CA Identity Manager

Administration Guide

r12.5 SP9

technologies

CA Technologies Product References

This document references the following CA products:

- CA Identity Manager
- CA SiteMinder®
- CA Directory
- User Activity Reporting Module (UARM)
- CA Role & Compliance Manager

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Chapter 1: Role Planning

To plan your roles, you decide what kind of roles your business or organization needs and how you will delegate the management of users and their application access. Based on these decisions, you determine each role's characteristics.

This section contains the following topics:

Role Decisions

The following section includes information to help you make informed role decisions.

Types of Roles

To decide what types of roles that you need, see the following table:

Type of Role	Purpose
Admin role	Contains the tasks that you perform in the Identity Manager User Console: ■ *Admin tasks*, which you use to manage users, organizations, groups, roles, and tasks. ■ *External tasks*, which perform functions in business applications, such as passing user attributes to a reporting application
Provisioning role	Contains account templates that define accounts that exist in managed endpoints, such as an email system. The account templates also define how user attributes are mapped to accounts.
Access role	Provides an additional way to provide entitlements in CA Identity Manager or another application.

You manage roles in an *Identity Manager environment*, which is a view of a management namespace where you manage users, groups, and organizations and the associated tasks and roles. To create an Identity Manager environment, see *CA Identity Manager Configuration Guide*.

For every Identity Manager environment, you need admin roles. You need provisioning roles if you need to assign additional accounts to existing users. You need access roles if you need to provide an additional way to provide entitlements in CA Identity Manager or another application.

Purpose of Roles

To use roles effectively, consider these types of questions about user needs and administrator responsibilities:

- Which departments and organizations have users to be managed?
- What additional accounts in managed endpoints will users need?
- Which users should be administrators of other users?
- Who should manage the administrators?
- What admin and access tasks are needed in each role?
- Who should create roles and tasks?
- How can I use roles to delegate work?

  The last question concerns sharing the work of managing users and granting application access. More information about the delegation model exists in Delegated Administration (see page 18).

Based on your answers to these questions, you can decide how many and what kind of roles are needed.

Delegated Administration

As an Identity Manager user, you can personally manage users and their access to applications or you can delegate this work. *Delegated administration* is the use of roles to share the work of managing users and granting application access.

For delegated administration, each role contains rules that describe which users perform the functions in the following figure:

Function	Definition
Role Owner	Modifies the role
Role Administrator	Assigns the role to users and other role administrators
Role Member	Uses the role to perform admin or access tasks

By dividing these functions between users, you can have lower-level administrators manage users and higher-level administrators assign or modify the role.

Note: An *administrator* is an Identity Manager user who can assign roles or use admin roles. A *user* is any Identity Manager user; that user may have admin roles, access roles, or both.

For a provisioning role, you can create administrator and owner rules, so that you can delegate administration. However, you cannot create member rules for provisioning roles in Identity Manager. Instead, you use Modify Provisioning Role Members/Administrators to add or remove role members.

Delegation Steps

After you decide about your use of roles based on Purpose of Roles, delegated administration occurs as follows:

1. An administrator creates the role with rules for who is a role owner, administrator, or member.
2. A role owner modifies the role, when changes are needed.
3. A role administrator:
    - Assigns more role administrators (optional).
    - Assigns more role members (optional).

    Some users are already role administrators or members by meeting rules defined in the role.
4. A role member uses the role:
    - An admin role member manages users and other objects in the Identity Manager environment.
    - An access role member performs functions in business applications.
    - A provisioning role member uses the accounts defined by policies in the role.

Delegation Example

You can create a role with rules for who can be a member or administrator. You can then assign the role, so that other users (who do not already meet the rules) can become a role member or administrator.

Consider the following example of administrators who manage the business application rights of end users:

- Jeff is a role owner for the Accountant role; so when the role requires changes, Jeff modifies the role.

- David and Lisa are role administrators for that role. They assign regional users as role members.
- Other users are role members without being assigned as role members. Instead, they meet the rule to be role members.

  The role members use the Accountant role to generate purchase orders and perform other tasks in financial applications.

The section Role Characteristics provides details on rules and other characteristics of a role.

Role Characteristics

When you create a role, you define the characteristics shown in the following table:

Characteristics	Definition
Role Profile	General characteristics of the role.
Tasks	Tasks for an admin role.
Account Templates	Templates that define accounts in managed endpoints for a provisioning role.
Member Rules, Member Policies	A member rule defines conditions for a user to be a role member. A member policy combines a member rule with scope rules. **Note:** Provisioning roles have no member rules and policies. To make a user a member, you use Modify Provisioning Role Members/Administrators.
Admin Rules, Admin Policies	■ An admin rule defines conditions for a user to be a role administrator. ■ An admin policy combines an admin rule with a scope rule and administrator privileges for assigning the role.
Owner Rules	Conditions for a user to be a role owner.
Scope Rules	Limits on which objects can be managed by the role.
Add Actions, Remove Actions	Changes to a user profile when a user is added or removed as a role member or administrator.

The following sections explain these characteristics.

Role Profile

The role profile is the name and description of the role and whether or not the role is enabled. If enabled, the role is available for use as soon as it is created.

Tasks for the Role

For an admin role, you can choose one or more admin tasks, including external tasks, from one or more categories.

Account Templates

Each provisioning role contains account templates. They define the accounts that exist in managed endpoints. For example, an endpoint for an Exchange account might define the size of the mailbox. The account templates also define how user attributes are mapped to accounts.

You can choose one or more endpoints for each endpoint type. A user who is assigned the role receives an account in the endpoint.

Member, Admin, and Owner Rules

Each role includes rules about who can be a member, administrator, or owner of that role. Therefore, a user could be a member of one role, several roles, or no roles.

Member, admin, and owner rules use the conditions in the following table:

Rule Condition	Example	Rule Syntax
The user must match one attribute value.	Users where title starts with senior	where <user-filter>
The user must match multiple attribute values.	Users where title=manager and locality=east	where <user-filter>
The user must belong to named organizations.	Users in organization sales and lower	in <org-rule>
The user must belong to organizations that meet a condition specified by attributes on the organization.	Users in organizations where Business Type=gold or platinum	in organizations where <org-filter>

Rule Condition	Example	Rule Syntax
The user must belong to specific organizations and match specific user attributes.	Users where title=manager and locality=east and who are in organization sales or marketing	where <user-filter> and who are in <org-rule>
The user must belong to a specific group.	Users who are members of 401K group	who are members of group [set the product group or family]
The user must be a member of a role.	Users who are members of the Help Desk role	who are members of <role-rule>
The user must be an administrator of a role.	Users who are administrators of the Sales Manager role	who are administrators of <role-rule>
The user must be an owner of a role.	Users who are owners of the User Manager role	who are owners of <role-rule>
The user must belong to a group which meets a condition specified by attributes on the group.	Users who are members of groups where owner=CIO	who are members of group <group-filter>
The user must meet a condition based on an LDAP query.	(Use an LDAP directory for situations where a query created in the Identity Manager User Console is insufficient)	user returned by the query ldap_query

Some rules may involve comparing a value to a multi-valued attribute. For the rule to apply, at least one value in a multi-valued attribute must satisfy the rule. For example, if the rule is Attribute A EQUALS 1, and the value of attribute A is 1, 2, 3 for User X, then User X satisfies the criteria.

The user who creates the role may be unable to modify the role. To be able to modify the role, that user must meet the conditions in the owner rules.

Note: In large implementations, it may take significant time to evaluate member, admin, and owner rules. To reduce the evaluation time for rules that include user-attributes, you can enable the in-memory evaluation option. For more information, see the *Configuration Guide*.

Scope Rules

You combine member and admin rules with scope rules. *Scope rules* limit objects on which the role can be used.

- For a role member, scope rules control which objects can be managed with the role.
- For a role administrator, scope rules control which users can become role members and administrators.

The objects include the primary object of the task and any secondary objects. For example, a Create User task that includes a group tab has a primary object of user and a secondary object of group.

For most object types, you can specify the types of scope rules in the following table.

Rule Condition	Example	Rule Syntax
All	Role members can manage all objects	All
The object must match one or more attribute values.	Users where **title** starts with **senior**	where <filter>

When you select the filter option, CA Identity Manager displays two types of filters:

<attribute> <comparator><value>

An attribute in the object’s profile must match a specific value.

<attribute> <comparator> admin's <user-attribute>

An attribute in the object’s profile must match an attribute on the administrator's profile. For example: Users where manager = admin’s UserID.

Additional options, which are described in the following tables, are available for user, group, and organization objects.

Note: The following user scope rules are examples. You can create other rules to handle different relationships between the administrator and the users that the administrator can manage.

Rule Condition	Example	Rule Syntax
The user must match one attribute value.	Users where member of group sales or cell phone does not equal null	where <user-filter>

Rule Condition	Example	Rule Syntax
The user must match multiple attribute values.	Users where title=manager and locality=USA	where <user-filter>
The user must belong to named organizations.	Users in organization Australia or New Zealand **Note:** Organization scope rule apply to suborganizations of the organization that meets the rule. For example, if the organization rule is "in Organization1", the scope rule applies to Organization1.1 and Organization1.2, but does not apply to Organization1.	in <org-rule>
The user must belong to organizations that meet a condition specified by attributes on the organization.	Users in organizations where Business Type=gold or platinum	in organizations where <org-filter>
The user must belong to specific organizations and match specific user attributes.	Users where title=manager and locality=east and who are in organization sales or organization marketing	where <user-filter> and who are in <org-rule>
The attribute on a user's profile must match an attribute on the administrator's profile.	Users where manager = admin's UserID	where <user-attribute> <comparator> admin's <user-attribute> **Note:** Do use the Not Equal To comparator with a multi-valued attribute.
The user is in the same organization as the administrator.	Users in the organization where Jeff (the administrator) is a member	admin's organization

Rule Condition	Example	Rule Syntax
The user is in an organization which is listed on the administrator's attribute.	Users in sales or marketing	organization that is a value in admin's <admin-attr>

Note: The following group scope rules are only examples. You can create other rules to handle different relationships between the administrator and the groups that the administrator can manage.

Rule Condition	Example	Rule Syntax
The group must match one attribute value.	Group name where Group name = 401K	where <group-filter>
The groups must belong to named organizations.	Groups in organization accounting and lower	in <org-rule>
The group must match one attribute value and belong to named organizations.	Groups where BusinessType = finance and who are in organization sales and lower	where <group-filter> and who are in <org-rule>
The group must be listed in an attribute of the administrator.	Groups where Description = Engineering	where <group-attribute> <comparator> admin's <user-attribute> **Note:** Do use the Not Equal To comparator with a multi-valued attribute.

Note: The following organization scope rules are only examples. You can create other rules to handle different relationships between the administrator and the organizations that the administrator can manage.

Rule Condition	Example	Rule Syntax
The organization must match one attribute value.	organizations where org Name=finance	where <org-filter>

Rule Condition	Example	Rule Syntax
The organization must belong to named organization.	organizations in finance and lower	in <org-rule>
The organization must match one attribute value and must belong to named organization	organizations where org Name=finance and are in finance and lower	where <org-filter> and are in <org-filter>

More information:

Common Guidelines about Rules (see page 26)

Common Guidelines about Rules

Whatever type of rule that you create, you should understand how Identity Manager processes them.

Evaluation of Operators

In creating rules for a role, you may include >=, <=, <, and > operators. However, these operators are evaluated as strings by the LDAP directory or relational database. Most user stores compare strings based on the alphabet. Therefore, in comparing 500 to 1100, the user store may determine that 500 is greater because 5 is greater than 1.

You may be able to change the way strings are compared in the user store. Consult the documentation for the LDAP directory service or relational database software.

Case-Insensitivity of Rules

When you create admin or access roles, the rules that you create may be evaluated in a case-insensitive or case-sensitive manner depending on the user store.

However, at the end of a create or modify operation, the rules are evaluated internally in a case-insensitive manner before committing the changes to the user store. For example, if a rule has a condition where title=manager, the rule matches the user store object, whether it has a title value of manager or Manager.

Add and Remove Actions

You must specify an Add and Remove Action for Identity Manager to correctly manage a role’s membership when an administrator grants or revokes the role.

- The Add Action must make the user meet the criteria in one of the role’s member rules. For example, if the member rule for the User Manager role states that role members have "User Manager" as a value of their Admin Roles attribute, the Add Action must add "User Manager" to the Admin Roles attribute.
- The Remove Action should alter the profile of a user so that the user no longer matches the member rule when the rule is revoked.

Each role can have two *add actions* and two *remove actions*.

If administrators can add and remove members of the role, you define add and remove actions. Otherwise, the user has the role by meeting the member rule, such as by belonging to the RoleAdmins group. For example:

- Role A can be assigned by an administrator, so add or remove actions will be defined.
- Role B has a rule that all members of Group "finance" have the role. This role cannot be assigned, so it has no add or remove action.

When you define add and remove actions, consider using the Admin Role attribute, which Identity Manager can use to store a list of user's roles. For example, you can configure an add action that adds Employee to a user's Admin Role attribute when that user is added as a member of the Employee role. When an administrator assigns the Employee role to a manager who already has the Self Administrator and User Manager roles, the manager's Admin Role attribute would contain the following values: Self Administrator, User Manager, Employee.

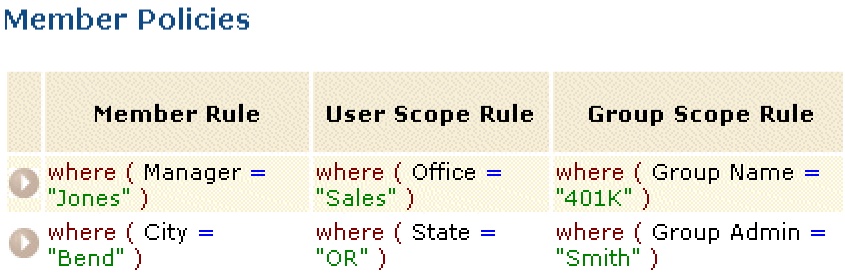
To use the Admin Role attribute, the %ADMIN_ROLE_CONSTRAINT% well-known attribute must be mapped to a multi-valued attribute in user profiles. For more information, see the *CA Identity Manager Configuration Guide*.

Important! When defining an add action, avoid setting up a rule that refers to the role you are defining. For example, do not define the add action that makes a member of Role A by being a member of Role A. This will create a recursive error that will cause the policy server to restart.

Member Policies

A *member policy* indicates that if a user meets the member rule, that user has the scope defined in that policy. The following figure shows a role that has two member policies.

- The first policy indicates that if a role member has the Manager Jones, that member can use the role on users in the Sales Office and manage them as members of the 401k group.
- The second policy indicates that if a role member is in the city Bend, that role member can use the role on users in the state of Oregon and manage them as members of the groups that have the Group Admin of Smith.



Member Policies

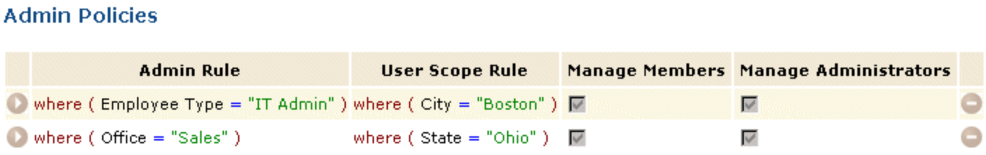
	Member Rule	User Scope Rule	Group Scope Rule
▶	where (Manager = "Jones")	where (Office = "Sales")	where (Group Name = "401K")
▶	where (City = "Bend")	where (State = "OR")	where (Group Admin = "Smith")

Admin Policies

An *admin policy* indicates that if a user meets the admin rule, that user has the user scope and administrator privileges defined in that policy. The user scope defines where the role is used. The administrator privileges determine if the role administrator can manage members or manage administrators of the role.

The following figure shows a role that has two admin policies, which are defined as follows:

- For the first policy, an IT Admin can add and remove role members and administrators from the users in the city of Boston.
- For the second policy, an administrator in Sales can add and remove members in the state of Ohio.



Admin Policies

	Admin Rule	User Scope Rule	Manage Members	Manage Administrators	
▶	where (Employee Type = "IT Admin")	where (City = "Boston")	☑	☑	⊖
▶	where (Office = "Sales")	where (State = "Ohio")	☑	☑	⊖

Role Planning Checklist

Before creating a role, use this checklist of role characteristics.

Role Characteristic	Details
Role Profile	Define a name and description for the role and set Enabled status.
Tasks	Include admin or access tasks.
Account Templates	Include account templates that define accounts that exist in endpoints (provisioning roles only).
Member Policies	For each member policy, define: ■ Member Rules -- Who can use the role ■ Scope Rules -- Which objects can a role member manage ■ Add Action -- What happens to the profile of a user who becomes a member ■ Remove Action -- What happens to the profile of a user who is removed as a member
Admin Policies	For each admin policy: ■ Admin Rules -- Who can manage the users as members or administrators ■ Scope Rules -- Which users can the administrator manage as members or administrators ■ Add Action -- What happens to the profile of a user who becomes an administrator ■ Remove Action -- What happens to the profile of a user who is removed as an administrator
Owner Rules	Define who can modify the role.

Chapter 2: Admin Roles

This section contains the following topics:

Admin Roles and Admin Tasks

You create roles that contain tasks for managing objects based on your individual business requirements. For example, you might create several roles with tasks that manage users and other roles with tasks that manage the roles you create.

Alternatively, you might create separate roles with:

- Tasks for administrators to manage users
- Tasks that manage the administrators
- Tasks to manage admin roles
- Tasks to manage access roles

Note: You can also use the default admin roles supplied with CA Identity Manager. These roles have tasks that are grouped in categories similar to the preceding list.

Admin Roles and Identity Manager Environments

When you log into an Identity Manager environment, your user account has one or more admin roles. Each admin role contains tasks, such as Create User, that you use in that Identity Manager environment.

For example, in the *central* Identity Manager environment, an admin role, *Help Desk,* has tasks for resetting passwords. The role has a member rule that the user must be an IT employee. When IT employees log into the *central* Identity Manager environment, they have the *Help Desk* role and can reset the passwords of users in that Identity Manager environment.

Admin Roles and the User Console

An Identity Manager environment is viewed through the User Console. Your assigned admin roles determine what you see in that console as shown in the following table:

Assigned Roles	Format of the User Console
System Manager role	The category list for all objects and all default admin tasks for managing those objects
Roles for managing more than one type of object	The category list with one item for each type of object you can manage
Roles for managing one type of object, such as Users	The tasks for that object (such as Modify User) *without* a category list
An approval role	The Work list screen Appears if the administrator has tasks pending approval (for example, self-registering users need approval)

If you can manage more than one object, the category list appears and shows the objects that you can modify, such as Users and Groups as tabs across the top of the screen. Select a tab to see tasks in your assigned roles.

Note: If your internet browser does not support Cascading Style Sheets (CSS), the User Console uses a different format. To control that format, see the *Configuration Guide*.

Create an Admin Role

You can create an admin role once you know the role requirements. These requirements concern who will use this role, what objects it will manage, and which Environment has the objects to be managed.

Begin Admin Role Creation

You create an admin role from the User Console.

To create an admin role

1. Log into an CA Identity Manager account that has a role with tasks for creating admin roles.

   For example, the first user of an Environment has the System Manager role, which has the Create Admin Role task.

2. Under Roles and Tasks, select Admin Roles, Create Admin Role.
3. Choose the option to create a new role or a copy of a role.

   The Profile tab appears where you begin defining the admin role.

4. Define the Admin Role Profile.

Define the Admin Role Profile

On the Profile tab, you define basic characteristics of the role.

To define the profile

1. Enter a name and description, and complete any other custom attributes that are defined for the role.

   Note: You can specify custom attributes on the Profile tab that specify additional information about admin roles. You can use this additional information to facilitate role searches in environments that include a significant number of roles.

2. Select Enabled if you are ready to make the role available for use as soon as you create it.
3. Select Admin Tasks for the Role (see page 34).

More Information:

User-defined Custom Attributes for Roles (see page 51)

Select Admin Tasks for the Role

On the Tasks tab, you select the admin tasks to include in the role. You can include tasks from different categories or copy tasks used in another role.

To select admin tasks

1. Select the category in the Filter by Category field.

   To view the list of available task categories, click the down arrow icon.

2. Select that task to include in the role in the Add Task field.

   CA Identity Manager adds the task to the list of tasks in the role.

3. Add additional tasks by repeating steps 1 and 2.

4. Remove a task from the role by clicking the minus icon (⊖) for that task.

5. Define Member Policies for an Admin Role (see page 35).

Define Member Policies for an Admin Role

On the Members tab, you create member policies, which determine who can be a role member.

To define member policies

1. Click Add to define member policies. A member policy contains these rules:

   - A member rule which defines the requirements for a user to be a role member.

     Note: The following operators treat numbers as characters in member rules:

     - Less than (<)
     - Less than or equal to (<=)
     - Greater than (>)
     - Greater than or equal to (=>)

     For example, '10' will come after '1' but before '2'.

   - Scope rules which limit the primary and secondary objects available to tasks in the role.

     For example, if the role contains a task that modifies users by assigning them to groups, the user scope rule limits the users (primary object) that can be found and the group scope rule limits the groups (secondary object) that can be assigned.

   Note: Be sure to enter an answer to at least one scope question. The scope rules limit the primary and secondary objects available to tasks in the role. For example, if the role contains a task that modifies users by assigning them to groups, the user scope rule limits the users (primary object) that can be found and the group scope rule limits the groups (secondary object) that can be assigned.

2. Verify that the Member Policy appears on the Members tab.

   - To edit a policy, click the right arrow symbol on the left.
   - To remove it, click the minus sign icon.

3. On the Members tab, enable the checkbox labeled “Administrators can add and remove members of this role,” unless users should only become members by meeting a member rule.

   Once you enable this feature, the screen expands.

4. In the expanded area, define the Add Action and Remove Action (see page 27) for when a user is added or removed as a role member.

   Important! When defining an add action, avoid setting up a rule that refers to the role you are defining. For example, do not define the add action that makes a member of Role A by being a member of Role A.This may cause errors.

5. Define Admin Policies for an Admin Role (see page 36).

Define Admin Policies for an Admin Role

On the Administrators tab, you define who can add or remove users as members and administrators of this role.

To define admin policies

1. If you want to make the Manage Administrators option available, enable the check box labeled “Administrators can add and remove administrators of this role.”

   Once you enable this feature, the screen expands.

2. In the expanded area, define the Add Action and Remove Action for when a user is added or removed as an administrator of the role.

3. Define admin policies, which contain admin and scope rules and at least one administrator privilege (Manage Members or Manage Administrators).

   Note: You can add several admin policies with different rules and different privileges for administrators who meet the rule.

4. To edit a policy, click the arrow symbol on the left. To remove it, click the minus sign icon.

5. Define Owner Rules for an Admin Role (see page 36).

Define Owner Rules for an Admin Role

On the Owners tab, you define rules about who can be an owner of the role, a user who can modify the role.

To define owner rules

1. Define owner rules, which determine which users can modify the role.

2. Click Submit.

   A message appears to indicate the task has been submitted. A momentary delay may occur before a user can use the role.

If you selected Enabled when you created this role, the role is available to be used. If a user meets conditions in the member rule, that user can now log into the Identity Manager environment and use the tasks in the role.

Verify an Admin Role

To check that the role was created, choose Admin Roles, View Admin Role, then select the name of the role.

Alternatively, you can choose System, View Submitted Tasks to see if the role creation task has completed.

Allow Users to Self-Assign Roles

There may be some roles in an environment that users can assign to themselves. For example, you may want to allow users to sign up for the Delegation Manager role so that they can delegate the work items of one user to another user.

To control the roles that users can assign to themselves, you configure criteria in the Roles Self-Manager task.

To allow users to assign roles to themselves

1. Modify the Roles Self-Manager task as follows:

   a. Select Roles and Tasks, Modify Admin Task, and search for the Roles Self-Manager task.

   b. Select the Tabs tab.

      CA Identity Manager displays the list of tabs that apply to the task.

c. Select the right arrow icon next to the Roles Self Manager tab to edit it.

d. Complete the following fields:

   Show only Admin Roles Meeting the Following Rules

   Specifies the criteria that CA Identity Manager uses to determine which roles to allow users to assign to themselves.

   To add additional rules, click the plus (+) icon.

   User to be used as Admin Role Administrator

   Specifies the administrator for roles that users can assign to themselves.

   The roles that users can assign to themselves must have the user you select in this field as an administrator *and* meet the criteria you specified in the Show Only Admin Roles Meeting the Following Rules field.

   List Screen

   Specifies the columns and format for the list of roles that a user can select to self-assign a role.

e. Click OK, then click Submit.

2. Add the Roles Self-Manager task to a role, and assign that role to users who should have this capability.

Chapter 3: Admin Tasks

This section contains the following topics:

Admin Task Planning

Admin roles consist of admin tasks, which represent granular capabilities for managing objects. For example, you could manage a user object by using these admin tasks:

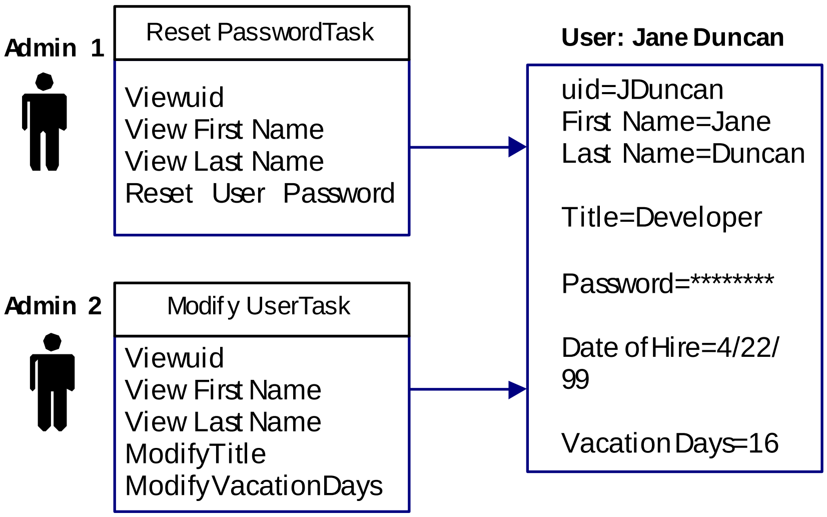
- Create User
- View User
- Modify User
- Reset User Password

You create or modify each task to match your exact requirements. Then, you combine the appropriate admin tasks into admin roles, which you assign to administrators. With these roles, administrators have the exact privileges they need to manage objects.

To plan admin task creation, decide which objects you need to manage (user, group, organization, role, or task) and which administrators will use these tasks. For example:

- To manage users, help desk administrators need tasks that manage user attributes, such as a user ID or title.
- To manage users' access to applications, other administrators need tasks that make users members of access roles.
- To manage the roles used by help desk administrators, higher-level administrators need tasks that manage admin roles.

For one type of object, such as users, you can create tasks so that different administrators manage different attributes. For example, the following figure shows a user who is managed by two administrators.



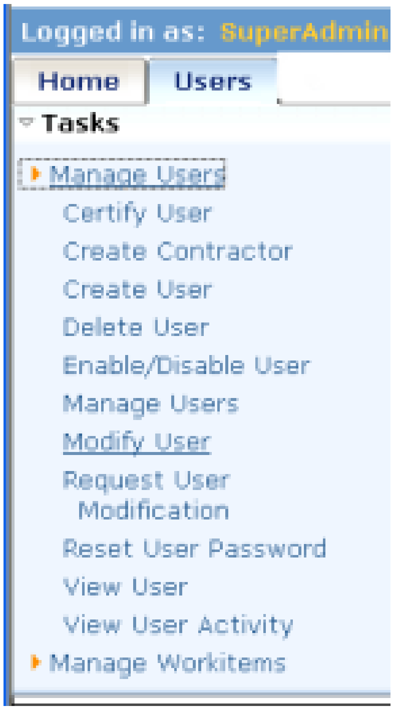
- Admin 1 has the Reset User Password task; that administrator can view the employee’s user ID and name or reset her password.
- Admin 2 has the Modify User task; that administrator can view the employee’s user ID and name or modify her title and vacation days.

A Sample Admin Task

When you create an admin task, you define the content and layout of screens in the task, including:

- The name of the task
- The category where the task appears
- The tabs and fields to use in the task, and field display properties
- The fields an administrator can use in a search query, and the fields displayed in the search results

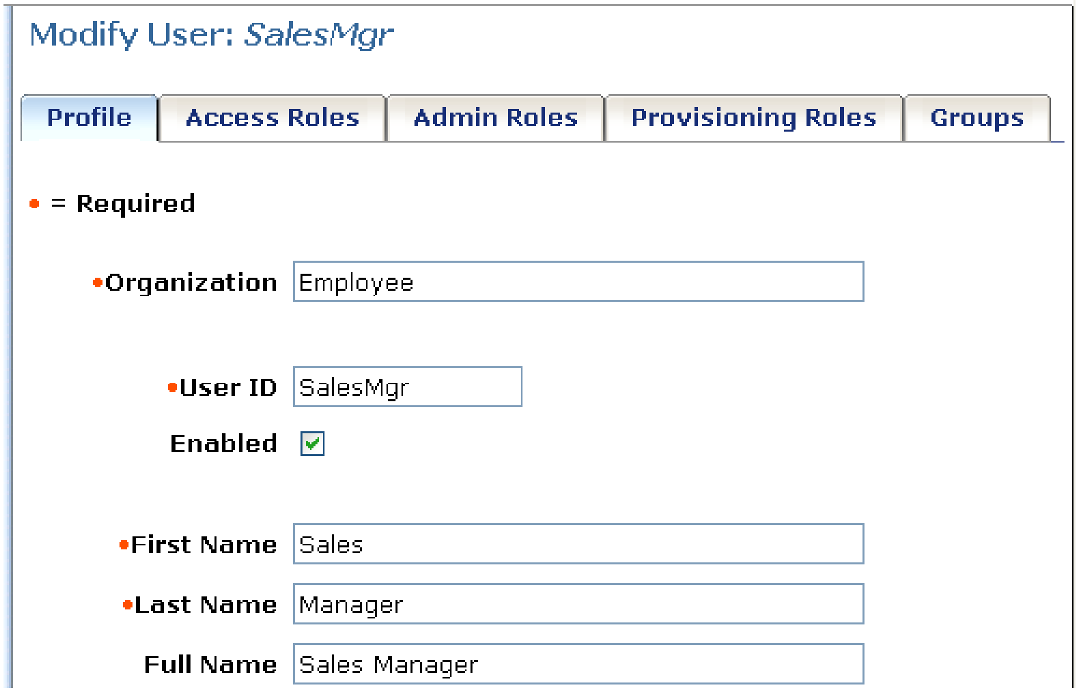
To understand the elements of a task, consider the Modify User task. In this case, Users is the category, Manage Users is a subcategory, and Modify User is the task. You create the category and task names when you create a task.



