform that the following example supports.



1. The user tries to access a CA SSO-protected resource and the eTrust WAC Web Agent intercepts the request. The user provides the Agent with authentication credentials.
2. The agent forwards the credentials to the CA SSO Policy Server for validation.
3. The CA SSO Policy Server verifies that the credentials of the user are valid.
4. The CA SSO Policy Server forwards the eTrust SSO web credentials of the user to the eTrust WAC web agent.

5. The eTrust WAC web agent sets the CA SSO web authentication cookie in the web browser of the user.
6. The user tries to access a protected resource and the web agent/CA SiteMinder® SPS intercepts the request.
7. The web agent/CA SiteMinder® SPS forwards the CA SSO web authentication credentials of the user to the Policy Server.
8. The Policy Server forwards the CA SSO web authentication credentials of the user to the eTrust SSO Policy Server.
9. The CA SSO Policy Server validates the CA SSO web authentication credentials of the user. Then the CA SSO Policy Server forwards the user name back to the Policy Server.
10. The Policy Server verifies the returned user name in the user store, then issues a corresponding cookie and returns it to the agent/CA SiteMinder® SPS.
11. The Web Agent/CA SiteMinder® SPS sets the cookies in the browser of the user. This process allows the user to access the requested resource.

## CA SiteMinder and CA SSO Integration Prerequisites

Before configuring a single sign-on integration between CA SiteMinder and CA SSO:

1. Install and configure CA SSO.

**Note:** When installing the CA SSO Policy Server, gather the following:

- An SSO administrator name and password. The CA SiteMinder Policy Server uses the administrator name and password when authenticating to the CA SSO Policy Server through the smauthetsso authentication scheme.
- The SSO ticket encryption key. The CA SiteMinder Policy Server smetssocookie active response requires this value.

2. Be sure that the CA SiteMinder environment and the CA SSO environment are operating in the same FIPS mode (AES encryption) of operation.

**Important!** The integration fails if both environments are not operating in the same FIPS mode of operation.

3. Consider the following:

- If the integration is to operate in FIPS-only mode, CA SiteMinder Policy Servers must be operating at r12.0 SP1 CR3 or later. If necessary, upgrade the CA SiteMinder Policy Servers that are to communicate with the CA SSO Policy Server.
- Be sure that operating systems on which the Policy Servers are installed support the smauthetsso authentication scheme. The integration requires that you configure the smauthetsso authentication scheme. For more information, see the [insert SiteMinder version number] CA SiteMinder Platform Support Matrix.

## Configure Single Sign-On from SiteMinder to CA SSO

The product provides single sign-on to CA SSO environments.

### To enable single sign-on from CA SiteMinder to CA SSO using a CA SiteMinder Web Agent or CA SiteMinder® SPS

Enable the CA SiteMinder SSO Plug-in that is installed with the agent or CA SiteMinder® SPS:

#### For the Apache 2.0 Web Agent

- Remove the comment (#) character from *one* of the following lines in the WebAgent.conf file:
  - (Windows operating environments)  
#LoadPlugin=Path\_to\_eTSSOPlugin.dll\_file
  - (UNIX or Linux operating environments)  
#LoadPlugin=Path\_to\_libetssoplugin.so\_file

**Note:** Restart the web server after you modify the WebAgent.conf file so the new configuration settings take effect.

#### For the 6.0 CA SiteMinder® SPS

- Remove the comment (#) character from the following line in the WebAgent.conf file, which is located in <SPS\_install\_dir>\proxy-engine\conf\defaultagent\WebAgent.conf:  
#LoadPlugin=<Path to eTSSOPlugin.dll or libetssoplugin.so>

**Note:** Restart the CA SiteMinder® SPS after you modify the WebAgent.conf file so the new configuration settings take effect.

**Follow these steps:**

1. Configure the domain in the webagent.ini file of the WAC Web Agent by setting the following parameter:

DomainCookie=<domain>

where <domain> is the same domain (for example, test.com) for the CA SSO and CA SiteMinder Web Agents.

The file is installed in the following location on the WAC Web Agent computer:

C:\Program Files\CA\WebAccessControl\WebAgent\webagent.ini

2. Verify the following web server and the authentication method settings in the webagent.ini file:
  - Configure the "Authentication methods" and the "Default authentication method" as SSO.
  - The WebServerName, PrimaryWebServerName, AgentName, NTLMPath, and Secure point to the computer where CA SSO Web Access Control is installed.
  - The ServerName attribute points to the IP Address of the computer where the CA SSO Policy Server is installed.

**CA SSO Policy Manager Verification Steps**

1. Ensure that the CA SiteMinder and CA SSO Policy Servers use the same user or authentication store.
2. Verify the following settings:
  - An SSO administrator name and password. The CA SiteMinder Policy Server uses the administrator name and password when authenticating to the CA SSO Policy Server through the smauthetsso authentication scheme.
  - The SSO ticket encryption key. The active response of the smetssocookie in the Policy Server requires the key.

**CA SiteMinder Policy Server Configuration Steps**

1. Create a Web Agent, Agent Configuration Object, and Host Configuration Object using the Administrative UI.
2. Configure the CA SiteMinder and CA SSO Policy Servers for the same user or authentication store.

3. Configure a smetssocookie (certificate) custom active response.
4. Create a domain, realm, and rules using the Administrative UI. Protect any resource with the CA SiteMinder Web Agent.

**Note:** When creating the rules, append the smetssocookie custom active response to them.

#### Overall Verification Steps

1. Configure the user with credentials to access resources that are protected by the CA SiteMinder Web Agent and the WAC Web Agent.
2. Restart the CA SiteMinder Policy Server and Web server hosting the Administrative UI.
3. Access the resource that is protected by the CA SiteMinder Web Agent and provide this Web Agent with the appropriate user credentials.
4. In the same browser session, request a resource that is protected by the WAC Web Agent.

Access to this resource should be granted without being prompted for credentials.

#### More information:

[Realms](#) (see page 461)

[Rules](#) (see page 473)

[Domains](#) (see page 453)

## Configure Single Sign-On from CA SSO Client to SiteMinder

CA SiteMinder provides single sign-on from the CA SSO Client to CA SiteMinder.

#### To enable single sign-on from a CA SSO Client to CA SiteMinder:

##### CA SiteMinder Policy Server Configuration Steps

1. Configure the smauthetssso custom authentication scheme using the Administrative UI.
2. Create a domain, realm, and rules using the Administrative UI. Protect any resource with the CA SiteMinder Web Agent.

3. Configure the smauthsso custom authentication scheme for a resource.
4. Create a policy granting access to the protected resource to users who can access the browser protecting the CA SSO Client.

### CA SSO Client Verification Steps

In the CA SSO Client SsoClnt.ini file, set the following items:

**Note:** The SsoClnt.ini file is installed in C:\Program Files\CA\CA SSO\Client on the CA SSO Client computer.

DomainNameServer=<eSSO\_WA\_FQDN> <SM\_WA\_FQDN>

#### eSSO\_WA\_FQDN

(Optional) Specifies the fully qualified domain name for the WAC Web Agent

#### SM\_WA\_FQDN

Specifies the fully qualified name for the CA SiteMinder Web Agent

### Overall Verification Steps

1. Restart the CA SSO Client, CA SiteMinder Policy Server, and web server hosting the Administrative UI.
2. Access the protected browser through the SSO Client and enter the URL of the resource that the Policy Server protects.

The resource appears without a rechallenge from CA SiteMinder.

### More information:

[Realms](#) (see page 461)

[Rules](#) (see page 473)

[Domains](#) (see page 453)

## Configure Single Sign-On from CA SSO to SiteMinder

CA SiteMinder provides single sign-on from CA SSO to the product.

### Follow these steps:

#### Policy Server Configuration Steps

1. Configure the smauthetsso custom authentication scheme using the Administrative UI.
2. Create a domain, realm, and rules. Protect any resource with the Web Agent.
3. Configure the smauthetsso custom authentication scheme for the protected resource.

#### WAC Web Agent Verification Steps

1. Configure the domain in the webagent.ini file of the WAC Web Agent by setting DomainCookie=<domain>.

Note: The Domain value must be the same for the CA SSO and CA SiteMinder Web Agents. The file is installed on the WAC Web Agent computer at C:\Program Files\CA\WebAccessControl\WebAgent\webagent.ini

2. Verify the following web server and the authentication method settings in the webagent.ini file:
  - Configure the "Authentication methods" and "The default authentication method" parameters to SSO.
  - The WebServerName, PrimaryWebServerName, AgentName, NTLMPath, and Secure must point to the computer where SSO Web Access Control is installed.
  - Point the ServerName attribute to the IP Address of the computer where the CA SSO Policy Server is installed.
  - For more information about configuring the WAC Web Agent, see the CA SSO documentation.

#### CA SiteMinder Web Agent or CA SiteMinder® SPS Configuration Steps:

1. Enable the SSO plug-in that is installed with the Web Agent or CA SiteMinder® SPS. This plug-in authenticates the SSO Client cookies. Remove the comment character (#) from the following line in the WebAgent.conf file:

```
#LoadPlugin=path_to_eTSSOPlugin.dll | path_to_libetssoplugin.so
```

**Note:** The WebAgent.conf file is located as follows:

#### Apache 2.0 Web Agent



## 6.0 CA SiteMinder® SPS

SPS\_install\_dir\proxy-engine\conf\defaultagent\

**SPS\_install\_dir**

CA SiteMinder® SPS installation directory

2. Restart the Policy Server.

### Overall Verification Steps

1. Restart the WAC Web Agent, the Policy Server, and the web server hosting the Administrative UI.
2. Access a resource that the WAC Web Agent protects. Provide valid credentials.
3. Using the same browser, access a resource that the Web Agent protects in the same browser.

The resource appears without a challenge for credentials.

## Configure an smetssocookie Web Agent Active Response Attribute

The smetssocookie Web Agent active response generates and sends an SSO cookie to a Web browser. The SSO cookie lets a CA SiteMinder-authenticated user access WAC or CA SSO protected content without having to reauthenticate.

**Follow these steps:**

1. Click Policies, Domain.
2. Click Responses.
3. Click Create Response.
4. Select a domain from the list and click Next.
5. Define a Name and Description for the response.
6. Verify that the CA SiteMinder is selected and that Web Agent appears in the Agent Type list.
7. Click Create Response Attribute.
8. Verify that Create a new object is selected, and then click OK.
9. Select WebAgent-HTTP-Cookie-Variable from the Attribute list.
10. Select Active Response in Attribute Kind.
11. In the Cookie Name field, type **SSOTK**.
12. In the Library Name field, type **smetssocookie**.
13. In the Function Name field, type **GenEtssoCookie**.

**Note:** The function name is case-sensitive.

14. In the Parameters field, define the following tokens:

`<CA_PS_Host_Name>;<SSO_Auth_Host>;<SSO_AuthMethod>;<EncryptionKey>`

**CA\_PS\_Host\_Name**

Specifies the host name of the CA SSO Policy Server.

**SSO\_Auth\_Host**

Specifies the SSO authentication host name in the CA Policy Manager. You can specify this host name by going to Web Access Control Resources, Configuration Resources, Authentication Host.

**Required value:** SSO\_Authhost

**SSO\_AuthMethod**

Defines the SSO authentication method.

**Required value:** SSO

**EncryptionKey**

Defines the ticket encryption key for the SSO authentication host name in the CA Policy Manager.

**Note:** To improve legibility, you can type a space before and after any token.

15. Click Submit.

16. Click Finish.

The response can be added to an OnAuthAccept rule.

## Configure an smauthetsso Custom Authentication Scheme

The CA SSO CA SiteMinder (smauthetsso) authentication scheme lets the Policy Server validate CA SSO authentication credentials so that a user already authenticated in a CA SSO/WAC environment does not need to re-authenticate. This custom authentication scheme accepts a CA SSO Cookie as a login credential; has it validated by a CA SSO Policy Server; extracts the user name from it; and verifies that the name is present in the user store. You can set this authentication scheme in a cookie, cookieorbasic, or cookieorforms mode.

You can configure one CA SSO Policy Server to failover to another CA SSO Policy Server when it fails for some reason. To configure fail-over, specify a comma-separated list of CA SSO Policy Servers as parameter field in Scheme Setup on the Authentication Scheme page.

**Follow these steps:**

1. Click Infrastructure, Authentication.
2. Click Authentication Schemes.

3. Click Create Authentication Scheme.

Verify that the Create a new object of type Authentication Scheme is selected.

Click OK

4. Select Custom Template from the Authentication Scheme Type list.
5. Enter **smauthetsso** in the Library field.
6. Enter and confirm the password of the CA SSO Policy Server administrator in the Secret and Confirm Secret fields.
7. Define an ordered set of tokens in the Parameter field with the following format:

*Mode [; <Target>] ; AdminID ; CAPS\_Host ; FIPS\_Mode ; Identity\_File*

**Note:** Separate tokens with semicolons. You may enter a space before and after each token for improved legibility.

**Example:** cookie ; SMPS\_sso ; myserver.myco.com ; 0 ; /certificates/def\_root.pem

**Example:** cookieorforms ; /siteminderagent/forms/login.fcc ; SMPS\_sso ; myserver.myco.com ; 1 ; /certificates/def\_root.pem

#### **Mode**

Specifies the type of credentials the authentication scheme accepts. Accepted values include cookie, cookieorbasic, or cookieorforms.

##### **cookie**

Specifies that only CA SSO cookies are acceptable.

##### **cookieorbasic**

Specifies that a basic authentication scheme is used to determine the login name and password if a CA SSO cookie is not provided.

##### **cookieorforms**

Specifies that a forms authentication scheme is used to determine the login name and password if a CA SSO cookie is not provided.

#### **Target**

Specifies the pathname of the .fcc file used by the HTML Forms authentication scheme.

**Note:** This value is only required for the cookieorforms mode.

#### **AdminID**

Specifies the user name of the CA SSO Policy Server administrator for the CA SSO Policy Server. CA SiteMinder uses the user name of the administrator and password to request validation of CA SSO cookies when authenticating to the CA SSO Policy Server.

#### **CAPS\_Host**

Specifies the name of the host where the CA SSO Policy Server resides.

**FIPS\_Mode**

Specifies the FIPS mode of operation in which the Policy Server is operating. Zero (0) specifies non-FIPS mode. One (1) specifies FIPS mode.

**Identity\_File**

Specifies the path to the CA SSO identity file. The Policy Server uses this file to communicate with the CA SSO Policy Server.

8. Click Submit.

## Chapter 26: CA User Activity Reporting Module Integration

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CA User Activity Reporting Module (CA UAR) provides CA SiteMinder connector guides, which detail how to configure a CA UAR integration with CA SiteMinder. The guide you use depends on whether CA SiteMinder is configured to store audit information in a text file (smaccess.log) or an ODBC database.

**To locate the CA UAR connector guides**

1. Go to the [CA User Activity Reporting Module Integration Matrix](#).
2. Click Authentication Service that is located under Product Integrations.  
  
The CA SiteMinder connector guides are based on the type of logsensor that CA UAR is to use.
3. Do *one* of the following:
  - If CA SiteMinder stores audit information in a text file, use the connector guide for a File logsensor.
  - If CA SiteMinder stores audit information in an ODBC database, use the connector guide for an ODBC logsensor.

Each of these guides is also available from the CA UAR Administrative UI when you create the required connector. To access these guides when creating the connector, click Help.



# Appendix D: Using the Policy Server as a RADIUS Server

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This section contains the following topics:

[Use the Policy Server as a Radius Server](#) (see page 703)  
[The RADIUS Client/Server Architecture](#) (see page 704)  
[How RADIUS Authentication Works with the Policy Server](#) (see page 704)  
[Policies in RADIUS Environments](#) (see page 706)  
[Responses in RADIUS Policy Domains](#) (see page 710)  
[Deploy SiteMinder in a RADIUS Environment](#) (see page 718)  
[Guidelines for Protecting RADIUS Devices](#) (see page 719)  
[How to Authenticate Users in a Homogeneous RADIUS Environment](#) (see page 719)  
[Authenticate Users in Heterogeneous RADIUS Environments with One User Directory](#) (see page 721)  
[How to Authenticate Users in Heterogeneous RADIUS Environments with Two User Directories](#) (see page 725)  
[RADIUS Agents Group Overview](#) (see page 729)  
[Set Up RADIUS Agent Groups](#) (see page 729)  
[Group RADIUS Responses](#) (see page 730)  
[Troubleshoot and Test RADIUS](#) (see page 731)

## Use the Policy Server as a Radius Server

Remote Authentication Dial-In User Service (RADIUS) is a protocol that enables you to exchange session authentication and configuration information between a Network Access Server (NAS) device and a RADIUS authentication server. You can use the Policy Server as the RADIUS authentication server.

The RADIUS protocol is often used by NAS devices that serve as:

- Proxy services for Internet Service Providers (ISP)
- Firewalls
- Corporate dial-up security services

## The RADIUS Client/Server Architecture

RADIUS is designed to simplify security by separating the communication technology provided by a NAS device from the security technology provided by the authentication server. RADIUS security protects remote access to networks and network services using a distributed client/server architecture. The Policy Server is the RADIUS server. The RADIUS client is the NAS device.

A NAS device performs one of the following:

- Supports dial-in protocols, such as SLIP or PPP, authenticates users by using the RADIUS authentication server, and routes the user onto the network; or
- Supports direct connections to the network through a firewall, authenticates users by using the RADIUS authentication server, and grants network access.

The Policy Server can serve as the RADIUS authentication server when configured as described in this chapter. As the RADIUS server, the Policy Server authenticates RADIUS users using a RADIUS authentication scheme and a pre-defined user directory.

**Note:** To use RADIUS accounting, you must configure a separate RADIUS accounting server. The Policy Server will satisfy the NAS device by sending the ACK response to the accounting server. However, you can log accounting information to files.

**More information:**

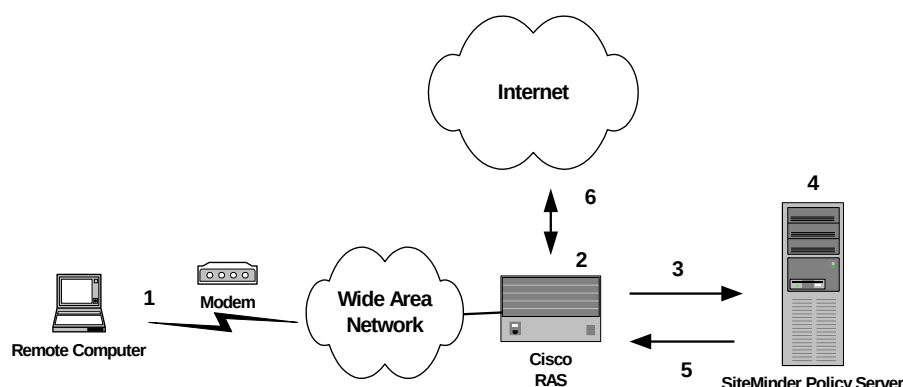
[Generate RADIUS Logs for Accounting and Debugging](#) (see page 732)

## How RADIUS Authentication Works with the Policy Server

The Policy Server authenticates users through a series of communications with the NAS device. When CA SiteMinder authenticates a user, the NAS provides that user with access to the appropriate network services.



This authentication process is depicted in the following graphic:



1. A user dialing in from a modem attempts to open a connection to the Cisco RAS (a NAS device), which will enable the user to access the Internet.
2. The RAS determines that it must use a RADIUS user profile to authenticate the user.
3. The RAS sends the user connection request to the Policy Server.
4. The Policy Server obtains the user's name and password using one of the following methods:
  - Authenticates using Password Authentication Protocol (PAP)
 

PAP is a PPP authentication protocol that provides a simple method for a host to establish its identity in a two-way handshake. Authentication takes place only upon initial link establishment and does not use encryption.
  - Authenticates using Challenge Handshake Authentication Protocol (CHAP)
 

CHAP is also a secure PPP authentication protocol. CHAP provides a way to periodically verify the identity of a host using a three-way handshake and encryption. Authentication takes place upon initial link establishment. The RAS can repeat the authentication process any time after the connection takes place.
  - Authenticates using Security Dynamics ACE/Server or Secure Computing SafeWord server.
5. The Policy Server sends an authentication response to the RAS.
6. One of the following takes place:
  - If authentication is unsuccessful, the RAS refuses the connection.
  - If authentication is successful, the RAS receives a list of attributes from the CA SiteMinder response that fires upon authentication of the user. The attributes are used as a user profile, which configures the user's network session.

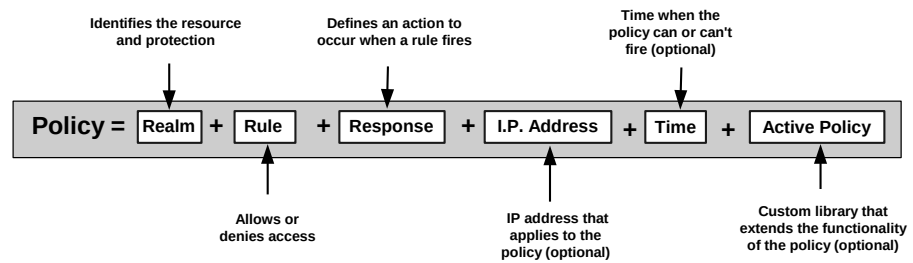
The RAS notifies the Policy Server that the session has begun and when the session ends.

## Policies in RADIUS Environments

A CA SiteMinder RADIUS policy is enforced by a RADIUS Agent and is created by binding the following elements together:

- An authentication rule
- A response
- A user or user group, and
- Optionally, an IP address, Time, and an active policy.

The basic structure of a policy is shown in the following diagram.

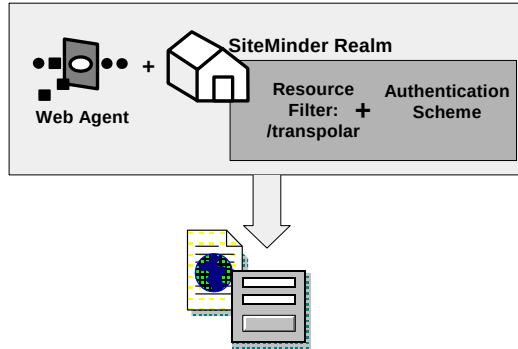


Although RADIUS policies are composed of the same elements that are contained in policies used by CA SiteMinder Agents, RADIUS Agents interpret the components differently. Rules, realms, and responses perform different functions, as shown in the following table.

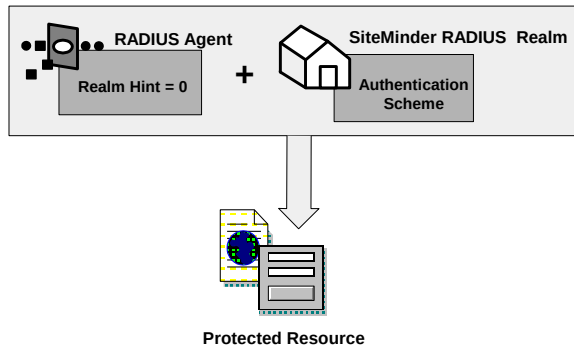
| Policy Component | In a RADIUS Policy, this item:                                                                                                                             | In a CA SiteMinder Agent Policy, this item:                                                                                                                                                                                                                                                                                                                                                                                  |
|------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Realm            | <ul style="list-style-type: none"> <li>Identifies the Agent.</li> <li>Identifies the authentication scheme.</li> <li>Defines session timeouts.</li> </ul>  | <ul style="list-style-type: none"> <li>Defines the resource filter (directory within the domain that the CA SiteMinder Agent will govern).</li> <li>Identifies the Agent.</li> <li>Identifies the authentication scheme.</li> <li>Defines the state (protected or unprotected) of the resource.</li> <li>Identifies which events (authentication or authorization) to process.</li> <li>Defines session timeouts.</li> </ul> |
| Rule             | <ul style="list-style-type: none"> <li>Authenticates only.</li> <li>Allows or denies access.</li> <li>Defines time or active rule restrictions.</li> </ul> | <ul style="list-style-type: none"> <li>Defines the resource filter.</li> <li>Defines the action (Web Agent action, authorization event, or authentication event).</li> <li>Allows or denies access.</li> <li>Authorizes and authenticates.</li> <li>Defines time or active rule restrictions.</li> </ul>                                                                                                                     |
| Response         | <ul style="list-style-type: none"> <li>Defines the values to return for authentication events.</li> </ul>                                                  | <ul style="list-style-type: none"> <li>Defines the value to return for an authorization event.</li> <li>Defines the values to return for authentication events.</li> <li>Defines the values to return for authorization reject events.</li> <li>Defines the values to return for authentication reject events.</li> </ul>                                                                                                    |

## RADIUS vs. Non-RADIUS Resources

The elements of a RADIUS policy are treated differently in part because of how resources are identified in a RADIUS environment. In a CA SiteMinder Agent environment, specific resources are identified using a resource filter in the definition of the realm. The resource filter identifies the directory location of the resources. The realm definition also identifies the Web Agent and the authentication scheme, as shown in the following diagram:



As shown in the following diagram, protected resources are located differently in a RADIUS environment. Instead of the realm identifying the resource using a filter, the RADIUS Agent identifies the resource using a *realm hint*. A realm hint is an attribute that enables the Policy Server to establish the domain in which to authenticate users. The realm hint either identifies a specific realm that the Agent protects or signifies that the Agent must protect the entire NAS device.



## Use Realm Hints

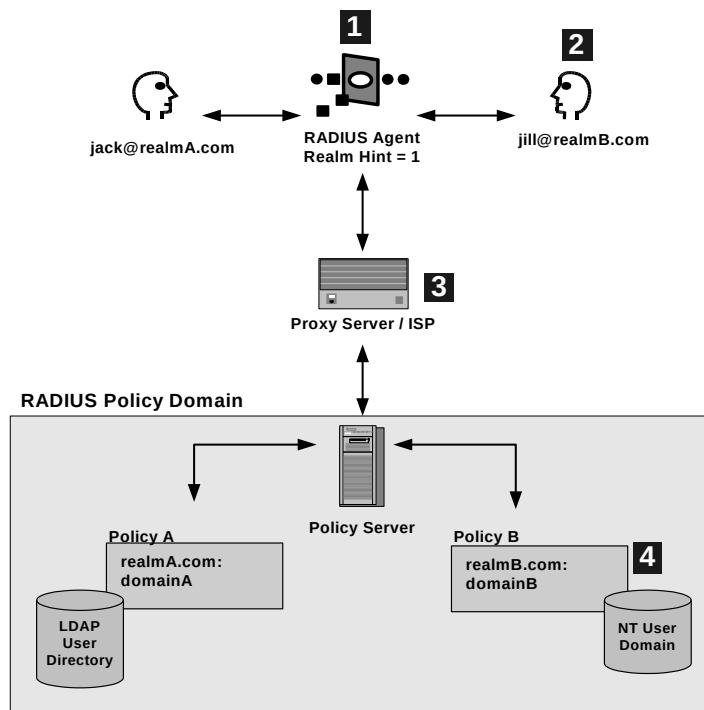
How does a RADIUS Agent protect a NAS device that must authenticate users in different domains, such as domainA and domainB? A realm hint is a RADIUS attribute that enables CA SiteMinder to determine the correct domain in which to authenticate a user. You must provide a RADIUS Agent with one of the following realm hint values:

- 0--(Default) Signifies that there is only one realm in the policy domain and therefore, a hint is not needed. The realm is bound to the NAS device directly.
- 1--(RADIUS User-Name attribute) CA SiteMinder parses the realm name from the user name in this attribute, then finds the associated domain, as explained below.
- An attribute that contains the actual name of the domain. This attribute is not available for all NAS devices. see your NAS device product documentation for more information.

When the realm hint is set to 1, the realm name is parsed from the user name attribute. The user\_name-realm separator must be "@" or "/".

- If the separator is "@" then the element following the "@" is the realm name. For example, in jack@realmA.com, the realm is realmA.com.
- If the separator is "/" then the element preceding the "/" is the realm name. For example, in x5/jack, the realm is x5.

The following diagram and explanation shows how a proxy server determines the correct CA SiteMinder domain in which to authenticate a user.



1. One RADIUS agent protects both CA SiteMinder domains. The RADIUS Agent is configured with the realm hint value of 1.
2. When Jill tries to access the ISP's proxy server, the RADIUS agent intercepts the request and forwards Jill's user name attribute jill@realmB.com to the Policy Server.
3. The Policy Server parses the user\_name and realm\_name from the user name attribute.

Example: jill@realmB.com, where jill is the user\_name and realmB.com is the realm\_name.

The Policy Server identifies the domain associated with the realm\_name. The domain associated with realmB.com is domainB.

4. The Policy Server authenticates the user\_name in the appropriate directory. The user\_name jill is authenticated in the NT user domain defined for Policy B: realmB.com:domainB.

## Responses in RADIUS Policy Domains

CA SiteMinder responses can be used to return RADIUS attributes to the NAS device if the user is authenticated. Attributes configure the characteristics of the session once the user is authenticated and define the user profile of the authenticated user. The user profile can be used by the NAS device. For example, using attributes in a response, you can define time limits for the RADIUS user session.

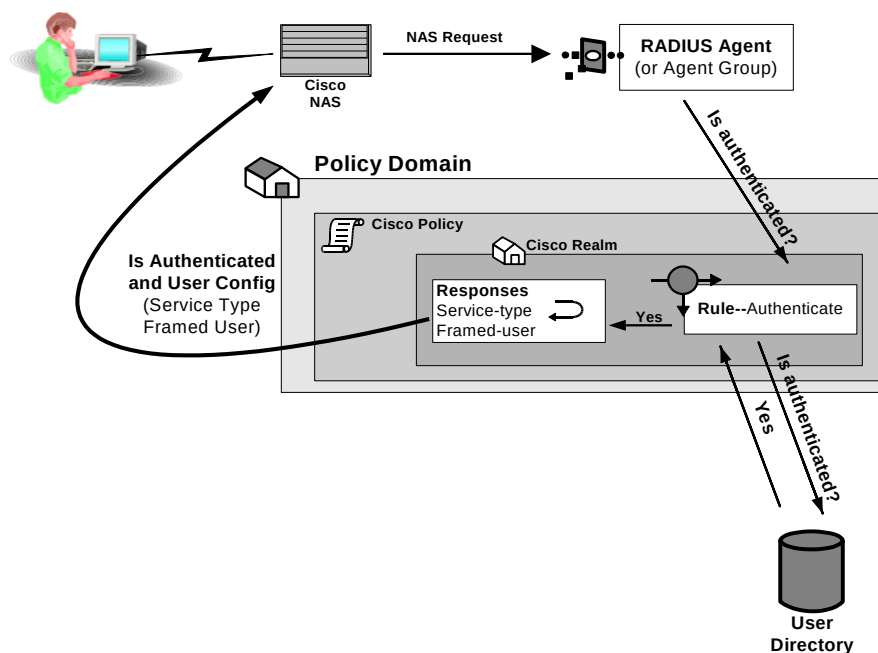
Using responses, you can provide the NAS device with user profile information that assigns privileges to the user. For example, you could allow one user unlimited access to a resource, yet limit another user's access to the same resource. Used in this way, responses give you the ability to authorize users even though RADIUS is primarily only a mechanism for authentication.

**Note:** If the NAS specifies authentication only, by default, CA SiteMinder does not return RADIUS attributes. To return RADIUS attributes when the NAS specifies authentication only, follow the instructions in [Configure SiteMinder to Always Return RADIUS Attributes](#) (see page 713).

## How Responses Work

RADIUS responses are paired with rules that authenticate. If a rule authenticates a user successfully, the RADIUS response is triggered. If the rule does not authenticate the user, the response is not triggered.

If a response is triggered, the Policy Server sends the attributes contained in the response to the NAS device. This information is used to customize the user's session, as shown in the following diagram:



## Attribute Types

You can use the following attributes in responses:

- User attributes
- DN attributes
- Active response attributes
- Radius attributes

## User Attributes

These attributes return information associated with a user in an LDAP, WinNT, or ODBC user directory. User attributes are retrieved from the user directory and can be used to modify the behavior of the RADIUS device.

## DN Attributes

These attributes return profile information associated with an LDAP directory object related to the user. For example, the DN attribute could return information about LDAP objects such as the user's group or organizational unit (OU).

## Active Response Attributes

These attributes return values from a custom library that was developed using the CA SiteMinder Authorization API. An active response is generated when CA SiteMinder invokes a function in the custom library.

## RADIUS Attributes

These attributes return values defined by the following Agent type attributes:

### RADIUS

Generic RADIUS attributes, as defined by the RADIUS Protocol specification, *Request for Comment (RFC) 2138*. The identifiers for these attributes include 1-25 and 27-63. Some of these attributes may be used multiple times in the same response.

Any RADIUS Agent type can return a response that includes generic RADIUS attributes.

### RADIUS Extended

Attributes defined in the Dictionary file of the NAS device. These attributes define values that are not defined by generic RADIUS attributes and are specific to the type of NAS device in use. The unique identifiers for these attributes extend beyond the range reserved for generic RADIUS attributes, starting with 64. For example, Lucent provides an extended RADIUS attribute called *Ascend-Disconnect-Cause*, which uses the identifier 195.

Only Agent types that match the vendor type of the extended RADIUS attribute can use the attribute. For example, a Shiva Agent type can use the extended RADIUS attributes defined for Shiva, but a Cisco Agent type cannot use Shiva extended attributes in a response. The extended attributes that are used in a response must match the attributes defined in the Dictionary file of the RADIUS client.

By default, CA SiteMinder provides pre-defined RADIUS extended attributes for some Agent Types that use these attributes, such as Ascend (Lucent). You can also define additional RADIUS extended attributes for any of the RADIUS Agent types, if necessary.



### Vendor-Specific

Attributes defined in the Dictionary file of the NAS device, which use 26 as an identifier. Vendor-specific attributes enable you to define attributes for values that are not provided by the generic RADIUS attributes. Some vendors use vendor-specific attributes in place of or in addition to RADIUS extended attributes. For example, Cisco does not use RADIUS Extended attributes; however, this NAS device supports several vendor-specific attributes, such as *Cisco AV-pair* and *Account-Info*.

You can use vendor-specific attributes to pass information to other protocols. For example, you can define a vendor specific attribute for the Cisco AV-pair attribute to pass TACACS+ information to a TACACS+ server.

Vendor-specific attributes can only be defined in responses that match the vendor type of the RADIUS client.

By default, CA SiteMinder provides pre-defined vendor-specific attributes for some Agent Types that use these attributes, such as the Network Associates' Sniffer Agent type. You can also define additional RADIUS extended attributes to any of the RADIUS Agent types, if necessary.

**Note:** For more information about RADIUS attributes, see *Request for Comment (RFC) RADIUS Protocol 2138*.

### More information:

[Create Attributes for Agent Types](#) (see page 714)

## Configure SiteMinder to Always Return RADIUS Attributes

Some NAS devices always expect RADIUS responses in the Access-Accept, even if the NAS specifies authentication only. If the NAS specifies authentication only, by default, CA SiteMinder does not return RADIUS attributes.

To always return RADIUS attributes to a NAS device, create a new registry value with the following parameters:

- Value type--DWORD
- Value Name--HKEY\_LOCAL\_MACHINE\SOFTWARE\Wow6432Node\Netegrity\SiteMinder\CurrentVersion\Authentication\AlwaysReturnRadiusAttrs
- Value Data--A numeric value greater than zero

**Note:** The install program does not create a registry entry for AlwaysReturnRadiusAttrs. Until you create and set the entry, CA SiteMinder uses the default value of 0.

After you set AlwaysReturnRadiusAttrs to a value greater than zero, the following message will appear in the Authentication Server's debug log:

```
Radius Attributes will be returned regardless of  
RA_SERVICE_TYPE_AUTHENTICATE_ONLY
```

## Create Attributes for Agent Types

Before you can use an attribute in a response, the attribute must be made available to the Agent type returning the response. Attributes are made available to Agent types by defining the attributes in Agent types. Although many Agent types are pre-configured with vendor-specific and RADIUS extended attributes, you can add additional extended RADIUS, generic RADIUS, and vendor-specific attributes to Agent types, as needed.

## Define Multiple Instances of an Attribute

You can define multiple instances of a vendor-specific attribute for the same Agent type. When you define multiple instances of a vendor-specific attribute, you can send a different value to the NAS device for each instance of the attribute. For example, for a Cisco Agent, you could define the following vendor-specific attributes, all using the same identifier (26):

- Cisco-AVpair
- Account-Info
- Command-Code

The settings that define the number of times an attribute can be used within a response are located on the Modify Agent Type Attribute pane of the Administrative UI.

To configure the attribute to be used multiple times, the Access Accept value must be set to Zero or Many.

The type of attribute that you define must match the vendor type of the Agent returning the response. For example, a vendor-specific Cisco attribute can only be returned by a Cisco Agent.

When the response is returned by the Agent, the packet structure of the response reflects the type of RADIUS Agent that sent the response. For example, the packet structure of a response returned by a Cisco Agent would include the vendor ID and the length of the string.

### To define an attribute for an Agent type

1. Log into the Administrative UI.
2. Click Infrastructure, Agent Type, Modify Agent Type.

The Modify Agent Type pane opens.

3. Specify search criteria, and click Search.  
A list of Agent types that match the search criteria opens.
  4. Select an Agent type, and click Select.  
The Modify Agent Type: *Name* pane opens.
  5. Click Create Agent Type Attribute on the Agent Type Attributes group box.  
The Create Agent Type Attribute pane opens.
  6. Verify that Create a new object is selected, and click OK.  
The Create Agent Type Attribute: *Name* pane opens.
  7. Type the name and a description of the Agent type in the fields on the General group box.
  8. Select RADIUS, RADIUS Extended, or Vendor Specific from the RADIUS Type list.
  9. Select the type of data that the attribute contains from the Data Type list.
  10. Type one of the following attribute identifiers in the Identifier field:
    - **Generic RADIUS**  
The attribute identifier is defined in the RADIUS protocol specification. Although it is possible to overwrite the identifier of a Generic RADIUS attribute, you should generally retain the pre-defined Generic RADIUS attribute definitions, which match the RADIUS specification (*RFC 2138*).  
**Example:** To create an attribute for the Callback-Id variable, type 20 in the Identifier field.
    - **RADIUS Extended**  
The attribute identifier is defined in the vendor documentation.  
**Example:** To create an attribute for the Ascend-Callback attribute, type 246 in the Identifier field.
    - **Vendor Specific**  
The attribute identifier is 26.  
**Example:** To create an attribute for a Cisco Agent that enables the Agent to use TACACS+, type 26 in the Identifier field.
- Note:** For more information about attribute identifiers, see your RADIUS vendor documentation.

11. Select a RADIUS code for each field on the RADIUS Behavior group box. The RADIUS codes are:

**Not allowed**

Attribute cannot be used in a response.

**Zero or One**

One instance or no instances of the attribute can be returned in the same response. If this value is selected, and you use the attribute in a response, the attribute will be removed from the Attribute list after you have used the attribute in a response.

**Zero or Many**

Multiple instances or no instances of the attribute can be returned in the same response.

**One and Only One**

One instance of the attribute must be returned in a response. If this value is selected, and you use the attribute in a response, the attribute will be removed from the Attribute list after you have used the attribute in a response.

The fields on the RADIUS group box are:

**Access Request**

Provides information used to determine whether or not a user is allowed access to a specific NAS. The Access Request packets also provide information for any special services requested for that user.

**Access Accept**

Provides specific configuration information necessary to begin delivery of service to the user.

**Note:** You must set the Access Accept value to Zero or One, Zero or Many, or One and Only One in order to use the attribute in a response.

**Access Reject**

Sends information if any value of the received Attributes is not acceptable. This code is often used for reply messages.

**Access Challenge**

Sends information if the NAS device has been configured for challenge/response.

**Accounting Request**

Describes the type of service being delivered and the user to whom it is being delivered.

**Accounting Response**

Sends information if the Accounting Request was recorded successfully. A RADIUS Accounting-Response is not required to have any attributes in it.

12. If the data type is number, click Create on the Values group box.
13. Type the symbolic name of the attribute in the Symbolic Name field, type the actual numeric value of the attribute in the Numeric Value field, and click OK.  
  
The Modify Agent Type Attribute pane reopens, and the attribute name-value pair is added to the Values group box.

**Note:** To create multiple attribute name-value pairs, repeat steps 12 and 13. By mapping symbolic names to values, you only need to remember names.

14. Click Submit.

The Modify Agent Type pane reopens, and the Agent type attribute is added to the Agent Type Attributes group box.

15. Click Submit.

The Modify Agent Type task is submitted for processing.

**Note:** When the task is complete and you create a response for this Agent type, you can select the Agent type attribute that you just added to the Agent type from an attribute list.

## Modify Existing Attributes

You can modify attributes that you created and attributes that have been pre-defined for a RADIUS Agent. For example, you can modify the pre-defined Ascend-PPP-Address attribute for the Ascend Agent type.

**Note:** When you modify an existing attribute, the attribute is not updated dynamically in responses that already use the attribute. If an attribute is used in a response, you must recreate the response using the updated attribute.

All RADIUS Agent types have been pre-configured to use the generic RADIUS attributes, as defined in *RFC 2138*. These attributes are available to be used by each RADIUS Agent type.

**Important!** If you overwrite a generic attribute or define a new attribute in the Generic RADIUS Agent, the change is applied to *all* RADIUS Agents. For example, if you modify the Filter ID attribute in the Generic RADIUS Agent, the modification is also made to all of the other RADIUS Agent types, such as Cisco, Shiva, Livingston, Ascend, and Checkpoint.

**To modify agent type attributes**

1. Log into the Administrative UI.
2. Select Agents from the Infrastructure tab.
3. Click Modify Agent Type.
4. Click Search.
5. Select an Agent type and click Select.

The Modify Agent Type pane opens.

6. Modify the Agent Type values by clicking the Edit button on the left of the attribute
7. Click Submit to save the changes.

**More Information:**

[Define Multiple Instances of an Attribute](#) (see page 714)

## Deploy SiteMinder in a RADIUS Environment

CA SiteMinder can be setup to provide authentication services in a variety of different RADIUS environments:

- A homogeneous environment composed of only one NAS device, such as a Cisco RAS, and only one user directory. This environment is discussed in [How to Authenticate Users in a Homogeneous RADIUS Environment](#).
- A heterogeneous environment composed of multiple NAS devices, such as a Checkpoint firewall and a Cisco RAS, and one user directory. This environment is discussed in [Authenticate Users in Heterogeneous RADIUS Environments with One User Directory](#) (see page 721).
- A heterogeneous environment composed of multiple NAS devices, such as a Checkpoint firewall and a Cisco RAS, and multiple user directories. This environment is discussed in [Authenticating Users in Heterogeneous RADIUS Environments with Two User Directories](#) (see page 725).

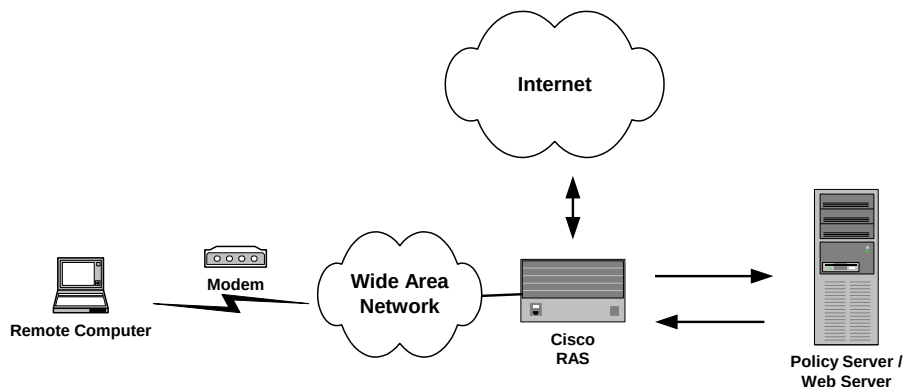
## Guidelines for Protecting RADIUS Devices

Before deploying CA SiteMinder in a RADIUS environment, note the following guidelines:

- Realm names in the same policy domain must be unique.
- Only one type of RAS device can be protected within one policy. A single policy cannot protect more than one RADIUS device because each vendor uses a separate Dictionary file. The responses in a single policy must interpret return attributes identically. If the environment is heterogeneous and includes a variety of RAS devices, define a separate policy for each type of RADIUS device.
- Multiple user directories can be defined within one policy domain. When multiple user directories are defined, specify a search order.
- You can combine RADIUS Agents for different NAS vendors in a single generic RADIUS Agent group, and then use the same Agent group in a separate policy for each type of RADIUS Agent. For example, if the Agent group contained a Shiva Agent and a Cisco Agent, you would create a Shiva policy and a Cisco policy. The same rule and realm would be added to each policy, which saves time. However the response associated to each instance of the same rule would differ; the Cisco policy would associate a Cisco response to the generic rule and the Shiva policy would associate a Shiva response to the generic rule.

## How to Authenticate Users in a Homogeneous RADIUS Environment

A homogeneous RADIUS environment is the most simple to protect. You can protect the RADIUS device using just one policy. This type of environment includes only one RADIUS device, such as a Cisco RAS, and one user directory, as shown in the following graphic:



**Follow these steps:**

1. Configure the system:
  - a. Define the RADIUS Agent, as explained in [Configure a RADIUS Agent](#).
  - b. Setup a user directory against which to authenticate RADIUS users, as explained in [Set Up the User Directory](#)
  - c. Optionally, you can also define administrative users and modify the authentication schemes.
2. Configure the policy domain:
  - a. Create a RADIUS authentication scheme (CHAP or PAP), as explained in [Create the Authentication Scheme](#).
  - b. Define a realm that identifies the RADIUS Agent and the RADIUS authentication scheme, as explained in [Configure a Realm Protected by a RADIUS Agent](#).
  - c. Define a rule that enables authenticated users to access the realm protected by the RADIUS Agent, as explained in [Configure a Rule for Authentication Event Actions](#).
  - d. Define a response that provides the user profile to the NAS device and configures the characteristics of the session using response attributes, as explained in [Configure a Response](#) and [RADIUS Agent Response Attributes](#) (see page 499).
  - e. Create a policy that binds the rule and response with the user directory, as explained in [Configure a Policy](#) (see page 522).

**More Information:**

[How RADIUS Authentication Works with the Policy Server](#) (see page 704)

## Set Up the User Directory

You can authenticate RADIUS users using any user directory that is supported for the NT or UNIX platform you are using.

If the user directory contains information about user privileges, you can create responses using user attributes. When the user attributes are sent back to the RADIUS device, the attributes are used to configure the user session.



You can use the following directories:

- ODBC-enabled database
- NT Domain
- Netscape or NDS LDAP

## Set Up the Policy Domain

The policy domain must identify one or more user directories that contain the names of the RADIUS users, the names of the Administrators who can modify the domain, and the realm that the RADIUS Agent is protecting.

## Create the Authentication Scheme

You can use any of the following authentication schemes:

- Password Authentication Protocol (PAP)  
PAP is a PPP authentication protocol that provides a simple method for a host to establish its identity in a two-way handshake. Authentication takes place only upon initial link establishment and does not use encryption.
- Challenge Handshake Authentication Protocol (CHAP)  
CHAP is also a secure PPP authentication protocol. CHAP provides a way to periodically verify the identity of a host using a three-way handshake and encryption. Authentication takes place upon initial link establishment. The RAS can repeat the authentication process any time after the connection takes place.
- Security Dynamics ACE/Server or Secure Computing SafeWord server.

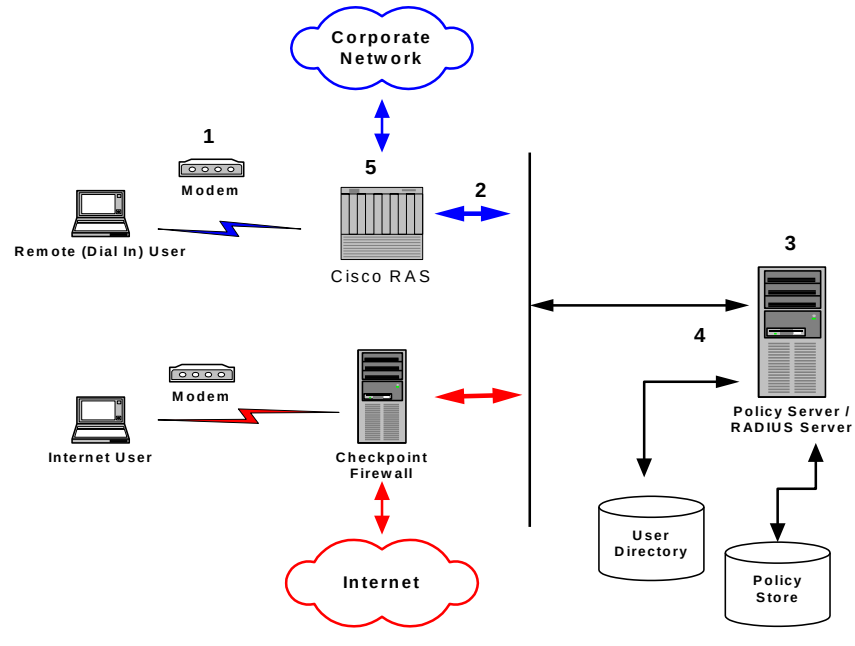
## Authenticate Users in Heterogeneous RADIUS Environments with One User Directory

A more powerful and complex deployment of the Policy Server in a RADIUS environment is one that includes multiple realms administered by multiple NAS devices. In this scenario, the Policy Server can serve as the RADIUS authentication server for multiple RADIUS clients at once.

The advantage of using a heterogeneous configuration is that you save time by using the same RADIUS authentication server (that is, the Policy Server) for each RADIUS client.

## How Users are Authenticated in Heterogeneous, Single Directory Environments

An example of a heterogeneous configuration is illustrated in the following graphic:



In the network topology shown in the previous diagram, the Policy Server authenticates users of two NAS devices: a Cisco RAS and a Checkpoint Firewall. The Policy Server uses one user directory to authenticate the users.

Each NAS device has its own RADIUS Agent, which has been configured with a realm hint. When the Policy Server receives a request to authenticate the user, it uses the RADIUS Agent's realm hint to determine the resource (domain) that the authenticated user can access.

The process of authentication when one user directory is used is as follows:

1. The remote user dials in from a modem and the Cisco RAS determines that it must use a RADIUS user profile to authenticate the user.
2. The RAS sends the user connection request to the Policy Server.
3. The Policy Server enacts the policy defined for the RAS, and the RADIUS Agent associated with the Cisco RAS does the following:
  - a. Determines the user's domain using a realm hint.
  - b. Obtains the user's name and password using the authentication scheme configured for the Agent.