When you choose Modify User, a search screen appears. A *search screen* provides options for finding the object to view or modify. Each option is called a *filter*, which is a limit to the objects found by the search.

After you fill in the search screen, a screen with tabs appears. For example, the following figure shows the tabs for the Modify User task. The Profile tab appears first and shows user attributes; the other tabs show role and group privileges for the user.

For the task you create, you decide which tabs to include and determine their order and content.



Modify User: *SalesMgr*

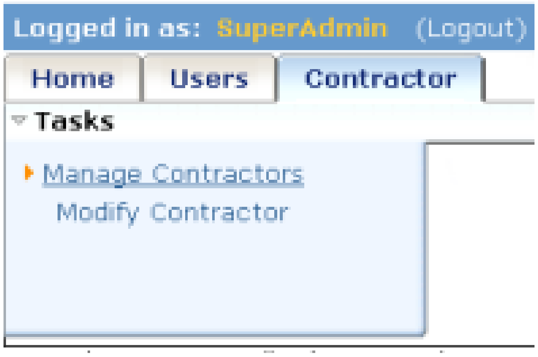
• = Required

•Organization	Employee
•User ID	SalesMgr
Enabled	☑
•First Name	Sales
•Last Name	Manager
Full Name	Sales Manager

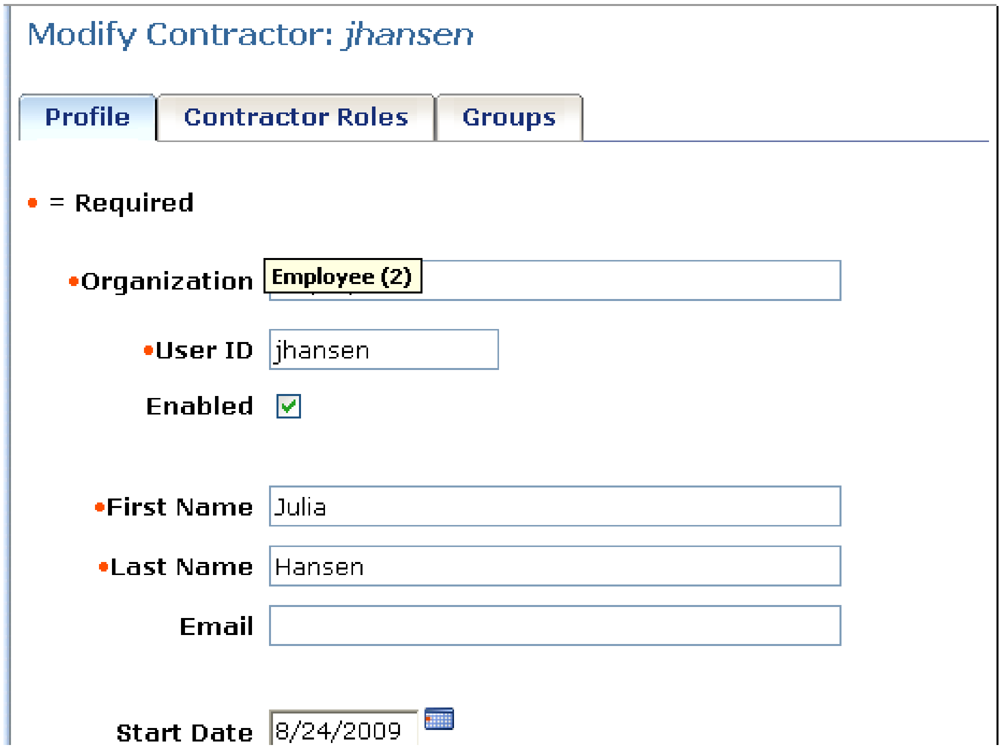
For example, using the Modify User task as a template, you could create a Modify Contractor task, which has changes to:

- The fields on the Profile tab
- The tabs to include in the task and their content
- The category under which the task appears

  You might create this task under a new category, Contractor.



The Modify Contractor task includes some of the fields on the Profile tab in the Modify User task plus other fields, such as the start date of the contract and the contractor’s company. Administrators can search for a contractor by searching on the contractor’s name, company, and start date.



Modify Contractor: *jhansen*

• = Required

•Organization Employee (2)

•User ID jhansen

Enabled ☑

•First Name Julia

•Last Name Hansen

Email

Start Date 8/24/2009

The new task also includes a Contractor Roles tab where you add roles for contractors.

Admin Task Usage Options

Identity Manager provides two ways to use admin tasks:

- **Select the task**

  You select a category and task, and then search for the object to which the task applies.

  For example, to modify a user profile, you select the Users category, and then select the Modify User task. You then search for the user to modify.

- **Select the object**

  You use "Manage" tasks, such as Manage Users or Manage Groups to search for an object. Once you select the object, you can display a list of tasks that you can use to manage that object. This method is called *object-task navigation.*

  For example, to modify a user using this method, you select the User category, then select the Manage User task. You search for and select the user that you want to manage. In the search results, you click an icon to see a list of tasks that you can use to manage the selected user. From that list, you can select Modify User or any other appropriate task.

  You can also configure task lists in tasks other than Manage tasks. For example, you can add a task list to a Membership tab. In this case, a task list is available for each member that appears on the Membership tab.

  Note: Only tasks that the current administrator can use appear in the task list for an object.

Default Admin Tasks

CA Identity Manager includes a set of default admin tasks and roles, which are added to CA Identity Manager by importing a Role Definitions file in the Management Console. When you create an environment in the Management Console and you choose to create the default roles, CA Identity Manager imports a Role Definitions file automatically.

Note: To support some functionality, such as account management for certain endpoint types, you may need to import additional Role Definitions files to create the roles and tasks you need.

In most cases, you can use the default tasks as installed. However, you may need to modify the Profile tab in the default user tasks, such as Create User, Modify User, and View User. The Profile tab includes all of the fields that are defined for the user object in the directory configuration file. You may want to limit the number of fields that appear on the tab, or change the field display properties.

Note: We recommend that you create a copy of a default task to modify, instead of modifying the default task directly.

How to Create a Custom Admin Task

An *admin task* is an administrative function that a user can perform in Identity Manager. Examples of admin tasks include Create User, Modify Group, and View Role Membership.

CA Identity Manager includes default admin tasks that you can modify to suit your business needs.

When you create a custom admin task, you complete the following steps:

Note: The section Active Directory Prerequisites (see page 65) includes additional considerations if CA Identity Manager is managing an Active Directory user store.

1. In the Identity Manager User Console, select Roles and Tasks, Admin Tasks, Create Admin Task.

   Identity Manager asks if you want to create a new task or create a task based on an existing task.

   For example, select the Modify User task as the basis of the new task.

2. Select Create a Copy of an Existing Task, and search for the task to copy.

   Note: We recommend modifying the copy of a default task, instead of modifying the default task directly.

3. Once you select Ok, you see a screen with the following six tabs:

Tab	Purpose	See this Topic
Profile	Define the profile of the task being created	Define the Profile of the Task (see page 46)
Search	Limit the range of objects that are managed by the task	Define the Task Scope (see page 53)
Tabs	Choose and design the tabs for the task	Choose Tabs for the Task (see page 61)
Fields	Show the fields used on all tabs	View Fields in the Task (see page 65)
Events	Select a workflow process for each event if the Identity Manager environment and the task uses workflow	Assign Workflow Processes for Events (see page 65)
Role Use	Displays the roles that include the task that you are modifying or viewing	View Role Use (see page 65)

Note: For more information about creating custom admin tasks, see the *User Console Design Guide*.

Define the Profile of the Task

The Profile tab includes general settings for the task.

Note: For more information about admin task profile settings, see the *User Console Design Guide*.

To define the profile of the task

1. Choose the type of object for the task, which is called the primary object, and the action to perform on it.
2. Complete the required fields and select the appropriate check boxes as needed for the task.

   Note: If you are creating a task that has similar profile settings as an existing task, click Copy Profile From Another Task. This option populates the profile settings for the task you are creating with the profile settings from any existing task that you select. You then add a name and description for the new task.
3. (Optional) Associate a business logic task handler with the task.
4. Once you complete this tab, proceed to the next step, Define the Task Scope (see page 53).

Admin Task Profile Tab

The Admin Task Profile Tab lets you define general settings for an admin task.

This tab contains the following fields:

- **Name**

  Defines the name of the task.
- **Tag**

  Defines a unique identifier for the task. It is used in URLs, web services, or properties files. The tag can contain ASCII characters (a-z, A-Z), numbers (0-9), or underscore characters, beginning with a letter or underscore.
- **Description**

  Specifies an optional note about the purpose of the task.
- **Task Order**

  Specifies the display order for the task. If no order is specified, the tasks are displayed in alphabetical order.
- **Category**

  Specifies a category for the task. Categories are displayed as tabs at the top of the screen.

- **Category Order**

  Specifies the order in which the category tab appears. For example, if you set the category order to 3, the category you specified will appear as the third tab.

- **Category 2**

  Specifies the second level category, which appears as a link below the list of category tabs. The second level category appears only when the tab for the first level category is selected. For example, if you created a task with the first level category of Employee and a second level category of Employee Management, the Employee Management category would appear only after you select the Employee tab.

- **Category 2 Order**

  Specifies the order in which the second level category appears, if more than one second level category exists in a primary category.

- **Category 3**

  Specifies the third level category, which appears in the left navigation pane. Tasks are listed under the third level category. For example, in a default environment, a user with the System Manager or User Manager role sees the third level category Manage Users when he selects the Users tab.

- **Category 3 Order**

  Specifies the order in which the third level category appears.

- **Primary Object**

  Specifies the object that the task operates on.

- **Action**

  Specifies the operation to perform on the object.

- **User Synchronization**

  Specifies whether the task synchronizes users with identity policies. You can select one of the following options:

  - **Off** (default)

    Specifies that this task does not trigger user synchronization.

  - **On Task Completion**

    Specifies that CA Identity Manager starts the user synchronization process after all of the events in a task complete. This setting is the default synchronization option for the Create User, Modify User, and Delete User tasks. The default setting for all other tasks is Off.

    Note: If you select the On Task Completion option for a task that includes multiple events, CA Identity Manager does not synchronize users until all of the events in the task complete. If one or more of those events require workflow approval, this may take several days. To prevent CA Identity Manager from waiting to apply identity policies until all events complete, select the On Every Event option.

  - **On Every Event**

    Specifies that CA Identity Manager starts the user synchronization process (see page 216) when each event in a task completes.

    For tasks with a primary and secondary event for the same user, setting user synchronization to On Every Event may result in more identity policies being applied to a user than if the On Task Completion option is selected.

- **Account Synchronization**

  Synchronizes accounts that exist in the Provisioning Server, if you have provisioning enabled.

  - **Off** (default)

    Specifies that this task does not trigger account synchronization.

  - **On Task Completion**

    Specifies that CA Identity Manager starts the account synchronization process after all of the events in a task complete.

  - **On Every Event**

    Specifies that CA Identity Manager starts the account synchronization process when each event in a task completes.

    Note: For best performance, select On Task Completion. However, if you select the On Task Completion option for a task that includes multiple events, CA Identity Manager does not synchronize accounts until all of the events in the task complete. If one or more of those events require workflow approval, this may take several days. To prevent CA Identity Manager from waiting to synchronize accounts until all events complete, select the On Every Event option.

- **Hide in Menus**

  Prevents the task from appearing in menus. Enable this control if the task is only invoked by a URL or by another task.

- **Public Task**

  Makes the task available to users who have not logged in to CA Identity Manager. The default public tasks are forgotten password and self-registration.

- **Enable Auditing**

  Records information about the task in an auditing database. Audit information can be used to generate reports. See the *Configuration Guide*.

- **Enable Workflow**

  Enables the CA Identity Manager events associated with the task to trigger workflow processes, if you have the workflow engine installed. For example, the events associated with the Delete Group task may trigger a workflow process that includes an approval step.

- **Enable Web Services**

  Marks the task as one for which Web Services Description Language (WSDL) output can be generated from the Management Console. Enable this control if you want to use remote task submission. For more information, see the *Programming Guide for Java.*

- **Workflow Process**

  Enables configuration for task level workflow. Click the pencil icon to configure policy-based or non-policy based workflow.

- **Task Priority**

  Determines the order in which CA Identity Manager executes tasks. Tasks with a High priority are executed before tasks with a Medium or Low priority. The default priority for a task is Medium.

  Note: You can use the View Submitted Tasks task to search for tasks with a specific priority, and then display their status.

- **Business Logic Task Handlers**

  Associates a business logic task handler (see page 69) with the task.

- **Workflow Action Buttons**

  Add custom action buttons to workflow approval tasks.

- **Copy Profile from another task**

  Copies data from the Profile tab of another task.

  For example, you might copy the Profile tab settings from the Modify User task, then add a name and description.

Task Configuration Properties

Task configuration properties control display properties and certain behaviors for the task.

Task Icon Path

Specifies the URL for a graphic to use as an icon for this task in task lists.

Task Icon Preview

Displays the icon for the task, as it appears in task lists.

Suppress Task Navigation

When selected, hides the top-level navigation and task list once a user selects a task. This prevents users from navigating away from the current task until they complete required actions or cancel the task.

Target Window

When you provide a value in this field, CA Identity Manager opens this task in a new browser window. Use this field to open a new browser window for an external task that redirects users to another website.

You can specify any name for the window.

Note: Do not use this field to open CA Identity Manager admin tasks in a separate browser window. CA Identity Manager does not support multiple browser windows for a single Identity Manager user session.

User-defined Custom Attributes for Roles

CA Identity Manager supports user-defined custom attributes that allow you to specify additional information about roles. You can use this information to filter roles in your organization. For example, a corporate environment may have more than a thousand roles. That organization can specify additional information, such as business unit or geographical location, for each role. Administrators can then use that information to facilitate role searches.

You can use custom attributes in the Create, Modify, and View tasks for the following roles:

- Admin Roles
- Provisioning Roles
- Access Roles

To configure custom attributes for roles, you complete the following high-level steps:

1. Add support for custom attributes to the profile tab for the tasks that create, modify, or view admin roles, provisioning roles, or access roles.
2. Configure search and list screens for the roles to include the custom attributes.

More Information:

Configure Custom Attributes in Profile Tab for Roles (see page 51)
Add Custom Attributes to Search Screen Definitions (see page 52)

Configure Custom Attributes in Profile Tab for Roles

CA Identity Manager allows you to configure up to 10 custom attributes on the Profile tab of tasks that allow you to create, modify, or view roles.

To configure custom attributes in the Profile tab

1. Click Roles and Tasks, Admin Tasks, Modify Admin Tasks.

   The Select Admin Task page appears.

2. Search for and select the admin task that you want to modify.

   Identity Manager displays the task details for the selected admin task.

3. Click the Tabs tab.

   The tabs that are configured for use with this admin task appear.

4. Click the arrow icon to edit the Profile tab.

   The Configure Profile screen appears.

5. Select the checkbox next to each custom field to add to the Profile tab and enter a meaningful label.

6. Click OK.

   The custom attributes will be available in the Profile tab of the modified task after you submit the task.

   Note: To use the custom attributes in role searches, configure the search screen (see page 52) to display these custom attributes.

Add Custom Attributes to Search Screen Definitions

When you want to filter roles in CA Identity Manager, you can only use the attributes that are available in the search screen. To filter the roles based on the custom attributes that you have defined, you must add the custom attributes to the search screen of the roles.

To add Custom Attributes to the Search Screens of roles

1. Click Roles and Tasks, Admin Tasks, Modify Admin Tasks.

   The Select Admin Task page appears.

2. Search for and select that admin task that you want to modify.

   To add custom attributes to search screens, select the Modify or View task for the type of role (admin, provisioning, or access) that includes custom attributes.

   Identity Manager displays the task details for the selected admin task.

3. Click the Search tab in the Modify Admin Role screen.

   The search screen details appear.

4. Click the Browse button to display a list of search screen definitions that are available for the task.

   The Select Screen Definition page appears.

5. Select a search screen definition to edit, or create a copy of an existing search screen definition.

   The Configure Standard Search Screen appears.

6. Add the custom attributes to the following tables:

   - Select the fields that a user can search on
   - Select the fields that appear in the search results

7. Change the name of the custom attribute to match the name you specified when you configured the Profile tab.

8. Click OK to save the changes to the search screen definition.

   The Select Screen Definition page displays again.

9. Select the screen that you created or edited, then click Select.

10. Select All Admin Roles from the Search Options list.

11. Click Submit.

    The search screen will now include the custom attributes in the search options and display the attributes in the search results.

Define the Task Scope

On the Search tab, you define the task scope, which limits the objects available to the task. For example, if the object of a task is users, you might define the scope as users who are contractors.

Note: If the task has no primary object, or if the action is self-modify, self-view, or approve, the Search tab does not appear.

You configure the following settings on the Search tab:

Search Screen

The search screen limits the scope of the task based on filters. Click Browse to see available search screen options.

Note: You may want to create your own search screen (see page 54). To create a modified version of an existing search screen, select the search screen and click Copy. You can then modify the search screen without changing the original search screen definition. To create a search screen, click New.

Search Options

The search options appear only when the object is a role or group.

- The first option limits the search based on fields that are defined on the search screen. Within these limits, the search locates all groups or roles in the administrator’s scope.
- Other options limit the search as indicated.

Note the following:

- By default, the group search screens support filtering. This means that administrators can specify criteria to limit the scope of group searches. To remove the filtering capability, create a search screen that does not contain any fields to include in a search query.
- *Filtering not supported*, which appears on the Search tab when the object is a role, means that the task displays the roles that meet the criteria in the option you select. Search fields that are configured on the search screen are ignored.

Modified objects must remain in administrator's scope

When this check box is selected, CA Identity Manager displays an error if changes to the task cause the administrator to lose scope over the primary object. For example, an administrator may use Modify User to change a user's Employee Type attribute to Manager. This change may put the user outside the administrator's scope.

Search Screen Configuration

You configure a search screen to limit the scope of the task and control the fields that users can search on. Search screens apply to two types of objects:

- A *primary object*—The object to be modified or viewed by the task.
- A *secondary object*—The object that is related to the primary object.

  For example, if you include a group tab on a create user task, the user is the primary object and the group is the secondary object. The group tab needs a search screen for groups.

  Note: After configuring a search screen, you can use it for any task to search for a primary or secondary object.

Search Filters

Search filters limit which objects the search returns. For example, if the object is users, you can limit the search to find only contractors. You can configure a filter to find users with the Employee Type of Contractor.

You can configure the following fields for searches:

Show only objects meeting the following rules

Defines additional criteria to be combined with the user-defined filter to constrain the search.

Note the following when using this field**:**

- Due to limitations with provisioning roles searches, these criteria override filter fields with the same name entered by the user.
- Attributes that are used when you configure this field should not be added as available search fields on the search screen.

  For example, if you configure the search screen to display only roles where the Enabled attribute is set to Yes, remove the Enabled attribute from the list of attributes that users can specify in search criteria.

  Otherwise, the user-entered criteria is ignored.

Default search filter

Defines a filter that appears by default when an administrator uses the search screen. For example, if you are configuring a search screen for the Modify Contractor task and you know that administrators typically search for contractors based on the contract firm name, you can set the default filter to Contract Firm = *. Administrators can override the default filter by specifying different search criteria. Setting a default filter improves performance by limiting the number of results returned if an administrator does not specify a filter before beginning a search.

Auto select all search results when used with multi-select tasks

Specifies that all search results are selected by default. If you select this check box, all the objects in the search results list appear with a checked box next to the object name.

Automatically perform search

Specifies that a search field is displayed with the search results.

Automatically set subject of task when there is only a single search result

Sets the primary object of the task automatically when only one object matches the search filter.

For example, suppose that this option is selected for a user search screen which is associated with the Modify User task. When an administrator opens the Modify User task and enters a search filter that returns only one user, CA Identity Manager opens the Modify User task for that user. The administrator does not have to select the user to open the Modify User task.

Note: For this setting to apply, Automatically perform search must also be selected.

Save search filter

Specifies that the search filter for the task is saved for the user in the current session. The next time that user searches in the task, the saved search filter will be displayed.

Note: CA Identity Manager saves the search filter for the duration of the user session. When the user logs out, the search filter is cleared.

Search in organization

Displays an organization filter on the search screen. If this check box is selected, administrators can specify a filter that limits the organizations in which CA Identity Manager searches for an object. You can specify defaults for the organization search filter by specifying a search screen in the Organization Search field.

Save search organization

Specifies that the organization for the task is saved if an organization was established for the search. The next time a user searches in the task, the organization will be displayed.

Organization Search

Specifies the search screen that CA Identity Manager uses to allow administrators to search for an organization.

Default Organization Search Scope

Specifies the default organization search scope that appears when an administrator uses a search screen. The search scope determines the levels in an organization tree that are included in the search. Administrators can override the default organization search scope by specifying different search criteria on the search screen.

For example, if you configure a search screen for a custom Modify Contractor task in an environment that stores contractor information at various levels in the organization tree, you can set the default organization search scope to And Lower.

Single expression search

Defines the type of search filter that appears on the search screen. When you select this checkbox, users can specify a single search filter, such as <attribute><comparator><value>. When you clear this checkbox, users can specify multiple search filters. For example, <attribute1><comparator><value1> AND <attribute2><comparator> <value2>. Objects that meet the conditions in all the filters are returned in the search results. In the previous example, objects that include <value1> and <value2> would be returned as search results.

Equals Only Search

Prohibits administrators from using search operators other than equals.

Display the number of results

Displays the number of matching search results. When this check box is selected, all searches return the message, "There are X number of results".

Add task button for <task name>

Adds a link to another task to the search screen. The link is displayed as a button. This field is typically used to add a Create task to a search screen that is configured for object-task navigation.

Optional label

Specifies a label for the task that you selected in the previous field. This label appears on the button for the task.

Add multi-delete button for <task name>

Adds a link to a task that allows administrators to select multiple objects to delete. The link is displayed as a button.
This field is typically with object-task navigation.

Search Fields and Search Results

On another part of the search screen, you select fields that an administrator can use in a search query and fields to display in search results.

Select the fields that a user can search on

Select the fields that an administrator can use to create a search query.

To add additional fields, select the fields in the list box below the search fields table.

After you select the fields, you can change the order in which they appear by using the up and down arrow icons to the right of the field.

Note: If you do not specify fields that an administrator can search on, CA Identity Manager starts the search automatically.

Select the fields that appear in the search results

Select the fields that Identity Manager displays in the search results. You can select fields that are not available in the search query.

To add additional fields, select the fields in the list box below the search fields table.

Style

When you select a field to display in the search results, you can select one of the following style options:

- **Boolean Display Name**

  Displays the name of the field for all results that are true. For example, if you enter Enabled as the name of the attribute that indicates a user’s account status, "Enabled" would appear in the search results for all active user accounts.

- **Checkmark**

  Displays the value as a selected check mark, based on the value of the attribute. For example, if you select the check mark style to represent the Enabled/Disabled state of user accounts, CA Identity Manager displays a selected check mark for all active accounts.

- **Multi-Value String**

  Displays the values in a multi-value attribute on separate lines. The values are listed alphabetically.

- **Read-Only Checkbox**

  Displays the value as a read only checkbox.

- **String**

  Displays the value as a text string.

- **Task**

  Adds a task list to a field. Users click an arrow icon to see a list of tasks that they can perform on the object associated with the search field. For example, if you add a task list to a Last Name field in the search results, users can click on the arrow icon in that field to see a list of tasks they can perform on the user they select.

  This setting can also be used to make an attribute value appear as a link to a task.

  If you select the Task style, a right arrow icon appears next to the Style column. Click the arrow to open a Field Properties dialog. Use this dialog to configure a task list.

- **Task List**

  Adds additional tasks that users can perform on objects in search and list screens. For example, you can configure the search screen in the Modify User task to enable users to perform a task, such as disabling a user, from the list of users returned by the search.

  When you select this option, you determine whether users access the task by clicking an icon, or a text link.

- **Task Menu**

  Adds additional tasks (similar to the Task List style) as pop-up menu items.

  When you select this option, an Action button appears next to each object in a search or list screen. Users click the Action button to see the list of tasks they can perform for that object.

Note: To see the Task List and Task Menu style options, select (Separator) when you add a field to the search results table. For more information about adding additional tasks to search and list screens, see the *User Console Design Guide*.

Sortable

Select this checkbox to allow administrators to sort search results by a field or fields.

Set the default sort order for the search results

Specifies the order in which search results are displayed. Search results are sorted initially by the first field in the list and then by each additional field in the order in which they appear. Select the Descending checkbox to sort the results in descending order.

Select objects with changes to field *field name*

Specifies that objects in which the specified field has changed are selected when the user clicks the Select button.

Return *N* results per page

Select the number of results to display per page. When search results exceed the number you specify, Identity Manager displays a link to each page of results.

User-Defined Help on Search Screens

If you want to add custom text to your search screen, you can define text in the corresponding HTML text box. You can add text in the following areas:

- Beginning or end of the page
- Before or after the create
- Before or after the results

Types of Search Screens

Identity Manager includes these pre-configured search screens.

Access Role Search Screen

The Access Role Search Screen lets you configure search filters to find access roles that match specific criteria.

Access Task Search Screen

The Access Task Search Screen lets you configure search filters to find access tasks that match specific criteria. This search screen is used to find an access task to view or modify, or to add a task to an access role.

Admin Role Search Screen

The Admin Role Search Screen lets you configure search filters to find admin roles that match specific criteria.

Admin Task Search Screen

The Admin Task Search Screen lets you configure search filters to find admin tasks that match specific criteria. This search screen is used to find an admin task to view or modify, or to add a task to an admin role.

Approval Search Screen

The Approval Search Screen lets you configure the display that appears at the top of an approval task.

Begin Certification User Search Screen

The Begin Certification User Search Screen lets you configure search filters to find users to set to require certification. Users selected will have their certification status set to *requiring certification*.

Certify User Search Screen

The Certify User Search Screen lets you configure the search filters to find users who require certification.

Delegation Search Screen

The Delegation Search Screen lets you configure search filters to find additional users to add as delegates. A delegate is another user that you can temporarily grant permission to view and resolve your workflow work items.

Enable/Disable User Search Screen

The Enable/Disable User Search Screen lets you configure search filters to enable/disable users who match specific criteria.

EndCertification User Search Screen

The EndCertification User Search Screen lets you configure search filters to identify users whose certification cycle should be completed.

End User License Agreement Search Screen

The End User License Agreement Search Screen lets you configure the Self Registration task with a page that is specific to your identity-based application.

Explore and Correlate Search

The Explore and Correlate Search Screen lets you configure search filters for explore and correlate definitions that match specific criteria.

Feeder File Upload Search

The Feeder File Upload Search Screen lets you browse for the feeder file to upload. A feeder file is used to automate repeated actions performed on large number of managed objects.

Forgotten Password Search Screen/Forgotten User ID Search Screen

The Forgotten Password Search Screen lets you configure the Forgotten Password task to prompt users for information that verifies their identity.

Group Search Screen

The Group Search Screen lets you configure search filters for groups, such as groups within the finance organization.

Identity Policy Set Search Screen

The Identity Policy Set Search Screen lets you configure search filters to find identity policy sets that match specific criteria.

Logical Attribute Handler Search Screen

The Logical Attribute Handler Search Screen lets you configure search filters to find logical attribute handlers. This search screen is used to find a logical attribute handler to view or modify its configuration.

Manage Reports Search Screen

The Manage Reports Search Screen lets you configure search filters to find a report to view or delete.

NonCertified User Search Screen

The NonCertified User Search Screen lets you configure search filters to find users who were not certified by the end of the certification period.

Organization Search Screen

The Organization search screen lets you configure search filters to limit the choice of organizations to certain sub-organizations.

Provisioning Role Search Screen

The Provisioning Role Search Screen lets you configure the search filters for retrieving provisioning roles.

Account Template Search Screen

The Account Template Search Screen lets you configure the search filters for retrieving account templates.

Password Policy Search Screen

The Password Policy Search Screen lets you configure the search filters to find password policies that match specific criteria.

Snapshot Definition Search Screen

The Snapshot Definition Search Screen lets you configure the search filters to find a snapshot definition to view, modify, or delete.

Standard Search Screen

The Standard Search Screen lets you configure filters to find custom managed objects.

User Search Screen

The User search screen lets you configure search filters to find users that match specific criteria. For example, you can search for users who are contractors.

Once you complete the Search tab, Choose Tabs for the Task.

Choose Tabs for the Task

On the Tabs tab, name and configure the tabs; each one is a set of fields that you include in the task. You can include default tabs or create new ones. For example, the Modify User task includes the following tabs:

- Profile
- Access Roles

- Admin Roles
- Groups
- Delegate Work Items

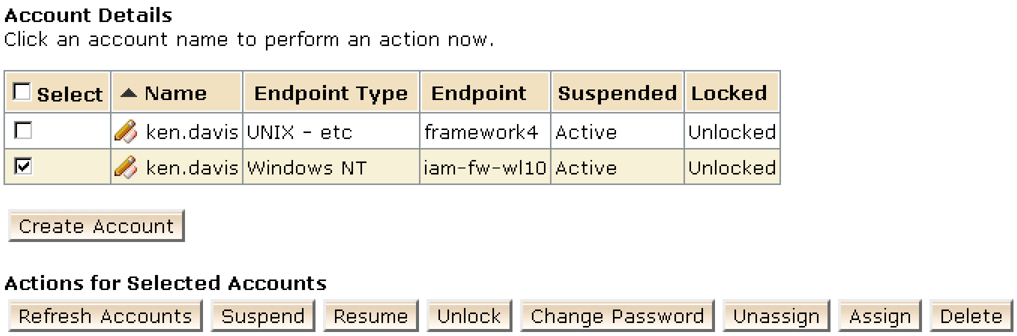
To edit the definition of a tab, click the edit icon (✎) next to the tab name.