4. The Policy Server evaluates the user information against the user directory and policy store.
5. The Policy Server sends an authentication response to the Cisco RAS and one of the following takes place:
  - If authentication is unsuccessful, the RAS refuses the connection.
  - If authentication is successful, the RAS receives a list of attributes from the user profile in the RADIUS server's database and establishes network access for the caller.

The RAS notifies the Policy Server that the session has begun and when the session ends.

When the Internet user attempts to dial into the Internet Service Provider via the Checkpoint Firewall, a similar process of authentication occurs. Using the realm hint, the RADIUS Agent defined for the Checkpoint Firewall determines which domain the Internet user has access to. If the user is authenticated, the Policy Server passes the Firewall the correct attributes to establish the session.

User information for both NAS devices is stored in the same user directory. Each time the Policy Server receives an authentication request, it authenticates the user using the same data directory.

## System and Policy Domain Configuration

This system configuration differs from the homogeneous environment; you must now create two Agents.

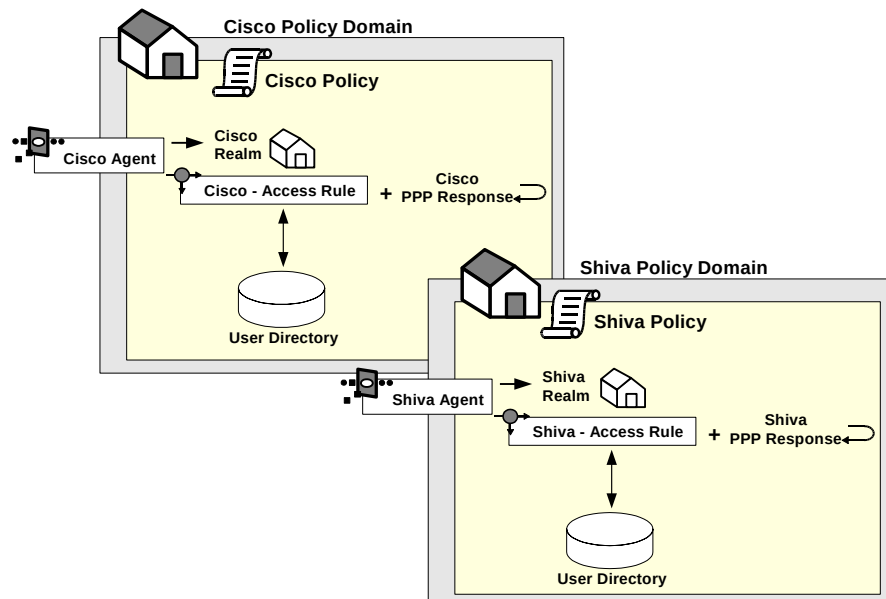
Within the policy domain there is one policy that includes rules and responses for the Cisco Agent and the Checkpoint Agent.

To setup CA SiteMinder in the heterogeneous, single directory environment described above, you must:

1. Configure the system:
  - a. Define two RADIUS Agents, as described in [Define Agents for a Heterogeneous, Single Directory Environment](#) (see page 724).
  - b. Setup a user directory against which to authenticate RADIUS users, as described in [Configure the User Directory](#) (see page 725).
  - c. Create one policy domain, as described in Create the Policy Domain.
  - d. Create an authentication scheme, as described in Create the Authentication Scheme.

2. Configure the policy domain:
  - a. Define two realms--one realm for the Cisco RAS and one realm for the Checkpoint firewall. Each realm binds a RADIUS Agent with a RADIUS authentication scheme.
  - b. Define two rules that allow authenticated users to access the appropriate realm. Each rule binds a realm with an allow or deny access event.
  - c. Define two responses that provide the user profile to the NAS device and configure the characteristics of the session using response attributes. A separate response must be defined for each NAS device because each device uses a different Dictionary file.
  - d. Create one policy that binds the Cisco rule with the Cisco response and the Checkpoint rule with the Checkpoint response. This policy also binds the components of the policy domain (the rule and response groupings) with the RADIUS user directory.

A diagram of this policy domain is shown in the following graphic:



## Define Agents for a Heterogeneous, Single Directory Environment

For this environment, you must configure two RADIUS Agents:

- One Agent must be associated with the Cisco RAS.
- One must be associated with the Checkpoint Firewall.
- Both RADIUS Agents must use 1 as the realm hint, which enables each Agent to identify the correct domain to protect.

## Configure the User Directory

The Policy Server can authenticate users using the same user directory for both NAS devices.

## Create the Policy Domain

The policy domain must identify the user directory that contains the names of the RADIUS users, the names of the Administrators who can modify the domain, and the realm that the RADIUS Agent is protecting. A RADIUS environment that uses only one user directory requires only one policy domain.

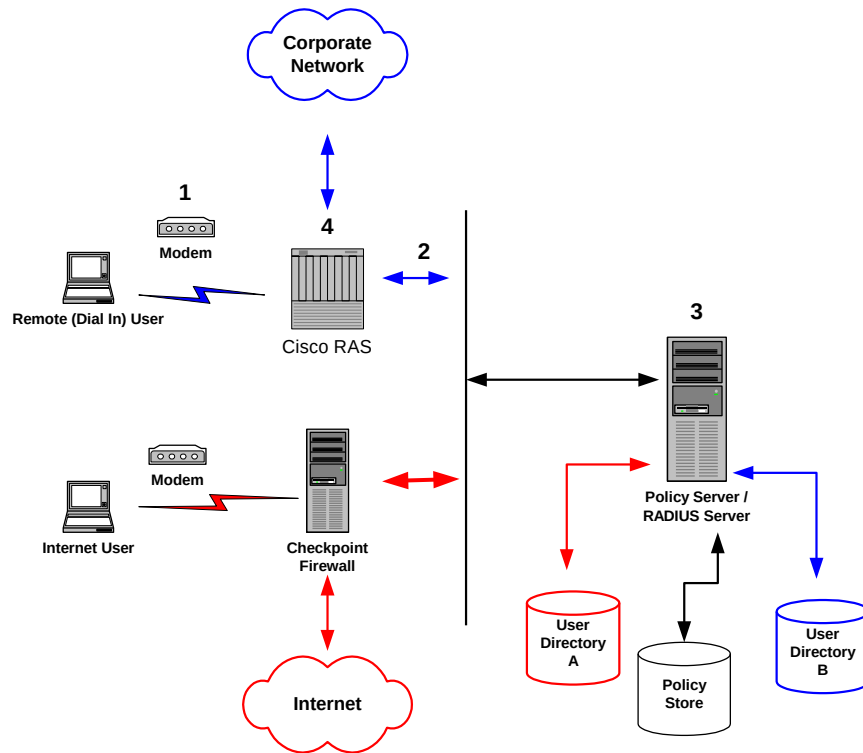
# How to Authenticate Users in Heterogeneous RADIUS Environments with Two User Directories

The Policy Server can also be configured to authenticate users for multiple NAS devices when the user information for each device is located in separate user directories. The NAS devices can be of different vendor types.

There are several advantages to this configuration:

- Using two user directories in a single policy domain enables you to delegate the administration of each directory to a different person.
- By configuring the Policy Server to authenticate users for multiple RADIUS clients, you save time. You do not need to install and configure a separate authentication server for each RADIUS client.
- Using existing user directories is more efficient. You do not need to merge the user information into a single directory.

An example of a heterogeneous configuration that uses two user directories is illustrated in the following graphic:



Unlike the topology described in the previous section, this Policy Server uses *two* user directories to authenticate the users. User information for the Cisco RAS users is stored in User Directory A. User information for the Checkpoint firewall is stored in User Directory B. The Policy Server can authenticate users using both of these directories.

By dividing the configuration into two policy domains, the need for realm hints is eliminated. Each RADIUS Agent exists in a separate policy domain and is bound to only one realm.

The process of authentication when two user directories are used is as follows:

1. The remote user dials in from a modem and the Cisco RAS determines that it must use a RADIUS user profile to authenticate the user.
2. The RAS sends the user connection request to the Policy Server.
3. The Policy Server enacts the policy defined for the RAS, and the RADIUS Agent obtains the user's name and password using the authentication scheme configured for the Agent.

4. The Policy Server evaluates the user information against the user directory and policy store associated with the policy's domain.
5. The Policy Server sends an authentication response to the Cisco RAS and one of the following takes place:
  - If authentication is unsuccessful, the RAS refuses the connection.
  - If authentication is successful, the RAS receives a list of attributes from the user profile in the RADIUS server's database and establishes network access for the caller.

The RAS notifies the Policy Server that the session has begun and when the session ends.

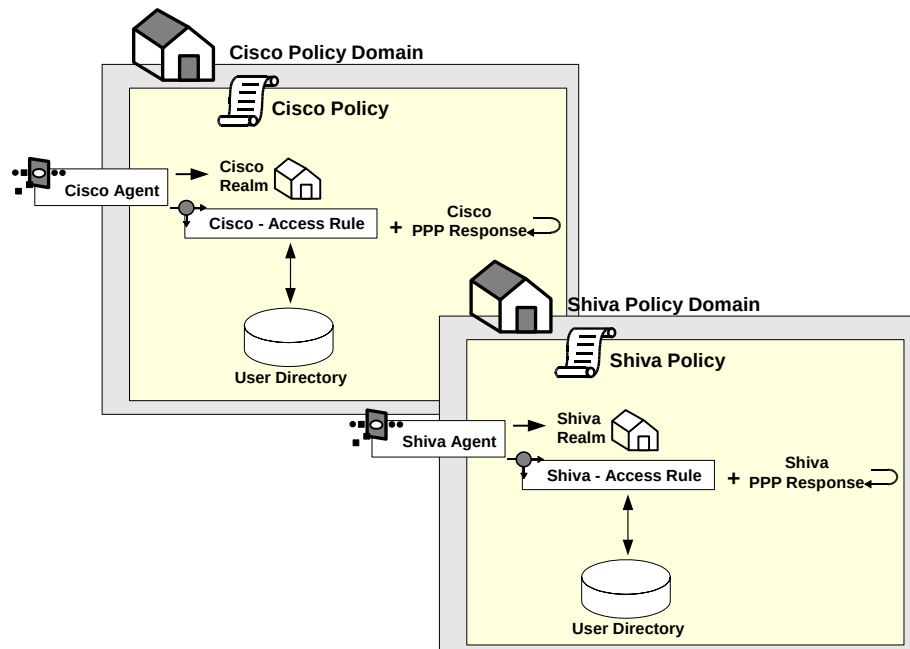
When the Internet user attempts to dial into the Internet Service Provider by using the Checkpoint Firewall, this same process of authentication occurs. However, the Policy Server evaluates the Internet user's authentication information against a different user directory.

## How to Configure the System and Policy Domain

To configure the heterogeneous environment described above, which includes two user directories, you must:

1. Configure the system:
  - a. Define two RADIUS Agents, as described in [Define Agents for a Heterogeneous, Two Directory Environment](#) (see page 728).
  - b. Set up the user directories, as described in [Set Up User Directories](#) (see page 728).
  - c. Create two policy domains, as described in [Create Two Policy Domains](#) (see page 729).
2. Configure the policy domain:
  - a. Define one realm. The realm binds a RADIUS Agent with a RADIUS authentication scheme.
  - b. Define a rule that enables authenticated users to access the realm. Each rule binds a realm with an allow or deny access event.
  - c. Define a response that provides the user profile to the NAS device and optionally, configures the characteristics of the session using response attributes.
  - d. Create a policy that binds the rule with the response. This policy also binds the rule and response with the RADIUS user directory.

A diagram of these two policy domains is shown in the following graphic:



## Define Agents for a Heterogeneous Two Directory Environment

For this environment, you must configure two RADIUS Agents:

- One Agent must be associated with the Cisco RAS.
- One Agent must be associated with the Checkpoint Firewall.
- Neither RADIUS Agent requires a realm hint.

**More information:**

[Define Agents for a Heterogeneous, Single Directory Environment](#) (see page 724)

## Set Up User Directories

Each of the user directories containing RADIUS user information must be configured in the Policy Server. Each directory will be associated with a separate policy domain so that separate administrators can be defined for each policy domain.



## Create Two Policy Domains

One policy domain must be created for the Cisco RAS and one policy domain must be created for the Checkpoint firewall. When defining the policy domains, associate each domain with the appropriate user directory.

## RADIUS Agents Group Overview

Creating a RADIUS Agent group enables you to manage multiple RADIUS Agents at once and eliminates the need to create and configure separate realms for each RADIUS Agent. Using one realm saves time because you can define the same session timeouts and the same authentication scheme for all RADIUS Agents simultaneously.

A group of RADIUS Agents could include Agents for different types of NAS devices. For instance, an Agent group could contain Agents for a Shiva LAN Rover RAS, a Checkpoint firewall, and a Cisco RAS. The Agent group containing all of these RADIUS Agents would be associated with a single realm, which defined the authentication scheme and session timeout requirements.

Agent groups are best suited for static environments that do not change often; Agent groups enable you to quickly configure CA SiteMinder to authenticate users of many NAS devices. If your environment is not static and frequently changes as new NAS devices are added or removed, you should probably avoid using Agent groups. Instead, it is usually easier to add and remove RADIUS Agents if they are not located in groups. If the Agents are separated and not grouped together, you can usually find specific Agents faster, and modify or remove policies more quickly.

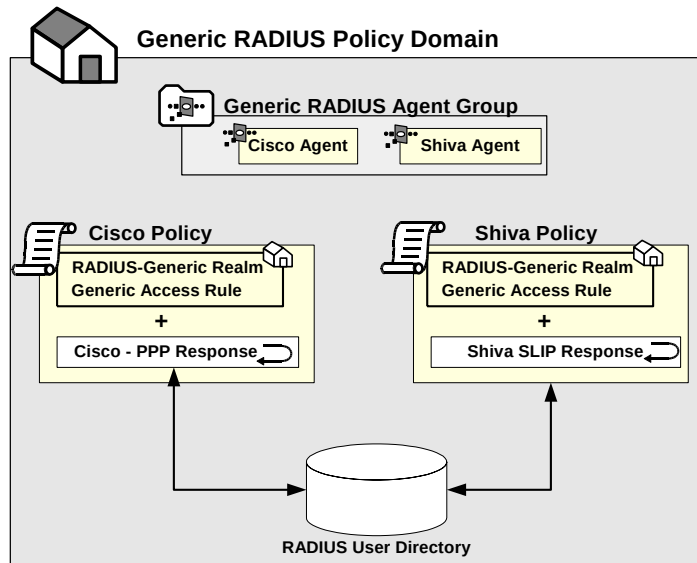
## Set Up RADIUS Agent Groups

When using RADIUS Agent groups, you typically setup a separate policy for each type of RADIUS Agent. By using separate policies for each type of RADIUS Agent, you can share the common elements of the policy domain, such as the realm and a rule, in each policy. Sharing these common elements saves time.

Unlike the rule and realm, the response in each policy is not shared. Each policy has its own response, which corresponds to the device type of the RADIUS Agent in the policy. The attributes in a response match the attributes provided by the Dictionary file of the NAS device. For example, a response for a Cisco RAS would need to provide attributes that the Cisco RAS could interpret using the Cisco Dictionary file.

**Note:** All of the NAS devices represented in a RADIUS Agent group must share the same user directory. If they do not share the same user directory, they cannot exist in the same policy domain and therefore, they cannot share the same generic realms or generic rules.

The following example depicts one RADIUS Agent group that contains both an Agent for a Cisco RAS and an Agent for a Shiva RAS. The Agent group is shared by both the Cisco policy and the Shiva policy. Both of these policies share the same generic rule to allow access and the same generic realm, which binds the Agent group to the same authentication scheme. Notice, however, that the responses for each policy are unique.



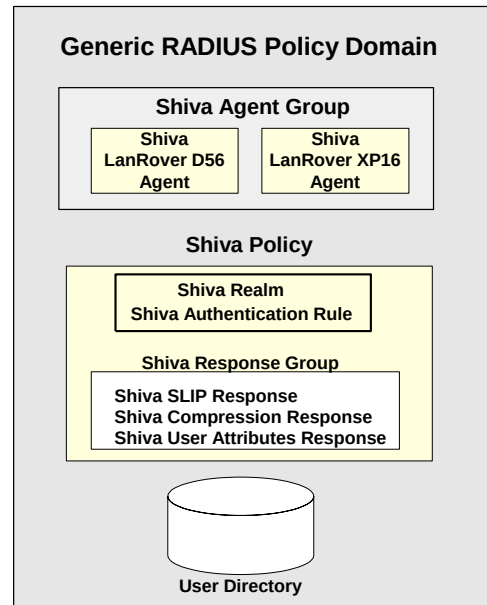
The procedure for setting up a RADIUS Agent Group is in [Configure an Agent Group](#).

## Group RADIUS Responses

A RADIUS response group is a collection of responses defined for the same type of Agent, such as Generic RADIUS. When a rule fires, all of the RADIUS responses paired with it in the response group are triggered.

The responses must be of the same Agent type in order to use the same Dictionary file. For example, you could combine two Cisco responses in the same group or two Generic RADIUS responses in the same group. However, you could not group a Generic RADIUS and a Cisco response in the same group.

The advantage of using RADIUS response groups is that it enables you to configure a policy domain using fewer policies. Instead of creating a separate realm and a separate policy for each RADIUS Agent, you could group RADIUS Agents of the same type, create one generic rule for authentication, and then group the responses for the rule. This type of configuration is shown in the following diagram:



Response groups also make it easier to add RADIUS devices to the environment. For instance, in an environment such as the one shown in the previous figure, you could quickly add another Shiva RAS to the RADIUS Agent group and this new RAS would automatically be configured with the appropriate rule and responses.

## Troubleshoot and Test RADIUS

Once you have configured the Policy Server to act as a RADIUS authentication server, you can test and troubleshoot the policies using the tools described in subsequent topics.

## Generate RADIUS Logs for Accounting and Debugging

RADIUS logs track debugging and accounting information generated by the Policy Server. Use the RADIUS log file to track the following:

- State of the Policy Server
- Connection attempts and session creations
- Information about each Policy Server action

Logs are turned on and off using the Policy Server Management Console from the Debug tab.

The Policy Server time stamps the log file with the date and time it was created. For example, "log.txt" can be specified as the name of the file. When the Policy Server is restarted and the Policy Server creates the log file, the date and time are added to the name.

If you are appending logging information to the same file, the date on the file reflects the date and time it was created. The timestamp is only updated if the Policy Server is restarted.

## Read RADIUS Log Files With Smreadclog

This tool is used to read RADIUS log files generated by the Policy Server. It is useful for troubleshooting the Policy Server when used as a RADIUS authentication server. Options are provided to display individual RADIUS attributes that are exchanged between NAS and CA SiteMinder.

Smreadclog uses the following arguments to supply information required to read RADIUS log files:

**-i<input-file>**

Specifies the filename of the log file.

**-o<output-file>**

Specifies the filename of the output file.

**-s<secret>**

Specifies the shared secret that can be used to decode RADIUS passwords.

**-r**

Indicates that a hex dump of an entire RADIUS packet be displayed.

**-a**

Indicates that RADIUS attributes should be displayed individually.

**-d**

Indicates that RADIUS attributes should be displayed according to their definition in the policy store. This option displays actual attribute names as well as attribute values formatted based on their attribute type. Without this option, only the attribute name and value are displayed (as a hex string).

**-p<radius-server>**

Enables you to record and replay RADIUS activity of the Policy Server service against your RADIUS server.

**-m<authentication port>**

Specifies the port used for RADIUS authentication if that port is not the default port, 1645.

**-n<accounting port>**

Specifies the port used for RADIUS accounting if that port is not the default port, 1646.

**To use smreadclog**

1. Navigate to one of the following locations:
  - On NT, <siteminder\_installation>\Bin  
where <siteminder\_installation> is the installed location of CA SiteMinder.
  - On UNIX, <siteminder installation>/bin  
where <siteminder\_installation> is the installed location of CA SiteMinder.
2. Enter the following command:

```
smreadclog -i<input-file> -o<output-file>
-s<secret> -r -a -d -p<radius-server> -m<portnumber>
-n<portnumber>
```

For example,

```
smreadclog -iradiuslog.txt -oradiuslog2.txt
-ssecret -r -a -d -p123.123.12.12
```

## How to Test using the SiteMinder Test Tool

The CA SiteMinder Test Tool simulates the behavior of a RADIUS authentication server. Using the Test Tool, you can test policies that authenticate RADIUS users and ensure that the response attributes you configured are returning the appropriate data.

The process of testing RADIUS policies includes the following steps:

1. Create a RADIUS policy.
2. Configure the Policy Server Management Console to use RADIUS, as explained in [Configure the Policy Server Management Console](#) (see page 734).
3. Configure the CA SiteMinder Test Tool to test RADIUS policies, as explained in [Test RADIUS Policies](#) (see page 734).

## Configure the Policy Server Management Console

### To configure the Policy Server Management console

1. Start the Policy Server Management Console.  
**Important!** If you are accessing this graphical user interface on Windows Server 2008, open the shortcut with Administrator permissions. Use Administrator permissions even if you are logged in to the system as an Administrator. For more information, see the release notes for your CA SiteMinder component.
2. Select the Settings tab.
3. On the Settings tab, do the following:
  - a. In the RADIUS UDP Ports group box, select the Enable check box.
  - b. In the Authentication field, enter 1645.
  - c. In the Accounting field, enter 1646.
4. On the Status tab, restart the Policy Server to enable the Policy Server configuration changes.

You are now ready to test the RADIUS policies using the Test Tool.

## Test RADIUS Policies

### To test RADIUS policies

1. Start the Test Tool.  
**Important!** Before running a CA SiteMinder utility or executable on Windows Server 2008, open the command-line window with administrator permissions. Open the command-line window this way, even if your account has administrator privileges.

2. In the CA SiteMinder Agent group box, do the following:
  - a. Select the RADIUS radio button.
  - b. In the Secret field, enter the shared secret that was defined for the RADIUS agent in the CA SiteMinder Administration User Interface.
3. In the User Information group box, do the following:
  - a. In the User field, enter the name of a user in the RADIUS user directory whose authentication will be tested.
  - b. In the Password field, enter the user's password.
  - c. Select the CHAP Password check box if you are using a RADIUS CHAP Authentication scheme.
4. In the Command group box, click IsAuthenticated.

The policy is tested and the response attributes appear in the Attributes group box.





# Appendix E: Attributes and Expressions Reference

---

This section contains the following topics:

[Data Types](#) (see page 737)

[Expression Syntax Overview](#) (see page 740)

[Pasting](#) (see page 741)

[Operators](#) (see page 742)

[Functions Available within Expressions](#) (see page 760)

## Data Types

All constant data is one of three main literal data types: strings, numbers, or Booleans. The string data type includes two sub-types: sets and LDAP distinguished names. The number data type includes one sub-type: dates. All functions and operations result in one of these types or their sub-types.

- Strings
  - Sets
  - LDAP Distinguished Names
- Numbers
  - Dates
- Booleans

In addition to the literal data types, there are data types that function as variables:

- User Attributes
- Named Expressions

### Strings

Strings represent character data as a string of zero or more characters enclosed by a pair of single or double quotes. String values are constants that can be manipulated by the built-in operators and functions. For example, strings can be converted to another data type or concatenated.

Strings that start with an optional positive or negative sign and contain the characters "0" through "9" can be converted to number values. The strings "TRUE" and "YES" (or "true" and "yes") can be converted to the Boolean value TRUE. All other string values are converted to FALSE. Two strings can be concatenated. In concatenation, the beginning of the second string is joined to the end of the first string.

Sets and LDAP distinguished names (DNs) are special cases of the string data type. A set is a string of elements that are separated by the caret character, for example, 'element1^element2'. Each element in the set is a string.

An LDAP DN is a simple string that uniquely identifies an entry in an LDAP directory and whose format is defined by the LDAP specification.

### Numbers

Numbers must be integers or whole numbers with an optional leading positive or negative sign. Four-byte integers are supported or whole numbers that range from  $-2^{31}$  to  $2^{31}$ . Decimal points are ignored. Number values are constants that can be manipulated by the built-in operators and functions. For example, numbers can be converted to another data type.

Numbers can be converted to strings that start with an optional negative sign and contain only the characters "0" through "9". Numbers can also be converted to Boolean values. Non-zero numbers are converted to TRUE; zero is converted to FALSE.

Dates are a special case of the number data type. They are represented as the number of seconds that have passed since January 1, 1970.

There are numerous functions that manipulate dates. For example, the DOW function accepts the numeric representation of a date and returns a number in the range 0-6 that corresponds to a day of the week. There are also functions that convert a date in string format to a number and a number representation of a date to a string.

### Booleans

Booleans are one of two values: TRUE or FALSE. Boolean values are constants that can be compared and manipulated by the built-in operators and functions. For example, Booleans can be converted to another data type.

When a Boolean value is converted to a number value, TRUE is converted to 1, and FALSE is converted to 0. When a Boolean value is converted to a string value, TRUE is converted to "TRUE" and FALSE is converted to "FALSE".

### User Attributes

User attributes have names and values. User attribute *names* are *unquoted*. User attribute *values* are strings and are *quoted*. User attribute names must conform to the following rules:

- They are not case-sensitive.
- The first character must be a letter.
- They contain only US-ASCII alphabetic characters, numeric characters, and the underscore character.