More information:

Account Tabs (see page 62)
Schedule Tab (see page 64)

Account Tabs

The Accounts tab lists accounts in managed endpoints for users who have been assigned provisioning roles. Typically, this tab is added to tasks that allow you to view or modify a user.



Account Details
Click an account name to perform an action now.

□ Select	▲ Name	Endpoint Type	Endpoint	Suspended	Locked
□	✎ ken.davis	UNIX - etc	framework4	Active	Unlocked
☑	✎ ken.davis	Windows NT	iam-fw-wl10	Active	Unlocked

Actions for Selected Accounts

When the Accounts tab is added to a Modify User task, administrators can perform other actions on the user's accounts. For example:

- Suspend or resume an account
- Unlock an account that has been automatically locked because of incorrect or inappropriate access. For example, an account may be locked when a user exceeds the acceptable number of failed login attempts set in an Identity Manager password policy.
- Change the user's password in one or more accounts.
- Assign and unassign accounts to a user.

For details on the other options you can provide on the Accounts tab, see the user console help for the Configure Accounts tab.

Prerequisite for Using the Accounts Tab

To use the Accounts tab, Identity Manager must be configured with provisioning support, and the Identity Manager environment must include a provisioning directory.

Note: To configure provisioning support for an environment, see the *Configuration Guide*.

Fields on the Accounts Tab

The Accounts tab displays details about the accounts the user has on endpoint systems.

The following are some of the more significant fields:

- Name—The login name, email name, or other name for the account.
- Endpoint Type—The type of endpoint, such as an LDAP directory, that is associated with the account.
- Endpoint—The specific endpoint that is associated with account.
- Suspended—One of three states.
  - Active appears if the account is enabled.
  - Suspended appears if the account is disabled.
  - Activation Pending (Manual) appears if it cannot be resumed or suspended. Log into the endpoint system to resume or suspend the account.
  - Unavailable appears if the state cannot be retrieved because of no communication with the endpoint.
- Locked—Shows if the account is locked. Locking occurs when a user makes several attempts to log into the account with the wrong password. Unavailable appears if the state cannot be retrieved because of no communication with the endpoint.

Additional Functions on the Accounts Tab

When the Accounts tab is included in a task that modifies a user, administrators can use that task to perform functions on the user's accounts. The available functions are determined by the tab configuration.

You can select which functions are available by using the Modify Admin Task on a tasks containing the Accounts tab. You edit the Accounts tab to determine if functions such as Assign Account and Unassign Account are available in the tab.

Note: See the online help for the Configure Accounts tab for more information.

Schedule Tab

Scheduling lets you automate the execution of a task at a later date. If you schedule a task that is associated with a workflow, CA Identity Manager executes all the tasks as defined in that workflow.The status of the scheduled tasks can be viewed in the View Submitted Tasks page.

A scheduled task that is not yet executed by CA Identity Manager can be cancelled through the View Submitted Tasks page.

Note: If a scheduled task is cancelled, and you resubmit that task, the task executes immediately, regardless of the scheduled time for execution.

CA Identity Manager provides the scheduler as a special tab. To access the scheduler, you must configure a task with the Schedule tab.

Add the Schedule Tab to an Admin Task

CA Identity Manager lets you schedule your tasks for execution at a specific date and time. To schedule a task, you must add the Schedule tab to an admin task.

Note: You cannot add a Schedule tab to all the admin tasks in CA Identity Manager. If the task cannot be scheduled, the schedule tab will not be available in the Modify Admin Task screen.

To add the Schedule tab to an admin task

1. Click Roles and Tasks, Admin Tasks, Modify Admin Task.

   The Select Admin Task page appears.

2. Select Name or Category in the where field, then enter the string you want to search on and click Search.

   Identity Manager displays the admin tasks that satisfy the search criteria.

3. Choose an admin task, and click Select.

   Identity Manager displays the task details for the selected admin task.

4. Click Tabs.

   The tabs that are configured for the selected admin task are displayed.

5. Select Schedule from the Which tabs should appear in this task drop down, and click ⊕.

   The Schedule tab is added to the list of tabs that will appear in the selected admin task.

6. Click Submit.

   The Schedule tab is added to the selected admin task.

View Fields in the Task

On the Fields tab, you view the fields that apply to this task. These fields are those created on the tabs for this task. To change the fields used, return to the Tabs tab and select the tab that requires the change.

Once you complete this tab, proceed to the next step, Assign Workflow Processes for Events (see page 65).

However, if this Identity Manager environment does not use workflow, you can now click Submit. A message appears indicating if the task succeeded. If it succeeds, you can add the task to a role, so that role members can start using the task.

View Role Use

On the Role Use tab, you view the roles that include the task that you are viewing or modifying.

Role owners can add and remove tasks from roles.

Note: Default Admin Roles provides a list of tasks in the admin roles that are installed with CA Identity Manager by default.

Assign Workflow Processes for Events

If you enabled workflow for this Identity Manager environment, use the Events tab to select a workflow process for each event that the task initiates. The workflow process that you select overrides the one selected by default in the Identity Manager Management Console.

For more detail on default workflow mappings, see the Advanced Settings chapter of the *Configuration Guide*.

To complete the creation of this task, click Submit. A message appears indicating if the task succeeded. If it succeeds, you can add the task to a role, so that role members can start using the task.

Active Directory Prerequisites

If Active Directory is the user store, before creating admin tasks, you may need to configure certain Active Directory features.

The sAMAccountName Attribute

The sAMAccountName attribute applies to users and groups. This attribute is required, and must be included on task screens used to create users and groups.

Note: When creating users, the value of the sAMAccountName attribute cannot exceed 20 characters. This restriction does not apply to groups.

You can write a custom logical attribute handler that generates a unique sAMAccountName automatically when a user or group is created. In this case, you can include the sAMAccountName attribute as a hidden field on Create User and Create Group screens.

See the Logical Attributes chapter in the *Programming Guide for Java* for more information.

Group Type and Scope

In Active Directory, there are two types of groups:

- Security--Listed in Access Control Lists (ACLs), which define permissions for resources and objects.
- Distribution--Used to group objects, such as users and groups. Distribution groups cannot be used to grant privileges in Active Directory.

Each type of group has a scope that determines the following:

- Member location--Where potential members can reside
- Permissions--Where the group can be used for access privileges (if the group is a security group)
- Group Membership in Other Groups--The location of groups to which the group can belong

Each type of group can have one of the following scopes:

Scope	Member Location	Permissions	Group Membership in Other Groups
Universal	Group members can be Universal groups, Global groups, and users from any domain in the forest.	Can be used to grant access in any domain in a forest.	Can be members of Domain Local and Universal groups in any domain in the forest.

Scope	Member Location	Permissions	Group Membership in Other Groups
Global	Group members can be Global groups and users located in the same domain as the group.	Can be used to grant access in any domain in a forest.	Can be members of Global, Domain Local, and Universal groups in any domain in the forest.
Domain Local	Group members can be Universal groups, Global groups, and users from any domain in the forest. Members can also be Domain Local groups from the same domain.	Can only be used to grant access to the domain where the group resides.	Can only be a member of other Domain Local groups within the domain.

Group type and scope are not required attributes; however, if you do not specify group type and scope, Active Directory creates a security group with global scope.

To create groups of a different type, you can create a custom logical attribute handler. See the chapter on Logical Attributes in the *Programming Guide for Java*.

Once you have configured these Active Directory features, proceed to the next step: Create an Admin Task.

External Tasks for Application Functions

An external task does the following:

- Allows an administrator to perform a function in an application other than CA Identity Manager from the User Console
- Optionally passes information to the application to generate user-, group-, or organization-specific tasks.

For example, an external task may pass information about an organization to an application that generates purchase orders. The administrator performing the task can view open purchase orders for the organization from the User Console.

You can view external tasks by opening the application in a new browser window, or by viewing them as tabs in an Identity Manager admin task.

Two tabs are available for External tasks. These tabs are configured in the same way; however, they function differently.

- The External tab is a visual tab, which means that the task displays the contents of the URL within a tab.
- External URL is a non-visual tab, which means that the task redirects to the URL entered.

The External Tab

An external tab can be added to any Create, View, or Modify task to make it an external task. For example, if you add an External tab to a Create User task, the tab appears on that task.

For an External tab:

- No events are generated for an external task.
- You can optionally use managed objects.
- In the External URL field, you can specify the address of the application as:
  - A complete address, including the fully qualified domain name--for example:

    http://server1.mycompany.org/report/viewUserReport
  - A relative path--for example:

    /report/viewUserReport

    If you specify the relative path, Identity Manager automatically appends the fully qualified domain name of the server where Identity Manager is installed.
- You configure the attributes to pass to the application on the Profile tab.

The External URL Tab

You can add an external URL tab to a view task, such as View User. When you use the View User task, you are redirected to the web site identified by the URL. No other tabs are visible.

For an External URL tab:

- The external URL tab must be the only tab in the task. If there are other tabs associated with the same task, the external tab will not redirect users to the specified URL.
- The task can generate events which can be audited.

- In the External URL field, you can specify the address of the application as:
  - A complete address, including the fully qualified domain name--for example:

    http://server1.mycompany.org/report/viewUserReport
  - A relative path--for example:

    /report/viewUserReport

    If you specify the relative path, Identity Manager automatically appends the fully qualified domain name of the server where Identity Manager is installed.
- You can optionally use managed objects.
- You can configure attributes to pass to the URL.

  Supply a URL for the application that you want to start and include the attributes that you want to pass to the application.

Advanced Task Components

Advanced task components allow you to specify custom processing for a task:

- Task-Level Validation validates an attribute value against other attributes in the task. For example, you might validate that the area code in a user-supplied phone number is appropriate for the user's city and state.
- Business Logic Task Handlers (see page 69) perform custom business logic before an Identity Manager task is submitted for processing. Typically, the custom business logic validates data. For example, a business logic task handler may check a group's membership limit before Identity Manager adds a new member to the group. If the group membership limit is reached, the business logic task handler displays a message informing the group administrator that the new member could not be added.

Create Business Logic Task Handlers

You define a business logic task handler's fully qualified class name as follows:

1. Create or modify an admin task.
2. On the Admin Profile tab, click Business Logic Task Handlers.

   The Business Logic Task Handlers screen appears. This screen lists any existing business logic task handlers assigned to the task. Identity Manager executes the handlers in the order in which they appear in the list.
3. Click Add.

   The Business Logic Task Handler Detail screen appears.

Use the Business Logic Task Handler Detail screen to define the following information for the business logic task handler you are assigning to the task:

Name

The name you are assigning to the business logic task handler.

Description

An optional description of the business logic task handler.

Java Class

If the business logic task handler is implemented in Java, the fully qualified business logic task handler class name--for example:

com.mycompany.MyJavaBLTH

Identity Manager expects the class file to be located in the root directory designated for custom Java class files. For information on deploying Java class files, see the *Programming Guide for Java*.

JavaScript Filename

If the business logic task handler is implemented in JavaScript, and the JavaScript code is contained in a file, specify the file name in this field. For example, you might want to put the JavaScript in a file if the business logic task handler is to be used by several task screens.

Identity Manager expects the file to be located in the root directory designated for custom JavaScript files. For information on deploying JavaScript files, see the *Programming Guide for Java*.

If you store the file in a subdirectory of the root, include the subdirectory name when you specify the JavaScript file name--for example:

JavaScriptSubDir\MyJavaScriptBLTH.js

The slashes must be appropriate for the platform where the JavaScript file is deployed.

JavaScript

You can implement a JavaScript business logic task handler by typing the complete JavaScript code in this field instead of in a file. For example, you might want to put the JavaScript in this field if the script is very short or if it is to be used with no other task screens.

Property and Value

With Java implementations, these fields are optional name/value pairs of data that are passed into the init() method of the Java business logic task handler, to be used in any way that the handler's business logic requires.

To add a user-defined property, specify a property name and value, and then click Add.

Note: If you add a Java business logic task handler, you restart the application server for the handler to be loaded.

Admin Tasks and Events

Admin tasks include *events*, actions that CA Identity Manager performs to complete the task. A task may include multiple events. For example, the Create User task may include events that create the user's profile, add the user to a group, and assign roles.

Identity Manager audits events, enforces customer-specific business rules associated with events, and, when events are mapped to workflow processes, requires approval for events.

If multiple events are generated for a task, and the events are mapped to workflow processes, all the workflow processes must be completed before Identity Manager can complete the task.

Primary and Secondary Events

Generally, events are independent of other events. However, some tasks are associated with a primary event and one or more secondary events:

- A failure of a primary event results in the automatic rejection of all of its secondary events. For example, if a CreateUserEvent fails, there is no need for the AddToGroupEvent to occur for the user. It also results in the cancellation of the associated task.
- A failure of a secondary event does not affect the success or failure of any other events executed for the task or the execution of the task itself. For example, in a Create User task, an AddToGroupEvent may be rejected, meaning that the new user cannot be added to a particular group. The user can still be created (CreateUserEvent) and assigned to provisioning roles (AssignProvisioningRoleEvent), and even be added to other groups.

View the Events for a Task

You can view the events that are associated with a task in the Identity Manager User Console.

To view the events for a task

1. Select Roles and Tasks, View Admin Tasks in the User Console.
2. Search for and select the appropriate task.
3. Select the Events tab.

   CA Identity Manager displays the events that are associated with the current task.

Events Generated for Unmodified Profiles

User, group, and organization objects each contain a set of physical attributes that are stored in the user directory. If a physical attribute of one of these objects is changed on a profile tab, Identity Manager generates a Modify... event after the user submits the task. For example, if a *Title* attribute is changed on a User Profile tab, Identity Manager generates the event ModifyUserEvent.

If a user, group, or organization object is represented on a profile tab, but no physical attributes have been changed when the user clicks Submit, Identity Manager does not generate a Modify... event. Instead, the corresponding View... event is generated, as follows:

- ViewUserEvent is generated instead of ModifyUserEvent
- ViewGroupEvent is generated instead of ModifyGroupEvent
- ViewOrganizationEvent is generated instead of ModifyOrganizationEvent

Admin Task Processing

The time it takes to process a task depends on the steps involved. When a task is submitted for processing, Identity Manager performs the following steps:

1. Identity Manager validates the data being submitted.

   This is called the *synchronous phase*.

2. If the task requires approval, Identity Manager sends the task to the workflow engine.

   a. The workflow engine determines approvers, and places the approval task in the approvers' work lists.

   b. Optionally, Identity Manager sends email notifying approvers of the pending work item.

   c. An approver reserves the work item (which removes the item from the work lists of other approvers), and approves or rejects the item.

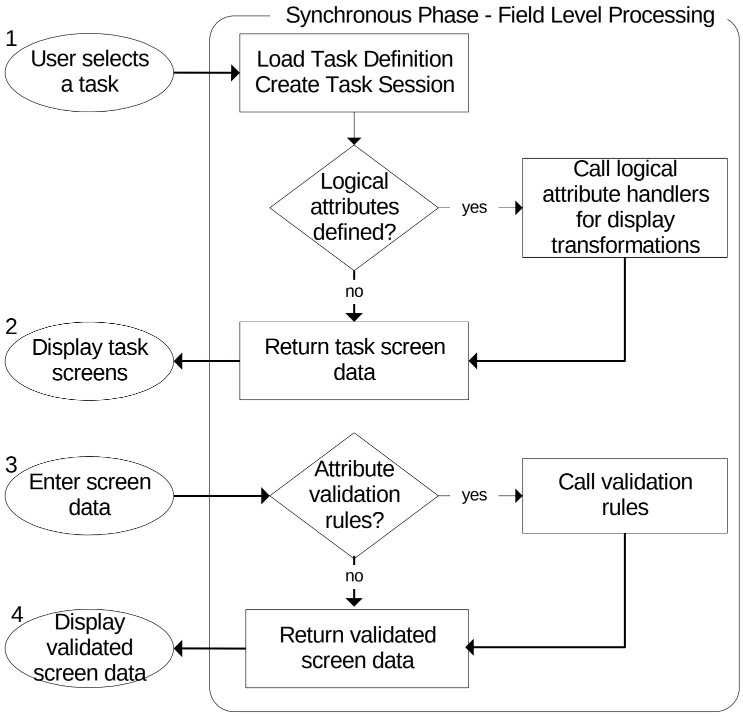
   d. Optionally, Identity Manager sends email notifying involved users of the task's status.

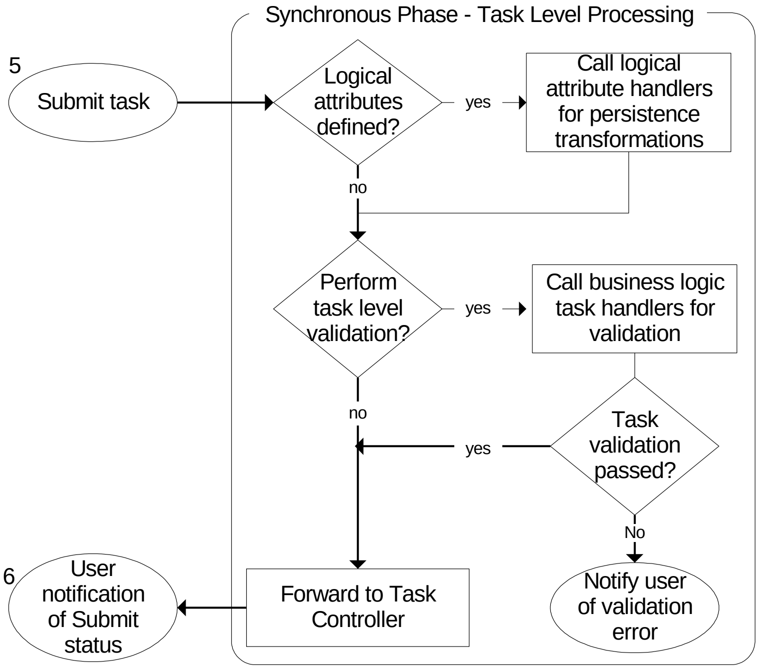
   This is called the *asynchronous phase*.

3. Identity Manager carries out the task, if the task was not rejected.

Synchronous Phase Processing

During the synchronous phase, Identity Manager can transform and validate data that users enter in task screens, and can enforce business logic on that data before the task is submitted for processing. The following diagram provides a high level description of what occurs during this phase.

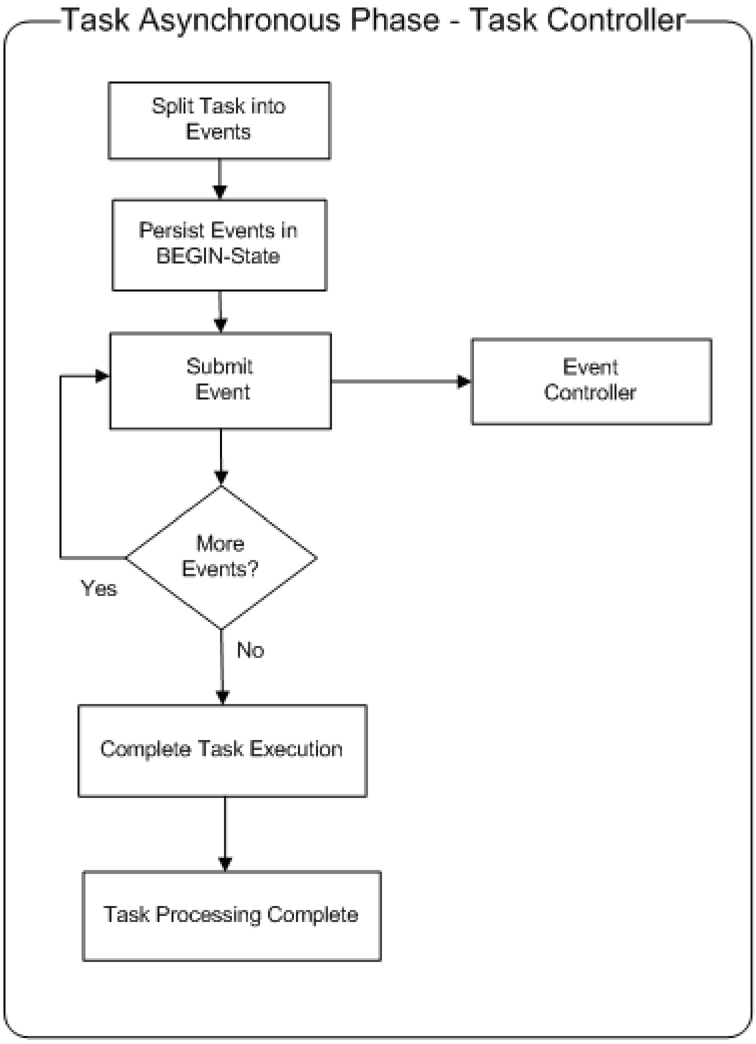

Synchronous Phase - Field Level Processing
1
User selects a task
Load Task Definition Create Task Session
Logical attributes defined?
yes
Call logical attribute handlers for display transformations
no
2
Display task screens
Return task screen data
3
Enter screen data
Attribute validation rules?
yes
Call validation rules
no
4
Display validated screen data
Return validated screen data


Synchronous Phase - Task Level Processing
5
Submit task
Logical attributes defined?
yes
Call logical attribute handlers for persistence transformations
no
Perform task level validation?
yes
Call business logic task handlers for validation
no
yes
Task validation passed?
No
6
User notification of Submit status
Forward to Task Controller
Notify user of validation error

Asynchronous Phase Processing

Upon completion of the synchronous phase, the task enters the asynchronous phase for execution. During this phase, a task generates one or more events. These events may be user-defined, such as creating a user profile or adding a user to a group, or system-generated, such as writing information to the audit log.

The task controller, a component of the Identity Manager Server, is responsible for the life cycle of a task and its events, as shown in the following illustration:



For most events, the life cycle, execution, and actions are independent from any other event. (Create tasks require the primary object's create event to execute before any secondary events.)

Typically, an event transitions through the following states:

- Begin
- Pending
- Approved
- Execute
- Completed
- Post

Note: Identity Manager provides hooks, called EventListeners, that "listen for" a specific event or a group of events. When the event occurs, the event listener performs custom business logic that is appropriate for the event and the current event state. You can use the Event Listener API to write custom event listeners. See the *Programming Guide for Java* for more information.

Chapter 4: Self-Service Tasks

This section contains the following topics:

CA Identity Manager Self-Service Tasks

Self-service tasks are CA Identity Manager tasks that users can use to manage their own profiles. These tasks are divided into two types:

- Public tasks--Tasks that users can access without providing login credentials. Examples of public tasks are self-registration, forgotten password, and forgotten user ID tasks.
- Protected tasks--Tasks for which users provide valid credentials. Examples include tasks for changing passwords or profile information. To gain access to these tasks, users must be given a role, such as the Self Manager role.

The following table lists the default self-service tasks, which are available when CA Identity Manager is installed.

Task Type	Tasks
Public Task	■ Self-registration--Allows users to register at a corporate Web site ■ Forgotten Password Reset--Allows users to reset a forgotten password ■ Forgotten Password--Displays a temporary password that users can use to login to CA Identity Manager. When the users log in, they are prompted to enter a new password ■ Forgotten User ID--Retrieves or resets a forgotten user ID

Task Type	Tasks
Protected Task	■ Change My Password--Allows users to reset their password ■ Modify My Profile--Maintains profile information, such as address and phone number ■ Modify My Groups--Enables users to subscribe to groups ■ View My Roles--Displays a user’s roles ■ View My Submitted Tasks--Displays CA Identity Manager tasks that the user initiated

Restrict Access to the Self Manager Role

By default, the Self Manager role, which allows users to manage their profile information and view their roles and submitted tasks, is assigned to all users.

To give the Self Manager role to a subset of users, delete the existing member policy and create a new policy as described in Define Member Policies for an Admin Role.

Access Self Service Tasks

Once you have configured the self service tasks for your Identity Manager environment, you can add URLs for these tasks to a corporate website.

URLs for self service tasks have the following format:

http://*domain*/iam/im/*alias*/index.jsp?task.tag=*task_tag*

where:

- *domain* is the fully qualified domain name of the system where CA Identity Manager is running
- *alias* is the public alias of the Identity Manager environment
- *task_tag* is the unique identifier for the task.

  For the default Forgotten Password Reset task, the task tag is ForgottenPasswordReset.

  http://*domain*/iam/im/*alias*/imcss/index.jsp?task.tag=ForgottenPasswordReset

  For the default Forgotten User ID task, the task tag is ForgottenUserID:

  http://*domain*/iam/im/*alias*/imcss/index.jsp?task.tag=ForgottenUserID

Embed a Self-Service Link in a Corporate Web Site

To allow access to a public self-service task from a corporate website, you can add a link to any web page. When a user clicks the link, an Identity Manager task screen opens. When the user completes the task, they are redirected to the User Console by default.

To change the page to which users are redirected, you can append the task.RedirectURL tag to the Identity Manager URL associated with the link as follows:

<A
href="http://*domain*/iam/im/*public_alias*/ca12/index.jsp?task.tag=*tasktag*&amp;task.RedirectURL=http://*domain*/*redirect_URL*">*link text*</A>

domain

The fully qualified domain name of the system where CA Identity Manager is installed.

public_alias

A unique string that is added to the URL for access to public Identity Manager tasks.

Public tasks are self-service tasks, such as self-registration or forgotten password tasks. Users do not need to log in to access public tasks.

Note: For more information about public tasks and aliases, see the *Configuration Guide*.

tasktag

The unique identifier for the task. To determine the task tag, use Modify Admin Task to view the profile for the task.

redirect_URL

The URL to which users are directed after they submit the Identity Manager task.

For example, you may redirect users to a Welcome page after they self-register.

link text

The text that users click to access the target URL.

For example, a company may add a link that allows users to reset a forgotten password and then directs them to a welcome page.

The link may resemble the following:

```
 <A href="http://myserver.mycompany.org/iam/im/Employees/ca12/
index.jsp?task.tag=
ForgottenPasswordReset&amp;task.RedirectURL=http://myserver.mycompany.org/
welcome.html">Reset My Password</A>
```

To return users to the page where they accessed the self-service task, specify RefererURL as the value of the task.RedirectURL tag as follows:

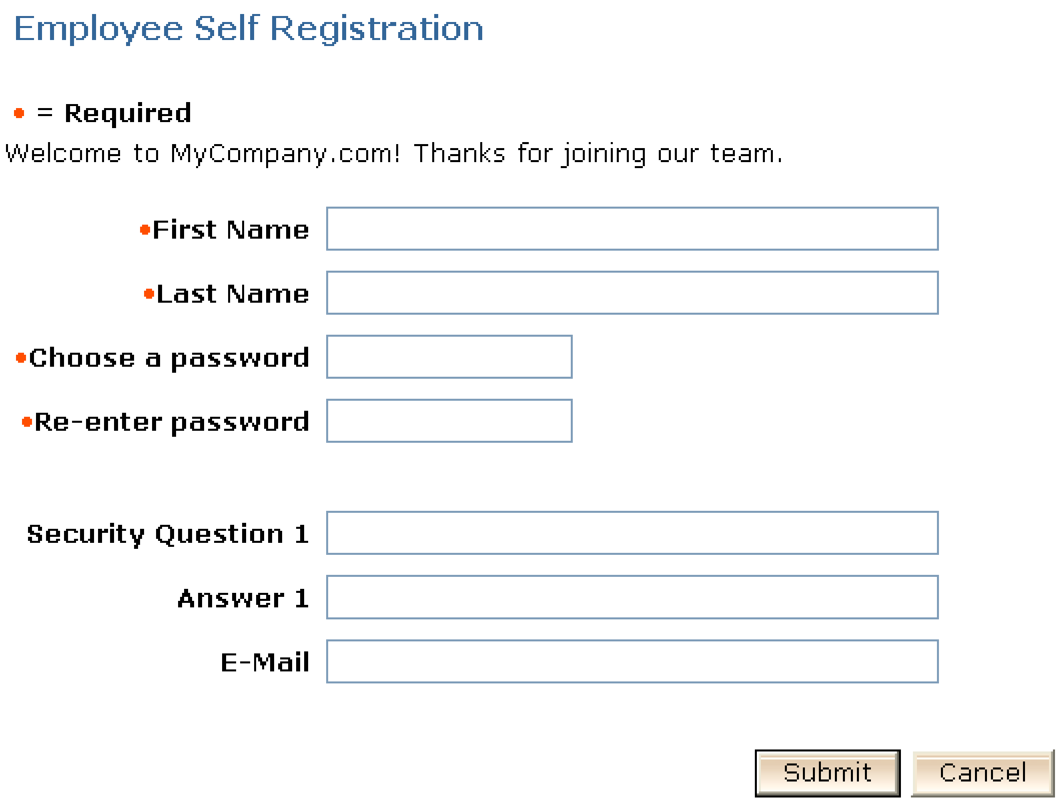
```
<A
href="http://domain/iam/im/public_alias/ca12/index.jsp?task.tag=tasktag&amp;task.R
edirectURL=RefererURL</A>
```

Configure Multiple Self-Service Tasks

You can create multiple self-service tasks for different types of users. For example, you can create one task to register new employees, and another task to register customers. By using different self-registration tasks, you can:

- Collect different information
- Register users in different organizations
- Redirect users to different logout pages after they register
- Use different branding

The following figures show the self-registration task for new employees and customers, respectively.