A user attribute name functions as a variable data type, not as a literal. When a user attribute name is encountered, the corresponding attribute value is retrieved from the user directory. When an attribute has multiple values, they are returned as a set. A set is a string of elements separated by the caret character, for example, 'value1^value2'. Each element in the set is a string.

### Named Expressions

There are two types of named expressions: virtual user attributes and user classes.

Virtual user attributes differ from user attributes. Unlike user attributes, which are stored in the user directory as strings, virtual user attributes name expressions that are calculated at runtime and that result in a string, number, or Boolean value. Also unlike user attributes, virtual user attributes are read-only.

User classes are a special case of virtual user attributes. Like virtual user attributes, user classes name expressions that are calculated at runtime. Unlike virtual user attributes, user classes name expressions that test membership in a user group or directory and that result in a Boolean value only.

Both virtual user attribute names and user class names must conform to the following rules:

- They are not case-sensitive.
- In the case of virtual user attributes, the first character must be the pound sign (#).
- In the case of user classes, the first character must be the at sign (@).
- The second character must be a letter or an underscore.
- The remaining characters must be US-ASCII alphabetic characters, numeric characters, or the underscore character.

**Note:** Active expressions and named expressions are not the same. While both types of expressions are evaluated at run-time, they differ in the following ways:

- While active expressions are Boolean expressions, named expressions can return a string, number, or Boolean value.
- While active expressions are referenced as is and must be reentered each time that they are used, named expressions are referenced by name and can be referenced from anywhere and reused.

## Expression Syntax Overview

The syntax described in this appendix belongs to an internal CA SiteMinder expression evaluator. You can use the data types, operators, and built-in functions that comprise this syntax in expressions, when you define Roles or Entitlements in the Administrative UI. An unnamed expression is local to the particular Role or Entitlement that you are defining, or you can use named expressions, which are defined globally.

Named expressions include virtual user attributes (whose names begin with #) and user classes (whose names begin with @).

A virtual user attribute calculates a value when the required information cannot be read directly from a user's directory entry. Virtual user attributes return a string, number, or Boolean value. For example, if you wanted to format name information so that it could be used frequently for sorting, you could define a virtual user attribute called #SortName in the user interface as follows:

```
UCase(RTrim(LastName + "," + FirstName + " " + Initial))
```

This example uses two built-in functions, UCASE and RTRIM. Note that these name are not case sensitive.

A user class is an expression that determines whether a user belongs to a particular category based on user type, such as a manager or an administrator. A user is either a member of a particular user class or not, so the result of a user class expression is always Boolean.

When you define a virtual user attribute or user class, you can specify that it is private, which means that it can only be called from other named expressions. Similarly, some of the built-in functions are designated as privileged functions, which means that they can only be called from within another named expression. Privileged functions are noted in the Remarks section as "Privileged". Functions that accept one or more LDAP Distinguished Names as parameters are noted in the Remarks section as "LDAP Only".

## Pasting

Expressions can be stored as objects in the Policy Store, where they can be referenced by name from anywhere, including from other expressions. Any expression can pass values to a named expression through the placeholders %1 through %9 and the special placeholder %0. This is called *pasting*.

There are two types of named expressions: virtual user attributes and user classes. Virtual user attribute names start with a pound sign, and user class names start with an at sign. Both types of named expressions are followed by up to nine parameters. The syntax is similar to the syntax of a function:

```
#virtual_user_attribute(P1, P2, P3, P4, P5, P6, P7, P8, P9)
```

```
@user_class(P1, P2, P3, P4, P5, P6, P7, P8, P9)
```

When creating a named expression in the Policy Store, you can use built-in operators and functions, the literal data types, the placeholders, and other named expressions. Use the placeholders to pass variable data to the named expression. In the following example, the URL is updated during each iteration and thus, must be represented by the placeholder %1.

### Example:

You can create a virtual attribute named #URLFile that accepts a URL and returns a filename:

```
#URLFile := { FIND(%1, '/')=0 ? %1 : #URLFile(AFTER(%1, '/')) }
```

```
Return_value=#URLFile('C:\My Documents\expression_syntax.doc')
```

```
Return_value='expression_syntax.doc'
```

In this example, the URL is passed to the built-in function FIND through the placeholder %1. FIND finds the first instance of "/" in the URL and returns its position. If "/" is not found, FIND returns 0 and #URLFile returns the filename. Otherwise, the URL is passed to the built-in function AFTER through the placeholder %1. AFTER returns that part of the URL that follows "/". The shortened URL is then passed to #URLFile. Recursion is supported.

The following table shows the values of the position and the URL at the completion of each iteration in this example:

| Iteration | Position | URL                                  |
|-----------|----------|--------------------------------------|
| 1         | 3        | 'My Documents\expression_syntax.doc' |

| Iteration | Position | URL                     |
|-----------|----------|-------------------------|
| 2         | 16       | 'expression_syntax.doc' |

When certain built-in functions, such as `ENUMERATE` or `LOOP`, call a named expression multiple times, once for each element in a set, the named expression must be created using the special placeholder `%0`. For example, you can create an expression named `#RTrimset` that removes trailing spaces from any number of set elements:

```
#RTrimset := RTrim(%0)
```

Then, you can pass a set to `#RTrimset` through the built-in function `ENUMERATE`:

```
Return_value=ENUMERATE('First_name ^Middle_name ^Last_name ',#RTrimset)
Return_value='First_name^Middle_name^Last_name'
```

In this example, the set consists of three elements: the first, middle, and last names. `ENUMERATE` passes each name to `#RTrimset`. `#RTrimset` removes the trailing spaces and returns the shortened name to `ENUMERATE`. `ENUMERATE` includes each returned name in the resulting string and uses the caret character to separate them.

**More information:**

[LOOP Function--Call a Virtual Attribute in a Loop](#) (see page 801)

[ENUMERATE Function--Test Set Elements](#) (see page 784)

## Operators

This topic lists all supported operators by category.

**Comparative Operators**

- Equality (= and ~=)
- Inequality (!= and ~=)
- Greater-than (> and ~>)
- Less-than (< and ~<)
- Greater-than or Equal-to (>= and ~>=)
- Less-than or Equal-to (<= and ~<=)

**String Operators**

- `BEGINS_WITH` and `~BEGINS_WITH`
- `ENDS_WITH` and `~ENDS_WITH`
- `CONTAINS` and `~CONTAINS`
- Pattern Matching (`LIKE`)
- Concatenation (`+`)

**Set Operators**

- Set Inclusion (`IN` and `~IN`)
- `INTERSECT` and `~INTERSECT`
- `UNION` and `~UNION`
- Indexing (`[..]`)

**Logical Operators**

- `AND`, `&`, and `&&`
- `NOT`
- `OR`, `|`, and `||`
- `XOR`

**Arithmetic Operators**

- Addition (`+`)
- Subtraction (`-`)
- Multiplication (`*`)
- Division (`/`)

**Miscellaneous Operator**

- Conditional Decision (`?` and `:`)

## Equality Operators

The equality operator (`=`) compares two values. If the values are equal, the result of the operation is `TRUE`. Otherwise, the result of the operation is `FALSE`. If the two values are strings, the operation is case-sensitive.

The equality operator (`~=`) only compares string values and is not case-sensitive.

**Examples:**

1 = 1  
Result = TRUE

1 = 2  
Result = FALSE

"sparrow" = "SPARROW"  
Result = FALSE

"sparrow" ~= "SPARROW"  
Result = TRUE

**More information:**

[Inequality Operators](#) (see page 744)

## Inequality Operators

The inequality operator (!=) compares two values. If the values are not equal, the result of the operation is TRUE. Otherwise, the result of the operation is FALSE. If the two values are strings, the operation is case-sensitive.

The inequality operator (~!=) only compares string values and is not case-sensitive.

**Examples:**

1 != 1  
Result = FALSE

1 != 2  
Result = TRUE

"sparrow" != "SPARROW"  
Result = TRUE

"sparrow" ~!= "SPARROW"  
Result = FALSE

**More information:**

[Equality Operators](#) (see page 743)



## Less-than Operators

The less-than operator (<) compares two values. If the first value is less than the second value, the result of the operation is TRUE. Otherwise, the result of the operation is FALSE. If the two values are Boolean, TRUE is greater than FALSE. If the two values are strings, the operation is case-sensitive.

The less-than operator (~<) only compares string values and is not case-sensitive.

### Examples:

```
1 < 2  
Result = TRUE
```

```
2 < 1  
Result = FALSE
```

```
'crow' < 'CROW'  
Result = FALSE
```

```
'crow' ~< 'CROW'  
Result = FALSE
```

### More information:

[Greater-than Operators](#) (see page 745)

## Greater-than Operators

The greater-than operator (>) compares two values. If the first value is greater than the second value, the result of the operation is TRUE. Otherwise, the result of the operation is FALSE. If the two values are Boolean, TRUE is greater than FALSE. If the two values are strings, the operation is case-sensitive.

The greater-than operator (~>) only compares string values and is not case-sensitive.

**Examples:**

1 > 2  
Result = FALSE

2 > 1  
Result = TRUE

'crow' > 'CROW'  
Result = TRUE

'crow' ~> 'CROW'  
Result = FALSE

**More information:**

[Less-than Operators](#) (see page 745)

## Less-than or Equal-to Operators

The less-than or equal-to operator (<=) compares two values. If the first value is less than or equal to the second value, the result of the operation is TRUE. Otherwise, the result of the operation is FALSE. If the two values are Boolean, TRUE is greater than FALSE. If the two values are strings, the operation is case-sensitive.

The less-than or equal-to operator (~<=) only compares string values and is not case-sensitive.

**Examples:**

1 <= 2  
Result = TRUE

2 <= 1  
Result = FALSE

'junco' <= 'JUNCO'  
Result = FALSE

'junco' ~<= 'JUNCO'  
Result = TRUE

**More information:**

[Greater-than or Equal-to Operators](#) (see page 747)

## Greater-than or Equal-to Operators

The greater-than or equal-to operator (`>=`) compares two values. If the first value is greater than or equal to the second value, the result of the operation is `TRUE`. Otherwise, the result of the operation is `FALSE`. If the two values are Boolean, `TRUE` is greater than `FALSE`. If the two values are strings, the operation is case-sensitive.

The greater-than or equal-to operator (`~>=`) only compares string values and is not case-sensitive.

### Examples:

```
1 >= 2  
Result = FALSE
```

```
2 >= 1  
Result = TRUE
```

```
'junco' >= 'JUNCO'  
Result = TRUE
```

```
'junco' ~>= 'JUNCO'  
Result = TRUE
```

### More information:

[Less-than or Equal-to Operators](#) (see page 746)

## Begins-with Operators

The two begins-with operators (`BEGINS_WITH` and `~BEGINS_WITH`) are designed to be used with string values. If the first string begins with the second string, the result of the operation is `TRUE`. Otherwise, the result of the operation is `FALSE`.

The `"BEGINS_WITH"` operator is case-sensitive. The `"~BEGINS_WITH"` operator is not case-sensitive.

### Examples:

```
'SiteMinder' BEGINS_WITH 'site'  
Result = FALSE
```

```
'SiteMinder' ~BEGINS_WITH 'site'  
Result = TRUE
```

**More information:**

[Ends-with Operators](#) (see page 748)

[Containment Operators](#) (see page 748)

## Ends-with Operators

The two ends-with operators (ENDS\_WITH and ~ENDS\_WITH) are designed to be used with string values. If the first string ends with the second string, the result of the operation is TRUE. Otherwise, the result of the operation is FALSE.

The "ENDS\_WITH" operator is case-sensitive. The "~ENDS\_WITH" operator is not case-sensitive.

**Examples:**

'SiteMinder' ENDS\_WITH 'DER'  
Result = FALSE

'SiteMinder' ~ENDS\_WITH 'DER'  
Result = TRUE

**More information:**

[Begins-with Operators](#) (see page 747)

[Containment Operators](#) (see page 748)

## Containment Operators

The two containment operators (CONTAINS and ~CONTAINS) are designed to be used with string values. If the first string contains the second string, the result of the operation is TRUE. Otherwise, the result of the operation is FALSE.

The "CONTAINS" operator is case-sensitive. The "~CONTAINS" operator is not case-sensitive.

**Examples:**

'SiteMinder' CONTAINS 'EMI'  
Result = FALSE

'SiteMinder' ~CONTAINS 'EMI'  
Result = TRUE

**More information:**[Begins-with Operators](#) (see page 747)[Ends-with Operators](#) (see page 748)

## Set Inclusion Operators

The set inclusion operators (IN and ~IN) test whether the first operand, a string, is an element of the second operand, a set. If the string is an element of the set, the result of the operation is TRUE. Otherwise, the result of the operation is FALSE.

The IN operator is case-sensitive. The ~IN operator is not case-sensitive.

**Examples:**

```
'MON' IN 'Sun^Mon^Tue^Wed^Thu^Fri^Sat'  
Result = FALSE
```

```
'MON' ~IN 'Sun^Mon^Tue^Wed^Thu^Fri^Sat'  
Result = TRUE
```

**More information:**[Set Union Operators](#) (see page 754)[Set Intersection Operators](#) (see page 753)

## Pattern Matching Operator

The pattern matching operator LIKE compares a string value to a pattern of characters that is also a string, for example, 'abc' LIKE '???'. If the string value matches the pattern, the result of the operation is TRUE. Otherwise, the result of the operation is FALSE. The pattern matching operation is case-sensitive.

Patterns are created by combining single characters, character ranges, or both. Character ranges are specified by concatenating the first character in the range, a hyphen, and the last character in the range, for example, 0-9. Valid characters include numbers, uppercase and lowercase letters, and reserved characters that have special meanings. Character sets contain one or more characters, character ranges, or both and are enclosed by square brackets. For example, [0-9A-Za-z], [0-2ABC], and [789x-z] are all valid character sets.

**Note:** Character ranges are always part of a character set.

The following table lists the reserved characters and their meanings:

| Character        | Meaning                                                                        |
|------------------|--------------------------------------------------------------------------------|
| ' or "           | Specifies a string, such as 'abc' or "abc"                                     |
| -                | Specifies a range of characters, such as 0-9                                   |
| ?                | Matches any single character                                                   |
| *                | Matches any sequence of characters, including one or none                      |
| [set]            | Matches any single character in the specified set                              |
| [!set] or [^set] | Matches any single character <i>not</i> in the specified set                   |
| [set]?           | Matches any single character in the specified set or an empty string           |
| [set]*           | Matches any sequence of characters in the specified set, including one or none |
| \                | Treats any reserved character as a regular character, such as \*               |

#### Examples that use '?'

" LIKE '?'  
Result = FALSE

'a' LIKE '?'  
Result = TRUE

'ab' LIKE '?'  
Result = FALSE

'abc' LIKE '???'  
Result = TRUE

'191' LIKE '1??'  
Result = TRUE

'201' LIKE '1??'  
Result = FALSE

**Examples that use '\*'**

```
" LIKE '*'
```

```
Result = TRUE
```

```
'a' LIKE '*'
```

```
Result = TRUE
```

```
'a1b2c3' LIKE '*'
```

```
Result = TRUE
```

```
'robin' LIKE 'r*n'
```

```
Result = TRUE
```

```
'room' LIKE 'r*n'
```

```
Result = FALSE
```

**Examples that use '[set]'**

```
" LIKE '[abcde]'
```

```
Result = FALSE
```

```
'f' LIKE '[abcde]'
```

```
Result = FALSE
```

```
'c' LIKE '[abcde]'
```

```
Result = TRUE
```

```
'abc' LIKE '[abcde]'
```

```
Result = FALSE
```

**Compare:** 'abc' LIKE '[abcde]\*'

**Examples that use '[!set]' or '[^set]'**

```
" LIKE '[!abcde]'
```

```
Result = FALSE
```

```
'f' LIKE '[^abcde]'
```

```
Result = TRUE
```

```
'c' LIKE '[!abcde]'
```

```
Result = FALSE
```

```
'xyz' LIKE '[^abcde]'
```

```
Result = FALSE
```

**Examples that use '[set]?'**

" LIKE '[abcde]?'  
Result = TRUE

'a' LIKE '[abcde]?'  
Result = TRUE

'ab' LIKE '[abcde]?'  
Result = FALSE

'z' LIKE '[abcde]?'  
Result = FALSE

**Examples that use '[set]\*'**

" LIKE '[abcde]\*'  
Result = TRUE

'a' LIKE '[abcde]\*'  
Result = TRUE

'aabbccdde' LIKE '[abcde]\*'  
Result = TRUE

'abcdef' LIKE '[abcde]\*'  
Result = FALSE

'abc' LIKE '[abcde]\*'      **Compare:** 'abc' LIKE '[abcde]'  
Result = TRUE

**Examples that use '\'**

'123-456-7890' LIKE '[0-9][0-9][0-9]\-[0-9][0-9][0-9]\-[0-9][0-9][0-9]'  
Result = TRUE

'\_!^\*\_?\_' LIKE '\_!\^\_\*\_?\_'  
Result = TRUE



**Examples that test case-sensitivity**

'a' LIKE '[a-z]'  
Result = TRUE

'A' LIKE '[a-z]'  
Result = FALSE

'A' LIKE '[A-Za-z]'  
Result = TRUE

'Robin' LIKE '[A-Za-z]\*'  
Result = TRUE

'Robin' LIKE '[A-Z][a-z]\*'  
Result = TRUE

'robin' LIKE '[A-Z][a-z]\*'  
Result = FALSE

## Set Intersection Operators

The set intersection operators (INTERSECT and ~INTERSECT) compare two sets. Sets are strings of elements separated by the caret character. The resulting set is a string that contains only those elements present in both sets. The INTERSECT operator is case-sensitive. The ~INTERSECT operator is not case-sensitive.

**Important!** The sequence of elements in the resulting set is not predictable. When the operation is not case-sensitive, the case of elements in the resulting set is also not predictable.

**Examples:**

'BLUE JAY^ORIOLE^WREN' INTERSECT 'BLUE JAY^wren'  
Result = 'BLUE JAY'

'BLUE JAY^ORIOLE^WREN' ~INTERSECT 'BLUE JAY^wren'  
Result = 'BLUE JAY^WREN'

**More information:**

[Set Union Operators](#) (see page 754)

[Set Inclusion Operators](#) (see page 749)

## Set Union Operators

The set union operator (UNION) returns a set containing all unique elements of the two operand sets (the union of the two sets). Duplicate elements are removed.

If the tilde character (~) precedes the UNION operator (~UNION), then two elements that differ only in case are considered identical.

**Important!** The sequence of the resulting set is not predictable. Also, if the ~UNION operator is specified, the case of a resulting intersecting element is not predictable.

### Examples:

```
"JUAN^BART^CHUCK" UNION "CHUCK^Bart"  
Result = "JUAN^BART^CHUCK^Bart"
```

```
"JUAN^BART^CHUCK" ~UNION "CHUCK^Bart"  
Result = "JUAN^BART^CHUCK"
```

```
"JUAN^BART^JUAN^CHUCK" UNION "JUAN^BART^JUAN^CHUCK"  
Result = "JUAN^BART^CHUCK"
```

### More information:

[Set Inclusion Operators](#) (see page 749)

[Set Intersection Operators](#) (see page 753)

## NOT Operator

The NOT operator takes a single Boolean operand and reverses its value. It changes FALSE to TRUE and TRUE to FALSE. Note that this operator is usually used to reverse the result of a comparison operator.

### Examples:

```
NOT ("SiteMinder" ENDS_WITH "R")  
Result = TRUE
```

```
NOT ("SiteMinder " ~ENDS_WITH "R")  
Result = FALSE
```

**More information:**[AND Operator](#) (see page 755)[OR Operator](#) (see page 755)[Exclusive OR Operator](#) (see page 756)

## AND Operator

The AND operator (also written & and &&) takes two Boolean operands and returns TRUE if both operands are TRUE. Note that this operator is usually used to connect two comparisons.

The evaluator does not evaluate the second Boolean operand if the first one is FALSE (since the result must be FALSE).

**Examples:**

(1 > 2) AND ("JUAN" ~= "JUAN")  
Result = FALSE

(1 < 2) AND ("JUAN" ~= "JUAN")  
Result = TRUE

**More information:**[NOT Operator](#) (see page 754)[OR Operator](#) (see page 755)[Exclusive OR Operator](#) (see page 756)

## OR Operator

The OR operator (also written | or ||) takes two Boolean operands and returns TRUE if either operand is TRUE. Note that this operator is usually used to connect two comparisons.

The evaluator does not evaluate the second Boolean operand if the first one is TRUE (since the result must be TRUE already).

**Examples:**

(1 > 2) OR ("JUAN" ~= "JUAN")  
Result = TRUE

(1 < 2) OR ("JUAN" ~= "JUAN")  
Result = TRUE

**More information:**

[NOT Operator](#) (see page 754)

[AND Operator](#) (see page 755)

[Exclusive OR Operator](#) (see page 756)

## Exclusive OR Operator

The exclusive OR (XOR) operator takes two Boolean operands and returns TRUE if either operand is TRUE, but not both. This operator is usually used to connect two comparisons.

**Examples:**

(1 > 2) XOR ("JUAN" ~= "JUAN")  
Result = TRUE

(1 < 2) XOR ("JUAN" ~= "JUAN")  
Result = FALSE

**More information:**

[NOT Operator](#) (see page 754)

[AND Operator](#) (see page 755)

[OR Operator](#) (see page 755)

## String Concatenation Operator

The string concatenation operator (+) returns a string that contains the combination of its two string operands.

If the first operand is a string, but the second is a number or a Boolean, the second operand is converted to a string. If the first operand is a number, the operator (+) indicates arithmetic addition, not concatenation.

**Examples:**

```
"JUAN" + " " + "Jones"  
Result = "JUAN Jones"
```

```
"JUAN" + 2  
Result = "JUAN2"
```

## Arithmetic Addition Operator

The arithmetic addition (+) operator returns the sum of two numeric operands.

If the first operand is a number, but the second is a string or a Boolean, the second operand is converted to a number.

**Examples:**

```
1 + 2  
Result = 3
```

```
1 + "JUAN"  
Result = 1
```

```
1 + "32JUAN"  
Result = 33
```

**More information:**

[Arithmetic Subtraction Operator](#) (see page 758)

[Arithmetic Multiplication Operator](#) (see page 758)

[Arithmetic Division Operator](#) (see page 759)

## Arithmetic Subtraction Operator

The arithmetic subtraction (-) operator returns the difference between two numeric operands.

If the first operand is a number, but the second is a string or a Boolean, the second operand is converted to a number.

### Examples:

1 - 2  
Result = -1

1 - "JUAN"  
Result = 1

100 - "32JUAN"  
Result = 68

### More information:

[Arithmetic Addition Operator](#) (see page 757)

[Arithmetic Multiplication Operator](#) (see page 758)

[Arithmetic Division Operator](#) (see page 759)

## Arithmetic Multiplication Operator

The arithmetic multiplication (\*) operator returns the product of two operands.

If the first operand is a number, but the second is a string or a Boolean, the second operand is converted to a number.

### Examples:

1 \* 2  
Result = 2

1 \* "JUAN"  
Result = 0

100 \* "32JUAN"  
Result = 3200

**More information:**

[Arithmetic Addition Operator](#) (see page 757)

[Arithmetic Subtraction Operator](#) (see page 758)

[Arithmetic Division Operator](#) (see page 759)

## Arithmetic Division Operator

The arithmetic division operator (/) returns the quotient of two operands.

If the first operand is a number, but the second is a string or a Boolean, the second operand is converted to a number.

All division is integer division.

**Note:** Division by zero, which is arithmetically undefined, always results in an error in this environment.

**Examples:**

1 / 2

Result = 0

1 / "JUAN"

Result = 0

100 / "32JUAN"

Result = 3

**More information:**

[Arithmetic Addition Operator](#) (see page 757)

[Arithmetic Subtraction Operator](#) (see page 758)

[Arithmetic Multiplication Operator](#) (see page 758)

## Conditional Operator

The conditional operator evaluates a Boolean expression (the first operand) and based on the result returns one of two other operands.

If the Boolean operand is TRUE, the result of the operator is the second operand (the THEN clause), otherwise the third operand is returned (the ELSE clause). The second and the third operand must be the same type.

Only one clause of this operator is ever evaluated. In other words, if the THEN clause (operand) is evaluated, the ELSE clause (operand) is not evaluated. (And the opposite is also true.)

**Examples:**

```
"JUAN" = "juan" ? "YES" : "NO"  
Result = "NO"
```

```
"JUAN" ~= "juan" ? "YES" : "NO"  
Result = "YES"
```

## Indexing Operator

The indexing operator takes two arguments: a set and a number (the index). The set is broken into components and the component corresponding to the specified index is returned (like a traditional array). If the index is out of range, a blank string is returned.

The first element in the set is at index zero (0).

**Examples:**

```
"Sun^Mon^Tue^Wed^Thu^Fri^Sat"[2]  
Result = "Tue"
```

```
"Sun^Mon^Tue^Wed^Thu^Fri^Sat"[0]  
Result = "Sun"
```

## Functions Available within Expressions

This topic lists all of the functions by area of utility.

**Numeric Functions**

- ABS
- ALL
- ANDBITS
- ANY
- HEX
- MAX
- MIN
- MOD



- NOTBITS
- ORBITS
- SIGN
- XORBITS

#### **String Functions**

- AFTER
- BEFORE
- CENTER
- CHAR
- FIND
- LCASE
- LEFT
- LEN
- LPAD
- LTRIM
- MID
- PCASE
- RIGHT
- RPAD
- RPT
- RTRIM
- SPACE
- TRANSLATE
- UCASE

#### **Set Functions**

- COUNT
- ENUMERATE
- FILTER

- LOOP
- SORT

#### **Date Functions**

- DATE (form 1)
- DATE (form 2)
- DATEFROMSTRING
- DATETOSTRING
- DAY
- DOW
- DOY
- HOUR
- HOUR24
- MINUTE
- MONTH
- NOW
- NOWGMT
- SECOND
- YEAR
- YEAR4

#### **Conversion Functions**

- BOOLEAN
- NUMBER
- STRING

#### **Generic User Directory I/O Functions**

- GET
- SET

#### **LDAP Functions**

- ABOVE
- AT
- BELOW

- COMMONDN
- EXPLODEDN
- PARENTDN
- RDN
- RELATIONDN

**URL/Path Handling Functions**

- QS
- URL
- URLDECODE
- URLENCODE

**Logging Functions**

- ERROR
- INFO
- TRACE
- WARNING

**File I/O Functions**

- EXISTS
- KEY
- LOG

**Error Handling Functions**

- MAYBE
- THROW
- VEXIST

**Miscellaneous Functions**

- EVALUATE

## ABOVE Function--Is User Above Specified LDAP DN

The ABOVE function returns a TRUE if the specified user (*user\_DN*) exists within a container that is *above* the specified container (*root\_DN*).

### Syntax

The ABOVE function has the following format:

```
ABOVE(root_DN, user_DN)
```

### Parameters

The ABOVE function accepts the following parameters:

*root\_DN* (string)

*user\_DN* (string)

### Return Value

The ABOVE function returns a Boolean value.

### Remarks

LDAP Only: Yes

## ABS Function--Find the Absolute Value

The ABS function finds the absolute value of a number.

### Syntax

The ABS function has the following format:

```
ABS(number)
```

### Parameters

The ABS function accepts the following parameter:

*number* (number)

### Return Value

The ABS function returns a number.

## Example

```
Return_value=ABS(3)  
Return_value=3
```

```
Return_value=ABS(-2)  
Return_value=2
```

## AFTER Function--Find a String

The AFTER function finds the specified instance of a search string in a source string and returns that part of the source string that follows the search string. If the search string is not found, then the AFTER function returns a blank string.

## Syntax

The AFTER function has the following format:

```
AFTER(source_string, search_string[, not_case_sensitive][, n])
```

## Parameters

The AFTER function accepts the following parameters:

*source\_string* (string)

*search\_string* (string)

*not\_case\_sensitive* (Boolean)

(Optional) Specifies case sensitivity. If the *not\_case\_sensitive* flag is omitted or set to FALSE, the function searches the source string for an exact match. If the *not\_case\_sensitive* flag is set to TRUE, the function ignores case.

*n* (number)

(Optional) Specifies the instance of the search string in the source string. If *n* is set to zero or one or omitted, the function finds the first instance of the search string. Otherwise, the function finds the *n*th instance of the search string. If *n* is negative, the function begins the search at the end of the source string.

## Return Value

The AFTER function returns a string.

## Example

```
Return_value=AFTER('EricEric', 'r')  
Return_value='icEric'
```

```
Return_value=AFTER('EricEric', 'R')  
Return_value=""
```

```
Return_value=AFTER('EricEric', 'R', TRUE)  
Return_value='icEric'
```

```
Return_value=AFTER('EricEric', 'r', -1)  
Return_value='ic'
```

```
Return_value=AFTER('EricEric', 'R', -1)  
Return_value=""
```

```
Return_value=AFTER('EricEric', 'R', TRUE, -1)  
Return_value='ic'
```

```
Return_value=AFTER('EricEric', 'r', 2)  
Return_value='ic'
```

```
Return_value=AFTER('EricEric', 'R', 2)  
Return_value=""
```

```
Return_value=AFTER('EricEric', 'R', TRUE, 2)  
Return_value='ic'
```

### More information:

[BEFORE Function--Find a String](#) (see page 769)

[FIND Function--Return Position in String](#) (see page 791)

## ALL Function--All Bits Set

The ALL function accepts two numbers and returns a TRUE if *all* of the bits that are set in the second number are also set in the first number.

### Syntax

The ALL function has the following format:

```
ALL(number1, number2)
```

## Parameters

The ALL function accepts the following parameters:

*number1* (number)

*number2* (number)

## Return Value

The ALL function returns a Boolean value.

## Example

```
Return_value=ALL(7, 2)
```

```
Return_value=TRUE
```

```
Return_value=ALL(7, 15)
```

```
Return_value=FALSE
```

## ANDBITS Function--Perform a Bitwise AND Operation

The ANDBITS function performs a bitwise AND operation on two numbers.

## Syntax

The ANDBITS function has the following format:

```
ANDBITS(number1, number2)
```

## Parameters

The ANDBITS function accepts the following parameters:

*number1* (number)

*number2* (number)

## Return Value

The ANDBITS function returns a number.

## Example

```
Return_value=ANDBITS(7,2)
```

```
Return_value=2
```

```
Return_value=ANDBITS(7,15)
```

```
Return_value=7
```

**More information:**

[ORBITS Function--Perform a Bitwise OR Operation](#) (see page 813)

[XORBITS Function--Perform a Bitwise XOR Operation](#) (see page 836)

[NOTBITS Function--Perform a Bitwise NOT](#) (see page 810)

## ANY Function--Any Bits Set

The ANY function accepts two numbers and returns a TRUE if *any* of the bits that are set in the second number are also set in the first number.

### Syntax

The ANY function has the following format:

```
ANY(number1, number2)
```

### Parameters

The ANY function accepts the following parameters:

*number1* (number)

*number2* (number)

### Return Value

The ANY function returns a Boolean value.

### Example

```
Return_value=ANY(7, 2)  
Return_value=TRUE
```

```
Return_value=ANY(7, 15)  
Return_value=TRUE
```



## AT Function--Is User at Specified LDAP DN

The AT function returns a TRUE if the specified user (*user\_DN*) exists within the specified container (*root\_DN*).

### Syntax

The AT function has the following format:

```
AT(root_DN, user_DN)
```

### Parameters

The AT function accepts the following parameters:

*root\_DN* (string)

*user\_DN* (string)

### Return Value

The AT function returns a Boolean value.

### Remarks

LDAP Only: Yes

## BEFORE Function--Find a String

The BEFORE function finds the specified instance of a search string in a source string and returns that part of the source string that precedes the search string. If the search string is not found, then the BEFORE function returns the entire source string.

### Syntax

The BEFORE function has the following format:

```
BEFORE(source_string, search_string[, not_case_sensitive][, n])
```

### Parameters

The BEFORE function accepts the following parameters:

*source\_string* (string)

*search\_string* (string)

*not\_case\_sensitive* (Boolean)

Specifies case sensitivity. If the *not\_case\_sensitive* flag is set to FALSE or omitted, the BEFORE function searches the source string for an exact match. If the *not\_case\_sensitive* flag is set to TRUE, the function ignores case.

*n* (number)

Specifies the instance of the search string in the source string. If *n* is set to zero or one or omitted, the BEFORE function finds the first instance of the search string. Otherwise, the function finds the *n*th instance of the search string. If *n* is negative, the function begins the search at the end of the source string.

## Return Value

The BEFORE function returns a string.

## Example

```
Return_value=BEFORE('EricEric', 'r')  
Return_value='E'
```

```
Return_value=BEFORE('EricEric', 'R')  
Return_value='EricEric'
```

```
Return_value=BEFORE('EricEric', 'R', TRUE)  
Return_value='E'
```

```
Return_value=BEFORE('EricEric', 'r', -1)  
Return_value='EricE'
```

```
Return_value=BEFORE('EricEric', 'R', -1)  
Return_value='EricEric'
```

```
Return_value=BEFORE('EricEric', 'R', TRUE, -1)  
Return_value='EricE'
```

```
Return_value=BEFORE('EricEric', 'r', 2)  
Return_value='EricE'
```

```
Return_value=BEFORE('EricEric', 'R', 2)  
Return_value='EricEric'
```

```
Return_value=BEFORE('EricEric', 'R', TRUE, 2)  
Return_value='EricE'
```

**More information:**

[AFTER Function--Find a String](#) (see page 765)

[FIND Function--Return Position in String](#) (see page 791)

## BELOW Function--Is User Below Specified LDAP DN

The BELOW function returns a TRUE if the specified user (user\_DN) exists within a container that is *below* the specified container (root\_DN)

### Syntax

The BELOW function has the following format:

```
BELOW(root_DN, user_DN)
```

### Parameters

The BELOW function accepts the following parameters:

*root\_DN* (string)

*user\_DN* (string)

### Return Value

The BELOW function returns a Boolean value.

### Remarks

LDAP Only: Yes

## BOOLEAN Function--Convert to "TRUE" or "FALSE"

The BOOLEAN function converts a number or string value to a string value of either "TRUE" or "FALSE". Numeric values of zero are converted to "FALSE". All other numeric values are converted to "TRUE". String values of "true" or "yes" are converted to "TRUE". All other string values are converted to "FALSE". The BOOLEAN function is not case-sensitive.

### Syntax

The BOOLEAN function has the following format:

```
BOOLean(number | string)
```

## Parameters

The BOOLEAN function accepts either one of the following two parameters:

*number* (number)

*string* (string)

## Return Value

The BOOLEAN function returns one of the following string values:

- "TRUE"
- "FALSE"

## Example

```
Return_value=BOOLEAN('Phoebe')  
Return_value="FALSE"
```

```
Return_value=BOOLEAN('Yes')  
Return_value="TRUE"
```

```
Return_value=BOOLEAN(123)  
Return_value="TRUE"
```

```
Return_value=BOOLEAN(0)  
Return_value="FALSE"
```

### More information:

[NUMBER Function--Convert to a Numeric Value](#) (see page 812)

[STRING Function--Convert to a String](#) (see page 827)

## CHAR Function--Convert an ASCII Value

The CHAR function converts the specified ASCII value to a one-character string.

## Syntax

The CHAR function has the following format:

```
CHAR(ASCII_value)
```

## Parameters

The CHAR function accepts the following parameter:

*ASCII\_value* (number)

Specifies the ASCII value. If the *ASCII\_value* is zero, the function returns an empty string. If the *ASCII\_value* is greater than 255, the function converts the modulus 256 of the *ASCII\_value* to a one-character string.

**Note:** Performing a modulus 256 on a value is equivalent to performing a bitwise AND with 255.

## Return Value

The CHAR function returns a one-character string.

## Example

```
Return_value=CHAR(0)  
Return_value=""
```

```
Return_value=CHAR(36)  
Return_value='$'
```

```
Return_value=CHAR(299)  
Return_value='+'
```

## CENTER Function--Pad a Source String

The CENTER function pads both ends of a source string with a specified character until the resulting string is a specified length. If the padding is uneven, the function adds an extra character to the end of the string.

## Syntax

The CENTER function has the following format:

```
CENTER(source, length[, padding])
```

## Parameters

The CENTER function accepts the following parameters:

*source* (string or number)

Specifies the source string. The function automatically converts a number to a string.

*length* (number)

Specifies the length of the resulting string.

*padding* (string)

(Optional) Specifies the character that the function uses to pad the source string.

- If the *padding* is more than one character long, the function uses the first character.
- If the *padding* is an empty string, the function does not pad the source.
- If the *padding* is omitted and the source is a string, the function uses a space for padding.
- If the *padding* is omitted and the source is a number, the function uses a zero for padding.

## Return Value

The CENTER function returns a string.

## Example

```
Return_value=CENTER('Robin', 9, '*')  
Return_value='**Robin**'
```

```
Return_value=CENTER('Robin', 7, 'ooo')  
Return_value='oRobino'
```

```
Return_value=CENTER('Robin', 7, '')  
Return_value='Robin'
```

```
Return_value=CENTER('Robin', 11)  
Return_value=' Robin'
```

```
Return_value=CENTER(123, 9)  
Return_value='000123000'
```

**More information:**

[LPAD Function--Pad a Source String on the Left](#) (see page 802)

[RPAD Function--Pad a String on the Right](#) (see page 820)

## COMMONDN Function--Find a Common Root

The COMMONDN function returns the common root of two LDAP distinguished names (DNs) without calling an LDAP server.

### Syntax

The COMMONDN function has the following format:

```
COMMONDN(ldapdn1, ldapdn2)
```

### Parameters

The COMMONDN function accepts the following parameters:

*ldapdn1* (string)

Specifies an LDAP distinguished name (DN).

*ldapdn2* (string)

Specifies an LDAP distinguished name (DN).

**Note:** If either *ldapdn1* or *ldapdn2* is not a valid LDAP DN or if the two DNs do not share a common root, the function returns an empty string. An LDAP DN is not case-sensitive.

### Return Value

The COMMONDN function returns a string.

### Remarks

LDAP Only: Yes

### Example

```
Return_value=COMMONDN('uid=Vincent,o=NDS.com', 'ou=People,o=nds.com')  
Return_value='o=NDS.com'
```

**More information:**

[PARENTDN Function--Retrieve Parent in LDAP Tree](#) (see page 814)

[EXPLODEDN Function--Convert LDAP DN to Set](#) (see page 788)

[RDN Function--Retrieve First Component of LDAP DN](#) (see page 817)

[RELATIONDN Function--Compare Two Distinguished Names](#) (see page 818)

## COUNT Function--Count the Elements in a Set

The COUNT function counts the number of elements in a set.

### Syntax

The COUNT function has the following format:

COUNT(set[, case\_sensitive])

### Parameters

The COUNT function accepts the following parameters:

*set* (string)

Specifies a string of elements that are separated by the caret character: 'element1^element2'. Each element is a string.

*case\_sensitive* (Boolean)

(Optional) Specifies case sensitivity.

- If the *case\_sensitive* flag is omitted, the function counts all elements.
- If the *case\_sensitive* flag is supplied, the function counts only unique elements.
- If the *case\_sensitive* flag is TRUE, the function is case-sensitive.
- If the *case\_sensitive* flag is FALSE, the function is not case-sensitive.

### Return Value

The COUNT function returns a number.



## Example

```
Return_value=COUNT('phoebe^PHOEBE^robin^robin')  
Return_value=4
```

```
Return_value=COUNT('phoebe^PHOEBE^robin^robin', FALSE)  
Return_value=2
```

```
Return_value=COUNT('phoebe^PHOEBE^robin^robin', TRUE)  
Return_value=3
```

### More information:

[ENUMERATE Function--Test Set Elements](#) (see page 784)

[FILTER Function--Test Set Elements](#) (see page 790)

[SORT Function--Sort a Set](#) (see page 825)

## DATE Function--Set to Midnight (form 1)

The DATE function (form 1) accepts a numeric representation of date and time and sets the time to midnight on the specified date.

### Syntax

The DATE function (form 1) has the following format:

```
DATE(date_time)
```

### Parameters

The DATE function (form1) accepts the following parameter:

*date\_time* (number)

Specifies the date and time as the number of seconds that have passed since January 1, 1970. If *date\_time* is not a valid representation of date and time, the function returns -1.

### Return Value

The DATE function (form1) returns a number.

## DATE Function--Convert Year, Month, Day, Hours, Minutes, and Seconds (form 2)

The DATE function (form 2) accepts six numbers that represent the year, month, day, hours, minutes, and seconds and converts them to a numeric representation of date and time. Date and time are represented numerically as the number of seconds that have passed since January 1, 1970. If the three time parameters are omitted, the function sets the time to midnight on the specified date.

### Syntax

The DATE function (form 2) has the following format:

DATE(year, month, day[, hours, minutes, seconds])

### Parameters

The DATE function (form 2) accepts the following parameters:

*year* (number)

Specifies a four-digit representation of the year.

**Example:** 2007

*month* (number)

Specifies the month.

**Range:** 1-12

*day* (number)

Specifies the day.

**Range:** 1-31

*hours* (number)

(Optional) Specifies the number of hours.

**Range:** 0-23

*minutes* (number)

(Optional) Specifies the number of minutes.

**Range:** 0-59

*seconds* (number)

(Optional) Specifies the number of seconds.

**Range:** 0-59

### Return Value

The DATE function (form 2) returns a number.

## DATEFROMSTRING Function--Convert String to Number

The DATEFROMSTRING function accepts a string representation of a date, a time, or both and converts the string to a numeric representation. Date and time are represented numerically as the number of seconds that have passed since January 1, 1970.

### Syntax

The DATEFROMSTRING function has the following format:

```
DATEFROMSTRING(date_time[, format_string])
```

### Parameters

The DATEFROMSTRING function accepts the following parameters:

*date\_time* (string)

*format\_string* (string)

(Optional) Specifies the format of *date\_time*. For example, the *format\_string* "YYYYMMDD" specifies the format of "20020223." If the *format\_string* is omitted, the function uses the default format of "YYYYMMDDhhmmss." If *date\_time* is invalid, the function returns -1.

### Return Value

The DATEFROMSTRING function returns a number.

### Example

```
Return_value=DATEFROMSTRING('20020223')  
Return_value=1024804800
```

## DATETOSTRING Function--Convert Number to String

The DATETOSTRING function accepts a numeric representation of a date, a time, or both and converts the number to a string representation.

### Syntax

The DATETOSTRING function has the following format:

```
DATETOSTRING(date_time[, format_string])
```

## Parameters

The DATETOSTRING function accepts the following parameters:

*date\_time* (number)

Specifies a date, a time, or both as the number of seconds that have passed since January 1, 1970. If the *date\_time* is invalid, the function returns the value "INVALID DATE".

*format\_string* (string)

(Optional) Specifies the format of a date, a time, or both in the resulting string using the format codes listed in the table. Any characters or character combinations not listed in the table are inserted in the resulting string as is. If the *format\_string* is omitted, the function formats the resulting string using the date and time representation appropriate for the locale that is currently stored in the Policy Server. The format codes and resulting formats are:

| Code | Resulting Format                                                        |
|------|-------------------------------------------------------------------------|
| %a   | Abbreviated weekday name (English)                                      |
| %A   | Full weekday name (English)                                             |
| %b   | Abbreviated month name (English)                                        |
| %B   | Full month name (English)                                               |
| %c   | Date and time representation appropriate for current locale             |
| %#c  | Long date and time representation appropriate for current locale        |
| %d   | Day of month as decimal number (01-31)                                  |
| %H   | Hour in 24-hour format (00-23)                                          |
| %I   | Hour in 12-hour format (01-12)                                          |
| %j   | Day of year as decimal number (001-366)                                 |
| %m   | Month as decimal number (01-12)                                         |
| %M   | Minute as decimal number (00-59)                                        |
| %P   | Local am and pm indicator for 12-hour clock                             |
| %S   | Second as decimal number (00-59)                                        |
| %U   | Week of year as decimal number with Sunday as first day of week (00-53) |
| %w   | Weekday as decimal number (0-6 with Sunday as 0)                        |
| %W   | Week of year as decimal number with Monday as first day of week (00-53) |
| %x   | Date representation appropriate for current locale                      |
| %#x  | Long date representation appropriate for current locale                 |

| Code   | Resulting Format                                   |
|--------|----------------------------------------------------|
| %X     | Time representation appropriate for current locale |
| %y     | Year without century as decimal number (00-99)     |
| %Y     | Year with century as decimal number                |
| %z, %Z | Time-zone name or abbreviation if known            |
| %%     | Percent sign                                       |

**Note:** The pound sign modifies the meaning of the format codes, as follows.

- The format code %**#**c specifies the long date and time representation appropriate for the current locale.
- The format code %**#**x specifies the long date representation appropriate for the current locale.
- In all other cases, the pound sign, which is inserted in the format code after the percent sign, results in the removal of leading zeros, if any.
- The pound sign has no effect on codes that format alpha characters, such as the names of months.

### Return Value

The DATETOSTRING function returns a string.

### Example

```
Return_value=DATETOSTRING(1024804800, '%Y%m%d')
Return_value='20020223'

Return_value=DATETOSTRING(1024804800, '%Y%#m%#d')
Return_value='2002223'
```

### DAY Function--Return Day of Month

The DAY function accepts a numeric representation of date and time and returns the number corresponding to the day of the month.

### Syntax

The DAY function has the following format:

```
DAY(date_time)
```

## Parameters

The DAY function accepts the following parameter:

*date\_time* (number)

Specifies the date and time as the number of seconds that have passed since January 1, 1970. If the date is invalid, the function returns -1.

## Return Value

The DAY function returns a number from 1 to 31.

## Example

```
Return_value=DAY(1024804800)
Return_value=23
```

### More information:

[DOW Function--Return Day of Week](#) (see page 782)

[DOY Function--Return Day of Year](#) (see page 783)

## DOW Function--Return Day of Week

The DOW function accepts a numeric representation of date and time and returns a number corresponding to the day of the week.

## Syntax

The DOW function has the following format:

DOW(*date\_time*)

## Parameters

The DOW function accepts the following parameter:

*date\_time* (number)

Specifies the date and time as the number of seconds that have passed since January 1, 1970. If the date is invalid, the function returns -1.

## Return Value

The DOW function returns a number from 0 (Sunday) to 6 (Saturday).

## Example

```
Return_value=DOW(1024804800)  
Return_value=0
```

### More information:

[DAY Function--Return Day of Month](#) (see page 781)

[DOY Function--Return Day of Year](#) (see page 783)

## DOY Function--Return Day of Year

The DOY function accepts a numeric representation of date and time and returns a number corresponding to the day of the year.

## Syntax

The DOY function has the following format:

```
DOY(date_time)
```

## Parameters

The DOY function accepts the following parameter:

*date\_time* (number)

Specifies the date and time as the number of seconds that have passed since January 1, 1970. If the date is invalid, the function returns -1.

## Return Value

The DOY function returns a number from 1 to 366.

## Example

```
Return_value=DOY(1024804800)  
Return_value=173
```

**More information:**

[DAY Function--Return Day of Month](#) (see page 781)

[DOW Function--Return Day of Week](#) (see page 782)

## ENUMERATE Function--Test Set Elements

The ENUMERATE function passes each element in the specified set to the named expression specified by the parameter *#virtual\_user\_attribute* or *@user\_class* using pasting. If the named expression returns a value, the element is included in the resulting string.

### Syntax

The ENUMERATE function has the following format:

```
ENUMERATE(set, #virtual_user_attribute | @user_class)
```

### Parameters

The ENUMERATE function accepts the following parameters:

*set* (string)

Specifies a string of elements that are separated by the caret character: 'element1^element2'. Each element is a string.

*#virtual\_user\_attribute* (named expression)

Specifies a named expression that calculates a user attribute.

*@user\_class* (named expression)

Specifies a named expression that tests for membership in a user directory or group.

### Return Value

The ENUMERATE function returns a string or integer depending on the attribute type that the function expects.



**Example 1**

Virtual User Attribute #GetCN set to RDN( STRING(%0),FALSE)

ENUMERATE(SM\_USERGROUPS, #GetCN)

**Example 2**

ENUMERATE(SM\_USERGROUPS, STRING(RDN(%0, FALSE)))

**More information:**

[LOOP Function--Call a Virtual Attribute in a Loop](#) (see page 801)

[COUNT Function--Count the Elements in a Set](#) (see page 776)

[FILTER Function--Test Set Elements](#) (see page 790)

[SORT Function--Sort a Set](#) (see page 825)

[Pasting](#) (see page 741)

## ERROR Function--Write Error Message to Console Log

The ERROR function writes the specified error message to CA SiteMinder's Console Log.

### Syntax

The ERROR function has the following format:

```
ERROR(error_message)
```

### Parameters

The ERROR function accepts the following parameter:

*error\_message* (string)

### Return Value

The ERROR function returns an empty string. When used in a Boolean context, the ERROR function returns the value TRUE.

### Remarks

Privileged: Yes

### Example

```
Return_value=ERROR('Invalid Access')  
Return_value=""
```

#### More information:

[TRACE Function--Write Trace Entry to Console Log](#) (see page 828)

[INFO Function--Write INFO Message to Console Log](#) (see page 796)

[WARNING Function--Write WARNING Message to Console Log](#) (see page 836)

## EVALUATE Function--Evaluate an Expression

The EVALUATE function evaluates an expression in the context of the current user and returns the result as a string. If an optional user path is provided, the function evaluates the expression in the context of the specified user.

### Syntax

The EVALUATE function has the following format:

```
EVALUATE([user_path, ]expression)
```

### Parameters

The EVALUATE function accepts the following parameters:

*user\_path* (string)

(Optional) Specifies a user other than the current user.

*expression* (string)

Specifies the expression to be evaluated.

### Return Value

The EVALUATE function returns a string.

### Remarks

Privileged: Yes

### Example

```
Return_value=EVALUATE("sn + ',' + givenname")  
Return_value="Hood, Robin"
```

```
Return_value=EVALUATE(manager, "sn + ',' + givenname")  
Return_value="Webb, Charlotte"
```

## EXISTS Function--Look Up File Name

The EXISTS function looks up the specified file and returns a TRUE if the file exists. Otherwise, the function returns a FALSE.

### Syntax

The EXISTS function has the following format:

EXISTS(filename)

### Parameters

The EXISTS function accepts a filename.

*filename* (string)

### Return Value

The EXISTS function returns a Boolean value.