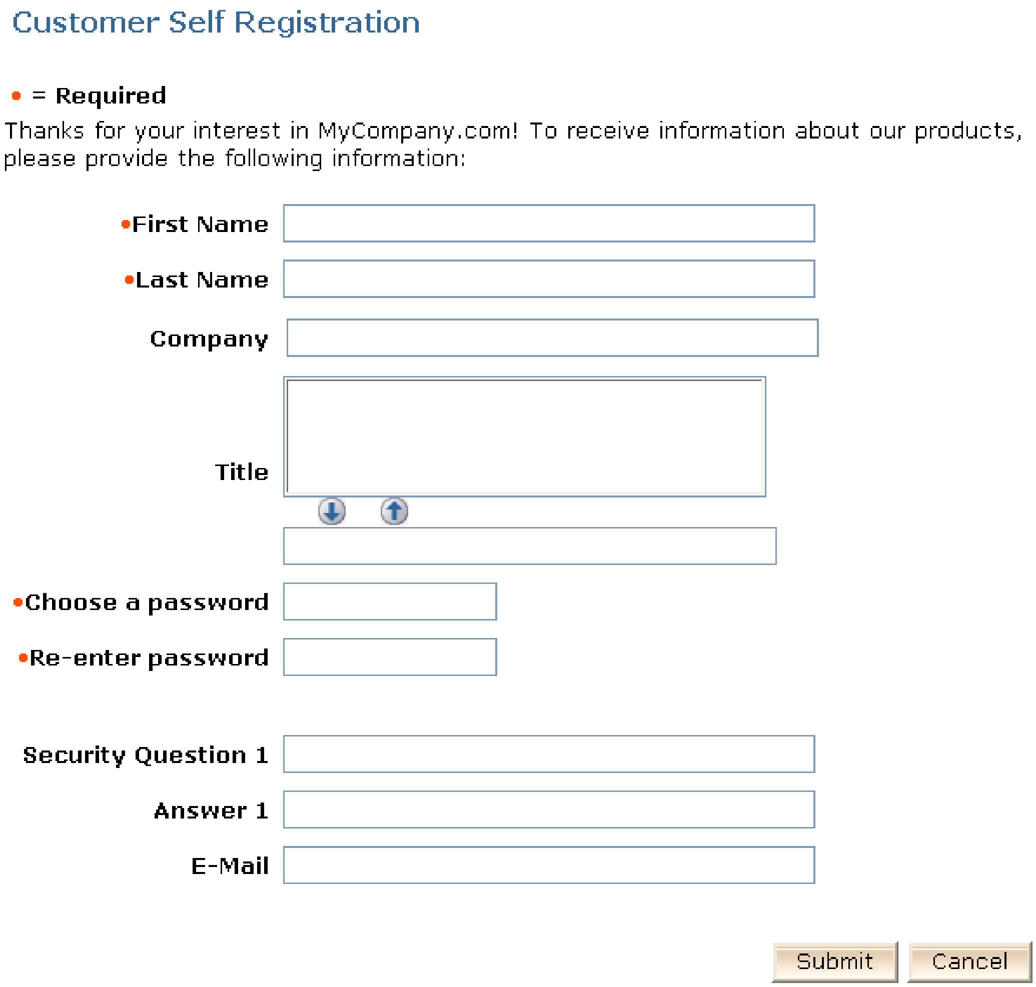


Employee Self Registration

• = Required

Welcome to MyCompany.com! Thanks for joining our team.

•First Name	
•Last Name	
•Choose a password	
•Re-enter password	
Security Question 1	
Answer 1	
E-Mail	



Customer Self Registration

• = Required

Thanks for your interest in MyCompany.com! To receive information about our products, please provide the following information:

•First Name	
•Last Name	
Company	
Title	
•Choose a password	
•Re-enter password	
Security Question 1	
Answer 1	
E-Mail	

To configure multiple self-service tasks of the same type, specify a unique tag when you create the task. The Tag field is located on the Configure Profile screen for the task.

When you add the link for accessing the task to a website, you append the task tag, creating a unique URL.

For example, you might create two tasks as follows:

Task	Tag	URL
Register as a new employee	selfregistration_employee	http://*domain*/iam/im/*alias*/index.jsp?task.tag=SelfRegistration_employee

Task	**Tag**	**URL**
Register as a customer	selfregistration_customer	http://*domain*/iam/im/*alias*/index.jsp?task.tag=SelfRegistration_customer

Chapter 5: Users

This section contains the following topics:

Create a User

Use this procedure to create a user profile. Depending on how the Create User task is configured in your Identity Manager environment, you may also use this task to add a user to a group, or make the user a member of an admin or provisioning role.

To create a user

1. Log into the User Console as a user with user management privileges.

   The default User Manager role gives users the appropriate privileges.

2. Select Users, Manage Users, Create User.

   The Create User task opens.

3. Complete the fields on the Profile tab, as needed.

4. Complete the fields on the other tabs in the task, if applicable.

5. Click Submit.

   CA Identity Manager creates the user.

Manage a User

You can use the Manage User task to search for a user to manage. Once you select the user, CA Identity Manager displays the list of tasks that you can use to manage that user.

For example, to modify a user using this method, you select the User category, then select the Manage User task. You search for and select the user that you want to manage. In the search results, you click an icon to see a list of tasks that you can use to manage the selected user. From that list, you can select Modify User or any other appropriate task.

To manage a user

1. Select Users, Manage Users, Manage Users.

   A search screen that enables you to search for a user opens.

2. Enter search criteria and click Search.

   CA Identity Manager displays a list of users who match the criteria in the search filter.

3. Click the right arrow icon next to the user to manage.

   CA Identity Manager displays a list of tasks that you can perform on that user.

4. Select the task that you want to use.

5. Complete the task and click Submit.

Modify a User

Use the Modify User task to make changes to a user's profile information, or, depending on how the Modify User task is configured in your environment, to manage the user's group and role membership.

To modify a user

1. Log into the User Console as a user with user management privileges.

   The default User Manager role gives users the appropriate privileges.

2. Select Users, Manage Users, Modify User.

   The Modify User task opens.

3. Change fields on the Profile tab, as needed.

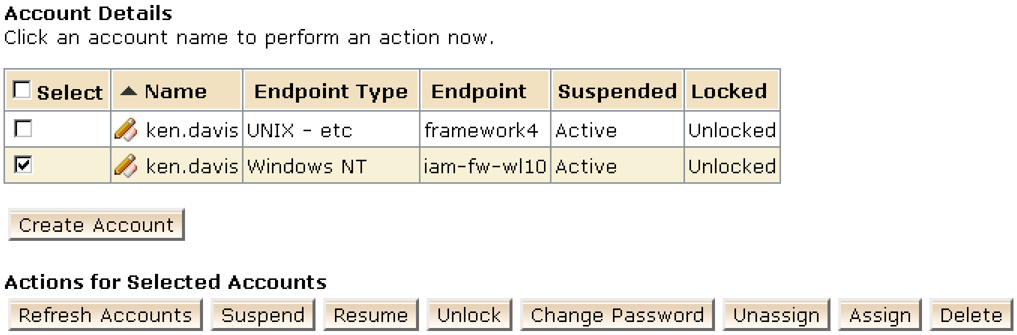
4. Change the fields on the other tabs in the task, if applicable.

5. Click Submit.

   CA Identity Manager modifies the user profile.

View or Modify Endpoint Accounts

Tasks that allow you to view a user's profile, such as View User or Modify My Profile, include an Accounts tab that lists that user's accounts on endpoints.



Account Details

Click an account name to perform an action now.

□ Select	▲ Name	Endpoint Type	Endpoint	Suspended	Locked
□	ken.davis	UNIX - etc	framework4	Active	Unlocked
☑	ken.davis	Windows NT	iam-fw-wl10	Active	Unlocked

For each account, Identity Manager displays information such as the account name, the endpoint where the account exists, and the status of the account. For a modify task, additional options are available for changing a user's password and locking or suspending an account.

In this example, the Accounts tab includes a Search button, which means the tab is configured with a search screen. You can configure this tab to use a list screen, a search screen, or both.

- When both the screens are configured, the search screen determines the fields in the search results.
- If only a list screen is configured, it determines the fields in the search results.
- If neither screen is configured, the accounts tab uses a static list display, which means that the Accounts tab cannot be customized for display columns.

For details on the other options you can provide on the Account tab, see the User Console help for the Configure Accounts tab.

Assign Roles to a User

You can assign a role to a user using one of the following methods:

- Use the Modify Role Members/Administrators task to add or remove multiple users from a role.
- Use the Admin Roles, Provisioning Roles, or Access Roles tab on the Modify User task to assign additional admin, provisioning, or access roles to a single user.
- Modify the member policy on the Members tab for the role.

  Modifying the member policy changes the criteria that Identity Manager uses to automatically assign the role to users. For example, a member policy may state that all users who have the title Manager have the User Manager role.

  Note: For more information on member policies, see Member, Admin, and Owner Rules (see page 21).

Assign Roles with the Modify Role Members/Administrators Task

The Modify Role Members/Administrators task allows you to add and remove users as members or administrators of a role.

This task lets you add or remove multiple users at the same time.

To modify role members or administrators

1. Log into the User Console as a user with role administrator privileges.
2. Select Roles and Tasks, Admin Tasks, Modify Admin Members/Administrators.

   Identity Manager displays the list of roles that you can manage. For a role to appear in the list, you must be an administrator of the role, and the role must have the following options selected, as needed:

   Administrators can add and remove members of this role

   Administrators can add and remove administrators of this role
3. Select the Membership or Administrators tab, depending on whether you want to modify the role's members or administrators.

   Identity Manager displays a list of existing members or administrators.
4. To remove a member or administrator from the role, clear the check box next to the user's name. Then, click Submit.

5. To add a new user, complete the following:

   a. Click the Add a User button.

      Identity Manager opens a user search screen.

   b. Search for and select the user or users to add as members or administrators.

      Identity Manager adds the selected users to the list of members or administrators.

6. Click Submit.

Assign Roles with the Modify User Task

Use the Admin Roles, Provisioning Roles, or Access Roles tab of the Modify User task to assign additional admin, provisioning, or access roles to a single user.

Note: You can also use these tabs in the Create User task.

To modify a user

1. Log into the User Console as a user with user management privileges.

   The default User Manager role gives users the appropriate privileges.

2. Select Users, Manage Users, Modify User.

   The Modify User task opens.

3. Select one of the following tabs, as needed:

   - Admin Roles
   - Provisioning Roles
   - Access Roles

   CA Identity Manager displays the selected tab.

4. Click on of the following buttons:

   - Add a *role-type* role

     role-type represents admin, provisioning or access roles.

     When you click this button, CA Identity Manager opens a search screen where you can search for and select roles to add. CA Identity Manager displays the list of roles that you can manage. For a role to appear in the list, you must be an administrator of the role, and the role must have one or more of the following options selected, as needed:

     Administrators can add and remove members of this role

     Administrators can add and remove administrators of this role

   - Copy from a user

     When you select this button, CA Identity Manager opens a search screen where you can search for and select a user that has the roles the current user needs.

5. Click Submit.

   CA Identity Manager adds the user as a member or administrator of the specified roles.

Chapter 6: Password Management

This section contains the following topics:

Password Management in CA Identity Manager

CA Identity Manager includes several features for managing user passwords:

- Password Policies--These policies manage user passwords by enforcing rules and restrictions governing password expiration, composition, and usage.
- Password Managers--Administrators who have the Password Manager role can reset a password when a user calls the Help desk.
- Self-service password management--CA Identity Manager includes several self-service tasks that allow users to manage their own passwords. These tasks include:
  - Self Registration--Users specify a password when they register at a corporate Web site.
  - Change My Password--Users can modify their passwords without help from IT or helpdesk personnel
  - Forgotten Password--Users can reset or retrieve a forgotten password after CA Identity Manager verifies their identity.
  - Reset Password or Unlock Account (see page 108)--Users can reset or retrieve a forgotten password or unlock a windows account on a system where they access Identity Manager.
  - Forgotten User ID--Users can retrieve a forgotten user ID after CA Identity Manager verifies their identity.
- Password synchronization on endpoint accounts--Password changes are synchronized in CA Identity Manager, the Provisioning Server, and its target systems. New passwords are verified against Identity Manager password policies.

Password Policies

A password policy is a set of rules and restrictions that determines how passwords are created and when they expire.

In a password policy, you can configure the following settings:

- Password composition—Specify the content requirements for new passwords. For example, you can configure settings that require users to create passwords which are at least eight characters long and contain a number and a letter.
- Regular expressions—Provide an expression that determines the format of a valid password. You can specify whether passwords must match or must not match that format.
- Advanced password options—Specify actions that CA Identity Manager should take, such as making passwords lower case, before processing a password. You can also specify the priority of a password policy, if multiple password policies apply.

Note: You configure a password policy in an Identity Manager environment; however, the policy applies to the user store associated with the environment. If a user directory is associated with multiple environments, a password policy defined in one environment may apply in other environments, as well.

When CA Identity Manager integrates with SiteMinder, you can configure additional rules and restrictions for password management:

- Password expiration—Define events, such as a number of days elapsing or a number of failed login attempts, that cause a password to expire. When a password expires, the user account is disabled.
- Password restrictions—Set limits on password reuse. For example, users must wait 90 days before reusing a password.

SiteMinder users can also configure password policies in the SiteMinder Administrative user interface. These policies appear in the Identity Manager User Console.

Note: When CA Identity Manager integrates with SiteMinder, *all* password policies, including policies that contain password composition rules, regular expressions, and advanced password options, are enforced by SiteMinder. In some cases, SiteMinder may enforce policies differently than CA Identity Manager. See the *CA SiteMinder Policy Server Configuration Guide* for information about SiteMinder Password Policies.

Create a Password Policy

To create a password policy

1. In the User Console, choose Policies, Manage Password Policies, Create Password Policy.
2. Enter a unique name and an optional description for the password policy.
3. Select the Enabled checkbox to use the password policy in an Identity Manager environment.
4. Select the task to which users are redirected if they are forced to reset their passwords. (Users may be forced to reset a password if their password expires or a change occurs in a password policy.)

   By default, Identity Manager redirects users to the Change My Password task.

   The task you specify can be a public or protected task. Any user can access a public task, such as the default Password Services task. Users must have a role, such as the Self Manager role, to access a protected task.
5. Configure the password policy settings you need as described in the following sections:
   - Configure Password Composition (see page 96)
   - Specify Regular Expressions (see page 93)
   - Configure Advanced Password Options (see page 97)
6. Configure additional password policy settings, if CA Identity Manager integrates with SiteMinder:
   - Configure Password Expiration (see page 101)
   - Set Password Restrictions (see page 105)

Specify Regular Expressions

Password regular expression matching allows you to specify regular expressions (text patterns used for string matching) that each password must match or not match in order to be valid. This can be useful, for example, if you want to require that the first character in the password is a digit, but that a digit not be the last character.

To configure multiple expressions for a single password policy, Identity Manager must integrate with SiteMinder. If you create multiple expressions, acceptable passwords must match *all* specified expressions.

To add a new required expression

1. Type a descriptive tag for the expression (no white space) in the Name field.
2. Type a regular expression using the syntax described in Regular Expressions Syntax (see page 94) in the Must Match field.
3. If the password must not match the regular expression, select the check box in the Must Not Match column.

Note: If CA Identity Manager integrates with SiteMinder, you can specify multiple expressions by clicking the plus (+) sign to add the expression.

Example: The following regular expression definition could be used to require that all passwords start with an upper or lower case letter:Name: MustStartAlpha

Expression: [a-zA-Z].*

Regular Expressions Syntax

This section describes the syntax you should use to construct regular expressions for password matching. This syntax is consistent with the regular expression syntax supported for resource matching when specifying realms.

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

Characters	Results
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*?	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 *n*th parenthesized subexpression

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), you can simply follow it with a ’?’. A reluctant closure will match as few elements of the string as possible when finding matches.

Manage Password Policies

Administrators with the appropriate privileges can manage password policies using the View, Modify, and Delete Password Policy tasks. By default, these tasks appear in the Policies category.

When you access one of these tasks, CA Identity Manager displays a list of password policies that apply to the user store associated with the current Identity Manager environment. If CA Identity Manager integrates with SiteMinder, the list may include password policies that are created in the SiteMinder Administrative User Interface using Password Services. You can manage password policies that are created in CA Identity Manager or SiteMinder.

For more information about SiteMinder Password Services, see *CA SiteMinder Policy Server Configuration Guide*.

Configure Password Composition

You can specify rules that determine the character composition of newly created passwords.

Note: When configuring password composition settings, consider the maximum password length when determining values for character requirements. If the total number of letters and/or numbers required exceed the maximum password length then all passwords will be rejected. For example, if Letters is set to 6 and Digits is set to 6, all passwords must contain at least 12 characters (6 letters and 6 digits). In this example scenario, if a maximum password length of 8 characters is specified, all passwords will be rejected.

Password composition settings include:

Minimum password length

Specify a minimum length for user passwords.

Maximum password length

Specify the maximum length for user passwords.

Maximum repeating characters

Determines the maximum number of identical characters that can appear consecutively in a password.

For example, if this value is set to 3, then “aaaa” can not appear anywhere in the password. However, “aaa” is acceptable within a password. You should set this value to ensure that users cannot enter passwords made up entirely of a single character.

Upper case letters

Specifies whether to allow upper case alphabetic characters and, if so, the minimum number a password must contain.

Lower case letters

Specifies whether to allow lower case alphabetic characters and, if so, the minimum number a password must contain.

Letters

Specifies whether to allow letters and if so, the minimum number a password must contain.

Note: The Letters check box is automatically selected if you allow upper or lower case letters.

Digits

Specifies whether to allow numbers and, if so, the minimum number a password must contain.

Letters and Digits

Specifies whether to allow letters and digits, and if so, the minimum number a password must contain. If this setting is set in conjunction with Digits, characters can satisfy both requirements. For example, if this setting and Digits are set to 4, the password “1234” is a valid password.

Note: The Letters and Digits check box is automatically selected if you allow upper or lower case letters, or numbers.

Punctuation

Specifies whether to allow punctuation marks, and if so, the minimum number a password should contain. These can be periods, commas, exclamation marks, slashes, dashes, and hyphens.

Non-printable

Specifies whether to allow non-printable characters, and if so, the minimum number a password should contain. These characters cannot be displayed on a computer screen.

Note: Certain browsers do not support non-printable characters.

Non-alphanumeric

Specifies whether to allow non-alphanumeric characters such as punctuation marks and other symbols located on the keyboard (“@”, “$”, and “*”) and if so, the minimum number a password should contain. Non-printable characters are also included. A non-alphanumeric character also satisfies Punctuation and Non-printable character requirements.

Configure Advanced Password Options

Advanced password policy options allow you to configure pre-processing of submitted passwords prior to validation and storage (for example, forcing all characters to upper case) and to assign the policy a priority to allow predictable evaluation of multiple password policies that apply to the same user directory or namespace.

Do Not Force Case | Force Upper Case | Force Lower Case

Determine whether passwords should be forced to upper or lower case before processing and storage. Choose a case forcing option by clicking the Force Upper Case or Force Lower Case radio button. Otherwise ensure that the Do Not Force Case radio button (the default) is selected.

Important! Be careful to ensure that any case forcing option that you specify is consistent with any case-related composition requirements you have defined (see page 96).

Remove Leading White Space

Select to remove leading white space from passwords before processing.

Remove Trailing White Space

Select to remove trailing white space removed from passwords before processing.

Remove Embedded White Space

Select to remove all embedded white space before processing.

Note: Some user directory implementations automatically strip leading and/or trailing white space from attribute values (in which user passwords are stored) before storing them regardless of the settings you specify in your password policy.

Evaluation Priority

Specifies the evaluation priority for the password policy. The value should be in the range 0 (the default) to 999. Applicable policies are evaluated in descending order (999 first; 0 last).

Apply Lower Priority Password Policies

Determines whether lower priority password policies are applied after this one.

Note: This field is available only when CA Identity Manager integrates with SiteMinder.

Password Policies with SiteMinder

CA Identity Manager enables you to create basic password policies that manage user passwords by enforcing rules and restrictions governing password expiration, composition, and usage.

If CA Identity Manager integrates with SiteMinder, you can create advanced password policies that enable you to define these additional rules and restrictions:

- Directory filters
- Password expiration:
  - Track failed or successful logins
  - Authenticate on login
  - Password expiration if not changed
  - Password inactivity
  - Incorrect password
  - Multiple regular expressions

- Password restrictions:
  - Minimum days before reuse
  - Minimum number of passwords before reuse
  - Percent different from last password
  - Ignore sequence when checking for difference
  - Profile attribute matching
  - Dictionary matching

Password Policies and Relational Databases

If you configure a password policy that applies to a relational database, you must use the following format to configure the Password Data attribute for the SiteMinder User Directory:

tablename.columnname

To avoid syntax problems during execution, we recommend that this field reside in the primary table.

CA Identity Manager and Siteminder Integration Password Criteria

When CA Identity Manager is integrated with SiteMinder and uses SiteMinder’s password handling capability, password policies are obtained from the SiteMinder Policy Store. In this case, construct passwords that meet SiteMinder’s password criteria. The following punctuation characters are the only punctuation characters that meet SiteMinder's password criteria:

'*', '(', '\',',','@','"',':','#','_','-','!','&','?',')','(','{','}','*','.','/'

Important: CA Identity Manager does not impose any restriction on the use of punctuation characters in passwords. However, if you intend to use SiteMinder password capability, we recommended that you construct passwords that meet SiteMinder’s restrictions.

Apply a Password Policy to a Set of Users

If Identity Manager integrates with SiteMinder for advanced password policies, you can specify rules that determine the set of users to which a password policy applies. This allows you to have one password policy for general employees, and a stricter policy for high-level managers.

To specify a rule for a password policy

1. Create or modify a password policy in the User Console.
2. Select the type of filter to configure in the Directory Filter field.

   See the following table for a description of each filter type.

   Note: The options for filter type that appear in the Directory Filter list box are determined by the type of user store to which the password policy applies. Some filter types are not available for relational databases and CA Directory user stores.
3. Specify a condition by selecting an attribute and operator, and entering a value.
4. To add additional conditions, click the plus sign.

The following table describes the options for directory filter types, and provides examples of each filter type.

Type of Filter	Use this filter to...	Example
Entire Directory	Apply a password policy to all users in a user store.	N\A
In a group	Search for a specific group	Name=Product Team
A user	Search for and select a single user	User ID=jsmith
User filter (Not available for relational databases)	Specify a filter for users.	Employee Type = Contractor
User Search Expression	Enter a search query for users **Note:** See the *CA SiteMinder Policy Server Configuration Guide* for information about the LDAP search expression.	uid=*smith
Group Filter (Not available for relational databases and Provisioning Server user stores)	Specify a filter for groups	Self Subscribing = *

Type of Filter	Use this filter to...	Example
Group Search Expression (Not available Provisioning Server user stores)	Enter a search query for groups **Note:** See the *CA SiteMinder Policy Server Configuration Guide* for information about the LDAP search expression.	cn=Sales*
Organization Filter (Not available for relational databases and Provisioning Server user stores)	Specify a filter for organizations **Note:** See the *CA SiteMinder Policy Server Configuration Guide* for information about the LDAP search expression.	Organization name = *Marketing
Organization Search Expression (Not available for relational databases and Provisioning Server user stores)	Enter a search query for organizations **Note:** See the *CA SiteMinder Policy Server Configuration Guide* for information about the LDAP search expression.	ou=Boston
Search	Specify a query that is not included in the other options for filter type. **Note:** See the *CA SiteMinder Policy Server Configuration Guide* for information about the LDAP search expression.	(&(uid=*smith)(ou=Boston))

Configure Password Expiration

To help manage user access, administrators can define events such as multiple failed login attempts or account inactivity, when CA Identity Manager integrates with SiteMinder. When those events are triggered, the user account that triggered the event is disabled, and optionally, the user is redirected to a new Web page.

You can configure the following settings for password expiration:

- Track Failed/Successful Logins Check Box
- Authenticate on Login Tracking Failure Check Box
- Password Expires if Not Changed Settings
- Incorrect Password Settings
- Password Expires from Inactivity Settings

Track Failed/Successful Logins Check Box

Note: To track failed or successful logins, Identity Manager must integrate with SiteMinder. See the *Implementation Guide* for more information.

This check box enables and disables tracking of user login attempts, including the time of the last login attempt. If you enable this check box, Identity Manager writes login information to an attribute in the user store.

When the Track Failed Logins check box is enabled, the Incorrect Password section and the Authenticate on Login Tracking Failure Check Box are active.

When the Track Successful Logins check box is enabled, the Password Expires from Inactivity section and the Authenticate on Login Tracking Failure Check Box are active.

If you disable login details, and you have multiple password policies, you must ensure that all applicable password policies disable login details. Otherwise, a single policy which enables the tracking of login details may cause password policies to behave incorrectly.

Authenticate on Login Tracking Failure Check Box

Note: To disable logins, Identity Manager must integrate with SiteMinder. See the *Implementation Guide* for more information.

This check box enables and disables logins when user tracking fails. By default, this check box is disabled and if user activity cannot be written to the user directory, users are not allowed to login. However, if you enable this check box, users may login, even if password data cannot be written to the user directory.

Note: To enable this check box, you must also enable the Track Failed Logins or Track Successful Logins check box.

Password Expires if Not Changed Settings

Note: To configure password expiration settings, Identity Manager must integrate with SiteMinder. See the *Implementation Guide* for more information.

In the Password Expires if Not Changed fields, you can configure behavior for passwords that have expired and have not been changed by the owner. Optionally, you can specify how far in advance users are warned that their password will expire.

You can configure the following fields:

After *<number>* Days

Determines the number of days after a password expires that Identity Manager waits before disabling the user or forcing a password change.

Note: Identity Manager does not disable the user account until the user attempts to login after the specified number of days has elapsed.

Disable User

If this radio button is selected, when a user's password expires, Identity Manager disables the user. Disabled users can be enabled by using:

- The Enable/Disable User task in the User Console. (The default System Manager, Organization Manager, and Security Manager roles include the Enable/Disable User task.)
- The SiteMinder administrative user interface.

  Note: For more information, see the *CA SiteMinder Policy Server Administration Guide*.

Force Password Change

If this radio button is selected, when a user's password expires, Identity Manager forces a password change when the user next attempts to log in.

Issue expiration warnings for *<number>* days

Allows you to specify how many days in advance a user is notified that a password will expire.

Password Expires from Inactivity Settings

Note: To configure password inactivity settings, Identity Manager must integrate with SiteMinder. See the *Implementation Guide* for more information.

The Password Expires from Inactivity settings allow you to specify a period of time between user login attempts after which a user account is considered inactive. You can also use this section to specify an action should a user whose account is considered inactive successfully log in.

Note: To configure settings in the Password Expires from Inactivity section, enable the Track login details check boxes.

The Password Expires from Inactivity section contains the following:

- After *<number>* Days--Determines the number of days of inactivity after which a user's password expires.
- Disable User--If this radio button is selected, when a user's password expires due to inactivity, the user account is disabled. Disabled users must then be enabled using the Enable/Disable Users task.
- Force Password Change--If this radio button is selected, when a user's password expires due to inactivity, the Policy Server forces a password change when the user next attempts to log in.

Incorrect Password Settings

Note: To configure incorrect password settings, Identity Manager must integrate with SiteMinder. See the *Implementation Guide* for more information.

In the Incorrect Password settings, you can specify how many failed logins are allowed before a user account is disabled. Additionally, you can specify how long the account is disabled before a user can attempt to log in again.

Note: This section applies only if the Track Failed Logins check box is enabled.

The Incorrect Password section contains the following fields:

Account disabled after *<number>* successive incorrect passwords

Determines the number of consecutive failed log in attempts a user can make before the user account is disabled. Limiting the number of unsuccessful attempts protects against programs designed to access a resource by repeatedly trying passwords until the correct one is found. If a user fails to login correctly after the specified number of attempts, the user's account is disabled. An administrator must re-enable the account.

After *<number>* minutes

Determines the length of time (in minutes) that a user must wait before he or she is allowed another login attempt or their account is re-enabled (see below). If the user enters another incorrect password, Identity Manager disables the account again. The user must wait the specified amount of time before trying again.

Allow one login attempt

If this radio button is selected, when a user enters an incorrect password, they are allowed one additional login attempt after the specified number of minutes.

Re-enable account

If this radio button is selected, when a user account is disabled due to incorrect passwords, their account is re-enabled after the specified number of minutes.

Set Password Restrictions

Note: To set password restrictions, Identity Manager must integrate with SiteMinder. See the *Implementation Guide* for more information.

Using password policies, you can place restrictions on password usage. The restrictions include how long a user must wait before reusing a password and how different the password must be from ones previously selected. You can also prevent users from specifying words that you determine are a security risk or contain users' personal information.

The Restriction section includes the following fields:

Minimum number of days before reuse

Determines how many days a user must wait before reusing a password.

Minimum number of passwords before reuse

Determines how many passwords must be used before a password can be reused.

Note: If you specify a length of time and number of passwords, both criteria must be satisfied before a password can be reused. For example, you can configure a password policy which requires users to wait 365 days and specify 12 passwords before reusing a password. After a year, if only six passwords have been used, another six would have to be used before the user can reuse the first password.

Percent different from last password

The percentage of characters a new password must contain that differ from characters in the previous password. If the value is set to 100, the new password may contain no characters that were in the previous password, unless Ignore sequence when checking for differences is deselected. For examples of how this parameter works with Ignore sequence when checking for differences, see the following table.

Ignore sequence when checking for differences

Ignores the position of the characters in the password when determining the percentage.

For example, if a user's initial password is BASEBALL12 and the Ignore sequence when checking for differences check box is selected, a user cannot choose 12BASEBALL as the new password. If the check box is deselected, 12BASEBALL is an acceptable password because each letter occurs in a different position. For examples of how this parameter works with Percent different from last password, see the following table.

For increased security, Ignore sequence when checking for differences check box should be selected.

Passwords	Percent different	Ignore sequence	Accepted
BASEBALL12 (Old) 12BASEBALL	0	Selected Deselected	Y Y
BASEBALL12 (Old) 12BASEBALL	100	Selected Deselected	N Y
BASEBALL12 (Old) 12SOFTBALL	0	Selected Deselected	Y Y
BASEBALL12 (Old) 12SOFTBALL	90	Selected Deselected	N Y
BASEBALL12 (Old) 12SOFTBALL	100	Selected Deselected	N N

Profile Attributes

Configuring the Match Length field prevents users from using personal information in their passwords. The Match Length field determines the minimum sequence length the password policy compares to attributes in the user's directory entry. For example, if this value is set to 4, Identity Manager checks to see that the password is not composed of the last four digits of the user's telephone number.