### Remarks

Privileged: Yes

### Example

Return\_value=EXISTS('SmUtilities.dll')  
Return\_value=TRUE

#### More information:

[KEY Function--Look Up Key](#) (see page 796)

## EXPLODEDN Function--Convert LDAP DN to Set

The EXPLODEDN function converts an LDAP distinguished name (DN) to a set without calling an LDAP server.

### Syntax

The EXPLODEDN function has the following format:

EXPLODED(ldapdn[, remove\_attribute\_names])

## Parameters

The EXPLODEDN function accepts the following parameters:

*ldapdn* (string)

Specifies an LDAP distinguished name (DN).

*remove\_attribute\_names* (Boolean)

(Optional) Specifies the *remove\_attribute\_names* flag. If the flag is TRUE, the function removes the attribute names from the LDAP distinguished name (DN).

## Return Value

The EXPLODEDN function returns a string of elements that are separated by the caret character: 'element1^element2'. Each element is a string.

## Remarks

LDAP Only: Yes

## Example

```
Return_value=EXPLODEDN('uid=hawk,o=NDS.com', FALSE)
```

```
Return_value='uid=hawk^o=NDS.com'
```

```
Return_value=EXPLODEDN('uid=hawk,o=NDS.com', TRUE)
```

```
Return_value='hawk^NDS.com'
```

### More information:

[COMMONDN Function--Find a Common Root](#) (see page 775)

[PARENTDN Function--Retrieve Parent in LDAP Tree](#) (see page 814)

[RDN Function--Retrieve First Component of LDAP DN](#) (see page 817)

[RELATIONDN Function--Compare Two Distinguished Names](#) (see page 818)

## FILTER Function--Test Set Elements

The FILTER function compares each element in the specified set to the specified pattern and returns a new set containing only the elements that match the pattern. If the optional NOT operator is included, the FILTER function returns a new set containing only the elements that do not match the pattern.

### Syntax

The FILTER function has the following format:

`FILTER(set, [NOT ]pattern)`

### Parameters

The FILTER function accepts the following parameters:

*set* (string)

Specifies a string of elements that are separated by the caret character: 'element1^element2'. Each element is a string.

*pattern* (string)

Specifies a pattern of characters. A *pattern* can include single characters, ranges of characters, or both. A range of characters is expressed as two characters separated by a hyphen. The following are examples of valid character ranges: 0-9, a-z, and A-Z. The *pattern* parameter can also include characters that are reserved and have special meanings. The reserved characters are:

| Character        | Meaning                                                          |
|------------------|------------------------------------------------------------------|
| ?                | Matches any single character                                     |
| *                | Matches any sequence of characters, including one or none        |
| [set]            | Matches any single character in the specified set                |
| [!set] or [^set] | Matches any single character <i>not</i> in the specified set     |
| \                | Treats any reserved character as a regular character, such as \* |

NOT (operator)

(Optional) If the NOT operator is included, the function returns a new set containing only the elements that do not match the pattern.

### Return Value

The FILTER function returns a string of elements separated by the caret character: 'element1^element2'. Each element is a string.

## Example

```
Return_value=FILTER('Faith^Earl^Emilie^Fred', 'E*')  
Return_value='Earl^Emilie'
```

```
Return_value=FILTER('Faith^Earl^Emilie^Fred', NOT 'E*')  
Return_value='Faith^Fred'
```

### More information:

[COUNT Function--Count the Elements in a Set](#) (see page 776)

[ENUMERATE Function--Test Set Elements](#) (see page 784)

[SORT Function--Sort a Set](#) (see page 825)

## FIND Function--Return Position in String

The FIND function finds the specified instance of the search string in the source string and returns its position. If the search string is not found, then the function returns a zero.

## Syntax

The FIND function has the following format:

```
FIND(source_string, search_string[, not_case_sensitive][, n])
```

## Parameters

The FIND function accepts the following parameters:

*source\_string* (string)

*search\_string* (string)

*not\_case\_sensitive* (Boolean)

(Optional) Specifies case sensitivity. If the *not\_case\_sensitive* flag is omitted or set to FALSE, the function searches the source string for an exact match. If the *not\_case\_sensitive* flag is set to TRUE, the FIND function ignores case.

*n* (number)

(Optional) Specifies the instance of the search string in the source string. If *n* is set to zero or one or omitted, the function finds the first instance of the search string. Otherwise, the function finds the *n*th instance of the search string. If *n* is negative, the function begins the search at the end of the source string.

## Return Value

The FIND function returns a number.

## Example

```
Return_value=FIND('PhoebePhoebe', 'oe', FALSE, 1)  
Return_value=3
```

```
Return_value=FIND('PhoebePhoebe', 'OE', FALSE, 1)  
Return_value=0
```

```
Return_value=FIND('PhoebePhoebe', 'OE', TRUE, 1)  
Return_value=3
```

```
Return_value=FIND('PhoebePhoebe', 'oe', FALSE, -1)  
Return_value=9
```

```
Return_value=FIND('PhoebePhoebe', 'OE', FALSE, -1)  
Return_value=0
```

```
Return_value=FIND('PhoebePhoebe', 'OE', TRUE, -1)  
Return_value=9
```

```
Return_value=FIND('PhoebePhoebe', 'oe', FALSE, 2)  
Return_value=9
```

```
Return_value=FIND('PhoebePhoebe', 'OE', FALSE, 2)  
Return_value=0
```

```
Return_value=FIND('PhoebePhoebe', 'OE', TRUE, 2)  
Return_value=9
```

### More information:

[AFTER Function--Find a String](#) (see page 765)

[BEFORE Function--Find a String](#) (see page 769)



## GET Function--Locate Attributes in a User Directory

The GET function locates the specified attribute or attributes in a user directory and returns the attribute values. Multiple attribute values are separated by the caret character. If the function cannot find an attribute, it returns an empty string.

### Syntax

The GET function has the following format:

```
GET(user_attribute_name | user_attributes_string)
```

### Parameters

The GET function accepts one of the following parameters:

*user\_attribute\_name* (unquoted string)

Specifies a single user attribute.

*user\_attributes\_string* (string)

Specifies a string of user attribute names separated by a character. The function uses this character to separate one attribute's values from another attribute's values in the resulting string.

### Return Value

The GET function returns a string.

### Remarks

Privileged: Yes

LDAP Only: Yes

### Example

```
Return_value=GET('sn,givenname')  
Return_value='Finch,Robin'
```

## HEX Function--Convert to Hexadecimal

The HEX function converts a decimal number to a hexadecimal number and returns it as a string.

### Syntax

The HEX function has the following format:

```
HEX(decimal_number)
```

### Parameters

The HEX function accepts the following parameter:

*decimal\_number* (number)

### Return Value

The HEX function returns a string.

### Example

```
Return_value=HEX(16)  
Return_value='10'
```

## HOURL Function--Convert to Hour

The HOURL function converts the specified date and time to an hour from 1 to 12.

### Syntax

The HOURL function has the following format:

```
HOURL(date_time)
```

## Parameters

The HOUR function accepts the following parameter:

*date\_time* (number)

Specifies the date and time as the number of seconds that have passed since January 1, 1970. If *date\_time* is not a valid representation of date and time, the function returns -1.

## Return Value

The HOUR function returns a number from 1 to 12.

**More information:**

[HOUR24 Function--Convert to Hour](#) (see page 795)

## HOUR24 Function--Convert to Hour

The HOUR24 function converts the specified date and time to an hour from 0 to 23.

## Syntax

The HOUR24 function has the following format:

HOUR24(*date\_time*)

## Parameters

The HOUR24 function accepts the following parameter:

*date\_time* (number)

Specifies the date and time as the number of seconds that have passed since January 1, 1970. If *date\_time* is not a valid representation of date and time, the function returns -1.

## Return Value

The HOUR24 function returns a number from 0 to 23.

**More information:**

[HOUR Function--Convert to Hour](#) (see page 794)

## INFO Function--Write INFO Message to Console Log

The INFO function writes the string argument to the CA SiteMinder Console Log as an INFO message.

### Syntax

The INFO function has the following format:

```
INFO(source_string)
```

### Parameters

The INFO function accepts the following parameter:

*source\_string* (string)

### Return Value

The INFO function returns a Boolean, always TRUE.

### Example

```
Return_value=INFO("86% Complete")  
Return_value=TRUE
```

## KEY Function--Look Up Key

The KEY function looks up the specified key name in the specified application section of the specified file and returns a key value. If the key, application, or file is not found, then the KEY function returns an empty string.

### Syntax

The KEY function has the following format:

```
KEY(filename, [application_name, ]key_name)
```

## Parameters

The KEY function accepts the following parameters:

*filename* (string)

Specifies the file. In the specified file, comment lines start with a semicolon, pound sign, or two forward slashes. Comment lines, blank lines, and leading and trailing spaces are ignored.

*application\_name* (string)

(Optional) Specifies the name of the application section. In the specified file, application names are enclosed by square brackets and specify the beginning of an application section: [*application\_name*]. Application names are case-sensitive.

*key\_name* (string)

Specifies the name of the key. In the specified file, key names and values are enclosed by angle brackets and paired by an equal sign, one pair per line: <*key\_name*>=<key\_value>. Key names are case-sensitive.

## Return Value

The KEY function returns a string.

## Remarks

Privileged: Yes

LDAP Only: No

## Example

```
Return_value=KEY('application.dat', 'login user')
Return_value='key_value'
```

### More information:

[EXISTS Function--Look Up File Name](#) (see page 788)

## LCASE Function--Convert to Lowercase

The LCASE function converts any uppercase letters in the specified string to lowercase.

### Syntax

The LCASE function has the following format:

```
LCASE(specified_string)
```

### Parameters

The LCASE function accepts the following parameter:

*specified\_string* (string)

### Return Value

The LCASE function returns a string.

### Example

```
Return_value=LCASE('BARRED OWL')
```

```
Return_value='barred owl'
```

#### **More information:**

[PCASE Function--Convert a String to Proper Case](#) (see page 815)

[UCASE Function--Convert to Upper Case](#) (see page 830)

## LEFT Function--Return Part of a String

The LEFT function returns a specified number of characters of a string. If the string is shorter than the specified number of characters, the entire string is returned.

### Syntax

The LEFT function has the following format:

```
LEFT(source_string, length)
```

## Parameters

The LEFT function accepts the following parameters:

*source\_string* (string)

*length* (number)

## Return Value

The LEFT function returns a string.

## Example

```
Return_value=LEFT('JuanJuan', 2)
```

```
Return_value='Ju'
```

```
Return_value=LEFT('JuanJuan', 10)
```

```
Return_value=('JuanJuan')
```

```
Return_value=LEFT('JuanJuan', 0)
```

```
Return_value=''
```

### More information:

[MID Function--Return Part of a String](#) (see page 806)

[RIGHT Function--Retrieve Characters from a String](#) (see page 819)

## LEN Function--Return the Length of a String

The LEN function returns the length of a string.

## Syntax

The LEN function has the following format:

```
LEN(source_string)
```

## Parameters

The LEN function accepts the following parameter:

*source\_string* (string)

## Return Value

The function returns a number.

## Example

```
Return_value=LEN("JuanJuan")  
Return_value=8
```

## LOG Function--Write a String to a File

The LOG function writes the string argument to the specified file.

## Syntax

The LOG function has the following format:

```
LOG(filename, source_string)
```

## Parameters

The LOG function accepts the following parameters:

*filename* (string)

*source\_string* (string)

## Return Value

The LOG function returns a Boolean, which is always TRUE.

## Remarks

Privileged: Yes

## Example

```
Return_value=LOG("auditlog.txt", "Accessing Realm XXX")  
Return_value=TRUE
```



## LOOP Function--Call a Virtual Attribute in a Loop

The LOOP function calls the virtual attribute once for each possible number in the loop, starting and ending at the specified values. If the step value is specified, the numbers are incremented by the step value. If the virtual attribute returns a non-blank value, the value is included in the resulting set.

### Syntax

The LOOP function has the following format:

```
LOOP(#virtual_user_attribute, start_value, end_value, [step,] )
```

### Parameters

The LOOP function accepts the following parameters:

*#virtual\_user\_attribute* (Named Expression)

Name of a defined virtual attribute. The virtual attribute can access the current loop counter by using a reference to %0.

*start\_value* (number)

*end\_value* (number)

*step* (number)

(Optional) The default is 1. Negative values are allowed.

### Return Value

The LOOP function returns a set.

### Examples

For these examples assume the virtual user attribute is #Padset := LPAD(%0, 2)

```
Return_set=LOOP(#Padset ,1, 5)
Return_set="001^002^003^004^005"
Return_set=LOOP(#Padset ,1, 5, 2)
Return_set="001^003^005"
Return_set=LOOP(#Padset ,5, 1, -1)
Return_set="005^004^003^002^001"
```

**More information:**

[ENUMERATE Function--Test Set Elements](#) (see page 784)

[FILTER Function--Test Set Elements](#) (see page 790)

[Pasting](#) (see page 741)

## LPAD Function--Pad a Source String on the Left

The LPAD function pads a source string on the left with the first character of the specified padding until the resulting string is the specified length.

### Syntax

The LPAD function has the following format:

```
LPAD(source_string, length[, padding])
```

### Parameters

The LPAD function accepts the following parameters:

*source\_string* (string)

This parameter can also be a number; it is automatically converted to a string.

*length* (number)

The number of characters of the final string.

*padding* (string)

(Optional) If the padding is more than one character long, only the first character is used. If the padding is zero length, no padding is done. If the source is a string and padding omitted, a space is used for padding. If the source is a number and padding is omitted, a zero is used for padding.

### Return Value

The LPAD function returns a string.

### Examples

```
Result_value=LPAD('Juan', 5)  
Result_value= ' Juan'
```

```
Result_value=LPAD('Juan', 5, 'X')  
Result_value= 'XJuan'
```

```
Result_value=LPAD('Juan', 6, 'XY')  
Result_value= 'XXJuan'
```

```
Result_value=LPAD(5, 2)  
Result_value= '05'
```

```
Result_value=LPAD(5, 2, ' ')  
Result_value=' 5'
```

**More information:**

[CENTER Function--Pad a Source String](#) (see page 773)

[RPAD Function--Pad a String on the Right](#) (see page 820)

## LTRIM Function--Remove Leading Spaces in a String

The LTRIM function returns a string representing the *source\_string* with any leading spaces removed.

### Syntax

The LTRIM function has the following format:

```
LTRIM(source_string)
```

### Parameters

The LTRIM function accepts the following parameter:

*source\_string* (string)

### Return Value

The LTRIM function returns a string.

### Example

```
Return_value=LTRIM(' Juan ')  
Return_value='Juan '
```

**More information:**

[RTRIM Function--Remove Trailing Spaces from a String](#) (see page 822)

## MAX Function--Determine the Larger of Two Values

The MAX function returns the larger of two numeric arguments.

### Syntax

The MAX function has the following format:

```
MAX(int_1, int_2)
```

### Parameters

The MAX function accepts the following parameters:

*int\_1* (number)

*int\_2* (number)

### Return Value

The MAX function returns a number.

### Example

```
Return_value=MAX(-2, 4)
```

```
Return_value=4
```

#### More information:

[MIN Function--Determine the Lesser of Two Numbers](#) (see page 807)

## MAYBE Function--Report an Indeterminate Result

You can write an expression that tests a condition and calls the function MAYBE if information needed for the test is missing or incomplete. When the expression evaluator encounters MAYBE, it tries to resolve the expression without the needed information. This is only possible when MAYBE is part of a compound expression.

For example, when the operator is AND and one operand is FALSE, the evaluator can determine that the result of the operation is FALSE. When one operand is TRUE and the other operand is undefined or both operands are undefined, the evaluator cannot determine the result of the operation. When both operands are TRUE, the result of the AND operation is TRUE.

| AND Operator | True          | False | Undefined     |
|--------------|---------------|-------|---------------|
| True         | True          | False | Indeterminate |
| False        | False         | False | False         |
| Undefined    | Indeterminate | False | Indeterminate |

Likewise, when the operator is OR and one operand is TRUE, the evaluator can determine that the result of the operation is TRUE. When one operand is FALSE and the other operand is undefined or both operands are undefined, the evaluator cannot determine the result of the operation. When both operands are FALSE, the result of the OR operation is FALSE.

| OR Operator | True | False         | Undefined     |
|-------------|------|---------------|---------------|
| True        | True | True          | True          |
| False       | True | False         | Indeterminate |
| Undefined   | True | Indeterminate | Indeterminate |

If the evaluator cannot resolve the expression, it stops processing and the specified message is output to the console log or report depending on the context. MAYBE is typically called during role evaluation either in the context of a policy or report generation.

Typically, conditions depend on the time of day or an IP address or the value of a virtual user attribute (specified by the # sign), a user class (specified by the @ sign), a context variable (specified by the % sign), or a user attribute.

**Note:** In the case of LDAP user directories, the evaluator cannot determine whether a user attribute is defined.

## Syntax

The MAYBE function has the following format:

MAYBE (message)

## Parameters

The MAYBE function accepts the following parameter:

*message* (string)

Specifies the information that is missing and needed to evaluate a condition in an expression.

## Return Value

The MAYBE function does not return.

## Example

```
VEXIST(%ClientIP) ? #CheckIP : MAYBE('Client IP address is not defined.')  
Message Output to the Console Log or Report: 'Client IP address is not defined.'
```

## MID Function--Return Part of a String

The MID function returns the characters of the *source\_string* starting at the *start* position (numbered from one) up to the specified *length*. If no *length* is specified, the rest of the *source\_string* (after the *start* position) is returned.

## Syntax

The MID function has the following format:

```
MID(source_string, start[,length])
```

## Parameters

The MID function accepts the following parameters:

*source\_string* (string)

*start* (number)

*length* (number) (Optional)

## Return Value

The MID function returns a string.

## Example

```
Return_value=MID('JuanJuan', 2, 3)  
Return_value='uan'
```

```
Return_value=MID('JuanJuan', 2)  
Return_value='uanJuan'
```

### More information:

[LEFT Function--Return Part of a String](#) (see page 798)

[RIGHT Function--Retrieve Characters from a String](#) (see page 819)

## MIN Function--Determine the Lesser of Two Numbers

The MIN function returns the lesser of two numeric arguments.

### Syntax

The MIN function has the following format:

```
MIN(int_1, int_2)
```

### Parameters

The MIN function accepts the following parameters:

*int\_1* (number)

*int\_2* (number)

### Return Value

The MIN function returns a number.

## Example

```
Return_value=MIN(-2, 4)  
Return_value=-2
```

### More information:

[MAX Function--Determine the Larger of Two Values](#) (see page 804)

## MINUTE Function--Return the Minutes Component for a Date

The MINUTE function returns the number representing the minute component for a specified *date\_time* expressed in seconds since January 1, 1970.

### Syntax

The MINUTE function has the following format:

MINUTE(*date\_time*)

### Parameters

The MINUTE function accepts the following parameter:

*date\_time* (number)

The date in the number of seconds.

### Return Value

The MINUTE function returns a number between 0 and 59. If the *date\_time* is invalid, MINUTE returns -1.

#### More information:

[HOUR Function--Convert to Hour](#) (see page 794)

[HOUR24 Function--Convert to Hour](#) (see page 795)

[SECOND Function--Return the Number of Seconds in a Date](#) (see page 823)

## MOD Function--Return Division Remainder

The MOD function returns the modulus (remainder) of the division of the first number by the second. If the second number is zero, zero is returned.

### Syntax

The MOD function has the following format:

MOD(*int\_1*, *int\_2*)



## Parameters

The MOD function accepts the following parameters:

*int\_1* (number)

The dividend of the division operation.

*int\_2* (number)

The divisor of the division operation.

## Return Value

The MOD function returns a number.

## Example

```
Return_value=MOD(3, 2)
```

```
Return_value=1
```

```
Return_value=MOD(6, 3)
```

```
Return_value =0
```

## MONTH Function--Return the Month Component of a Date

The MONTH function returns the number representing the month component for a specified *date\_time* expressed in seconds since January 1, 1970.

## Syntax

The MONTH function has the following format:

```
MONTH(date_time)
```

## Parameters

The MONTH function accepts the following parameter:

*date\_time* (number)

The date represented in the number of seconds.

## Return Value

The MONTH function returns a number between 1 and 12. If the *date\_number* is invalid, MONTH returns -1.

**More information:**

[DAY Function--Return Day of Month](#) (see page 781)

[DOW Function--Return Day of Week](#) (see page 782)

[DOY Function--Return Day of Year](#) (see page 783)

[YEAR Function--Return the Year Component of a Numeric Date](#) (see page 837)

[YEAR4 Function--Return the Year Component of a Date \(4 digits\)](#) (see page 838)

## NOTBITS Function--Perform a Bitwise NOT

The NOTBITS function performs a bitwise NOT operation on a number.

### Syntax

The NOTBITS function has the following format:

NOTBITS(number)

### Parameters

The NOTBITS function accepts the following parameter:

*number* (number)

### Return Value

The NOTBITS function returns a number.

### Examples

Return\_value=NOTBITS(0)

Return\_value=-1

Return\_value=NOTBITS(1)

Return\_value=-2

**More information:**

[ANDBITS Function--Perform a Bitwise AND Operation](#) (see page 767)

[ORBITS Function--Perform a Bitwise OR Operation](#) (see page 813)

[XORBITS Function--Perform a Bitwise XOR Operation](#) (see page 836)

## NOW Function--Return Current Time in Seconds

The NOW function returns a numeric value representing the number of seconds since January 1, 1970 at the time the function is invoked. The time is local to the current server system.

This value is computed at the beginning of operations in a specific expression. Multiple references to the NOW function within the same expression always have the same result.

### Syntax

The NOW function has the following format:

```
NOW( )
```

### Parameters

The NOW function accepts no parameters.

### Return Value

The NOW function returns a number.

### Example

```
Return_value=NOW()  
Return_value=1024804800
```

#### More information:

[NOWGMT Function--Return Current Time in Seconds](#) (see page 811)

## NOWGMT Function--Return Current Time in Seconds

The NOWGMT function returns a numeric value representing the number of seconds since January 1, 1970 at the time the function is invoked. The time is in the Greenwich (ZULU) time zone.

This value is computed at the beginning of operations in a specific expression. Multiple references to the NOWGMT function within the same expression always have the same result.

## Syntax

The NOWGMT function has the following format:

```
NOWGMT ( )
```

## Parameters

The NOWGMT function accepts no parameters.

## Return Value

The NOWGMT function returns a number.

### More information:

[NOW Function--Return Current Time in Seconds](#) (see page 811)

## NUMBER Function--Convert to a Numeric Value

The NUMBER function converts its argument to a numeric value. Strings are converted up to the first non-digit. Booleans that have a value of TRUE are converted to 1; otherwise, they are converted to zero.

## Syntax

The NUMBER function has the following format:

```
NUMBER(source_string | bool_val)
```

## Parameters

The NUMBER function accepts either of the following parameters:

*source\_string* (string)

*bool\_val* (Boolean)

## Return Value

The NUMBER function returns a number.

## Example

```
Return_value=NUMBER('juan')  
Return_value=0
```

```
Return_value=NUMBER('45juan')  
Return_value=45
```

```
Return_value=NUMBER(TRUE)  
Return_value=1
```

### More information:

[BOOLEAN Function--Convert to "TRUE" or "FALSE"](#) (see page 771)

[STRING Function--Convert to a String](#) (see page 827)

## ORBITS Function--Perform a Bitwise OR Operation

The ORBITS function performs a bitwise OR operation on its two arguments.

### Syntax

The ORBITS function has the following format:

```
ORBITS(int_1, int_2)
```

### Parameters

The ORBITS function accepts the following parameters:

*int\_1* (number)

*int\_2* (number)

### Return Value

The ORBITS function returns a number.

### Examples

```
Result_value=ORBITS(6, 1)  
Result_value=7
```

```
Result_value=ORBITS(7, 8)  
Result_value=15
```

**More information:**

[ANDBITS Function--Perform a Bitwise AND Operation](#) (see page 767)

[XORBITS Function--Perform a Bitwise XOR Operation](#) (see page 836)

[NOTBITS Function--Perform a Bitwise NOT](#) (see page 810)

## PARENTDN Function--Retrieve Parent in LDAP Tree

The PARENTDN function returns the next level up in the LDAP Directory Information Tree above the specified distinguished name (DN). If the specified DN is invalid, or is already at the top of the tree, a blank string is returned.

### Syntax

The PARENTDN function has the following format:

PARENTDN(*source\_string*)

### Parameters

The PARENTDN function accepts the following parameters:

*source\_string* (string)

The LDAP distinguished name (DN).

### Return Value

The PARENTDN function returns a string.

### Remarks

LDAP Only: Yes

### Example

```
Return_value=PARENTDN("uid=juan,o=NDS.com")  
Return_value="o=NDS.com"
```

```
Return_value=PARENTDN("o=NDS.com")  
Return_value=""
```

## PCASE Function--Convert a String to Proper Case

The PCASE function converts the specified string to proper case (initial capital letters).

### Syntax

The PCASE function has the following format:

```
PCASE(source_string)
```

### Parameters

The PCASE function accepts the following parameters:

*source\_string* (string)

### Return Value

The PCASE function returns a string.

### Example

```
Return_value=PCASE("framingham, mass")  
Return_value="Framingham, Mass")
```

## QS Function--Retrieve Items from a Query String

The QS function retrieves items from the query string associated with the resource being accessed by the user when the expression is evaluated.