Dictionary

Specifies a list of strings that cannot be used in passwords.

Note: The last line of the dictionary file used by Password Services must be followed by a carriage return or it will not be included in the dictionary search.

The Dictionary settings include the following fields:

- Path--Contains the full path and name of the dictionary file.
- Match Length--Controls the length of strings compared against values in the dictionary file. The comparison ignores the case (upper/lower) of the strings. If the Match Length field is left blank or set to zero, only passwords that match a string in the dictionary exactly will be rejected. If the match length is greater than zero, password entries will be rejected if both of the following are true:

  The password includes a substring which starts with the same series of characters as a dictionary entry.

  The number of consecutive matching characters is greater than or equal to the number specified in the Match Length field.

  For example, consider a dictionary file that contains the following:

  lion

  tiger

  bear

  If the Match Length field is set to 4, the following will result:

  "TeddyBear" will be rejected because Bear matches the bear entry in the dictionary file.

  "prestige" will be rejected because "tige" matches the first four characters of the tiger entry in the dictionary file.

  "Geiger Counter" will be accepted since "iger" does not include the first letter of the tiger entry in the dictionary file.

Reset Password or Unlock Account

In the case users forget their passwords on Windows systems, you can configure Self-Service to prompt the user from the Windows logon screen. You can use this feature by installing one of these components:

- The Graphical Identification and Authorization (GINA) component, for Windows 2000, 2003, and XP systems
- The Credential Provider, for Windows VISTA and Windows 7 systems

With this feature, the user is logged into Self Service through the Cube web browser where a password change request page appears. After filling in this page, the user clicks Return to go back to the Windows Logon screen.

Install the GINA or Credential Provider

You can install the GINA (for Windows 2000, 2003, and XP systems) or the Credential Provider (for Windows Vista, Windows 7 Enterprise Edition, or Window 7 Professional Edition) on a system from which a user accesses an Identity Manager environment.

To install the GINA

1. Locate the Identity Manager Provisioning Components download or other installation media.
2. Run the installer under Agent.
3. Follow the wizard prompts to answer the questions.
4. Once the installation completes, Configure the GINA (see page 109).

To install the Credential Provider

1. Locate the Identity Manager Provisioning Components download or other installation media.
2. Run the installer under Agent.

   Note: For the Credential Provider on a 64-bit operating system, be sure to choose the 64-bit version of this software.
3. Follow the wizard prompts to answer the questions.
4. If you installed the Credential Provider on a 64-bit operating system, download Microsoft Visual C++ 2008 SP1 (64-bit).
5. Once the installation completes, Configure the Credential Provider.

Configure the GINA

You can use the GINA configuration tool to edit default GINA values and export them to a registry (.reg) file for repackaging. The settings can also be applied to the current system.

To configure GINA

1. In Windows Explorer, go to the location where you installed the GINA. For example:

   ```
   C:\Program Files\CA\Identity Manager\Provisioning GINA
   ```

2. Double-click the following executable:

   ```
   ginaconfig.exe
   ```

3. Enter information in the GINA settings fields:

   Link1 Command

   The complete command line to execute when a user clicks the Forgot Password link. This link should load a URL to a web interface for password resetting. For example, the command could be:

   ```
   C:\Program Files\CA\Identity Manager\Provisioning GINA\cube.exe
   http://eastern.local:8080/iam/im/environment/ca12/index.jsp?
   task.tag=forgottenpassword&facesViewId=/app/page/screen/
   fp_identify_user.jsp&action.forgottenpassword.identify=1&USER_ID=%usernam
   e%
   ```

   Occurrences of %username% are replaced by the value in the username field on the Logon dialog. For this URL, self enrollment must be working on the environment. Also, verify the Self Service URL for the Identity Manager environment works from the system where you are installing the GINA.

   Link2 Command

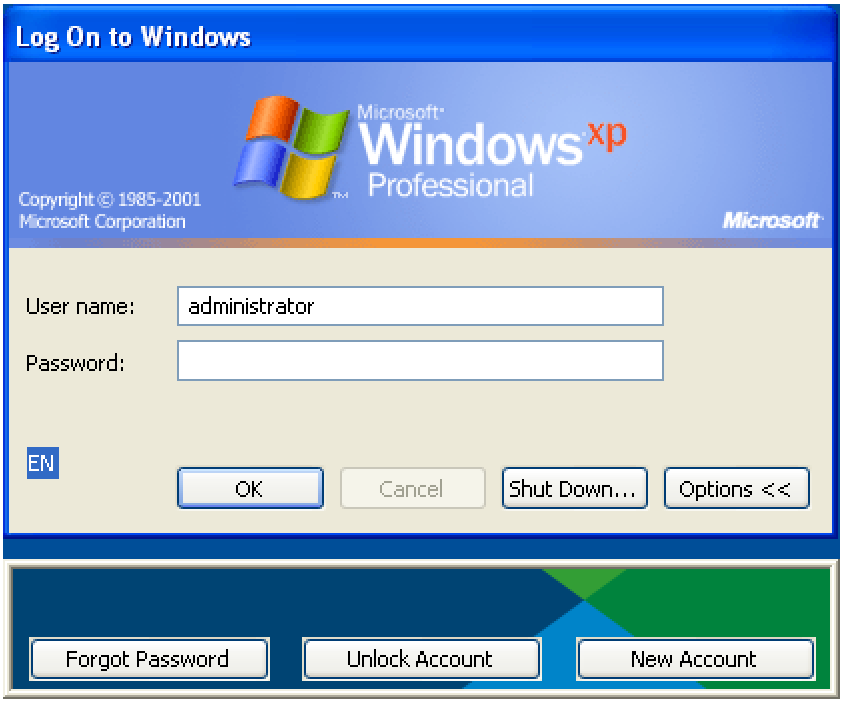
   The complete command line to execute when a user clicks on the Unlock Account link. This link should load the full path to the cube.exe command followed by a URL to a web interface allowing a user to unlock an account.Occurrences of %username% are replaced by the value in the username field on the Logon dialog.

   Link3 Command

   The complete command line to execute when a user clicks on the New Account link. This link should load the full path to the cube.exe command followed by a URL to a web interface allowing a user to create an account. The %username% tag is not expected to be part of the URL.

   Use Floating Dialog

   An alternative to the Link commands, providing the same features and appearing during Window logon. This dialog can also render a BMP, WMF, or ICO image in the background. An example of a floating dialog follows:



Log On to Windows

User name: administrator

Password:

Domain

The Provisioning domain name.

Section 508 Compliance (Use Return in menu)

Enables the Return function in a menu. If unchecked, the Return dialog is used.

4. Fill in the Secure Browser Settings fields as follows:

   Default URL

   The default page to navigate to when no command line is given for the link1_cmd or link2_cmd.

   Allow List

   A regular expression pattern matching URLs to which access should always be allowed.

   Deny List

   A regular expression pattern matching URLs to which access should always be denied.

5. (Optional) Click Export to export your settings to another system.

6. Click OK to save your settings.

7. Restart the system.

Configure the Credential Provider

You can use a configuration tool to configure a system where you installed the Credential Provider.

To configure the Credential Provider

1. In Windows Explorer, go to directory where you installed the Credential Provider. For example:

   C:\Program Files\CA\Identity Manager\Credential Provider

2. Double-click the following executable:

   CAIMCredProvConfig.exe

3. Fill in the Credential Provider Settings fields as follows:

   Link1 URL

   The complete command line that executes when a user clicks on the Forgot Password link. This link should be a URL to a web interface for password resetting.

   For example, the command could be:

   ```
   http://eastern.local:8080/iam/im/environment/ca12/index.jsp?
   task.tag=forgottenpassword&facesViewId=/app/page/screen/
   fp_identify_user.jsp&action.forgottenpassword.identify=1&USER_ID=%usernam
   e%
   ```

   For this URL, self enrollment must be working on the environment. Also, verify the Self Service URL for the Identity Manager environment works from the system where you are installing the Credential Provider. Occurrences of %username% are replaced by the value in the username field on the Logon dialog.

   Link2 **URL**

   The complete command line that executes when a user clicks on the Unlock Account link. This link should be a URL to a web interface allowing a user to unlock an account.. Occurrences of %username% are replaced by the value in the username field on the Logon dialog.

   Link3 URL

   The complete command line to execute when a user clicks on the New Account link. This link should be a URL to a web interface allowing a user to create an account.The %username% tag is not expected to be part of the URL.

   Domain

   The Provisioning domain name.

   Section 508 Compliance (Use Return in menu)

   Enables the Return function in a menu. If unchecked, the Return dialog is used.

4. Fill in the Secure Browser Settings fields as follows:

   Allow List

   > A regular expression pattern matching URLs to which access should always be allowed.

   Deny List

   > A regular expression pattern matching URLs to which access should always be denied.

5. (Optional) Click Export to export your settings to another system.
6. Click OK to save your settings.
7. Restart the system.

Settings in the Registry

While configuration tools exist to set up the GINA or Credential Provider, you can edit the Windows registry to provide the same values.

GINA Registry Settings

If you choose not to use the GINA configuration tool, you can edit the Windows registry settings in the following key:

```
[HKEY_LOCAL_MACHINE\SOFTWARE\ComputerAssociates\GINAUNLOCK]
```

gina

> This holds the value of the current chained GINA. Usually, this would be MSGINA.DLL, the default Microsoft Windows GINA, unless you were integrating with a product such as Novell.

link1_cmd

> This is the complete command line to execute for link 1 on the Logon dialog.

link2_cmd

> This is the complete command line to execute for optional link 2 on the Logon dialog. For example, you could add a link that would lead to a website for unlocking accounts.
>
> If the link2_cmd is blank, only the link1_cmd appears in the Logon Dialog Window.

link3_cmd

> This is the complete command line to execute when a user clicks on the New Account link. This link should load a URL to a web interface allowing a user to create an account.

comp508

Enables the Return function in a menu. If unchecked, the Return dialog is used

usecustomtitle

This enables the custom title for the GINA.

customtitle

This a title you want to appear in the GINA.

domain

The Provisioning domain name.

langdir

The location of the localized language DLLs.

configdir

The full directory path to where the GINA is installed.

rejectinvalidcerts

Controls whether GINA accepts only valid SSL certificates. When set to no, this option permits expired or invalid SSL certificates.

Valid values for this key are *yes* and *no*.

Credential Provider Registry Settings

If you choose not to use the Credential Provider configuration tool, you can edit the Windows registry settings in the following key:

```
[HKEY_LOCAL_MACHINE\SOFTWARE\CA\CAIMCredentialProvider]
```

link1_cmd

This is the complete command line to execute for link 1 on the Logon dialog. This link should be the URL to navigate to when a user clicks link 1.

link2_cmd

This is the complete command line to execute for optional link 2 on the Logon dialog. This link should be the URL to navigate to when a user clicks link 2. For example, you could add a link that would lead to a website for unlocking accounts.

If the link2_cmd is blank, only the link1_cmd appears in the Logon Dialog Window.

link3_cmd

This is the complete command line to execute when a user clicks on the New Account link. This link should load a URL to a web interface allowing a user to create an account.

usecustomtitle

This enables the custom title for the Credential Provider.

customtitle

This a title you want to appear in the Credential Provider.

comp508

Enables the Return function in a menu. If unchecked, the Return dialog is used

domain

The Provisioning domain name.

langdir

The location of the localized language DLLs.

disablepwdcp

The Disable Microsoft Password Credential Provider option. 1 is disabled. 0 is enabled.

CredentialProviderInstallPath

The full directory path to where the Credential Provider is installed.

configdir

The full directory path to where the Credential Provider is installed.

rejectinvalidcerts

Controls whether the Credential Provider accepts only valid SSL certificates. When set to no, this option permits expired or invalid SSL certificates.

Valid values for this key are *yes* and *no.*

Cube Browser Registry Settings

The Cube secure browser component has several registry values which control its behavior. The Cube Values are in the following Registry key:

```
[HKEY_LOCAL_MACHINE\SOFTWARE\ComputerAssociates\Cube]
```

404

The path to a standard HTML document to be displayed if the machine cannot contact the remote Provisioning Server at startup.

default

The default page to navigate to when no URL is included in Link1 Command or Link2 Command.

allow

Explicit Allow ACL. A regular expression pattern matching URL that is always allowed. For more information, see Cube Access Control Lists (see page 116).

deny

Explicit Deny ACL. A regular expression pattern matching URLs that should always be denied access. For more information, see Cube Access Control Lists (see page 116).

langdir

The location of the localized language DLLs.

Cube Access Control Lists

Cube ACLs are regular expression patterns that explicitly allow or deny permission to navigate to a selected URL. ACLs evaluate in the following order:

1. Allow (Permission is automatically allowed first)
2. Deny (Denied URLs are checked second)

GINA Access Control List Examples

"allow"="(.pdf)"

Allow all PDF documents to be displayed.

"deny"="(.doc|.xls)"

Deny access to Microsoft Word and Excel documents.

Customize the Powered By Message

You may notice a "Powered by..." message in the Return dialog or the Return menu option of GINA or the Credential Provider.You can edit or remove this message.

To customize the Powered By message

1. Download ResEdit, a freeware resource editor from http://www.resedit.net.
2. Start ResEdit.
3. Edit the file 1033.dll in the languages folder.
4. Double-click String Table.
5. Remove or modify resource ID 135, the English version of the resource for this message.

Reset a Password for a Windows Login

After the GINA or Credential Provider is installed on a Windows system, a Forgot Password link appears on the standard Microsoft Windows logon dialog. Use this link to reset your password or see clues to help you remember it.

To reset a password for a Windows login

1. Click Login from the Windows Security dialog. The Windows Login dialog appears.
2. Enter a valid user name.
3. Click Forgot Password.

   The Identity Manager Password Clue page appears.

   If you remember your password, return to the login dialog to continue. Otherwise, perform step 4 to authenticate to Identity Manager Self Service.
4. Type the answers to the authentication questions.

   Note: If you do not know the answers to all questions, click Request so that your password can be reset by an administrator.
5. If you succeed in answering the questions, click Log In.

   The system logs you in and opens Self Service.
6. Change your password.
7. Return to the login dialog and log in with the new password.

GINA Silent Install

GINA supports a silent mode of installation. Six properties are supported.

LINK1

refers to the SOFTWARE\ComputerAssociates\GINAUNLOCK\link1_cmd in the registry.

LINK2

refers to the SOFTWARE\ComputerAssociates\GINAUNLOCK\link2_cmd in the registry.

LINK3

refers to the SOFTWARE\ComputerAssociates\GINAUNLOCK\link3_cmd in the registry.

COMP508

refers to the SOFTWARE\ComputerAssociates\GINAUNLOCK\comp508 in the registry.

USECUSTOMTITLE

refers to the SOFTWARE\ComputerAssociates\GINAUNLOCK\usecustomtitle in the registry.

CUSTOMTITLE

refers to the SOFTWARE\ComputerAssociates\Cube\customtitle in the registry.

REJECTINVALIDCERTS

refers to the SOFTWARE\ComputerAssociates\Cube\rejectinvalidcerts in the registry.

The syntax to set the value of these properties follows:

```
setup /s /v"/qn LICENSE=Yes INSTALLDIR=\"C:\\Program Files\\CA\\Identity
Manager\\Provisioning GINA\" LINK1=\"[INSTALLDIR]cube <url>\"
LINK2=\"[INSTALLDIR]cube <url>\" LINK3=\"<url>\" COMP508=\"yes\"
REJECTINVALIDCERTS=\"yes\"  USECUSTOMTITLE=\"yes\" CUSTOMTITLE=\"custom gina
title\""
```

The [INSTALLDIR] refers to the value of the INSTALLDIR property.

Credential Provider Silent Install

The Credential Provider supports a silent mode of installation. Six properties are supported

LINK1

refers to the SOFTWARE\CA\CAIMCredentialProvider\link1_cmd in the registry.

LINK2

refers to the SOFTWARE\CA\CAIMCredentialProvider\link2_cmd in the registry.

LINK3

refers to the SOFTWARE\CA\CAIMCredentialProvider\link3_cmd in the registry.

COMP508

refers to the SOFTWARE\CA\CAIMCredentialProvider\comp508 in the registry.

USECUSTOMTITLE

refers to the SOFTWARE\CA\Cube\usecustomtitle in the registry.

CUSTOMTITLE

refers to the SOFTWARE\CA\Cube\customtitle in the registry.

REJECTINVALIDCERTS

refers to the SOFTWARE\ComputerAssociates\Cube\rejectinvalidcerts in the registry.

The syntax to set the value of these properties follows:

```
setup /s /v"/qn LICENSE=Yes INSTALLDIR=\"C:\\Program Files\\CA\\Identity
Manager\\Credential Provider\" LINK1=\"<url>\" LINK2=\" <url>\" LINK3=\"<url>\"
COMP508=\"yes\" REJECTINVALIDCERTS=\"yes\" USECUSTOMTITLE=\"yes\"
CUSTOMTITLE=\"custom vcp title\""
```

Password Synchronization

CA Identity Manager is able to intercept the password change of a native Windows account and propagate the new password to a user and all accounts belonging to that user.

This situation assumes your standard is that a user's password can be the same on all systems. However, you can designate that accounts on certain endpoints are excluded from password propagations. It is also possible to use the Provisioning Domain Configuration parameter (Password Synchronization/Update Only Global User) to designate that requests from Password Synchronization Agents only update the user, but not any of the user's other accounts.

When the Password Synchronization Agent detects a password change attempt, the agent intercepts the request and sends it to the Provisioning Server, which then propagates the new password to the user and other accounts associated with that user.

The requirements for Identity Manager password synchronization include the following:

- The Identity Manager Password Synchronization Agent must be installed on the system on which password changes are to be intercepted.
- The system must be managed as an acquired endpoint.
- The Password synchronization agent is installed check box must be selected on the acquired endpoint's properties.
- The accounts on the managed systems must be explored and correlated to CA Identity Manager users.
- The Enable Password Synchronization Agent flag is selected on the Global User property sheet's Password tab for each user requiring password synchronization.

Important! Use care in formulating password rules, so that a single password can be used on all systems. For example, if Windows passwords must be 12 characters, any system that accepts passwords only up to 10 characters will reject the change during synchronization.

The Identity Manager server is not aware of the password restrictions on the endpoint. When working with endpoint accounts, the Identity Manager password policy should be stricter than the password policy of the endpoints.

Install the Password Synchronization Agent

You can install the Password Synchronization Agent on any managed Windows computer where global users log on. The Agent runs in the background on these machines.

Run the Installation Program

Note the following:

- The system on which you are installing the Agent must be managed by the Provisioning Server.
- You will need to create a user to act as the Administrator for password changes: suggested name is etapwsad. This user needs to be assigned the PasswordAdministrator profile.
- There are two Windows Password Synchronization Agents available in the installation media: one for 32-bit Windows and one for 64-bit. The 32-bit Password Synchronization Agent is not supported on 64-bit Windows. FIPS is only supported by the 32-bit Password Synchronization Agent.

To install the Password Synchronization Agent

1. Locate the CA Identity Manager Provisioning Components installation media.
2. Browse to \Agent\PasswordSync or \Agent\PasswordSync-x64.
3. Run setup.exe.
4. As part of the installation process you will be guided by a Configuration Wizard as follows:
   a. In the Host name field, enter the name of the Provisioning Server system.
   b. The suggested LDAP port used to connect to the Provisioning Server is 20390. Change this as required if your Provisioning Server installation uses a non-default port.
   c. Click the Find domain button to retrieve the Provisioning Server Domain.
   d. If your Provisioning Server installation is configured for failover follow the on-screen instructions to add a comma separated list of servers.
   e. Click Next.
   f. In the Administrator field, enter etapwsad as the default global user name for the Password Synchronization Agent. This user must be created with the PasswordAdministrator profile. It does not exist by default.
   g. In the Password Administrator field, enter the password of the Administrator.
   h. Click Next.
   i. From the Endpoint Type drop-down list, select the Endpoint Type of the host on which you are installing the Agent.
   j. From the Endpoint Name drop-down list, select the name of the host on which you are installing the Agent.
   k. Click Configure.
5. Click Finish when prompted to complete the installation and reboot.

Configure the Agent for Alternate Servers

To configure the Password Synchronization Agent to use an alternate server, you use the Password Synchronization Agent Configuration wizard.

To configure an alternate server for the Agent

1. Run PwdSyncConfig.exe located in *password_sync_folder*\bin.
2. Enter the following configuration information:

   Host

   Specify the name of the Provisioning Server system.

   This populates the Server URL field with the host name you specify.

   LDAP port

   Specify the LDAP port used to connect to the Provisioning Server is 20390. Change this port as required if your Provisioning Server installation uses a non-default port.

3. Click the Find domain button to retrieve the Provisioning Server Domain.
4. Add the host name and port of the alternate servers in the Server URLs field using the following format:

   ldaps://*primaryhost*:20390,ldaps://*alternatehost1*:20390

5. Click Next.
6. Complete the remaining fields in the configuration wizard.

How the Password Synchronization Agent Works

The propagation process begins when a user's password is changed on a Windows system using any method. After the password is entered, the following occurs:

1. The Windows operating system checks to make sure the password meets its password policy. If Windows does not accept the password, the change request is rejected, an error message appears, and no further action, including synchronization, is taken.
2. The Windows system passes the password change request to the Identity Manager Password Synchronization agent, which, if configured for password quality checking, submits the password to the Provisioning Server for password quality checking. If the password does not meet the Identity Manager quality rules, the change request is rejected and an error message displays. The Windows password remains unchanged and no synchronization takes place.

3. A password that meets the quality rules of both Windows and CA Identity Manager is submitted by the Password Synchronization Agent to the Provisioning Server for propagation.
4. CA Identity Manager updates the global user password and propagates the new password accounts associated with the global user.

Note: Your password policies for Windows and CA Identity Manager must be identical or consistent, because the error messages displayed are based on the Windows password policy, even if CA Identity Manager rejects the request.

The password_update_timeout configuration parameter (eta_pwdsync.conf) specifies how long (in seconds) the PSA waits for the password-change-propagation confirmation from the Identity Manager server. If the PSA does not receive a confirmation during that time, it proceeds as if the propagation succeeded and logs a warning (eta_pwdsync.log) that password change propagation could not be verified. The minimum value for the parameter is zero (0), which means that the PSA will not wait for confirmation. For more information, see eta_pwdsync.conf--Configure Password Synchronization Agent in the Provisioning Manager help.

Account-Level Password Quality Checking

Password quality checking is performed when accounts on managed endpoints are created or modified or when Identity Manager user passwords are set. Password quality checking on accounts is limited to checks based on the characters in the password. Checks of global user passwords that are based on the history of recent changes (frequency of password update and frequency of password reuse) are not performed on accounts because Identity Manager cannot intercept all password changes for account passwords. Therefore, it cannot have an accurate password change history with which to perform these checks.

The checking of account passwords is controlled by the following domain configuration parameters:

- Endpoint/Check Account Passwords
- Endpoint/Check Empty Account Passwords

The value for each parameter specifies for each managed endpoint the level of checking that should be performed. The endpoint can be specified in the following ways:

```
ALL
-ALL
<NamespaceName>
-<NamespaceName>
<NamespaceName>:<DirectoryName>
-<NamespaceName>:<DirectoryName>
```

The forms that include a minus (-) sign, disable the parameter. The forms without it enable the parameter. The [-]<NamespaceName> forms control all endpoints of the indicated endpoint type, while the [-]<NamespaceName>:<DirectoryName> forms control individual endpoints. The [-]ALL forms control all endpoints of all endpoint types. The default value for both parameters is -ALL.

Each of these parameters can be specified many times. If multiple values specify the same endpoint, the last value is used. You can place general rules first and specific rules later to override the general rule.

The Check Account Passwords parameter provides checking equivalent to global user password quality checking. With this parameter enabled for an endpoint, CA Identity Manager checks any password in a requested change for an existing account, including attempts to set an empty password. During account creation, if no password is provided, password quality checking is not performed.

Check Empty Account Passwords provides the added checking of empty passwords when creating accounts. If the password profile is enabled and requires at least a single-character password, an empty password causes account creation to fail. This parameter is separate from Check Account Passwords because in some endpoint types it is acceptable to create an account with no password.

Note: Account password quality checking is skipped for synchronized account passwords if the supplied password matches the current global user password.

Password Quality Enforcement

The Password Synchronization option intercepts password changes requests on native systems (for example, Windows NT/ADS) and submits them to the Identity Manager server. The Server synchronizes the global user password and account passwords associated with the global user. Both Identity Manager password quality rules for a password profile and native system password quality rules (Windows NT/ADS) can be used to enforce password quality control.

Configure Password Synchronization

The Password Synchronization Agent is initially configured during installation and can be reconfigured at any time using the Password Synchronization Configuration Wizard . Further configuration is possible, for example password quality checking on the Identity Manager server or modifying timeouts, using the eta_pwdsync.conf file. This file is located in the password_sync_folder\data\ folder. For more information, see the eta_pwdsync.conf file topic in the Provisioning Manager help.

Failover

If the Provisioning Server is down or heavily loaded, the Password Synchronization Agent can failover from one server to another. For this to happen multiple Provisioning Servers must be configured to serve the same domain and the Agent must be configured to make use of those servers. For more information about failover, see the *Installation Guide* and configuring the agent to use alternate servers (see page 122).

Enable Log Messages

To discover why a password modification was rejected, view the Password Synchronization Agent logs. All logged messages are stored in the eta_pwdsync.log file. By default, this file is located in the password_sync_folder\Logs folder.

Password Synchronization Agent logging can contain the following:

- Error messages, which are always logged.
- Diagnostic (process flow, trace) messages, which can be enabled or disabled based on the value of the logging_enabled=yes|no parameter in the eta_pwdsync.conf file.

For additional information, review the eta_pwdsync.log and the Provisioning Server logs for the same time period.

The previous log_level configuration parameter has been deprecated but left for backward compatibility: log_level=0 translates into logging_enabled=no and log_level=anything else translates into logging_enabled=yes. If both old and new parameters are present in the configuration file, the explicit setting of logging_enabled=yes|no parameter overrides the indirect setting performed through the old log_level=number.

Verify the Installation

After the Password Synchronization Agent installation is complete, change a password on the Windows system to verify that the global user password associated with the account is changed also.

Chapter 7: Groups

You can create several types of groups, or a combination of these types:

- Static group--A list of users who are added interactively
- Dynamic group--Users belong to the group if they meet an LDAP query (Requires an LDAP directory as the user store)

  Note: The Dynamic Group Query field is not included in the Create Group task or other group tasks even if this field exists in the directory.xml for a group. You include Dynamic Group Query field in the task by editing the associated profile screen.

- Nested group--A group containing other groups (Requires an LDAP directory as the user store)

Note: To view the static, dynamic, and nested groups to which a user belongs, use the Groups tab for the User object. This tab appears in the View and Modify User tasks by default.

This section contains the following topics:

Create a Static Group

You can associate a collection of users in a *static group*. You manage the static group by adding or removing individual users from the group's membership list. To see the list of members for a group, use the Membership tab, which is included with the View and Modify Group tasks by default.

Note: The Membership tab displays only the members who are explicitly added to the group. It does not display members who are added dynamically.

To create a static group:

1. In the User Console, select Groups, Create Group.
2. Choose to create a new group or a copy of a group and click **OK**.
3. On the Profile tab, enter a group name, group organization, description, and group administrator name.

4. Click the Membership tab.
5. Click Add a user.
6. Search for users to include.
7. Put a check next to the users and click Select.
8. Click Submit.

Create a Dynamic Group

You can create a *dynamic group* by defining an LDAP filter query using the User Console to dynamically determine group membership at runtime without having to search and add users individually.

For example, if you wanted to generate a group that lists all U.S. employees of NeteAuto, you could define an LDAP search filter similar to the following in the Dynamic Group Query field of the User Console:

ldap:///cn=Employees,o=NeteAuto,c=US??sub

You could also modify this query to locate employees outside the United States.

Static, Dynamic, and Nested Groups Example (see page 132) shows an example of a group created by static, dynamic, and nested groups.

Note: You include Dynamic Group Query field in the task by editing the associated profile screen. It is not included by default in the Create Group task.

To create a dynamic group:

1. In the User Console, select Groups, Create Group.
2. Choose to create a new group or a copy of a group and click **OK**.
3. On the Profile tab, enter a group name, group organization, description, and group administrator name.
4. Enter an LDAP search filter like the following example in the Dynamic Group Query field:

   ldap:///cn=Employees,o=NeteAuto,c=US??sub?
5. Click Submit.

Note: Only an administrator with the Modify Group task can change a group's dynamic membership.

Dynamic Group Query Parameters

You can use the following dynamic query parameters in the search:

ldap:///*<search_base_DN>*??*<search_scope>*?*<searchfilter>*

- *<search_base_DN>* is the point from where you begin the search in the LDAP directory. If you do not specify the base DN in the query, then the group's organization is the default base DN.
- *<search_scope>* specifies the extent of the search and includes:
  - sub -- Returns entries at the base DN level and below
  - one -- Returns entries one level below the base DN you specify in the URL. This is the default value.
  - base -- Uses one instead, ignoring base as a search option

  Using one or base obtains only the users in the Base DN organization.

  Using sub obtains all users under the Base DN organization and all sub-organizations in the tree.
- *<searchfilter>* is the filter that you want to apply to entries within the scope of the search. When you enter a search filter, use the standard LDAP query syntax as follows:

  (<logical operator ><comparison><comparison...>)

  - <logical operator> is one of the following:

    Logical OR: |

    Logical AND: &

    Logical NOT: !
  - <comparison> indicates <attribute><operator><value>

  For example:

  (&(city=boston)(state=Massachusetts))

  The default search filter is (objectclass=*).

Note the following when creating a dynamic query:

- The "ldap" prefix must be lowercase, for example:

  ldap:///o=MyCorporation??sub?(title=Manager)
- You cannot specify the LDAP server’s host name or port number. All searches occur within the Identity Manager LDAP directory that you configured for your Identity Manager environment.