If no arguments are supplied to this function, the entire query string (and only the query string) is returned. The query string is returned unchanged.

If the string argument is supplied as a blank string (""), then all of the arguments in the query string that are unnamed are returned. If multiple values exist, they are returned as a set.

If the string argument is supplied as a non-blank string, all of the arguments in the query string that are named with a matching name are returned. Case-sensitivity is controlled by the optional Boolean flag. If multiple values exist, they are returned as a set.

### Syntax

The QS function has the following format:

```
QS([input_string],[ not_case_sensitive])
```

## Parameters

The QS function accepts the following optional parameters:

*input\_string* (string)

(Optional) Name of an argument in the query string.

*not\_case\_sensitive* (Boolean)

(Optional) If the *not\_case\_sensitive* flag is set to FALSE or omitted, the function searches the query string for an exact match. If the *not\_case\_sensitive* flag is set to TRUE, the function ignores case.

## Return Value

The QS function returns a string.

## Example

Assume this resource: <http://myserver.com/index.jsp?Test=A&X&TEST=D&c&Dbg>

```
Return_value=QS()
```

```
Return_value='Test=A&X&TEST=D&c&Dbg'
```

```
Return_value=QS("")
```

```
Return_value='X^c'
```

```
Return_value=QS("Test")
```

```
Return_value='A^D'
```

```
Return_value=QS("Test", false)
```

```
Return_value='A'
```

```
"Dbg" IN QS("")
```

```
Return_value=TRUE
```

### More information:

[URL Function--Returns a Component of a URL String](#) (see page 831)



## RDN Function--Retrieve First Component of LDAP DN

The RDN function returns the first component of the specified LDAP Distinguished Name (DN). If the optional Boolean argument is TRUE (the default), the attribute name is removed and only the value is returned.

If the specified DN is invalid, a blank string is returned. This function does not call any LDAP server.

### Syntax

The RDN function has the following format:

```
RDN(DN_string[, remove_name])
```

### Parameters

The RDN function accepts the following parameters:

*DN\_string* (string)

LDAP Distinguished Name

*remove\_name*

(Optional) When set to TRUE (the default), the attribute name is removed from the returned string. When set to FALSE, the attribute is included in the returned string.

### Return Value

The RDN function returns a string.

### Remarks

LDAP Only: Yes

### Example

```
Return_value=RDN("uid=juan,o=NDS.com")  
Return_value="juan"
```

```
Return_value=RDN("uid=juan,o=NDS.com", TRUE)  
Return_value="juan"
```

```
Return_value=RDN("uid=juan,o=NDS.com", FALSE)  
Return_value="uid=juan"
```

**More information:**

[COMMONDN Function--Find a Common Root](#) (see page 775)

[PARENTDN Function--Retrieve Parent in LDAP Tree](#) (see page 814)

[EXPLODEDN Function--Convert LDAP DN to Set](#) (see page 788)

[RELATIONDN Function--Compare Two Distinguished Names](#) (see page 818)

## RELATIONDN Function--Compare Two Distinguished Names

The RELATIONDN function compares the two specified LDAP distinguished names (DNs) and returns a string indicating the relationship between them.

If either of the two DN is invalid, or the two DN are completely unrelated, a blank string is returned.

If the two DN are related, the difference in levels (of the Directory Information Tree) is returned as a string. If the first DN is the ancestor of the second, the number is positive. If the first DN is a descendent of the second, the number is negative. If the two DN are equal or siblings, the return is 0 (indicating no levels).

**Note:** This function does not call any LDAP server functions.

### Syntax

The RELATIONDN function has the following format:

```
RELATIONDN(dn_1, dn_2)
```

### Parameters

The RELATIONDN function accepts the following parameters:

*dn\_1* (string)

*dn\_2* (string)

### Return Value

The RELATIONDN function returns a string.

### Remarks

LDAP Only: Yes

## Example

```
Return_value=RELATIONDN("uid=eric,o=NDS.com", "o=NDS.com")
Return_value="-1"

Return_value=RELATIONDN("o=NDS.com", "uid=eric,o=NDS.com")
Return_value="1"

Return_value=RELATIONDN("uid=dave,o=NDS.com", "uid=eric,o=NDS.com")
Return_value="0"

Return_value=RELATIONDN("uid=dave,o=XYZ.com", "uid=eric,o=NDS.com")
Return_value=""
```

## RIGHT Function--Retrieve Characters from a String

The RIGHT function returns the specified number of characters from the end of a string. If the string is shorter than the number, the entire string is returned.

### Syntax

The RIGHT function has the following format:

```
RIGHT(source_string, length)
```

### Parameters

The RIGHT function accepts the following parameters:

*source\_string* (string)

*length* (number)

Number of characters to extract, counting from the end of the string.

### Return Value

The RIGHT function returns a string.

## Example

```
Return_value=RIGHT('JuanJuan', 2)
Return_value='an'

Return_value=RIGHT('JuanJuan', 10)
Return_value='JuanJuan'

Return_value=RIGHT('JuanJuan', 0)
Return_value=''
```

**More information:**

[LEFT Function--Return Part of a String](#) (see page 798)

[MID Function--Return Part of a String](#) (see page 806)

## RPAD Function--Pad a String on the Right

The RPAD function adds the first character of the specified padding to the end of the string until the source string becomes the specified length.

If the padding is more than one character long, only the first character is used. If the padding is zero length, no padding is added.

If the source is a string, and the padding is not specified, a space is used for padding. If the source is a number and padding is not specified, a zero is used for padding.

### Syntax

The RPAD function has the following format:

```
RPAD(source_string|number, length[, padding])
```

### Parameters

The RPAD function accepts the following parameters:

*source\_string* (string)

This parameter can be a number; it is converted to a string.

*length* (number)

*padding* (string)

(Optional)

### Return Value

The RPAD function returns a string.

## Example

```
Return_value=RPAD('Juan', 5)
Return_value='Juan '
```

```
Return_value=RPAD('Juan', 5, 'X')
Return_value='JuanX'
```

```
Return_value=RPAD('Juan', 6, 'XY')
Return_value='JuanXX'
```

```
Return_value=RPAD(5, 2)
Return_value='50'
```

```
Return_value=RPAD(5, 2, ' ')
Return_value='5 '
```

## RPT Function--Repeat a String

The RPT function returns a string that repeats a source string the specified number of times.

### Syntax

The RPT function has the following format:

```
RPT(source_string|number, repeat_count)
```

### Parameters

The RPT function accepts the following parameters:

*source\_string* (string)

This parameter can be a number; it is converted to a single character.

*repeat\_count* (string)

### Return Value

The RPT function returns a string.

## Example

```
Return_value=RPT('Juan', 3)
Return_value='JuanJuanJuan'

Return_value=RPT('*', 10)
Return_value='*****')
```

## RTRIM Function--Remove Trailing Spaces from a String

The RTRIM function eliminates trailing spaces from a source string and returns the result.

### Syntax

The RTRIM function has the following format:

```
RTRIM(source_string)
```

### Parameters

The RTRIM function accepts the following parameter:

*source\_string* (string)

### Return Value

The RTRIM function returns a string.

## Example

```
Return_value=RTRIM(' JuanJuan ')
Return_value=' JuanJuan'
```

### More information:

[LTRIM Function--Remove Leading Spaces in a String](#) (see page 803)

## SECOND Function--Return the Number of Seconds in a Date

The SECOND function returns a value that represents the seconds component of a date expressed as the number of seconds since January 1, 1970.

### Syntax

The SECOND function has the following format:

SECOND(*date\_time*)

### Parameters

The SECOND function accepts the following parameter:

*date\_time* (number)

The number of seconds.

### Return Value

The SECOND function returns a number from 0 to 59.

#### More information:

[MINUTE Function--Return the Minutes Component for a Date](#) (see page 808)

## SET Function--Set the Value of an Attribute

The SET function assigns a specified value to a specified attribute. Multiple values are specified for multi-valued attributes by a set. This function works for all User Directories supported by CA SiteMinder.

The SET function returns TRUE if CA SiteMinder returns success on the modification.

If the attribute is not visible to CA SiteMinder, the function fails. The attribute may not be visible due to security reasons (security in the User Directory) or, in the case of ODBC directories, because it is not in the configured Query or not an attribute listed in the Set Properties setting of the CA SiteMinder Query Scheme.

### Syntax

The SET function has the following format:

SET(*attr\_name*, *value*)

## Parameters

The SET function accepts the following parameters:

*attr\_name* (string)

*value* (string)

Specifies one or more values. Multiple values are separated by the caret character.

## Return Value

The SET function returns a Boolean.

## Remarks

Privileged: Yes

## Example

Return\_value=SET("Retries", STRING(NUMBER(Retries) + 1))

### More information:

[GET Function--Locate Attributes in a User Directory](#) (see page 793)

## SIGN Function--Return the Sign of a Number

The SIGN function accepts a number. If the number is negative, SIGN returns a negative one. If the number is zero, SIGN returns a zero. If the number is positive, SIGN returns a positive one.

## Syntax

The SIGN function has the following format:

SIGN(number)

## Parameters

The SIGN function accepts the following parameter:

*number* (number)

## Return Value

The SIGN function returns a number: -1, 0, or +1.



## Example

```
Return_value=SIGN(-40)  
Return_value=-1
```

```
Return_value=SIGN(0)  
Return_value=0
```

```
Return_value=SIGN(999)  
Return_value=1
```

## SORT Function--Sort a Set

The SORT function sorts a specified set. Case sensitivity is specified by an optional Boolean parameter. Duplicate items are eliminated from the resulting set.

### Syntax

The SORT function has the following format:

```
SORT(source_set[, not_case_sensitive])
```

### Parameters

The SORT function accepts the following parameters:

*source\_set* (string)

Set to be sorted.

*not\_case\_sensitive* (Boolean)

(Optional) If this parameter is omitted or set to FALSE, the sort treats entries as identical unless the cases are different. If this parameter is set to TRUE, the sort ignores case.

### Return Value

The SORT function returns a set.

## Examples

```
Return_value=SORT("Eric^Bart^Chuck^BART^Chuck")  
Return_value="BART^Bart^Chuck^Eric"
```

```
Return_value=SORT("Eric^Bart^Chuck^BART^Chuck", FALSE)  
Return_value="BART^Bart^Chuck^Eric"
```

```
Return_value=SORT("Eric^Bart^Chuck^BART^Chuck", TRUE)  
Return_value="Bart^Chuck^Eric"
```

## SPACE Function--Return a String of Spaces

The SPACE function returns a string that consists of the specified number of spaces.

### Syntax

The SPACE function has the following format:

```
SPACE (repeat_count)
```

### Parameters

The SPACE function accepts the following parameters:

*repeat\_count* (number)

The number of spaces to include in the string.

### Return Value

The SPACE function returns a string.

### Example

```
Return_value=SPACE(3) Return_value='   '
```

```
Return_value=SPACE(10) Return_value="          "
```

## STRING Function--Convert to a String

The STRING function converts a number or Boolean into a string value.

### Syntax

The STRING function has the following format:

```
STRING(num_value|bool_value)
```

### Parameters

The STRING function accepts either one of these parameters:

*num\_value* (number)

*bool\_value* (Boolean)

### Return Value

The STRING function returns a string.

### Example

```
Return_value=STRING(TRUEVAL)  
Return_value="TRUE"
```

```
Return_value=STRING(123)  
Return_value='123'
```

#### More information:

[BOOLEAN Function--Convert to "TRUE" or "FALSE"](#) (see page 771)

[NUMBER Function--Convert to a Numeric Value](#) (see page 812)

## THROW Function--Stop Processing and Report Custom Error

You can write an expression that tests for an error and if an error has occurred, calls THROW, passing a custom error message. When the expression evaluator encounters THROW, it stops processing the expression and outputs the custom error message to the console log.

### Syntax

The THROW function has the following format:

```
THROW(error_message)
```

## Parameters

The THROW function accepts the following parameter:

*error\_message* (string)

Specifies the custom error message that is output to the console log.

## Return Value

The THROW function does not return.

## Example

```
EXISTS('MyFile') ? #Process('MyFile') : THROW('File does not exist.')
```

Message Output to the Console Log: 'File does not exist.'

```
VEXIST(#Sortname) ? #Sortname : THROW('Sortname is not defined.')
```

Message Output to the Console Log: 'Sortname is not defined.'

## TRACE Function--Write Trace Entry to Console Log

The TRACE function writes the string argument to the CA SiteMinder Console Log as a trace entry.

## Syntax

The TRACE function has the following format:

```
TRACE(source_string)
```

## Parameters

The TRACE function accepts the following parameter:

*source\_string* (string)

## Return Value

The TRACE function returns a Boolean, always TRUE.

## Remarks

Privileged: Yes

## Example

```
Return_value=TRACE("Executing Code")  
Return_value=TRUE
```

### More information:

[ERROR Function--Write Error Message to Console Log](#) (see page 786)

[INFO Function--Write INFO Message to Console Log](#) (see page 796)

[WARNING Function--Write WARNING Message to Console Log](#) (see page 836)

## TRANSLATE Function--Replace String Value

The TRANSLATE function replaces all occurrences of one string found within a second string with a third string. The search is case-sensitive unless the optional Boolean is set to TRUE.

## Syntax

The TRANSLATE function has the following format:

```
TRANSLATE(source_string, search_string, replace_string[, not_case_sensitive])
```

## Parameters

The TRANSLATE function accepts the following parameters:

*source\_string* (string)

*search\_string* (string)

*replace\_string* (string)

*not\_case\_sensitive* (Boolean)

(Optional) If this parameter is not set or set to FALSE, case is considered in the search. If set to TRUE, case is ignored.

## Return Value

The TRANSLATE function returns a string.

## Example

```
Return_value=TRANSLATE('Eric','r','x')  
Return_value='Exic'
```

```
Return_value=TRANSLATE('Eric','ri','x')  
Return_value='Exc'
```

```
Return_value=TRANSLATE('Eric','r','xy')  
Return_value='Exyc'
```

```
Return_value=TRANSLATE('Eric','R','x')  
Return_value='Eric'
```

```
Return_value=TRANSLATE('Eric','R','x',TRUE)  
Return_value='Exic'
```

## UCASE Function--Convert to Upper Case

The UCASE function converts the source string to upper case.

### Syntax

The UCASE function has the following format:

```
UCASE (source_string)
```

### Parameters

The UCASE function accepts the following parameter:

*source\_string* (string)

### Return Value

The UCASE function returns a string.

## Example

```
Return_value=UCASE('framingham, mass')  
Return_value='FRAMINGHAM, MASS'
```

### More information:

[PCASE Function--Convert a String to Proper Case](#) (see page 815)  
[LCASE Function--Convert to Lowercase](#) (see page 798)

## URL Function--Returns a Component of a URL String

The URL function parses the supplied URL (or path) and returns the specified component. This function ignores characters that are URL-encoded.

**Note:** The URL function only parses strings that use slashes, not backslashes. If you are using a system running Windows, use the TRANSLATE function to convert backslashes to slashes.

### Syntax

The URL function has the following format:

URL(url\_string, component)

### Parameters

The URL function accepts the following parameters:

*url\_string* (string)

The URL or path must be specified following this format:

```
[<protocol>:][//[<user>[:<password>]@]<server>[:<port#>]  
[/<directory>]/<file>][?<querystring>]
```

*component* (string)

Component names are not case-sensitive. You can specify any of the following components:

- PROTOCOL, DRIVE, or NAMESPACE
- USER
- PASSWORD
- SERVER
- PORT
- DOMAIN
- URI
- PATH
- DIRECTORY
- FILENAME
- BASENAME
- EXTENSION
- QUERYSTRING

## Return Value

The URL function returns a string.

## Examples

```
Return_value=URL("http://www.myserver.com:8080/app1/xyzyy.jsp?id=12",  
"PROTOCOL")  
Return_value="http:"
```

```
Return_value=URL("ftp://joe:dog@ftp.myserver.com/dir1/xyzyy.zip", "USER")  
Return_value="joe"
```

```
Return_value=URL("ftp://joe:dog@ftp.myserver.com/dir1/xyzyy.zip", "PASSWORD")  
Return_value="dog"
```

```
Return_value=URL("http://www.myserver.com:8080/app1/xyzyy.jsp?id=12", "SERVER")  
Return_value="www.myserver.com"
```

```
Return_value=URL("http://www.myserver.com:8080/app1/xyzyy.jsp?id=12", "PORT")  
Return_value="8080"
```

```
Return_value=URL("http://www.myserver.com:8080/app1/xyzyy.jsp?id=12",  
"DOMAIN")  
Return_value="myserver.com"
```

```
Return_value=URL("ftp://joe:dog@ftp.myserver.com/dir1/xyzyy.zip", "URI")  
Return_value="/dir1/xyzyy.zip"
```

```
Return_value=URL("ftp://joe:dog@ftp.myserver.com/dir1/xyzyy.zip", "PATH")  
Return_value="/dir1/xyzyy.zip"
```

```
Return_value=URL("ftp://joe:dog@ftp.myserver.com/dir1/xyzyy.zip", "DIRECTORY")  
Return_value="/dir1"
```

```
Return_value=URL("ftp://joe:dog@ftp.myserver.com/dir1/xyzyy.zip", "FILENAME")  
Return_value="xyzyy.zip"
```

```
Return_value=URL("ftp://joe:dog@ftp.myserver.com/dir1/xyzyy.zip", "BASENAME")  
Return_value="xyzyy"
```

```
Return_value=URL("ftp://joe:dog@ftp.myserver.com/dir1/xyzyy.zip", "EXTENSION")  
Return_value="zip"
```



```
Return_value=URL("ftp://joe:dog@ftp.myserver.com/dir1/xyzyz.zip", "QUERYSTRING")
Return_value=""
```

```
Return_value=URL("http://www.myserver.com:8080/app1/xyzyz.jsp?id=12",
"QUERYSTRING")
Return_value="id=12"
```

## URLDECODE Function--Decode a URL String

The URLDECODE function decodes the specified URL string.

### Syntax

The URLDECODE function has the following format:

```
URLDECODE(url)
```

### Parameters

The function accepts the following parameter:

*url* (string)

### Return Value

The URLDECODE function returns a string.

### Example

```
Return_value=URLDECODE("Framingham%2C+Mass")
Return_value="Framingham, Mass"
```

#### More information:

[URLENCODE Function--Encode a String](#) (see page 833)

## URLENCODE Function--Encode a String

The URLENCODE function encodes the passed-in string to URL format.

### Syntax

The URLENCODE function has the following format:

```
URLENCODE(source_string)
```

## Parameters

The URLENCODE function accepts the following parameter:

*source\_string* (string)

## Return Value

The URLENCODE function returns a string.

## Example

Return\_value=URLENCODE('Framingham, Mass') Return\_value='Waltham%2C+Mass'

### More information:

[URLDECODE Function--Decode a URL String](#) (see page 833)

## VEXIST Function--Is the Parameter Defined?

The VEXIST function accepts a named expression, a context variable, or user attribute and determines whether it is defined. If defined, VEXIST returns TRUE. If not, VEXIST returns FALSE.

**Note:** In the case of LDAP user directories, CA SiteMinder cannot determine whether a user attribute is defined and returns FALSE.

## Syntax

The VEXIST function has the following format:

```
VEXIST(#virtual_user_attribute | @user_class | %context_variable |  
user_attribute_name | user_attribute_string)
```

## Parameters

The VEXIST function accepts one of the following parameters:

*#virtual\_user\_attribute* (named expression)

Specifies a named expression that calculates a user attribute.

*@user\_class* (named expression)

Specifies a named expression that tests for membership in a user directory or group.

*%context\_variable* (context variable)

Specifies a context variable.

*user\_attribute\_name* (unquoted string)

Specifies a single user attribute.

*user\_attributes\_string* (string)

Specifies a string of user attribute names separated by a character.

## Return Value

The VEXIST function returns a Boolean.

## Example

```
Return_value=VEXIST(#Age)  
Return_value=TRUE
```

```
Return_value=VEXIST(@IsDolphin)  
Return_value=FALSE
```

```
Return_value=VEXIST(%ClientIP)  
Return_value=TRUE
```

```
Return_value=VEXIST(givenname)  
Return_value=FALSE
```

```
Return_value=VEXIST('last,first')  
Return_value=TRUE
```

## WARNING Function--Write WARNING Message to Console Log

The WARNING function writes the string argument to the CA SiteMinder Console Log as a warning message.

### Syntax

The WARNING function has the following format:

```
WARNING(source_string)
```

### Parameters

The WARNING function accepts the following parameter:

*source\_string* (string)

### Return Value

The WARNING function returns a Boolean, always TRUE.

### Example

```
Return_value=WARNING("Buffer Full")  
Return_value=TRUE
```

## XORBITS Function--Perform a Bitwise XOR Operation

The XORBITS function performs a bitwise XOR operation on its two arguments.

### Syntax

The XORBITS function has the following format:

```
XORBITS(num_1,num_2)
```

### Parameters

The XORBITS function accepts the following parameters:

*num\_1* (number)

*num\_2* (number)

### Return Value

The XORBITS function returns a number.

## Example

```
Return_value=XORBITS(7, 2)  
Return_value=5
```

```
Return_value=XORBITS(7, 15)  
Return_value=8
```

### More information:

[ANDBITS Function--Perform a Bitwise AND Operation](#) (see page 767)

[ORBITS Function--Perform a Bitwise OR Operation](#) (see page 813)

[NOTBITS Function--Perform a Bitwise NOT](#) (see page 810)

## YEAR Function--Return the Year Component of a Numeric Date

The YEAR function returns a number that indicates the year component of a date in seconds since January 1, 1970.

## Syntax

The YEAR function has the following format:

```
YEAR(date_time)
```

## Parameters

The YEAR function accepts the following parameter:

*date\_time* (number)

The date represented in seconds.

## Return Value

The YEAR function returns a number between 70 and 138.

## YEAR4 Function--Return the Year Component of a Date (4 digits)

The YEAR4 function returns the four-digit year component of a date expressed in seconds since January 1, 1970.

### Syntax

The YEAR4 function has the following format:

YEAR4(*date\_time*)

### Parameters

The YEAR4 function accepts the following parameters:

*date\_time* (number)

### Return Value

The YEAR4 function returns a returns a number between 1970 and 2038.

# Chapter 27: CA SiteMinder Kerberos Authentication

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This section contains the following topics:

[Kerberos Overview](#) (see page 839)

[How To Configure Kerberos Authentication](#) (see page 840)

[Kerberos Configuration Examples](#) (see page 845)

[Verify that a Resource is Protected](#) (see page 852)

[Troubleshooting SiteMinder Kerberos Authentication](#) (see page 853)

## Kerberos Overview

Kerberos is a standard protocol, designed at MIT, to provide a means of authentication between a client and a server on an open network. The Kerberos protocol protects messages from eavesdropping and replay attacks. Kerberos uses shared secrets, symmetric keys, and Kerberos services. Microsoft Windows operating environments use Kerberos V5 as the default authentication package. Solaris 10 also includes Kerberos V5.

In a Kerberos environment, user accounts and service accounts are named principals. Kerberos uses a trusted third party (the Key Distribution Center, or KDC) to mediate message exchanges between principals. The purpose of the Key Distribution Center is to reduce the risks inherent in exchanging keys.

Kerberos authentication is based on messages that request and deliver tickets. The Key Distribution Center processes two types of tickets:

- Ticket-Granting Ticket (TGT) — used internally by the KDC to transport a requestor's credentials to the ticket-granting service (TGS).
- Session Ticket — used by the ticket-granting service (TGS) to transport the requestor's credentials to the target server or service.

Kerberos uses keytab files for logging in to the KDC. Keytab files consist of pairs of Kerberos principals and encrypted keys derived from a Kerberos password.

The Kerberos protocol message exchange can be summarized in a simplified way as follows:

1. When a user logs in, the client contacts the KDC Authentication Service, requesting a short-lived message (the ticket-granting ticket) containing the user identity information.
2. The KDC authentication service generates the TGT and creates a session key that the client can use to encrypt communication with the ticket-granting service.

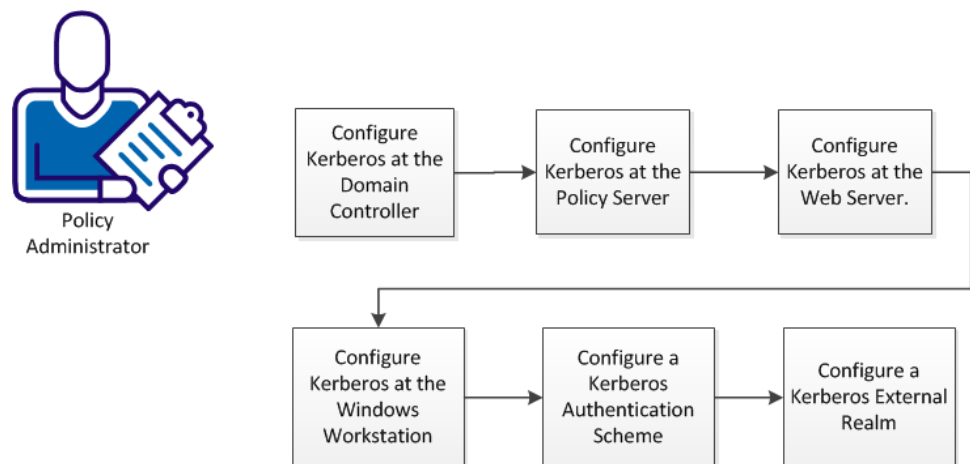
3. When a user requests access to local or network resources, the client presents the ticket-granting ticket (TGT), an authenticator, and the Service Principal Name (SPN) of the target server to the KDC.
4. The ticket-granting service examines the ticket-granting ticket and the authenticator. If these credentials are acceptable, the ticket-granting service creates a service ticket, which includes the user identity information copied from the TGT. The service ticket is sent back to the client.

**Note:** The ticket-granting service cannot determine whether the user is granted access to the target resource. The ticket-granting service only authenticates the user and returns the session ticket.

5. After the client has the session ticket, the client sends the session ticket and a new authenticator to the target server, requesting access to a resource.
6. The server decrypts the ticket, validates the authenticator, and grants the user access to the resource.

## How To Configure Kerberos Authentication

Kerberos authentication supports various configuration scenarios, depending on the host environments of the client and server. Although each scenario is slightly different, implementing Kerberos authentication in a CA SiteMinder environment requires a policy administrator to perform the tasks represented in the following diagram:





Complete these procedures to configure Kerberos authentication:

1. [Configure Kerberos at the Domain Controller](#) (see page 841).
2. [Configure Kerberos at the Policy Server](#) (see page 842).
3. [Configure Kerberos at the Web Server](#) (see page 843).
4. [Configure Kerberos at the Windows Workstation](#). (see page 843)
5. Configure a Kerberos Authentication Scheme
6. [Configure a Kerberos External Realm](#) (see page 844).

## Configure Kerberos Authentication at the Domain Controller

In a pure Windows environment, a Kerberos realm is equivalent to a Windows Domain. The domain controller host provides storage for the user, service accounts, credentials, the Kerberos ticketing services, and Windows Domain services.

A keytab file is required for Kerberos authentication, which lets users authenticate with the KDC without being prompted for a password. The keytab file is created with the ktpass utility. The ktpass command tool utility is a Windows support tool. The ktadd utility is the equivalent on UNIX.

KDC configuration for the Policy Server on the domain controller host (Windows or UNIX) follows this general sequence:

1. Create a user account. This account is for logging in to the workstation.
2. Create a service account for the web server for logging in to the web server host.
3. Create a service account for the Policy Server for logging in to the Policy Server host.
4. Associate the web server account with a web server principal name.
5. Create a keytab file, which is transferred to the web server host.
6. Associate the Policy Server account with a Policy Server principal name.
7. Create another keytab file, which is transferred to the Policy Server host.
8. Specify that the web server and Policy Server accounts are Trusted for Delegation.

**Important!** For any service to use Kerberos protocol, be sure to create the Service Principal Name (SPN) in a standard format, that is, service/fqdn\_host@REALM\_NAME.

**More information:**

[KDC Configuration on Windows Example](#) (see page 845)

[KDC Configuration on UNIX Example](#) (see page 847)

## Configure Kerberos Authentication at the Policy Server

The Kerberos authentication scheme requires that you modify the Agent Configuration Object (ACO):

1. Log in the Administrative UI.
2. Click Infrastructure, Agent Configuration, Modify Agent Configuration.
3. Click the edit button for the Agent Configuration object of your agent.
4. Add these three parameters to the Agent Configuration Object:

| Parameter             | Value                                                                                        |
|-----------------------|----------------------------------------------------------------------------------------------|
| KCCExt                | .kcc                                                                                         |
| HttpServicePrincipal  | Specifies the web server principal name.<br><b>Example:</b> HTTP/www.example.com@EXAMPLE.COM |
| SmppsServicePrincipal | Specifies the Policy Server principal name.<br><b>Example:</b> smps.example.com@EXAMPLE.COM  |

Complete these additional steps at the Policy Server:

- Deploy the keytab file on the KDC that contains the Policy Server principal credentials to a secure location on the Policy Server.
- Configure a Kerberos configuration file (krb5.ini) and place it in the system root path on Windows and in KRB5\_CONFIG on UNIX.

**Important!** If the Policy Server is installed on Windows and the KDC is deployed on UNIX, perform the additional configuration on the Policy Server host using the [Ksetup utility](#) (see page 844).

**More information:**

[Kerberos Configuration at the Policy Server Example](#) (see page 849)

[Kerberos Configuration at the Policy Server on UNIX Example](#) (see page 850)

## Kerberos Authentication Configuration at the Web Server

Configuring a Windows or UNIX web server to support Kerberos authentication follows these general steps:

1. Install a Web Agent with the Kerberos authentication scheme support.
2. Register a trusted host with the Policy Server and configure the Web Agent.
3. Deploy the keytab file (created on the KDC) containing the web server credentials to a secure location on the web server.
4. Configure a Kerberos configuration file (krb5.ini):
  - Configure the KDC for the Kerberos realm (domain).
  - Configure krb5.ini to use the keytab file containing the credentials of the web server principal.
  - Place krb5.ini in the system root path on Windows and in KRB5\_CONFIG on UNIX.

**Important!** If the web server is installed on Windows and the KDC is deployed on UNIX, perform additional configuration on the web server using the [Ksetup utility](#) (see page 844).

## Configure Kerberos Authentication at the Windows Workstation

To support Kerberos authentication, several Internet Explorer settings are required, and the workstation host is added to the KDC domain.

**Important!** If the KDC is deployed on UNIX, perform the additional required configuration on the workstation using the [Ksetup utility](#) (see page 844).

**Follow these steps:**

1. Add the host for the Windows workstation to the KDC domain.
2. Log in to the host using user account created on the KDC.
3. Configure the browser to pass credentials automatically:

## Configure a Kerberos Authentication Scheme

An authentication scheme is required to support Kerberos authentication in the SiteMinder environment. Associate this authentication scheme with any realm whose protected resources use Kerberos authentication.

Refer to these instructions for information about creating a Kerberos authentication scheme.

## Configure Kerberos External Realm on Windows Host

For the Windows workstation to use a Kerberos KDC deployed on UNIX, you must configure both the Kerberos KDC server and the workstation.

In the Kerberos realm, create a host principal for the Windows host. Use the following command:

```
kadmin.local: addprinc host/machine-name.dns-domain_name.
```

For example, if the Windows workstation name is W2KW and the Kerberos realm name is EXAMPLE.COM, the principal name is host/w2kw.example.com.

Because a Kerberos realm is not a Windows domain, the KDC operating environment must be configured as a member of a workgroup, which happens automatically when you follow this process:

1. Remove the host from the Windows domain.
2. Add the test user, for example, testkrb, to the local user database.
3. Add the Kerberos Realm:

```
ksetup /SetRealm EXAMPLE.COM
```

4. Restart the host.

5. Add the KDC :

```
ksetup /addkdc EXAMPLE.COM rhasmit
```

6. Set a new password:

```
ksetup /setmachpassword password
```

**Note:** The password used here is same as the one used while creating the host principal account in the MIT KDC.

7. Restart the host.

**Note:** Whenever changes are made to the external KDC and realm configuration, a restart is required.

8. Set the Realm Flag

```
ksetup /SetRealmFlags EXAMPLE.COM deLegate
```

9. Run AddKpasswd:

```
ksetup /AddKpasswd EXAMPLE.COM rhasmit
```

10. Use Ksetup to configure single sign on to local workstation accounts by defining the account mappings between the Windows host accounts to Kerberos principals. For example:

```
ksetup /mapuser testkrb@EXAMPLE.COM testkrb  
ksetup /mapuser * *
```

The second command maps clients to local accounts of the same name. Use Ksetup with no arguments to see the current settings.

## Kerberos Configuration Examples

The configurations that follow include examples of the specifics, such as keytab file creation, required to implement Kerberos authentication in a SiteMinder environment. Note that additional configuration is required when the KDC is deployed in a UNIX operating environment and the Policy Server, or web server, or workstation is in a Windows operating environment.

### KDC Configuration on Windows Example

The following procedure shows how to configure a Windows domain controller/KDC to support Kerberos authentication. This example uses the following server and account names:

- Servers
  - Domain Controller: kdc.example.com
  - Policy Server: smps.example.com
  - Web Server: www.example.com
  - Active Directory Domain: EXAMPLE
  - Kerberos Realm: EXAMPLE.COM
- Accounts
  - User Account: testkrb
  - Web Agent Service Account: krbsvc-smwa
  - Policy Server Service Account: krbsvc-smps

**Follow these steps:**

1. Add the Active Directory Domain Services role to your Windows server.  
This action makes your Windows server a domain controller. A Windows domain controller operates as a Kerberos Key Distribution Center (KDC), implements the Kerberos V5 protocol, and performs Kerberos-related authentication functions.
2. Run the Windows dcpromo utility from the command line, or click the link on Service Manager, which launches the dcpromo utility.
3. Verify the domain functional level:
  - a. Open the Active Directory users and computers dialog from Administrative tools.
  - b. Right-click the example.com drop-down on the left side of dialog.
  - c. Click Raise domain functional level.
  - d. Verify the domain functional level of Active Directory is at least Windows Server 2003. If not, raise the domain functional level.

**Important!** Raising the domain functional level is irreversible.
4. Create a user account (for example, testkrb). Provide a password for this account. Clear the option, User must change password at next logon. The Windows workstation uses this account to log in to example.com.
5. Create a service account for the web server (for example, krbsvc-smwa). Create a password for this account. Clear the option, User must change password at next logon.
6. Create a service account for the Policy Server (krbsvc-smps). Provide a password for this account. Clear the option, User must change password at next logon.
7. Associate the web server service account (krbsvc-smwa) with a Kerberos service principal name (HTTP/www.example.com@EXAMPLE.COM) and create a keytab file using the Ktpass utility. Always verify the version of support tools. The default encryption type is RC4-HMAC. The encryption type can be confirmed by running ktpass /? at the command prompt.  

```
ktpass -out c:\krbsvc-smwa.keytab -princ HTTP/www.example.com@EXAMPLE.COM  
dc.example.com -ptype KRB5_NT_PRINCIPAL -mapuser EXAMPLE\krbsvc-smwa -pass "*"
Targeting domain controller: dc.example.com
Using legacy password setting method
Successfully mapped HTTP/www.example.com to krbsvc-smwa..
Key created.
Output keytab to c:\krbsvc-smwa.keytab:
Keytab version: 0x502
keysize 82 dc.example.com ptype 1 (KRB5_NT_PRIN  
CIPAL) vno 3 etype 0x17 (RC4-HMAC) keylength 16 (0xf3d3d2a17c7ea172ff22044806443  
9a9)

The password is the same as the one used for creating the service account for the web server.
```

8. Associate the Policy Server service account (krbsvc-smps) with a Kerberos service principal name (smps/smps.example.com@EXAMPLE.COM) and create another keytab file for the Policy Server host.

```
Ktpass -out c:\krbsvc-smps.keytab -princ smps/smps.example.com@EXAMPLE.COM  
-ptype KRB5_NT_PRINCIPAL -mapuser EXAMPLE\krbsvc-smps -pass *
```

Targeting domain controller: dc.example.com.com

Using legacy password setting method

Successfully mapped smps/smps.example.com to krbsvc-smps.

Key created.

Output keytab to c:\krbsvc-smps.keytab:

Keytab version: 0x502

keysize 72 smps/smps.example.com@EXAMPLE.COM ptype 1 (KRB5\_NT\_PRINCIPAL) vno 2  
etype 0x17 (RC4-HMAC) keylength 16 (0xfd77a26f1f5d61d1fafd67a2d88784c7)

The password is same as the one used for creating the service account for Policy Server.

9. Specify that the web server service account is Trusted for Delegation as follows:
  1. Right-click the service account (krbsvc-smwa) properties.
  2. Select the Delegation tab.
  3. Select the second option, Trust this user for delegation to any service (Kerberos only).

The domain controller is ready for Kerberos authentication.

## KDC Configuration on UNIX Example

The following process shows how to configure a KDC Kerberos realm on a UNIX host to support Kerberos authentication. This example uses the following server and account names:

- Servers
  - Domain Controller: dc.example.com
  - Policy Server: smps.example.com
  - Web Server: www.example.com
  - Active Directory Domain: EXAMPLE
  - Kerberos Realm: EXAMPLE.COM
- Accounts
  - User Account: testkrb
  - Web Agent Service Account: krbsvc-smwa
  - Policy Server Service Account: krbsvc-smps

**Follow these steps:**

1. Install MIT Kerberos, if necessary.
2. Use the `kdb5_util` command to create the Kerberos database and an optional stash file. The stash file is used to authenticate the KDC to itself automatically before starting the `kadmind` and `krb5kdc` daemons as part of the host auto-boot sequence.

Both the stash file and the keytab file are potential point-of-entry for a break-in. If you install a stash file, it must be readable only by root, must not be backed up, and must exist only on the KDC local disk. If you do not want a stash file, run the `kdb5_util` without the `-s` option.

This example generates the following five database files in the directory specified in `kdc.conf` file:

- Two Kerberos database files: `principal.db` and `principal.ok`
- One Kerberos administrative database file: `principal.kadm5`
- One administrative database lock file: `principal.kadm5.lock`
- One stash file: `.k5stash`

```
[root@rhasmit init.d]# kdb5_util create -r EXAMPLE.COM -s
Initializing database '/var/kerberos/krb5kdc/principal' for realm
'EXAMPLE.COM',
master key name 'K/M@EXAMPLE.COM'
```

You will be prompted for the database Master Password.

It is important that you NOT FORGET this password.

Enter KDC database master key:

Re-enter KDC database master key to verify:

3. Create a user principal (`testkrb`).
4. Create a user principal (for example, `testwakrb`), a host principal (`HTTP/www.example.com@EXAMPLE.COM`), and a service principal (`krbsvc-smwa`) for the web server host. The password used for creating host account must be same as the password specified when using the `ksetup` utility on the web server host.
5. Create a user principal (`testpskrb`), host principal (`smpls/smpl.example.com`) and service principal (`krbsvc-smpls`) for the Policy Server host. The password used for creating host account must be same as the password specified when using the `ksetup` utility on the Policy Server host.
6. Create a keytab file for the web server service principal as follows:  

```
ktadd -k /tmp/krbsvc-smwa.keytab HTTP/www.example.com
```
7. Create keytab for Policy Server service principal as follows:  

```
ktadd -k /tmp/krbsvc-smpls.keytab smpls/smpl.example.com
```

The Kerberos realm is configured on a UNIX host.



## Kerberos Configuration at the Policy Server Example

The following procedure shows an example of how to configure a Policy Server on Windows to support the Kerberos authentication scheme. The configuration on Windows and UNIX are similar except for the following differences:

- The Kerberos configuration file on Windows is C:\windows\krb5.ini. On UNIX, the file can reside anywhere as long as the KRB5\_CONFIG environment variable is set to the fully qualified path.
- The location of the keytab is system dependent. For example, C:\windows\krbsvc-smtps.keytab on Windows, or /opt/CA/siteMinder/krbsvc-smtps.keytab on UNIX. The Kerberos configuration file default\_keytab\_name configuration option specifies the fully qualified path to the file.
- The UNIX keytab merges the service account keytab and the host keytab into a single keytab file.

**Note:** If the Policy Server is installed on Windows and the KDC is deployed on UNIX, perform other required configuration on the Policy Server host using the [Ksetup utility](#) (see page 844).

### Follow these steps:

1. Install and configure the Policy Server.
2. Install and configure policy store directory services.
3. Add a Host Configuration Object referencing the Policy Server.
4. Create an Agent Configuration Object and add these three new parameters:

#### KCCExt

**Value:** .kcc

#### HttpServicePrincipal

Specifies the web server principal name.

**Example:** HTTP/www.example.com@EXAMPLE.COM

#### SmtpsServicePrincipal

Specifies the Policy Server principal name.

**Example:** smtps@smtps.example.com

5. Create a user directory.
6. Create a user, for example, testkrb, in the user directory.
7. Configure a new authentication scheme using the Administrative UI. See Configure a Kerberos Authentication Scheme.
8. Configure a policy domain.

9. Add a realm to protect a resource using the authentication scheme.
10. Add Rules and Policies to allow access for the user, testkrb.
11. Configure a Kerberos configuration file (krb5.ini) and place krb5.ini in the Windows system root path. Configure krb5.ini to use the Windows 2008 KDC keytab file containing the Policy Server principal credentials. See the following sample krb5.ini:

```
[libdefaults]
default_realm = EXAMPLE.COM
default_keytab_name = C:\WINDOWS\krbsvc-smtps.keytab
default_tkt_enctypes = rc4-hmac
default_tgs_enctypes = rc4-hmac
[realms]
EXAMPLE.COM = {
kdc = dc.example.com:88
default_domain = example.com
}
[domain_realm]
.example.com = EXAMPLE.COM
```

12. Deploy the Windows KDC keytab file containing the Policy Server principal credentials to a secure location on the Policy Server.

The Policy Server on a Windows host is configured for Kerberos authentication.

## Kerberos Configuration at the Policy Server on UNIX Example

The following procedure shows an example of how to configure a Policy Server on a UNIX host to support CA SiteMinder Kerberos authentication.

### Follow these steps:

1. Create a user, for example, sol8psuser, with the same password used for creating a service account for the Policy Server host (sol8ps) in Active Directory.
2. Add the host to the test.com domain and login to host with user sol8psuser.
3. Install and configure CA SiteMinder Policy Server.
4. Install and configure policy store directory services.
5. Add a Host Configuration Object referencing the Solaris Policy Server.
6. Add an Agent Configuration Object and add the following three new parameters:

| Parameter            | Value                                                                                                |
|----------------------|------------------------------------------------------------------------------------------------------|
| KCCExt               | .kcc                                                                                                 |
| HttpServicePrincipal | Specify the web server principal name.<br><b>Example:</b><br>HTTP/policyserverhost.test.com@TEST.COM |

| Parameter            | Value                                                                                    |
|----------------------|------------------------------------------------------------------------------------------|
| SmpsServicePrincipal | Specify the Policy Server principal name.<br><b>Example:</b> smps@webserverhost.test.com |

7. Create a user directory.
8. Create a user, for example, testkrb, in the user directory.
9. Configure a new Authentication Scheme using the Administrative UI. See [Configure a Kerberos Authentication Scheme](#).
10. Configure a policy domain.
11. Add a realm to protect a resource using the Authentication Scheme.
12. Add Rules and Policies to allow access for the user, testkrb.
13. Configure a Kerberos configuration file (krb5.ini) and place krb5.ini in the KRB5\_CONFIG system path.
  - Configure the KDC for the Windows 2008 Kerberos realm (domain) to use the Windows 2008 domain controller.
  - Configure krb5.ini to use the Windows 2008 KDC keytab file containing the Policy Server principal credentials.

See the following sample krb5.ini:

```
[libdefaults]
ticket_lifetime = 24000
default_realm=TEST.COM
default_tgs_enctypes = des-cbc-md5
default_tkt_enctypes = des-cbc-md5
default_keytab_name = FILE:/etc/krb5.keytab
dns_lookup_realm = false
dns_lookup_kdc = false
forwardable = true
proxiabile = true
[realms]
TEST.COM = {
    kdc = winkdc.test.com:88
    admin_server = winkdc.test.com:749
    default_domain = test.com
}
[domain_realm]
.test.com=TEST.COM
test.com=TEST.COM
```

14. Use the ktutil utility to merge the keytab files (sol8ps\_smps.keytab & sol8ps\_host.keytab) containing the host principal and service principal names for the Policy Server host in the /etc/krb5.keytab file:

```
ktutil: rkt sol8ps_host.keytab
ktutil: wkt /etc/krb5.keytab
ktutil: q
ktutil: rkt sol8ps_smps.keytab
ktutil: wkt /etc/krb5.keytab
ktutil: q
```

15. Verify the created krb5.keytab as follows:

```
klist -k
Keytab name: FILE:/etc/krb5.keytab
KVNO Principal
----
```

```
-----
3 host/sol8ps.test.com@TEST.COM
3 smps/sol8ps.test.com@TEST.COM
```

16. Deploy the Windows KDC keytab file containing the host and Policy Server principal credentials to a secure location on the Policy Server.
17. Verify that the following environment variable is set before starting the Policy Server:

```
KRB5_CONFIG=/etc/krb5/krb5.conf
```

The Policy Server on a UNIX host is configured for Kerberos authentication.

## Verify that a Resource is Protected

You can verify that a resource in your Kerberos domain is protected by creating a CA SiteMinder policy using the Kerberos Authentication scheme and attempting to access the resource with a user principle.

### To verify that a resource is protected by Kerberos authentication

1. Log into the Administrative UI.  
**Note:** When you create or modify a Policy Server object in the [set the ufi variable for your book], use ASCII characters. Object creation or modification with non-ASCII characters is not supported.
2. Configure a policy domain.
3. Configure a realm using the Kerberos Authentication scheme.
4. Configure a rule to protect a specific resource within your Kerberos domain.

5. Configure a policy to protect the Kerberos resource, and add a test user to the policy.
6. Log in to the Kerberos domain as a user principle and attempt to access the protected resource.

CA SiteMinder authenticates the user using the KDC security token.

## Troubleshooting SiteMinder Kerberos Authentication

Be aware of the following issues when working with Kerberos authentication:

- The Policy Server system clocks must be synchronized (within 2 minutes) to the KDC system clock. Otherwise, Kerberos authentication fails because of clock skew errors.
- All the hosts must have suitable entries for the IP Address, fully qualified domain name (FQDN) and hostname in the `/etc/hosts` file. The order of these entries also matters in some cases. Also, include at least single space between these entries:

IP Address FQDN hostname

- Use `klist` (UNIX KDC clients) to list tickets present in the credential cache. The flag `-f` provides information about tickets flags. These tickets are forwarded to complete the Kerberos authentication process.

For example, see sample `klist` output listed following.

```
bash-2.05$ klist
Ticket cache: /tmp/krb5cc_1002
Default principal: HTTP/sol8sunone.test.com@TEST.COM
```

| Valid starting           | Expires                  | Service principal        |
|--------------------------|--------------------------|--------------------------|
| Wed Dec 26 15:00:03 2007 | Wed Dec 26 21:40:03 2007 | krbtgt/TEST.COM@TEST.COM |

- Always use the `kinit` program for the user and service principal at the MIT KDC host and UNIX KDC client.

The `kinit` syntax for the user principal is:

```
kinit principalname
```

This command prompts for the password used while creating the user principal.

The `kinit` syntax (it can vary from host to host) for service principal is:

```
kinit -k [-t keytab location containing service principal] principalname
```

The `kinit` command does not prompt for a password, because it uses a keytab file to authenticate the service principal.

- Install any network packet trace utility on the workstation to see the Kerberos tokens exchanged between the browser and web server. The token starting with `TIR` indicates NTLM tokens, and tokens starting with `YII` denote the Kerberos tokens.

- Log off the workstation host after any change in encryption type at the KDC. Also, restart the Policy Server and web server services after any changes are made to the Kerberos configuration or the keytab files.
- The KDC does not support post-dated tickets.
- Only DES-CBC-MD5 and DES-CBC-CRC encryption types are available for MIT interoperability.
- Always enable the Policy Server and the Web Agent logs to record the authentication error messages.
- Verify that the name and location of keytab file for any host matches the ones in the krb5.conf file.
- The SPN is always case-sensitive. The krb5.keytab files for the Policy Server and the web server hosts must contain the host and service principals.
- Verify the version of ktpass utility. The ktpass command tool utility is included in the Windows support tools and can be installed from MSDN download.
- Always confirm the encryption type used while creating the keytab file. Windows by default supports RC4-HMAC encryption.
- Confirm the Kerberos version number (kvno). The kvno of the service principal must match the kvno of its keytab file. The kvno number of any keytab is displayed when it is created.

To determine the kvno of a service account for Windows Active Directory, use the ADSI Edit as follows:

1. Run adsiedit.msc from command prompt.
2. Go to service account, under CN=Users, DC=domain, DC=com under drop-down Domain (fqdn\_ADhost) at the left.
3. Right-click the service account and click properties.
4. Verify the value of the msDs-KeyVersionNumber attribute, which matches the one shown while creating the keytab file for the service account.

The kvno for any user account changes every time its password is changed. If the version numbers do not match, create an account and keytab, or change the password to match the kvno to the kvno of the keytab.

To determine the kvno of a service account for a UNIX MIT KDC, use the kvno utility. The syntax of this command is:

Kvno principalname

- Verify the keytab file validity

**Windows:** Verify whether the keytab file is valid by installing Windows support tools on the Policy Server and Web Agent. Run the following command:

```
Kinit -k -t <keytab file location> <respective spn>
```

For example:

```
kinit -k -t C:\Windows\webserver.keytab HTTP/websvriis6.test.com@KRISH.COM
```

This command returns no error when the keytab file is valid.

**Solaris:** Verify both keytab files validity by running the following commands:

```
Kinit -k -t <keytab file> <SPN>
```

For example:

```
kinit -k -t host.keytab host/<fqdn>@DOMAIN.COM
```

```
kinit -k -t smps.keytab smps/<fqdn>@DOMAIN.COM
```

- If you get no errors, keytab files are fine, and the krb.conf file has valid values.
- If you get an error, check whether the SPN is valid in KDC using the following command:

```
Kinit host/<fqdn>@DOMAIN.COM
```

This command usually asks for password. If you provide a valid password, you do not get an error message. If this command does not ask for password, the SPN was not identified. Check the property of that object. The SPN entry is on the Account tab, for example, *host/fqdn*. Make sure no other object has the same entry set as SPN.