The following are sample LDAP queries:

Description	Query
All users who are managers.	ldap:///o=MyCorporation??sub?(title=Manager)
All managers in the New York West branch office	ldap:///o=MyCorporation??one?(&(title=Manager) (roomNumber=NYWest))
All technicians with a cell phones	ldap:///o=MyCorporation??one?(&(employeetype=technician) (mobile=*))
All employees whose employee numbers are between 1000 and 2000	ldap:///o=MyCorporation, (& (ou=employee) (employeenumber >=1000) (employeenumber <=2000))
All help desk administrators who have been employed at the company for more than 6 months	ldap:///o=MyCorporation,(& (cn=helpdeskadmin) (DOH => 2004/04/22) **Note:** This query requires that you create a DOH attribute for the user's date of hire.

Note: The > and < (greater than and less than) comparisons are lexicographic, not arithmetic. For details on their use, see the documentation for your LDAP directory server.

Create a Nested Group

If the user store is an LDAP directory, you can add a group as a member of another group. The group is called a *nested group*.

The group containing the nested group is called a *parent group*. Members of the nested group become members of the parent group. However, members of the parent group do not become members of a nested group.

Nested groups are similar to email distribution lists where one list can be a member of another. With nested groups, you can add groups and users as members in the group. By nesting a group in another group's membership list, you could include all nested groups members.

For example, if you created separate groups for the manufacturing, design, shipping, and accounting divisions of a company, you can construct a parent group for the entire company by nesting all the separate division groups as members of the company parent group. As a result, any changes you made to the manufacturing, design, shipping, and accounting nested groups would be automatically reflected in the nested group for the entire company. A group that is nested within another group can be dynamic and/or contain other nested groups.

The figure in Static, Dynamic, and Nested Groups Example (see page 132) shows a parent group created by static, dynamic, and nested groups.

Be aware of the following before creating a nested group:

- Only an administrator with the Modify Group Members task can add or change nested groups from the group's static member list in the User Console.
- Only users with the appropriate administrator privileges can modify, add, or remove members from a group.

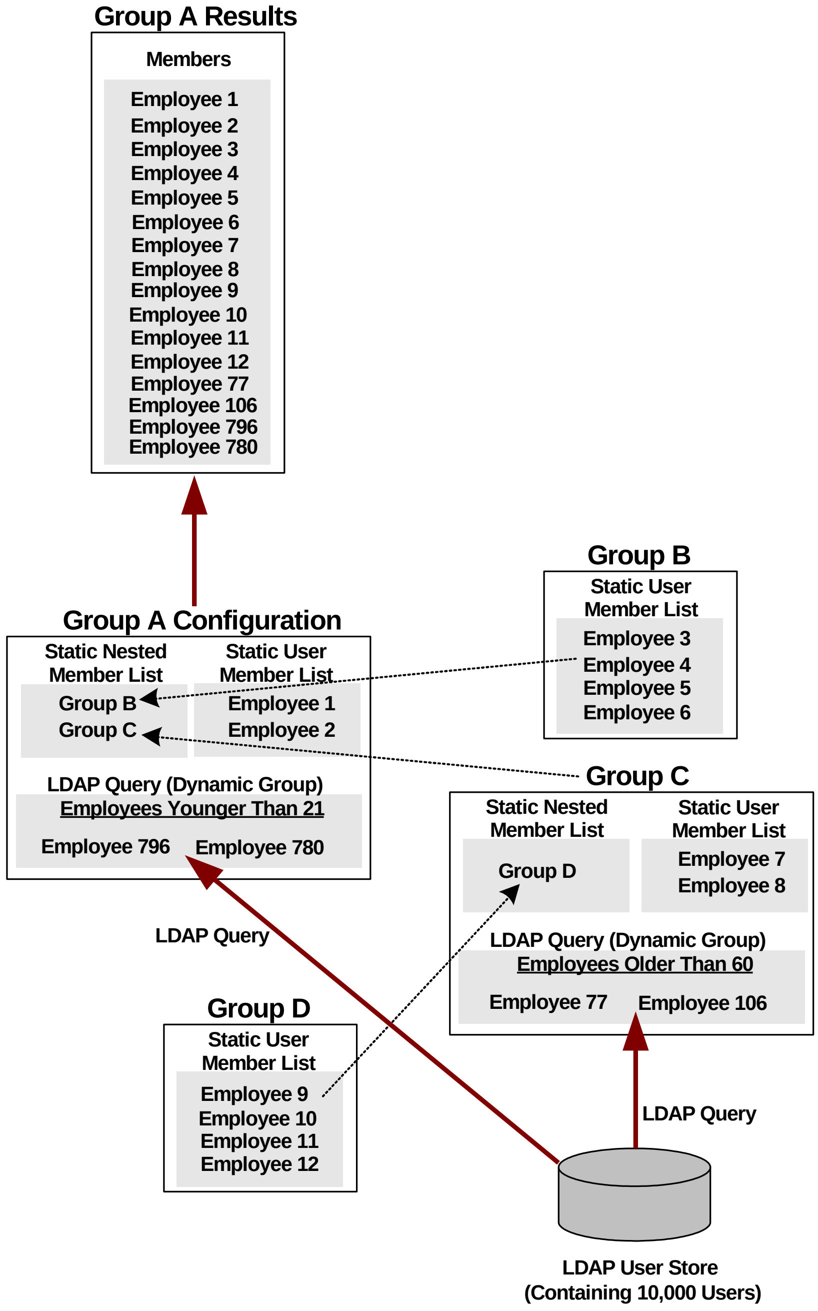
  For example, if parent Group A is created by nested groups B and C, the Group A administrator can only modify the members of Group A and not B and C. Groups B and C can only be modified by their appropriate administrators.

To create a nested group:

1. In the User Console, select Groups, Create Group.
2. Choose to create a new group or a copy of a group and click **OK**.
3. On the Profile tab, enter a group name, group organization, description, and group administrator name.
4. On the Membership tab:
   a. Click Add a group to add a nested group to this group.
   b. Search for an existing group.
   c. Put a check next to the group and click Select.
   d. Click Submit.

Static, Dynamic, and Nested Groups Example

Groups can be complex, consisting of a combination of dynamic, static, or nested groups. The following figure shows an example of a parent group created by static, dynamic, and nested groups.



In the previous figure:

- Parent Group A contains nested groups B and C, two static users, and a dynamic LDAP query that lists all employees who are younger than 21 years old.
- Group B is composed of four static users.
- Parent Group C contains nested Group D, two static users, and a dynamic LDAP query that lists all employees who are older than 60 years old.
- Group D contains four static users.
- The top of the figure lists the Group A members that result from the nested groups, dynamic queries, and static user member lists from Groups B, C, and D.

Group Administrators

On the Administrators tab of the Create or Modify Group tasks, you can specify users and groups as administrators of a group. When you assign a user as a group administrator, make sure that the administrator has a role with appropriate scope for managing the group. For example:

1. Use Modify Group to assign a user as an administrator of a group.
2. Assign that user an admin role with group management tasks, such as Modify Group Members, or user management tasks with a Groups tab.
3. Check that the role has appropriate scope over the group.
    a. Use View Admin Role on the role that you assigned with group management tasks.
    b. On the Members tab, verify that a policy exists with the following:

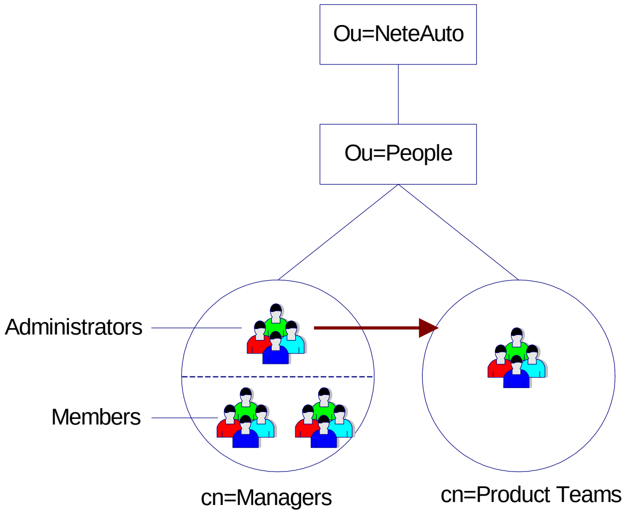
        A member rule that the group administrator meets

        A scope rule that includes the group

        A scope rule that includes some users to be added to the group

Note: To enable groups to be administrators of other groups in an Identity Manager environment, configure group administrator support in the directory configuration file. For information, see the *Configuration Guide*.

When you assign a group as an administrator, only administrators of that group will be administrators of the group you are creating or modifying. Members of the administrator group you specify will not have privileges to manage the group. The following illustration shows a group as an administrator of another group.



In this example:

- The group Managers is an administrator of the group Product Teams.
- Administrators of the Managers can manage the Product Teams group. Members of the Managers group cannot.

Chapter 8: Managed Endpoint Accounts

In CA Identity Manager, you can manage accounts on endpoint systems if your installation of CA Identity Manager has a Provisioning Server. You can manage accounts, such as an Exchange, Windows NT, or Oracle account, and manage orphan and system accounts, which are accounts not currently associated with CA Identity Manager.

This section contains the following topics:

Multiple Accounts for Users

You can assign accounts that exist on other systems to Identity Manager users. For example, a user may need an Exchange account for email, an Ingres account for database access, and an Active Directory account to use a Windows system. When you assign a provisioning role to a user, that user receives the accounts defined by the account templates in the provisioning role.

The account templates define specific characteristics of the account. For example, a template for an Exchange account could define the size of the mailbox.

Note: To install the Provisioning Server, see the *Installation Guide*.

Identity Manager Users

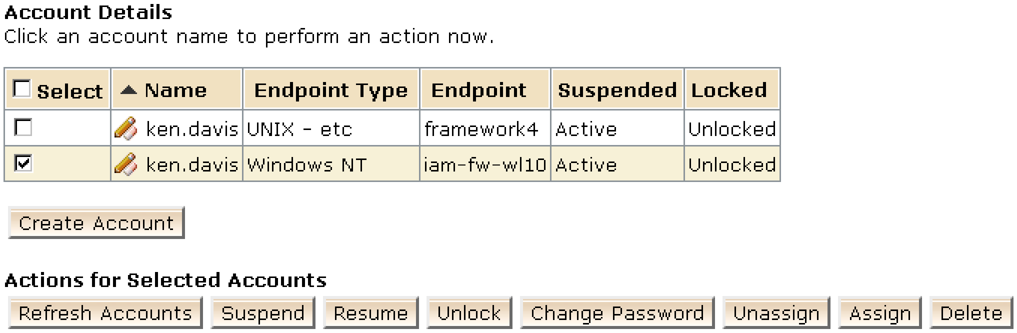
CA Identity Manager users are the users who are visible through an admin task, such as View User or Modify User. Some users may have an associated global user, a corresponding account which exists on the Provisioning Server.

Global Users

A global user is an object maintained by the Provisioning Server. It corresponds to one person or other identity that needs access to the Provisioning Server or the endpoints that it manages. A global user object contains information such as the person's name, password settings, job title, phone number, and address. The primary purpose of a global user is to tie together a person's accounts on the endpoint systems.

Accounts on Endpoint Systems

When you view or modify a user's endpoint account, you see accounts on endpoints such as UNIX, Microsoft Exchange, or Active Directory for that user. You see the account name, the endpoint type, endpoint, and the status of the account. For a modify task, additional options exist such as changing a user's password and locking or suspending an account.



Account Details
Click an account name to perform an action now.

□ Select	▲ Name	Endpoint Type	Endpoint	Suspended	Locked
□	ken.davis	UNIX - etc	framework4	Active	Unlocked
☑	ken.davis	Windows NT	iam-fw-wl10	Active	Unlocked

Actions for Selected Accounts

To include these options in a task, see the user console help for the Configure Accounts tab.

The following other types of accounts may exist on an endpoint but do not appear in the User Console:

- Orphan Accounts—Accounts that are not associated with a global user
- System Accounts—Accounts that are not associated with a global user and are used to manage the endpoint system

These accounts can be managed in the User Console once you assign them to a user. Use the Manage Orphan Accounts and Manage System Accounts tasks.

Giving Endpoint Accounts to Users

In CA Identity Manager, the recommended method for giving endpoint accounts to Identity Manager users involves three steps:

1. Configure the endpoint in CA Identity Manager (see page 137).
2. Create a provisioning role (see page 164) with an account template for that endpoint.
3. Assign the role (see page 88) to users who need an account on that endpoint.

After performing these steps, you can easily assign accounts to more users by assigning them the role.

How to Configure an Endpoint in CA Identity Manager

Configuring an endpoint in the user console populates the Provisioning Directory with accounts and other objects found in the endpoint. The endpoint is any application or computer managed by CA Identity Manager, such as a Microsoft Exchange Server or an Oracle database.

Configuring an endpoint consists of these steps:

1. Define the endpoint type (see page 137) by importing a role definition file.

   This action makes it possible to manage the endpoint in CA Identity Manager.
2. Create the endpoint in the User Console (see page 138).
3. Explore the contents of the endpoint and correlate its accounts (see page 139).

Define the Endpoint Type

You define the endpoint type by importing a role definition file that contains the screens, tasks, and roles for that endpoint type.

To define the endpoint type

1. In the Management Console, click Environments.

2. Select the environment that requires the endpoint type.
3. Select Role and Task Settings.
4. Click Import.
5. Choose a role definition file from the list that appears.

   Note: For endpoints that you define in Connector Xpress, click Browse at the bottom of the page. Choose the role definition file from the folder where you stored it.

6. Click Finish.
7. Restart the Identity Manager environment.

Add the Endpoint to the Environment

You add the endpoint to the environment where you need to manage it.

To add the endpoint to the Environment

1. Select Endpoints, Manage Endpoints, Create Endpoint.
2. Select an endpoint type.
3. Complete the tabs to fill in the fields.

   The required fields begin with a red circle. Click Help for definitions of fields on the current tab.

   Note: Avoid using a # symbol in the endpoint name, because this character cannot be searched.

4. Click Submit.

You are now ready to explore and correlate the endpoint (see page 139), so that its accounts can be managed.

Explore and Correlate an Endpoint

To add users that exist in an endpoint, you define an explore and correlate definition for that endpoint. Then, you use this definition with the Execute Explore and Correlate task.

This operation has three results:

- When you explore an endpoint, CA Identity Manager finds the objects in the endpoint and stores instances of them in the provisioning directory.
- When you correlate accounts on an endpoint, CA Identity Manager associates each account with a user in the provisioning directory. For the correlate function, you can determine if the accounts are assigned to the default user or if new users are created.
- You can also set the selected user attributes using the account's attribute values that you select.

To create an explore and correlate definition

1. In an environment, click Endpoints, Explore and Correlate Definitions, Create Explore and Correlate Definition.
2. Click Okay to start a new definition.
3. Complete the Explore and Correlate Tab as follows:
4. Fill in Explore and Correlate name with any meaningful name.

   Click Select Container/Endpoint/Explore Method to click an endpoint to explore and one or more containers if it has containers. A container search may take a little while for a large endpoint. Use the search filter to narrow the search. Click an explore method for the container. The explore and correlate process includes containers you select and its sub-containers. For a directory container, it includes all the containers in the sub-tree.

Click the Explore/Correlate Actions to perform:

- **Explore directory for managed objects**—Finds objects that are stored on the endpoint and not in the provisioning directory.
- **Correlate accounts to users**—Correlates the objects that were found in the explore function with users in the provisioning directory. Two choices of correlation exist.
  - **User existing users**

    Use this choice for a correlation-matching algorithm that matches each account with a previously created user.

    If the user is found, the account is correlated with that user. If multiple users are found, the account is correlated with the default user. If no user is found, this option creates the user (if all mandatory attributes are known) and correlates the account with that user; otherwise, it correlates the account with the default user.
  - **Create users as needed**

    Use this choice when correlating accounts on your primary endpoint. This option presumes that the accounts on your endpoint are named exactly the same as the users. The correlation-matching algorithm is unused with this option. Instead, each account is associated to the user with the same name. If the user does not yet exist, it is created. No accounts are associated to the default user.
- **Update user fields**—If a mapping exists between the object fields and the user fields, the user fields are updated with data from the objects fields.

  Users are created with no optional attributes such as full name, address and telephone numbers. During the initial acquisition of an endpoint, use this option to set these user attributes using account attribute values. During subsequent explore and correlates, use this option to refresh the user attributes to apply changes made to the account attributes, perhaps by tools other than CA Identity Manager.

5. Click Submit.

To use an explore and correlate definition

1. In an environment, click Endpoints, Execute Explore and Correlate.
2. Select Execute now to run explore and correlate immediately, or select Schedule new job (see page 294) to run explore and correlate at a later time or on a recurring schedule.

   Note: This operation requires the client browser to be in the same time zone as the server. For example, if the client time is 10:00 PM on Tuesday when the server time is 7:00 AM, the Explore and Correlate definition will not work.

3. Click an explore and correlate definition to execute.
4. Click Submit.

The user accounts that exist on the endpoint are created or updated in CA Identity Manager based on the explore and correlate definition you created.

To verify explore and correlate succeeded

1. Go to System, View Submitted Tasks.
2. Complete the task name field as follows: Execute Explore And Correlate
3. Click Search.

The results show if the task completed successfully.

Reverse Synchronization with Endpoint Accounts

Although it is CA Identity Manager's responsibility to create, delete and modify accounts, it is impossible to prevent an endpoint system user from performing these operations on their own. This situation can occur due to emergency reasons, or malicious reasons, such as a hacker. Reverse Synchronization ensures control of the accounts a user has on each endpoint by identifying discrepancies between Identity Manager accounts and accounts on the endpoints.

For example, if an account was created in the Active Directory domain using an external tool, CA Identity Manager must be aware of this potential security issue. In addition, bypassing CA Identity Manager causes a lack of approval processes, and audit reports.

Two types of discrepancies between CA Identity Manager and managed endpoints are as follows:

- A new account detected
- A change within an existing account

You can treat both cases by defining policies to handle the change. Then, using Explore and Correlate to update CA Identity Manager, you trigger the execution of policies.

How Reverse Synchronization Works

Reverse synchronization with endpoint accounts occurs as follows:

1. An administrator or a malicious user creates or modifies an account on an endpoint.
2. When Explore and Correlate runs on that endpoint, the new or modified account is detected.
3. The Provisioning Server sends a notification to the Identity Manager server.
4. The Identity Manager server searches for a reverse synchronization policy that matches the change on the endpoint.
5. If a matching policy is found, it executes. If more than one policy applies to this account and those policies have the same scope, the highest priority policy runs.
6. Depending on the policy, one of the following actions occurs:
   - For a new account, the policy accepts, deletes, or suspends the account or sends it for workflow approval.
   - For a modified account, the policy accepts the value, reverts it to the last known value, or sends it for workflow approval.
7. If workflow is selected, a new event for the workflow is generated and the approvers are set. Then, one of the following actions occurs:
   - For a new account, the approver can accept, delete, or suspend the account or assign it to a user.
   - For a modified account, the workflow process is the same as if the value was changed in the User Console, except that rejected values are reverted at the endpoint.

Map Endpoint Attributes

To use reverse synchronization on an attribute in an endpoint account, you first map it to an attribute visible in the User Console. Some attributes, such as account name and password, are mapped by default. Other attributes are not mapped. For example, the Active Directory attribute group membership is not mapped. For some endpoint types, no attributes are mapped.

To check if the attribute can be mapped

1. In the User Console, click Endpoints, Reverse Modify, Create Reverse Sync Modified Account Policy.
2. Choose to create a new policy or a copy of a policy.
3. Click Endpoint Type and choose an endpoint, such as Active Directory.
4. Click Attribute Name to display a list of attributes that can be mapped.
5. Click Cancel.

   You cancel the policy because you are only using it now to check which attributes can be mapped.

Important! You can manage certain attributes only by native tools on the endpoint. So if an endpoint user modifies this type of attribute, the reverse event fails when the reverse synchronization policy is triggered. However, changes to other attributes in that reverse event are not reversed. Therefore, avoid mapping attributes that can only be managed on the endpoint.

To map endpoint attributes for reverse synchronization

1. Click Endpoints, Modify Endpoint.
2. Search for and select an endpoint that requires reverse synchronization.
3. Click the Attribute Mapping tab.
4. Select Use Custom Settings.
5. Click Add to add a new custom attribute.
6. Select an available custom attribute. For example, use CustomField 10 if it is not used in your environment.
7. Map the custom attribute to the account attribute name that you want to manage.
8. Repeat Steps 5 to 7 to add mappings between all account attributes required and the custom attribute selected.

   You can use the same custom attribute (CustomField 10 in our example) for all attributes you want to manage.
9. Click Submit.

To create baseline values for this endpoint

Once all values for an endpoint are mapped, you explore the endpoint. For this operation, you disable inbound notification and enable it after the explore completes. Disabling notification eliminates notifications that are unnecessary. Otherwise, every account that has values on the new attributes would generate a notification during the explore operation.

1. In Provisioning Manager, disable inbound notification as follows:
    a. Click System, Domain configuration, Identity Manager Server, Enable Notification.
    b. Select No.
    c. Restart the Provisioning Server to make sure the change takes effect.
2. In the User Console, click Endpoints, Execute Explore and Correlate.

    Choose an explore and correlate definition that has correlation deselected.

    This action repopulates the user store attributes with the new endpoint attribute data. This task may take a while if the endpoint is large.
3. Reenable inbound notification in Provisioning Manager.
4. Restart the Provisioning Server.

At the next explore and correlate operation for that endpoint, modify account notifications are generated. Notifications are generated if a change occurred for an attribute that is mapped to a global user attribute and a policy applies to that attribute.

More information:

Capability and Initial Attributes (see page 171)

Policies for Reverse Synchronization

When an account is created or modified on an endpoint, reverse synchronization policies can take appropriate actions in response. For example, a user creates some Active Directory accounts in several OUs in the corporate domain. Also, the user modifies some Microsoft Exchange accounts. You can detect the new and changed accounts and provide appropriate actions as a response using reverse synchronization account policies.

You can do the following using reverse synchronization:

- Configure a policy to accept the new account, reject it, or send it for workflow approval.
- Configure a policy to accept a change to an attribute, revert it to the original attribute, or send it for workflow approval.
- When an account is sent for workflow approval, the approver can perform one of the following actions:
  - Reject it (delete/suspend it from the endpoint or change the value to match the Identity Manager user store value)
  - Accept it and update the Identity Manager user store to match the account
  - Assign it to a user in User Console (in the case of account creation)

Create a Policy for New Accounts

If you want to define a process for when a new account is detected on an endpoint, you create an account policy that applies to new accounts. New account policies run when accounts are detected when the Correlate option is included in the Explore and Correlate definition. If an account was found when running explore only, the policy runs the next time the Correlate option is included when exploring that endpoint.

To create a policy for new accounts

1. In the User Console, click Endpoints, Reverse New, Create Reverse Sync New Account Policy.
2. Enter a name and description for the policy.
3. Enter the following parameters:
   - Priority—The priority of policy. The highest priority policy is the one with the lowest number. If two policies have the same priority and the same scope, either policy may run. Therefore, be sure to set different priority levels.
   - Endpoint Type—All endpoints or a specific endpoint type.
   - Endpoint—The specific endpoint name. If Endpoint Type is All, the only choice is All endpoints.
   - Container—The container where the account resides. This field applies only to hierarchical endpoints. Enter the container as a list of nodes, ending with the endpoint. For example, for an AD OU with the path "ou=child,ou=parent,ou=root,dc=domain,dc=name" the format "child,parent,root" is correct.
   - Correlated User—Controls when to run the policy based on if a correlated user is found in the Provisioning Directory.

4. Select one of the following Actions:
    - Accept—Takes no action on the account. This choice would be useful if two policies exist, one that rejects all new accounts, and a higher priority policy that accepts accounts created under a certain OU. Therefore, if the account was created at that OU, it is accepted. The reject priority does not run since it has a lower priority.
    - Delete—Removes the account from the endpoint.
    - Suspend—Leaves the account in the endpoint, but suspends it.
    - Send for Approval—Submits the change for workflow approval.
5. Perform the following steps if you set Action to Send for Approval:
    a. Click the icon next to Workflow Process.
    b. Choose a workflow process.
    c. Click OK.
6. Click Submit.

If you assigned a workflow process to the policy, you need to create an approval task (see page 149).

Create a Policy for Modified Accounts

Any account attribute in an endpoint account can be managed by Reverse Synchronization, as long as it is defined in the attribute mapping (see page 142).

To define a process for when a discrepancy is found between existing endpoint accounts and their known values in CA Identity Manager, you can create an account policy that applies to existing accounts. If an attribute is multivalued, more than one value might have been added or removed. In this case, the policy is applied to each value separately or you can create different policies for different values.

To create a policy for modified accounts

1. In the User Console, click Endpoints, Reverse Modify, Create Reverse Sync Modify Account Policy.
2. Enter a name and description for the policy.
3. Enter the following parameters:
   - Priority—The priority of policy. The highest priority policy is the one with the lowest number. If two policies have the same priority and the same scope, either policy may run. Therefore, be sure to set different priority levels.
   - Endpoint Type—All endpoints or a specific endpoint type.
   - Endpoint—The specific endpoint name. If Endpoint Type is All, the only choice is All endpoints.
   - Container—The container where the account resides. This field applies only to hierarchical endpoints. Enter the container as a list of nodes, ending with the endpoint. For example, for an AD OU with the path "ou=child,ou=parent,ou=root,dc=domain,dc=name" the format "child,parent,root" is correct.
   - Attribute—The physical name.
   - Value—A string representation of the value, which may contain ***** (asterisk) as a wildcard. The wildcard refers to any value in the change.

4. Select one of the following Actions:
   - Accept—Updates the account value in the Identity Manager user store to match the value in the endpoint account.
   - Reject—Reverts the attribute to reinstate the original value without affecting other changes to attributes for the account.
   - Send for Approval—Submits the change for workflow approval.
5. Perform the following steps if you set Action to Send for Approval:
   a. Click the icon next to Workflow Process.
   b. Choose a workflow process.
   c. Click OK.
6. Click Submit.

If you assigned a workflow process to the policy, you need to create an approval task (see page 149).

Create an Approval Task for Reverse Synchronization

You create reverse approval tasks for policies that have a Send to Workflow action. Consider the following guidelines for creating the tasks:

- For tasks that approve new accounts, you have two choices.
  - You can create a generic approval screen for accounts. The profile screen for the task shows only general information about the account. The Approve Reverse New Account task operates in this manner.
  - If the approver needs to see the details of the new account, that screen must be specific to the endpoint type. So the approval task with the screen should be used only for policies that are specific to that endpoint type. The task must include the Reverse Approval tab.
- For tasks that approve account modifications, the approval screen must be specific to an endpoint type, so that the approver can see the changed values.

Reverse approval tasks are identical to approval tasks used for account changes. If an approval task for a specific endpoint type already exists, that task can be used. For a new account, an additional reverse approval tab is needed. If an existing approval task for the endpoint type does not exist, use the following procedure.

To create an approval task for reverse synchronization

1. In the User Console, click Roles and Tasks, Admin Tasks, Create Admin Task.
2. Select the modify task for the endpoint.

   The name would start with modify and state the name of the endpoint type. Modify Active Directory Account is an example.

3. Make the following changes on the Profile tab:
   - Change the name of the new task.
   - Change the task tag.
   - Change the action to Approve Event.
4. Make the following changes on the Tabs tab:

   a. Remove all Relationship tabs.

   b. Add the Reverse Approval tab if the task is to approve new accounts. Move this tab to be the first tab.

   c. Copy and edit the approval screens on the tabs as necessary.

   Note: You may run into problems when using some account screens in an approval task. If so, modify the default account screen for the tab to make it work in the task.

5. Click Submit.
6. If the task is for new account approvals, add the task to a role to which the approver would belong. The role defines the user scope, which is used to search for users to whom the new account can be assigned.

Execute Reverse Synchronization

Reverse synchronization occurs when you use the Execute Explore and Correlate (see page 139) task. Using this task, you update the Identity Manager user store with the new or changed accounts on an endpoint.

To execute reverse synchronization

1. Create an explore and correlate definition (see page 139) that includes a Correlate option. Correlation is needed to detect new accounts.
2. Click Endpoints, Execute Explore and Correlate.
3. Choose a definition that applies to the endpoint with the new or changed accounts.

   Note: When correlating to the existing user, the user must exist in the Provisioning Directory, otherwise the user is correlated to the default user in that directory. The Identity Manager user store is not in the scope of the Explore and Correlate task.
4. Click Submit.

If a policy has no workflow process, the accounts are already processed as defined in the policy.

Note: If multiple attributes were rejected on an account that was detected by reverse synchronization policy, all actions are put into one event. However, if that event fails due to an issue with one of the attributes, no attributes are updated.

If workflow is part of the policy, any approvals generated by the reverse synchronization appear under Workflow, View My Work List for the approver.

For new accounts, the approver has the following choices:

- The approver may choose to suspend or delete the account in the endpoint, by selecting either Delete or Suspend and then clicking reject.
- Otherwise, the approver may accept the new account by clicking Approve.

  If an approver does not select a user in the Correlated User field, the account is assigned to the default user. If the Correlated User field is populated in the approval task, the account is correlated with this user. The Correlated User field contains the suggested user found by the correlation mechanism if a user can be found.

For modified accounts, the approver has the following choices:

- For each account, the approver sees which values are changed and can approve or reject them just as if the changes were initiated in the account management screens.
- The approver sees changes to capability attributes (such as an Active Directory groups) as separate approval events.

To verify if reverse synchronization succeeded

1. Go to System, View Submitted Tasks.
2. Complete the task name field as follows: Provisioning Activity
3. Click Search.

The results show if the reverse synchronization events completed successfully.

Extend Custom Attributes on Endpoints

The Provisioning Server can manage custom endpoint attributes. To enable CA Identity Manager to read custom endpoint attributes that are associated with provisioning roles, additional steps are required.

To extend custom attributes on endpoints

1. Generate metadata from the parser table if this connector was created before CA Identity Manager r12.5.

   See the *Programming Guide for Java Connector Server*.

2. Use Connector Xpress as follows:

   a. Install metadata in the namespace node.

   b. Generate a JAR file, property file, and role definition file using the Role Definition Generator.

      For details, see the *Connector Xpress Guide*.

3. Copy the JAR file to this location:

   - (Windows) *app server home*/iam_im.ear/user_console.war/WEB-INF/lib
   - (UNIX) *app server home*\iam_im.ear\user_console.war\WEB-INF\lib

     Note: For WebSphere, copy the JAR file to: WebSphere_home/AppServer/profiles/*Profile_Name*/config/cells/*Cell_name*/applications/iam_im.ear/user_console.war/WEB-INF

4. Copy the property file to this location:

   - (Windows) *app server home*/iam_im.ear/custom/provisioning/resourceBundles
   - (UNIX) *app server home**i*am_im.ear\custom\provisioning\resourceBundles

     Note: For WebSphere, copy the properties file to:

     WebSphere_home/AppServer/profiles/*Profile_Name*/config/cells/*cell_name*/applications/iam_im.ear\custom\provisioning\resourceBundles

5. Repeat the preceding two steps for each node if you have a cluster.

6. Restart the application server.
7. Import the role definition file as follows:
   a. In the Management Console, select the environment.
   b. Select Role and Task Settings.
   c. Click Import.
   d. Select the endpoint type and click Finish.

Account Tasks

In the User Console, you can create, modify, view, and delete endpoint accounts that are associated with an Identity Manager user. You can also assign other endpoint accounts that are not associated with CA Identity Manager to a user.

Four types of endpoint accounts exist:

Provisioned

Accounts created when the user is assigned a provisioning role

Exception

Accounts created when the user is assigned an account template

Orphan

Accounts created on the endpoint system and are not associated with any Identity Manager user

System

Accounts created on the endpoint system, are not associated with any Identity Manager user and are used to manage the endpoint system

Create a Provisioned Account

The recommended way to create an endpoint account for an Identity Manager user is to assign a provisioning role to the user. The user receives the account with the attributes defined in the account templates for that role. When necessary, changes to that account template, such as the mailbox size for Exchange accounts, update the endpoint account.

To create a provisioned account

1. In the User Console, select Manage Users, Modify User.
2. Select a user to modify.
3. Click the Provisioning Roles tab.
4. Click add a provisioning role.
5. Select a role.
6. Click Submit.

Create an Exception Account

You can create an account directly on the Accounts tab when you use Modify User on a user. This account is named an exception account. However, because no provisioning role is involved with this account, synchronization of roles with users does not update this account.

To create an exception account

1. In the User Console, select Users, Modify User's Endpoint Accounts.
2. Select a user to modify.
3. Click Create.
4. Select an endpoint.
5. Select a container if one is required for this endpoint type.
6. Complete the fields on each tab.
7. Click Submit.

Assign Orphan Accounts

In the User Console, you can manage orphan accounts, which are accounts not associated with an Identity Manager user.

To create a default user for orphan accounts

If the Provisioning Directory is separate from the Identity Manager user store, create the Provisioning Server default user in the Identity Manager user store. The default user is used for orphan accounts.

1. In the User Console, click the Users tab.
2. Click Manager Users, Create User.
3. Name the user as follows, including the brackets:

   ```
   [default user]
   ```

   You can now assign orphan accounts to users.

To assign an orphan account

1. In the User Console, click Endpoints,
2. Click Manage Orphan Accounts.
3. Search for and select a user.
4. Click a user to assign to the orphan user.

Assign System Accounts

In the User Console, you can manage system accounts, which are endpoint accounts that are used to manage the endpoint system.

To assign a system account to a user, you create an admin task based on the Manage System Accounts task. The new task has a specific Identity Manager user who applies for a specific endpoint. You could create one task for each type of endpoint.

To configure a task to assign system accounts

1. In the User Console, click Roles and Tasks, Admin Tasks, Create Admin Task.
2. Base the new task on the Manage System Accounts.

   For example, you could create a task named *Manage Oracle System Accounts* to assign system accounts on an Oracle endpoint type.
3. On the Search tab, click the Browse button to edit the search screen. On that screen, include a search filter for a user to assign to this system account.

4. Submit the task.
5. Include this task in a role.
6. Assign the role to a user who should assign system accounts for an endpoint to a user.

   The user with this role can execute the new task to assign system users to an Identity Manager user.

Move Accounts Between Containers on the Same Endpoint

You can move account objects between containers on the same endpoint using the User Console's Move Accounts task screen from either the Modify User's Endpoints Accounts task screen or the Manage Orphan Accounts task screen. Previously, this support was available on some hierarchical endpoints using the Provisioning Manager.

Move Accounts Using the Modify User's Endpoint Accounts

To move account objects between containers using the Modify User's Endpoint Accounts task screen

1. In the User Console, select Users, Manage Users, Modify User's Endpoint Accounts.

   The Modify User's Endpoint Accounts: Select user screen appears.
2. Click Search to search for the user whose account objects you want to move.
3. Select the user and click Search to find the accounts.
4. Select an account, click the pencil icon, and select Move *xxx* Account.

   The Move *xxx* Account screen appears.
5. Click the Select Container button to search for the available containers on the endpoint.
6. Select the container to move the account into and click Submit.

   The account is in a pending state until the move successfully finishes or fails.

   Note: Once you have returned to the Modify User's Endpoint Accounts: Select user screen, you must execute the search for accounts again before managing the moved account.

Move Accounts Using Manage Orphan Accounts

To move account objects between containers using the Manage Orphan Accounts task screen

1. In the User Console, Select Endpoints, Manager Orphan Accounts.

   The Manage Orphan Accounts screen appears.

2. Select the endpoint type or ALL and click Search to find orphan accounts.
3. Select an account, click the pencil icon, and select Move *xxx* Account.

   The Move *xxx* Account screen appears.

4. Click the Select Container button to search for the available containers on the endpoint.
5. Select the container to move the account into and click Submit.

   The account is in a pending state until the move successfully finishes or fails.

Delete an Endpoint Account

You can delete an endpoint account in two ways:

1. Using the Modify User task, on the Provisioning Roles tab, remove the role that created that account.
2. Using the Modify User's Endpoint Accounts task, delete the account.

To delete an account with Modify User's Endpoint Accounts

1. In the User Console, select Users, Modify User's Endpoint Accounts.
2. Select a user to modify.
3. Search for accounts based on an endpoint type.
4. Select an account.
5. Click the Delete button.

Deleted accounts are recreated when you use Provisioning Manager as follows:

- Synchronize User with Roles recreates provisioned accounts, accounts created when a user has a provisioning role.
- Synchronize Accounts with Account Templates recreates exception (if the account has an account template) and provisioned accounts.

Change Password for an Endpoint Account

You can change the password of an endpoint account without knowing the current password.

To change the password of an endpoint account

1. In the User Console, select Users, Modify User's Endpoint Accounts.
2. Select a user to modify.
3. Search for accounts based on an endpoint type.
4. Select one or more accounts.
5. Click the Change Password button.
6. Enter a new password.

   CA Identity Manager password policies validate the new password.
7. Click Submit.

Performing Actions on Several Accounts

You can perform several other actions on one or more accounts. For example, you can resume an account that was suspended, unlock an account when a user entered the wrong password, or assign or unassign an account to a user. The actions apply to all selected accounts and the procedure is the same.

To perform tasks on several accounts

1. In the User Console, select Users, Modify User's Endpoint Accounts.
2. Select a user to modify.
3. Search for accounts based on an endpoint type.
4. Select one or more accounts.
5. Click any of the buttons under Actions for Selected Accounts.
6. Respond to the dialog that appears and click Submit.

Advanced Account Operations

In the Provisioning Manager, you can perform a number of additional operations on accounts:

- Associate an Account with Different Global Users
- Automatically Explore Accounts
- Delete Accounts
- Use Delete Pending
- Recreated Deleted Accounts

Change the Global User for an Account

The following are instances when you would want to associate an account to a different global user:

- You have two global users with the same name and CA Identity Manager correlates the account to the wrong person
- CA Identity Manager correlated an account to the [default user] object and you want to associate it with another global user object
- You created an account using New and now you want to associate it with a global user

To associate an account with a different global user in the Provisioning Manager, drag and drop the account onto the correct global user.

How Automatic Exploration Works

The addition or deletion of accounts or other objects using tools native to the endpoint are unnoticed by CA Identity Manager until you explore the endpoint. The exploration process notices additions and deletions (and in some cases modifications) that have occurred and applies those changes to the Identity Manager representation of the object in the provisioning directory.

However, if you use the Provisioning Manager to attempt to create an object with the same name before this exploration occurs, CA Identity Manager notices that an object with that name already exists and report this error. CA Identity Manager then explores that object, creating a representation of it in the provisioning directory. You can immediately start working with that object. The automatic one-object explore occurs whenever an Add, Move or Rename operation generates an already exists error from the endpoint when the object does not exist in the provisioning directory.

You can combine automatic exploration with the Synchronization/Automatic Correlation domain configuration parameter described in the *Provisioning Reference Guide*. When these features work together, they first process an attempt to create an account from an account template as an attempt to create a new account. Then, the processing uses the following steps:

- Notices an unexplored account
- Explores that account automatically
- Correlates the account automatically to the global user
- Adds an account template to the account as though it were an existing account correlated to this global user.

Delete Accounts

If you must delete an account, you can use the following methods in the Provisioning Manager:

- Right-click the account and select Delete
- Right-click a global user and select Delete User and Accounts
- Run the Delete Accounts wizard
- Synchronize global users with provisioning roles and specify that you want to delete extra accounts

When you remove a global user from a provisioning role, the Provisioning Manager provides these choices for account deletion:

- If you decide to delete these accounts, Identity Manager removes the accounts from the provisioning directory.
- If you decide not to delete the accounts, you can use the Synchronize User with Roles option and select the Delete Account.

When you remove a global user from a provisioning role before deleting accounts, you can list the accounts for the global user. Right-click the global user and select List Accounts.

- The account listing displays the provisioning roles to which each account belongs. If an account belongs to one provisioning role, it is deleted when you remove that user from that role and accept the user synchronization action to delete the accounts.
- If an account belongs to no provisioning role, it is an extra account and is reported by Check User Synchronization. The account is deleted if you select the Synchronize the User with Roles menu item on the global user.

Use Delete Pending

CA Identity Manager can be configured on an endpoint-by-endpoint basis, so accounts on an endpoint are not deleted when administrators initiate delete or synchronization actions that would typically delete the accounts. Instead, the accounts are placed in a Delete Pending state in the User Console and in a Suspended state on the managed endpoint. CA Identity Manager also removes all account templates from the suspended accounts and clears any multi-valued capability attributes on the suspended accounts.

Delete Pending accounts can be identified in the Provisioning Manager on the Statistics tab of the account properties. A suspended account has a suspend reason of Delete Pending and a timestamp when it entered this state. The storing of the Delete Pending status and Suspended timestamp permits the writing of a utility that identifies these Delete Pending accounts and deletes them from the Provisioning Server and the managed endpoint later.

Recreate Deleted Accounts

If you delete an account on a managed endpoint by using a tool other than Identity Manager, the Check Account Synchronization feature reports the account as missing, because it exists in the Provisioning Directory but not on the managed endpoint. When this happens, recreate the account on the endpoint by issuing the Synchronize Account with Account Templates function, which recreates the account using the account templates associated to the account.

If accounts are recreated, Identity Manager logs them as recreated. These accounts can be identified separately from accounts that have been updated because administrators need to be aware that attributes other than capability attributes (for example, passwords) have been set to the original account template values.

Chapter 9: Provisioning Roles

This section contains the following topics:

Provisioning Roles and Account Templates

To simplify account management, you create and maintain accounts using account templates, which are used in provisioning roles. A provisioning role contains one or more account templates. When you apply that role to a user, the user receives the accounts as defined by the templates.

These templates provide the basis for accounts on a specific endpoint type. They provide the same type of capabilities as Provisioning Policies provided in eTrust Admin.

Using account templates, you can:

- Control what account attributes CA Identity Manager users have on an endpoint when their accounts are created
- Define attributes using rule strings or values
- Combine account attributes from different provisioning roles, so users have only one account, on a specific endpoint, with all the necessary account attributes
- Create or update account attributes as global users change provisioning roles

Role and Template Tasks

In the User Console, you can create and manage provisioning roles by choosing Roles and Tasks and selecting a task under Provisioning Roles. Tasks exist for the standard operations, such as making a user a member of a role and modifying or deleting a role.

Before creating a provisioning role, you need an account template to include in that role or a provisioning role that you want to import. You can import roles that were created in the Provisioning Manager or eTrust Admin. However, CA Identity Manager does not support nested roles that were created in eTrust Admin.

Create a Provisioning Role

You create a provisioning role once you decide about the role requirements:

- Which users need other accounts
- Which accounts are associated with the role
- Who the members, administrators, and owners of the role are

To create a provisioning role

1. In the User Console, click Roles and Tasks, Provisioning Roles, Create Provisioning Role.

   For details on each tab, click the Help link on the screen.

2. Complete the Profile tab. Only the Name field is required.

   Note: You can specify custom attributes on the Profile tab that specify additional information about provisioning roles. You can use this additional information to facilitate role searches in environments that include a significant number of roles.

3. Complete the Account Templates tab.

   a. Click an Endpoint Type, such as an ActiveDirectory.

   b. Click an account template.

      The templates that you can click are based on Endpoint Type.

   c. Add more account templates as needed for different endpoint types.

4. Complete the Provisioning Roles tab if you want to nest provisioning roles in this tab.

   This step requires that you have enabled nested roles (see page 170) for this environment.

5. Complete the Administrators tab by adding admin rules that control who manages members and administrators of this role.

6. Complete the Owners tab by adding owner rules that control who can modify this role.

7. Click Submit.

8. To verify that the role was created, click Provisioning Roles, View Provisioning Role.

Import a Provisioning Role

Although you manage provisioning roles in the User Console, some provisioning roles may have been created in Provisioning Manager or an external application. For these provisioning roles, you can reset the role owner to be a CA Identity Manager administrator, so you can manage it in the User Console.

To import a provisioning role

1. Log into the User Console as a user with the System Manager role. Click Roles and Tasks.
2. Click Provisioning Roles, Reset Provisioning Role Owners and select a provisioning role created in Provisioning Manager.
3. Complete the Owners tab by adding owner rules that control who can modify this role.
4. Click Submit.

The role can now be modified, assigned, or viewed by using tasks in the Provisioning Roles category.

Assign New Owners for Provisioning Roles

You can select one or more provisioning roles and assign owner policies to control who can modify the roles.

To assign new owners for provisioning roles

1. Log into the User Console as a user with the System Manager role.
2. Click Roles and Tasks.
3. Click Provisioning Roles, Create Owner Policies for Provisioning Roles.
4. Select one or more provisioning roles.
5. Complete the Owners tab by adding owner rules that control who can modify this role.
6. Click Submit.

Users who meet the new owner policies can modify the selected provisioning roles.

Create an Account Template

A default account template for each endpoint type is installed with the Identity Manager server. In a provisioning role, you can use the default account template or you can create your own account templates for any endpoint that you have configured (see page 137).

To create an account template

1. Select Endpoints, Account Templates, Create Account Template.
2. Select an endpoint type for the template.
3. Define Endpoint Name as the system name of the endpoint or localhost if that applies.
4. Complete the fields in the tabs or use the default values.

   Each endpoint type has a different set of tabs. Click Help for field definitions.
5. Select an endpoint to use on the Endpoints tab.
6. Click Submit.

Passwords for Accounts Created by Provisioning Roles

When a user is assigned a provisioning role, account creation for that user fails if the Identity Manager user's password does not meet the endpoint's password requirements. This situation includes creation of a new user with a temporary password.

Therefore, set the password policy to match, or be stricter than, the endpoint password requirements. You can set the password policy by using the CA Identity Manager Password Policy or the Provisioning Password Profile. If both methods are used, the policies must match.

Provisioning Role Event Processing Order

Some default CA Identity Manager tasks include *events*, actions that CA Identity Manager performs to complete a task, that determine provisioning role membership. For example, the default Modify User task includes the AssignProvisioningRoleEvent and the RevokeProvisioningRoleEvent. Assigning or revoking a provisioning role may add or remove an account on an endpoint. In some cases, the endpoint may require that all Add actions occur before Remove actions.

To make CA Identity Manager process Add actions first, you enable the Accumulation of Provisioning Role Membership Events setting in the Management Console. When this setting is enabled, CA Identity Manager accumulates all of the Add and Remove actions into a single event, called the AccumulatedProvisioningRolesEvent. For example, if the Modify User task assigns a user to three provisioning roles and removes that user from two other provisioning roles, an AccumulatedProvisioningRolesEvent will be generated which contains five actions: 3 Add actions and 2 remove actions.

When this event executes, all Add actions are combined into a single operation and sent to the Provisioning Server for processing. Once processing of the Add actions completes, CA Identity Manager combines the Remove actions into a single operation and sends that operation to the Provisioning Server.

Enabling this setting affects the following CA Identity Manager functionality:

- **Provisioning Roles Tab in User Tasks**

  When an administrator adds or removes a user from a provisioning role using the Provisioning Roles tab, CA Identity Manager accumulates those actions into a single event.

- **Identity Policies**

  All provisioning role membership events (AssignProvisioningRoleEvent or RevokeProvisioningRoleEvent) that are generated as a result of an Identity Policy evaluation are accumulated into a single AccumulatedProvisioningRolesEvent. CA Identity Manager executes this event like any other secondary event. For example, consider an identity policy set that includes two identity policies: Policy A revokes membership in the Provisioning Role A and Policy B makes users members of Provisioning Role B. If CA Identity Manager determines that a user no longer satisfies Policy A, but now satisfies PolicyB, an AccumulatedProvisioningRolesEvent that contains two actions (one for the remove action and one for the add action) is generated. The Add action is executed first and then the Remove action is executed.

- **View Submitted Tasks**

  To view the status of the AccumulatedProvisioningRolesEvent and the status for each of the individual actions, use the View Submitted Tasks task to view event details.

  If one of the individual actions fails, the status of the event is failed, which moves the task to a failed state.

- **Workflow**

  You can associate a workflow process with the AccumulatedProvisioningRolesEvent. In this case, an approver can approve or reject the entire event, which approves or rejects each of the individual events.

  Additional configuration (see page 168) is required to enable workflow for individual events within the AccumulatedProvisioningRolesEvent.

- **Auditing**

  CA Identity Manager audits information about the AccumulatedProvisioningRolesEvent and each individual event.

Enable Provisioning Role Membership Event Accumulation

CA Identity Manager provides a configuration setting in the Management Console that enables the combination of all Add and Remove actions for a provisioning role membership event into a single operation. Once combined, CA Identity Manager processes the Add actions as a single operation before processing the Remove actions.

This setting allows sequencing of events required by some endpoint types.

Note: This feature is disabled by default.

To enable Provisioning Role Membership Event Accumulation

1. Access the Identity Manager Management Console.
2. Click Environments.
3. Select the environment that you want to configure.
4. Open Advanced Settings, Provisioning.
5. Select the Enable Accumulation of Provisioning Role Membership Events check box.
6. Restart the application server.

Add Workflow Support for AccumulatedProvisioningRolesEvent

If approvals are required for the individual add/remove actions within the AccumulatedProvisioningRolesEvent, additional configuration is required for updating roles, tasks, and workflow process definitions.

Note: This additional configuration is required **only** if deployments need to approve individual actions within the AccumulatedProvisioningRolesEvent, *and* the CA Identity Manager environment was created in a release before CA Identity Manager r12 CR1.

To approve or reject individual actions within the AccummulatedProvisioningRolesEvent, an approver uses a specific approval screen that lets him select an Approve or Reject radio button for each action. If at least one action is approved, the event moves into the approved state and gets executed. If all actions are rejected, the event moves into the rejected state and then to the canceled state.

Note: To view the status of each action, use the View Submitted Tasks task to view the details of the AccumulatedProvisioningRolesEvent.

This procedure includes references to *admin_tools*, which represents the folder for the CA Identity Manager Administrative Tools.

The Administrative Tools are placed in the following default locations:

- **Windows:** C:\Program Files\CA\Identity Manager\IAM Suite\Identity Manager\tools
- **UNIX:** /opt/CA/IdentityManager/IAM_Suite/Identity_Manager/tools

To enable workflow for the AccumulatedProvisioningRolesEvent

1. In the Management Console, select an environment.
2. Click Role and Task Settings.
3. Import the appropriate Upgrade-12-to-12.5SP-RoleDefinitions.xml file (either the Organization or NoOrganization version).

   Note: For new environments created with CA Identity Manager r12.0 CR1 or later, the AccumulatedProvisioningRolesUpdate.xml import is not necessary as the approval task is available with new environments.
4. Restart the application server.
5. Verify that the Approve Accumulated Provisioning Roles task exists by using View Admin Task.
6. Run the Archive.bat program, which is located in the *admin_tools*\Workpoint\bin folder.
7. Import the AccumulatedProvisioningRolesApproveProcess.zip, which is located in the *admin_tools*\Workpoint\bin folder.
8. Open Designer.bat to verify that this process definition now exists.

   Workflow now supports the AccumulatedProvisioningRolesEvent.

Enable Nested Roles in an Environment

You can include a provisioning role within another provisioning role. The included role is named a nested role.

For example, you could create an Employee provisioning role. The Employee role would provide accounts needed by all employees, such as email accounts. You include the Employee role in department-specific provisioning roles, such as a Finance role and a Sales role. The department provisioning roles would provide accounts related only to that department. This combination of roles provides the right accounts for each user.

To enable Nested Roles in an environment

1. In the Management Console, select the environment.
2. Click Role and Task Settings, Import.
3. Select Nested Provisioning Roles Support.
4. Click Finish.
5. Restart the environment.

Include a Role in a Provisioning Role

To include a role in a Provisioning Role

1. Click Roles and Tasks, Provisioning Roles, Modify Provisioning Roles.
2. Complete the Provisioning Roles tab by clicking Add a Role and select a provisioning role.

   For performance reasons, we recommend limiting role nesting to three levels. For example, you are including in the current provisioning role (the first-level role) another role (the second-level role), which can contain a third-level role. We recommend that the third-level role contains no role.
3. Complete the owner policy by modifying the owner rule.

   The scope must be equal to or broader than the scope for the role you added.
4. Click Submit.

Attributes in Account Templates

The attributes in account templates determine how attributes are defined in the account.

Capability and Initial Attributes

Account templates include two types of attributes:

- *Capability attributes* represent account information, such as storage size, quantity, frequency limits, or group memberships. Provisioning Manager bolds the capability attributes on all account template screens to make identifying capability attributes easy.
- *Initial attributes* represent all information that is initially set for an account, such as account name, password, and account status and personal information such as name, address and telephone numbers.

Accounts are considered synchronized with their account templates when all the capability attributes are synchronized. These are attributes that differ from endpoint type to endpoint type such as group memberships, privileges, quotas, login-restrictions; they control what the user can do when logging into the account.

Synchronization does not update other account attributes. They are initialized from the account templates during account creation and they can also be updated during propagation functions. The Provisioning Server provides two propagation functions (an immediate update of accounts at the time the account template is changed and an update of accounts at the time global user attributes change).

Rule Strings in Account Templates

When you create an account template, you use rules strings to define the format of many account attributes. Rule strings are variables for the actual value. Rules strings are useful when you want to generate attributes that change from one account to another. When rules are evaluated, CA Identity Manager replaces the rule strings entered in the account templates with data specified in the user object.

Note: Rule evaluation is not performed on accounts created during an exploration or on accounts created without provisioning roles.

Because account names must be unique, enter a %AC% rule string in the account name field on an account template. When CA Identity Manager creates an account using this account template, it uses the account name of the user.

The following table lists the rule strings in CA Identity Manager:

Rule String	Description
%AC%	Account name

Rule String	Description
%D%	Current date in the format *dd/mm/yyyy* (the date is a computed value that does not involve the global user information*).* This rule string is equivalent to one of the following: %$$DATE()% %$$DATE%
%EXCHAB%	Mailbox hide from exchange address book
%EXCHS%	Mailbox home server name
%EXCMS%	Mailbox store name
%GENUID%	Numeric UNIX/POSIX user identifier. This rule variable is the same as %UID% as long as the global user UID value is set. However, if the global user has no assigned UID value, and UID-generation is enabled (Global Properties on System Task), several actions occur. The next available UID value is allocated, assigned to the global user, and used as the value of this rule variable.
%P%	Password
%U%	Global user name
%UA%	Full address (generated from street, city, state, and postal code)
%UB%	Building
%UC%	City
%UCOMP%	Company name
%UCOUNTRY%	Country
%UCU*xx*% or %UCU*xxx*%	Custom field (*xx* or *xxx* represents the two-digit or three-digit field ID as specified on the Custom User Fields tab in the System Task frame)
%UD%	Description
%UDEPT%	Department
%UE%	Email address
%UEP%	Primary email address
%UES%	Secondary email addresses
%UF%	First name
%UFAX%	Facsimile number
%UHP%	Home page

Rule String	Description
%UI%	Initials
%UID%	Numeric UNIX/POSIX User Identifier
%UL%	Last name
%ULOC%	Location
%UMI%	Middle initial
%UMN%	Middle name
%UMP%	Mobile telephone number
%UN%	Full name
%UO%	Office name
%UP%	Telephone number
%UPAGE%	Pager number
%UPC%	Postal code, ZIP Code
%UPE%	Telephone number extension
%US%	State
%USA%	Street address
%UT%	Job title
%XD%	Generates the current timestamp in XML dateTimeValue format, a fixed-length string format. In a dateValue or timeValue attribute, you can write an (:offset,length) substring expression to extract the date or time parts of the dateTimeValue. For example, %XD:1,10% yields YYYY-MM-DD; and %XD:12,8% yields HH:MM:SS.

Values for Attributes

To use a specific, constant value for an account attribute, enter the value in the account template field instead of in a rule string. For example, you can enter values for specifying frequency limits or quantity size.

If the constant attribute value must contain more than one percent sign, enter two percent signs (%%) each time. CA Identity Manager translates them to one percent sign (%) when building the account attribute value. If the account template value contains only one percent sign, CA Identity Manager does not generate an error. The rule states that if you want a literal value of 25%, you must specify 25%%. However, as a special case, 25% will be accepted.

Advanced Rule Expressions

To provide greater flexibility than simple global user attribute substitution, you can enter advanced rule expressions, including the following:

- Substrings of rule expressions using Offset and Length
- Combinations of rule strings and values
- Rule expressions to set multiple values for multivalued account attributes
- Rule variables for other global user attributes
- Invocation of Built-in functions
- Invocation of customer-written Program Exit functions

Combining Rule Strings and Values

You can combine rule strings and constant values into an account template attribute value. For example, if there were no %UI% rule string, you could obtain the same effect by concatenating multiple rule expressions as follows:

```
%UF:,1%%UMI:,1%%UL:,1%
```

The %UA% rule string is equivalent to the following:

```
%USA%, %UC%, %US%, %UPC%
```

You can also combine a rule string with a constant value to create a UNIX home endpoint attribute as follows:

```
/u/home/%AC%
```

Rule Substrings

The following is the syntax for creating a substring value of a rule variable:

```
%var[:offset,length]%
```

var

Represents the name of the predefined rule variable as defined in the table shown previously.

offset

(Optional) Defines the starting offset of the substring suffix. The number 1 represents the first character.

length

(Optional) Defines the ending offset of the substring suffix. A length value of asterisk (*) indicates to the end of the value.

For example, to set an account attribute to the first 4 characters of a global user's Building attribute, use the following to define the variable:

```
%UB:1,4%
```

If the Building attribute is empty or has fewer than four characters, the resulting account attribute value will have fewer than four characters.

Multivalued Rule Expressions

Most rule expressions are single-valued. They start from one user attribute value (possibly empty) and result in one account attribute value (also possibly empty). However, sometimes you want to consider an empty user attribute as 0 values. Sometimes you may want to generate multiple values to populate a multivalued account attribute value.

The following rule syntax lets you work with zero or more values that a user attribute may contain:

%**var*%

The optional multivalued flag asterisk (*) immediately after the first percent sign % of a rule expression indicates that the result of this rule expression should be 0, 1 or more than 1 value depending on how many values the referenced user attribute contains.

Most user attribute values are single-valued, so they may only contain 0 or 1 values. However, the custom attributes (CustomField01 through CustomField99) are multivalued attributes, so a rule variable referencing these attributes may contain 0, 1, or more than 1 value.

If a user attribute has more than 1 value, but you fail to include the asterisk (*) in your rule expression, then the result of the rule evaluation will be that of the first value. However, in most cases attribute values are officially unordered and as a result the value that CA Identity Manager considers first may not be predictable.

If a user attribute has more than one value, and you include the * in your rule expression, multiple values are generated for the account attribute. Do not define such a multivalued rule expression in an account template if the account attribute being set from that account template attribute is not itself multivalued.

You can define an extended account attribute in the ADS endpoint type to be multivalued; and use this multivalued rule expression syntax to set that attribute. For example, consider an environment that defines an extended ADS account attribute named patents and custom user attribute number three also named patents.

An ADS account template could define, for the patents attribute, the rule string %*UCU03%. Then, you could change a user's patents attribute by adding one or more values. When applying the changes to the user, select the option of updating the user's accounts. This consults the account's account template, finds the rule variable %*UCU03%, and knows to copy all of the user's patents to the account's patents attribute.

Similarly, during account creation, rule strings are evaluated. Furthermore, during account template change, if the rule string has been changed, you can choose to recompute the rule for all accounts associated to the account template.

The %**var*% syntax is also meaningful for variables *var* that refer to single-valued user attributes. This is true only when concatenation is involved and if the referenced attributes are unset on users.

The optional multivalued flag asterisk (*) indicates that the rule containing a %**var*% rule variable evaluates to no value if the user attribute has no values. This is different from the single-valued rule expression %*var*%, which always evaluates to a single value, even if it is an empty string.

To understand this difference, consider the following rule strings:

```
(310)%UP%
 (310)%*UP%
```

Both rule strings appear to append area code 310 to the telephone number. However, they are different because if users have no value for their telephone number, the first rule evaluates to the account value of (310). The second rule string generates no value and leaves the account attribute unset.

On the other hand, consider the following rule strings that appear to append the telephone extension to the telephone number:

```
%UP% %UPE%
%UP% %*UPE%
```

If everyone has a telephone number, but some do not have extensions, the first rule string generates a value that includes the phone number for each user with no extension. The second rule string generates no values. In this case, use the first rule with %UPE%.

Explicit Global User Attribute Rules

Each user has many more attributes than are listed in the previous rule table. You will probably have no need to create rule expressions referencing any of these other attributes. However, should the need arise, you can use the following syntax to refer to a specific user attribute:

```
%#ldap-attribute%
```

For instance, if you must determine the value of the user's Suspended field, you would determine the corresponding LDAP attribute name for this field (which is eTSuspended) and create the rule expression that evaluates to 0 or 1, like eTSuspended:

```
%#eTSuspended%
```

As another example, you can obtain the user's assigned provisioning roles with the following rule expression:

```
%*#eTRoleDN%
```

These provisioning roles are full LDAP distinguished name values. Perhaps in conjunction with the built-in function RDNVALUE (see the table that follows), the values would be a little more useful. Note the multi-value indicator asterisk (*) so as to obtain all of the user's assigned provisioning roles as multiple values.

The substring syntax is also applicable to these rule expressions, so you could use %#eTTelephone:6,*% to mean the same thing as %UP:6,*. Each asks CA Identity Manager to strip off the first five characters of the user's telephone field.

Built-in Rule Functions

You may use built-in rule functions in your rule expressions to perform various transformations on the values. The general form of built-in rule function invocation is

```
%[*]$$function(arg[,…])[:offset,length]%
```

where the multivalued indicator asterisk (*) and the offset and length substring specifications are once again optional.

The recognized built-in functions are as follows:

Built-in Rule Function	Description
ALLOF	Merges all the parameters into a multivalued attribute. Order is preserved and duplicates are removed. For example, if user attributes are set to the following: eTCustomField01: { A, B } eTCustomField02: { A, C } Then, the rule: %*ALLOF(%*UCU01%,%*UCU02%)% evaluates to three values { A, B, C }.
DATE	Evaluates to the current date in *dd/mm/yyyy* format. The rule expression %D% is equivalent to one of the following: %$$DATE()% %$$DATE%
FIRSTOF	Returns the first value of any of the parameters. Used to insert a default value if an attribute is not set: %$$FIRSTOF(%UCU01%,'unknown')% %$$FIRSTOF(%LN%,%UCU01%,%U%)% If none of the values is set, the result is no values. To enter a constant string in an argument, enclose it in single quotes.
INDEX	Returns one value of a multivalued attribute. Index 1 is the first value. If the index is greater than the number of values, the result is the unset (empty) value. The following rules are equivalent to the following: %$$INDEX(%*UCU01%,1)% %$$FIRSTOF(%*UCU01%)%

Built-in Rule Function	Description
NOTEMPTY	Returns the single value of its one argument, but reports a failure if this attribute value is not set. Example 1: Fail the account creation or update if the user does not have an assigned UID attribute: %$$NOTEMPTY(%UID%)% Example 2: Use the first name, unless it is not set, in which case use the last name. If neither is set, fail the account creation or update. %$$NOTEMPTY(%$$FIRSTOF(%UF%, %UL%)%)%
PRIMARYEMAIL	Returns the primary email address extracted from the multiple email addresses. The expression %UE% is equivalent to the following: %$$PRIMARYEMAIL(%UEP%)%
RDNVALUE	Treats the attribute value as an LDAP distinguished name and extracts the common name of the object from that DN: %*$$RDNVALUE(%#eTRoleDN%)% This returns the common names of all assigned provisioning roles. If the user belongs to two provisioning roles with the same common name, that role name is listed once.
TOLOWER	Converts uppercase text to lowercase: %$$TOLOWER(%AC%)%
TOUPPER	Converts lowercase text to uppercase: %$$TOUPPER(%U%)%

Built-in Rule Function	Description
TRIM	Removes leading and trailing blank characters from an attribute value. For example, “%UF %UL%” would generally create a value with a first and last name separated by a blank character. However, if the user had an empty first name attribute, this rule would generate a value ending with a trailing blank. However, using “%$$TRIM(%UF% %UL%)% ensures that no leading or trailing blank exists in the account attribute value even if one or the other of First Name and Last Name was unset.

Provisioning Role Performance

When using Identity Manager with a Provisioning Server, there are some provisioning performance enhancements you may want to consider.

JIAM Object Cache

Identity Manager communicates with the Provisioning Server using the Java IAM (JIAM) API. To improve communication performance, you configure a cache for objects retrieved from the Provisioning Server.

Enable the JIAM Cache

To enable the JIAM Cache

1. Access the environment settings through the Management Console. Click Advanced Settings, Miscellaneous.
2. Configure the User Defined Property for the JIAM Cache.
   - **Property**—JIAMCache
   - **Value**—true
3. Click Add.
4. Click Save.

   The User Defined Property is saved.

Define the JIAM Cache TTL (Time-to-live)

The JIAM Cache stores information for a specified period of time before the data expires. This period of time is referred to as time-to-live (TTL). You set the JIAM Cache TTL value (in seconds) to define how long data remains in the cache.

To gain the maximum benefit from locally cached data, you balance performance gains against timely data. We recommend a minimum TTL value of 1 day with a maximum value of 7 days. See the following table for time-to-live values to use:

Desired Lifetime	TTL Settings (secs)
24 hours (1 day)	86,400
72 hours (3 days)	259,200
120 hours (5 days)	432,000
168 hours (7 days)	604,800

To define the JIAM Cache TTL

1. Access the Environment through the Management Console. Click Advanced Settings, Miscellaneous.
2. Configure the User Defined Property for the JIAM Cache TTL.
   - **Property**—JIAMCacheTTL
   - **Value**—number of seconds that data remains in the JIAM Cache

     Default: 300
3. Click Add.
4. Click Save.

   The User Defined Property is saved.

Session Pooling

To improve performance, Identity Manager can pre-allocate a number of sessions to be pooled for use when communicating with the Provisioning Server.

For more information on Session Pooling, see the *Management Console Online Help.*

Provisioning Tasks for Existing Environments

If you import custom roles definitions and want to enable provisioning on an environment, you must *also* import the Provisioning Only role definitions in the Management Console. These role definitions can be found in this folder:

```
iam_im.ear\management_console.war\WEB-INF\Template\environment
```

Note: For more information on importing role definitions, see the *Configuration Guide*.

Chapter 10: Synchronization

This section contains the following topics:

User Synchronization between Servers

You configure synchronization in Identity Manager to make sure that the users for corporate directory and provisioning directory have matching data. To handle changes from either directory, you configure inbound and outbound synchronization.

Inbound Synchronization

Inbound synchronization keeps Identity Manager users up to date with changes that occur in the provisioning directory. Changes in the provisioning directory include those made using Provisioning Manager or systems with connectors to the Provisioning Server. The synchronization uses the mappings defined on the Provisioning screen of the Management Console.

Status of Provisioning Manager Operations

When you use View Submitted Task to view an operation that was performed in Provisioning Manager, you may not see the actual status of the operation. For example, you may have used Provisioning Manager to attempt to acquire an endpoint and that operation failed. However, the task is shown as completed when you use View Submitted Tasks in the User Console. In this situation, check the event details for the actual status of the task.

Failover for Inbound Synchronization

Fail over to an alternate Identity Manager Server URL occurs only if the application server named by a URL is not running. If the application server is running and accepts the notification but then encounters a configuration error, such as unknown environment or environment not started, these errors block the delivery of notifications. These problems must be resolved before inbound notifications functions properly.

Outbound Synchronization

Outbound synchronization involves using Identity Manager to create and update users in the provisioning directory.

Create Global Users from Identity Manager

User creation in the provisioning directory occurs only for provisioning related events, such as assigning a provisioning role to a user. No user is created in the provisioning directory when you use an admin task to create a user unless that task assigns a role or includes an identity policy that assigns the role.

When user creation in Identity Manager triggers user creation in the provisioning directory, Identity Manager sends an email with a temporary password to the new user's email address as it is defined in the provisioning directory. The user can log into to the User Console with that password, however, the user is then required to change to a new password. As a result, the password is synchronized between the user store and provisioning directory.

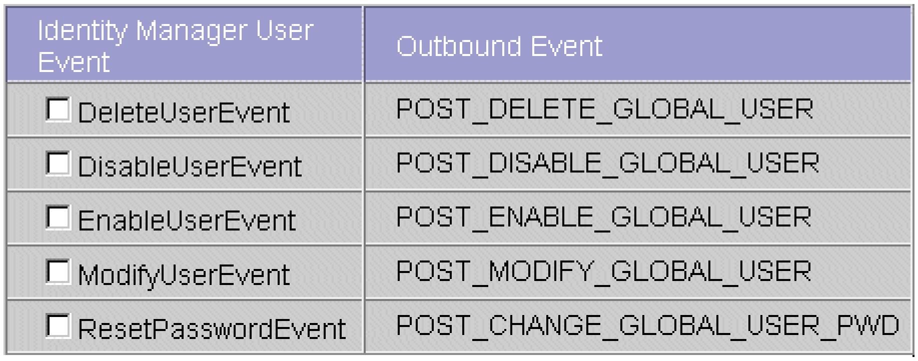
If the user has no email address, the user cannot access the User Console until changing password in the user store, or an Identity Manager administrator changes the user's password in the Provisioning Manager.

Note: To email a temporary password, email notifications must be enabled for the Environment, and the CreateProvisioningUserNotificationEvent must be configured for email notification. (See the *Configuration Guide*.)

Update Global Users using Identity Manager

Updates to users in the provisioning directory occur when you use an admin task that modifies users. If no global user exists, no synchronization occurs.

Outbound mappings match the Identity Manager user events to an outbound event that affects the provisioning directory.



Identity Manager User Event	Outbound Event
□ DeleteUserEvent	POST_DELETE_GLOBAL_USER
□ DisableUserEvent	POST_DISABLE_GLOBAL_USER
□ EnableUserEvent	POST_ENABLE_GLOBAL_USER
□ ModifyUserEvent	POST_MODIFY_GLOBAL_USER
□ ResetPasswordEvent	POST_CHANGE_GLOBAL_USER_PWD

If a user exists in the provisioning directory but not in Identity Manager, you can create that user in the User Console. If you have mapped attributes for the create task and the users have the same user ID, the attributes for the provisioning user are updated in the provisioning directory. Now you can manage that user from Identity Manager.

Note: If an event updates user attributes and you want the values to be synchronized to CA Identity Manager, then you need to map the events to the Outbound Event: POST_MODIFY_GLOBAL_USER.

Delete Global Users using Identity Manager

By default, outbound synchronization is configured for the Delete User event. When you delete a user in Identity Manager, the user is also deleted in the provisioning directory and all endpoint accounts.

If CA Identity Manager cannot delete a user's account in a managed endpoint, it deletes the user from the remaining accounts, but does not delete the user from the provisioning directory.

For example, suppose User A has a UNIX account and an Exchange account, which are managed in the Provisioning Server. When user A is deleted in Identity Manager, the Provisioning Server attempts to delete the user's accounts. If the Provisioning Server cannot delete the Exchange account due to a communication error, it deletes user A's UNIX account, but does not delete the user from the provisioning directory. However, User A is not restored in the user store.

Enable Password Synchronization

The Provisioning Server allows password synchronization between Identity Manager users and associated endpoint user accounts. Two configurations are required to enable endpoint initiated changes:

- Endpoints must be configured to capture endpoint-initiated changes and forward the changes to the Provisioning Server.
- The Enable Password Synchronization Agent attribute should be activated for the Global User.

To enable password synchronization

1. In the Management Console, choose Advanced Settings, Provisioning.
2. Check Enable Password Changes from Endpoint Accounts.
3. Click Save.
4. Restart the Application Server.

More information:

Password Synchronization (see page 119)

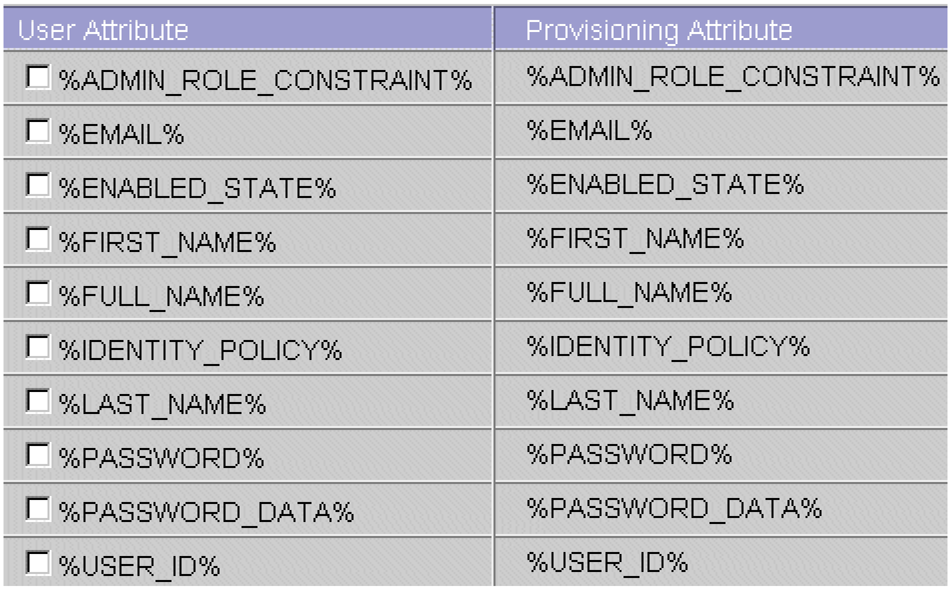
Synchronize Users in Create or Modify User Tasks

On the profile tab of a task that creates or modifies users, synchronization controls ensure that changes to the Identity Manager are also made to the global user. If you create admin tasks that create or modify users and you have Identity Policies, set the synchronization controls as follows:

- Set User Synchronization to On Task Completion.
- Set Account Synchronization to On Task Completion.

Note: For best performance, select the On Task Completion option. However, if you select the On Task Completion option for a task that includes multiple events, Identity Manager does not synchronize until all of the events in the task complete. If one or more of those events require workflow approval, this may take several days. To prevent Identity Manager from waiting to apply identity policies or synchronize accounts until all events complete, select the On Every Event option.

If you add attributes to admin tasks that manage users, you need to update the Attribute Mappings in the Provisioning screen in the Management Console. For each user attribute in Identity Manager, a default provisioning attribute exists.



User Attribute	Provisioning Attribute
□ %ADMIN_ROLE_CONSTRAINT%	%ADMIN_ROLE_CONSTRAINT%
□ %EMAIL%	%EMAIL%
□ %ENABLED_STATE%	%ENABLED_STATE%
□ %FIRST_NAME%	%FIRST_NAME%
□ %FULL_NAME%	%FULL_NAME%
□ %IDENTITY_POLICY%	%IDENTITY_POLICY%
□ %LAST_NAME%	%LAST_NAME%
□ %PASSWORD%	%PASSWORD%
□ %PASSWORD_DATA%	%PASSWORD_DATA%
□ %USER_ID%	%USER_ID%

Synchronization in Provisioning Manager

You can perform the following types of synchronization in Provisioning Manager:

User Synchronization

Ensures that each global user has the necessary accounts on the appropriate managed endpoints, and that each account is assigned to the appropriate account templates as called out by the global user's provisioning roles.

Account Synchronization

Ensures that the capability attribute values on accounts are the appropriate values as indicated by the account's assigned account templates. Account synchronization can be strong or weak. Weak synchronization ensures that accounts capability attributes have at least the minimum capability required by its account templates. Strong synchronization ensures that account capability attributes have the exact capability required by its account templates. Account synchronization is strong if the account belongs to at least one account template whose Strong Synchronization check box is selected.

No corresponding Strong Synchronization check box governs User Synchronization, but a similar concept exists. When you issue the Synchronize User with Roles menu item on a global user, you are presented with two synchronization options:

- Add missing accounts and account template assignments.
- Delete extra accounts and account template assignments.
- By selecting only the Add check box, which is similar to Weak Account Synchronization, you want global users to have at a minimum all accounts required by their assigned provisioning roles, but you allow global users to have additional accounts not prescribed by current provisioning roles.

Select both the Add and Delete check boxes, which is similar to Strong Account Synchronization, to have the provisioning roles define exactly which accounts the global user should have. Any additional accounts are deleted.

Choose Weak/Strong Account Synchronization or Weak/Strong User Synchronization based on how precisely provisioning roles are defined. If your users fit into clearly-defined provisioning roles where account access is tied to those roles, you would use Strong Synchronization.

Note: Some endpoint types set strong synchronization as the default. For more information, see your endpoint type-specific *Connector Guide*.

User synchronization and account synchronization are separate tasks that you must perform individually. Typically, you perform user synchronization first to ensure that all necessary accounts are created, then perform account synchronization later so the Provisioning Server assigns or changes the values of the account attributes.

The Provisioning Server provides two sets of synchronization menu options for objects:

- Check synchronization menu options verify the synchronization and return a list of the accounts that do not comply with the provisioning roles or account templates.
- Synchronize menu options synchronize global users with their provisioning roles or accounts with their account templates.

If you perform the check synchronization functions first, the Provisioning Server tells you what corrections the synchronize functions will perform. If the check synchronization functions find no problem, the synchronize functions do not run.

Note: You need not run the check synchronization functions first. However, if you are becoming familiar with Provisioning Manager, we recommend that you run these commands so you learn what to expect from synchronization functions.

Why Global Users Become Out of Sync

The following are some reasons why global users become out of sync with their provisioning roles or account templates:

- Earlier attempts to create the necessary accounts failed due to hardware or software problems in your network, thereby causing missing accounts.
- Provisioning roles and account templates may have changed, thereby creating extra or missing accounts.
- Accounts were assigned to account templates after they were created, so accounts exist that have not been synchronized with their account templates.
- The creation of a new account is delayed because the account was specified to be created later.
- A new endpoint was acquired. During exploration and correlation, the Provisioning Server does not assign provisioning roles to the global users automatically, so you must update the role to indicate which users should have accounts on the new endpoint. Any account that was correlated to a global user is listed as an extra account when the global user is synchronized.
- An existing account was assigned to a global user by copying the account to the global user, thereby performing a manual correlation and establishing an extra account.
- An account was created for a global user other than by assigning the user to a role. For example, if you copy a global user to an account template that is not in any of the user's provisioning roles, the account is listed as an extra account or as an account with an extra account template. If you copy the global user to an endpoint to create an account using the endpoint's default account template, that account could be an extra account.

Global User Synchronization

User synchronization creates, updates, or deletes accounts so they comply with the provisioning role assigned to the global user. So if administrators add or delete accounts on your managed endpoint by using native tools, and you have not performed a recent re-exploration of your endpoint to update the provisioning directory, User Synchronization may indicate no problems exists when actually a user may have extra or missing accounts.

Create Accounts

Because provisioning roles contain account templates, and account templates are associated to endpoints, a global user should have accounts listed on each endpoint with the correct account attributes.

During the user synchronization process, if CA Identity Manager discovers that a required account does not exist on an endpoint, it creates the account on the endpoint. If more than one account template in the global user's provisioning roles prescribes the same account, the account is created by merging all relevant account templates. This account is assigned to those account templates, which are currently not synchronized with the account. Account synchronization is not necessary on newly created accounts.

Add Account Templates to Accounts

If an existing account is missing one or more account template assignments, user synchronization assigns an existing account to those Account Templates. When an account is assigned to one or more new Account Templates, account synchronization is run automatically to update the capability attributes of the account to capabilities specified by the Account Templates.

After account update from user synchronization, the account may or may not be in sync with its Account Templates. If one of the Account Templates added was a strong synchronization account template or if two or more Account Templates were added to an account, user synchronization will start a full account synchronization on the account. However, if only one weak synchronization account template was added, user synchronization starts an account synchronization involving only this one account template. If the account was previously out of account synchronization with its other Account Templates before this update, it could still be out of account synchronization afterwards.

Delete Accounts

During user synchronization, you have the option to delete extra accounts. You may determine that your users have legitimate reasons for having accounts other than those required by their provisioning roles. If that is the case, you should not select this delete option.

If an account being deleted resides in a managed endpoint for which account deletions have been disabled, the account is not actually deleted. See the section Using Delete Pending.

Removing Account Templates from Accounts

User synchronization can also be used to remove extra account templates from an account. This is only done if you select the delete option. When user synchronization determines that an account needs to be updated to remove one or more extra account templates, account synchronization is run automatically on the account to synchronize its capability attributes with the account templates remaining on the account.

This account synchronization that occurs when removing account templates from an account will use strong synchronization if any of the remaining account templates is marked for strong synchronization and weak synchronization if all of the remaining account templates are marked for weak synchronization.

Whether weak or strong synchronization is used affects whether account capabilities granted earlier when an account template was assigned to an account are taken away when that that account template is later removed. With strong synchronization, a capability granted by an account template, such as a group membership or higher quota, will be taken away (group membership removed or quota lowered) if none of the account templates remaining on the account prescribe that capability. However, with weak synchronization, typically the account is unchanged because the Provisioning Server does not distinguish between on-demand extra capabilities and capabilities granted through account templates.

The exception to this rule is for certain multivalued capability attributes designated as SyncRemoveValues attributes. A simple multivalued attribute representing a collection of values assigned to the account (a group membership list, say), will typically be listed as a SyncRemoveValues attribute. For these attributes, the weak synchronization action that occurs while removing an account template from an account will remove values prescribed by the account template that is being removed - as long as that value is not also prescribed by one of the remaining account templates.

For example, if you create your account templates where each account template assigns a unique group membership to your account, this SyncRemoveValues feature will mean that when you change a global user's provisioning roles so as to no longer require a particular account template, the account will be updated to no longer belong to the group prescribed by that account template. You will note that this is not exactly the same as strong synchronization, as group memberships given to accounts beyond what is prescribed to account templates are retained.

For all single-valued attributes and certain multivalued attributes which are not designated as SyncRemoveValues attributes, the weak synchronization action while removing an account template from an account is the same as a normal weak synchronization action - capabilities are never removed.

If you want the capabilities never to be removed by weak synchronization, disable the SyncRemoveValues feature by setting the domain configuration parameter Synchronize/Remove Account Template Values from Accounts to No.

Check User Synchronization

You can check synchronization on global users or provisioning roles to list accounts that are missing. For global users, the list may include extra accounts or account templates. You can select synchronization checking for a global user or a provisioning role.

The following table describes what the Provisioning Server looks for when you check user synchronization:

Object	Action
Global user	Ensures that the global user has all the accounts required by the person's provisioning roles and ensures each account belongs to the correct account templates.
Provisioning Role	Ensures that each global user assigned to the provisioning role has all the accounts required. It also ensures that each account belongs to the account templates associated with the role.

Synchronize Global Users or Roles

You can perform user synchronization on global users or roles. Synchronization is a choice on the right-click pop-up menu for a global user or a role. The following table describes what the Provisioning Manager does when it synchronizes global users or roles:

Object	Action
Global user	Synchronizes the global user with each role associated to it.
Role	Synchronizes the role with each global user associated to it.

Account Template Synchronization

In Provisioning Manager, changes that you make to account templates affect the existing accounts as follows:

- If you change the value of a capability attribute in Provisioning Manager, the corresponding account attribute is updated, if necessary, to be in synchronization with the account template attribute value. See the description of weak and strong synchronization.

- Certain account attributes are designated by the connector as not being updated on account template changes. Examples are certain attributes that the endpoint type only allows to be set during account creation, and the Password attribute, where you would not want to accidentally reset all user's passwords with an inadvertent Yes response.

After you modify an account template in Provisioning Manager, the Account Template Attribute Changes dialog appears. This dialog lists the account attributes that have changed and the account attributes that will be updated if you answer Yes to the question to update account attributes now. The dialog distinguishes the three kinds of attributes described previously with regard to how they affect accounts (initial attribute, capability attribute, template-only attribute).

Note: If you update attributes that affect the account template only, the dialog does not open. Moreover, in some endpoint types, fields on the property sheet do not correspond with the account attributes on a one-to-one basis; therefore, two or more fields might affect a single attribute.

How Capability Attributes are Synchronized

When you change capability attributes in an account template, the corresponding attribute on the accounts may change. The affect on a particular account's attributes depends on two factors:

- Whether the account template is defined to use weak or strong synchronization
- Whether the account belongs to multiple account templates

Weak Synchronization

To specify strong or weak synchronization, click the Account Template tab on the property sheet and select or clear the Strong Synchronization check box.

Weak synchronization ensures that global users have the minimum capability attributes that their accounts should possess. Weak synchronization is the default in most endpoint types. If you update a template that uses weak synchronization and accept the option to update associated accounts, CA Identity Manager updates capability attributes as follows:

- If a number field is updated in an account template and the new number is greater than the number in the account, CA Identity Manager changes the value in the account to match the new number.
- If a check box was not selected in an account template and you subsequently select it, CA Identity Manager updates the check box on any account where the check box is not selected.
- If a list is changed in an account template, CA Identity Manager updates all accounts to include any value from the new list that was not included in the account's list of values.

If an account belongs to other account templates (whether those templates use weak or strong synchronization), CA Identity Manager consults only the template that is changing. This is more efficient than checking every account template. Because weak synchronization only adds capabilities to accounts, it generally is not necessary to consult those other account templates.

Note: When propagating from a weak synchronization account template, changes that would remove or lower capabilities could leave some accounts unsynchronized. Remember that with weak synchronization, capabilities are never removed or lowered. Without consulting other templates for an account, the propagation does not consider if weak synchronization is sufficient.

A subsequent Synchronize Account with Account Templates might be needed to properly synchronize an account with its account templates. For this operation, you use Provisioning Manager.

Strong Synchronization

Strong synchronization ensures that accounts have the exact account attributes as those specified in the account template.

For example, suppose you add a group to an existing UNIX account template. Originally, the account template made accounts members of the Staff group. Now, you want to make the accounts members of both the Staff and System groups. All accounts associated with the account template are considered synchronized when each account is a member of the Staff and System groups (and no other groups). Any account not in the Staff group is added to both groups.

Some other factors to consider include the following:

- If the account template uses strong synchronization, any account belonging to groups, other than Staff and System, are removed from those extra groups.
- If the account template uses weak synchronization, the accounts are added to the Staff and System groups. Any account that has additional groups defined to it remains a member of these groups.

Note: If you do not apply the changes to accounts each time you update the capability attributes of an account template, you should synchronize your accounts with their account templates regularly to ensure the accounts stay synchronized with their account templates.

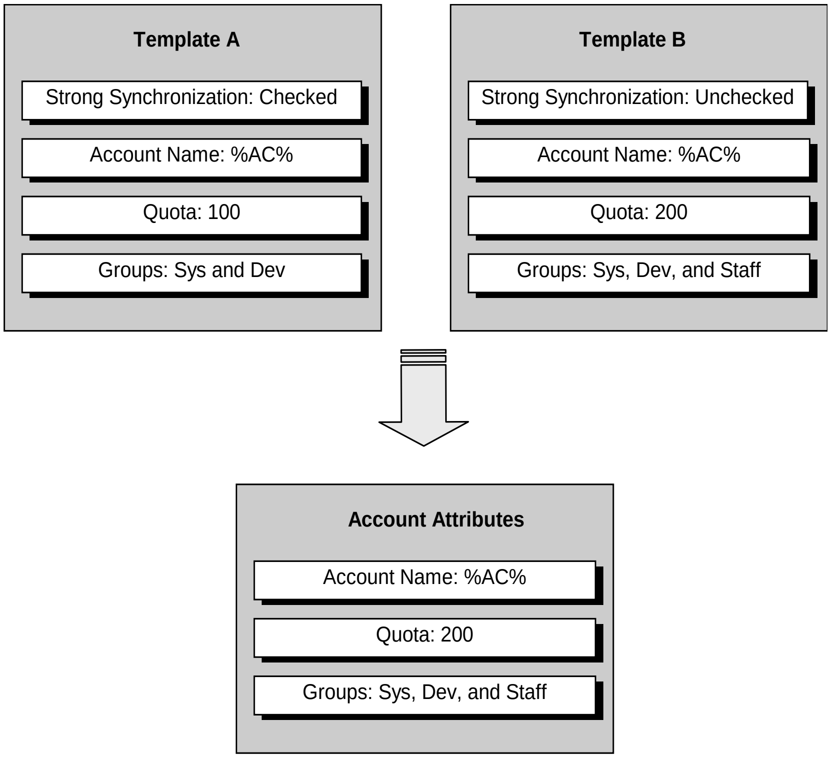
Accounts with Multiple Templates

Synchronization also depends on whether the account belongs to more than one account template. If an account has only one account template and that template uses strong synchronization, each attribute is updated to exactly match what the account template attribute value evaluates to. The result is the same as if the attribute were an initial attribute.

An account may belong to multiple Account Templates, as would be the case if a global user belonged to multiple provisioning roles each of which prescribed some level of access on the same managed endpoint. When this happens, CA Identity Manager combines those account templates into one effective account template that prescribes the superset of the capabilities from the individual account templates. This account template is itself considered to use weak synchronization if all its individual account templates are weak or strong synchronization if any of the individual account templates is strong.

Note: It is typical that you would use only weak synchronization or only strong synchronization for the account templates controlling one account, depending on whether your company's roles completely define the accesses your users need. If your users do not fit into clear roles and you need the flexibility to grant additional capabilities to your user's accounts, use weak synchronization. If you can define roles to exactly specify the accesses your users need, use strong synchronization.

The following example demonstrates how multiple account templates are combined into a single effective account template. In this example, one account template is marked for weak synchronization and the other for strong synchronization. Therefore, the effective account template created by combining the two account templates is treated as a strong synchronization account template. The integer Quota attribute takes on the larger value from the two account templates, and the multivalued Groups attribute takes on the union of values from the two polices.



Attributes Only for New Accounts

In an account template, certain attributes are only applied when creating the account. For example, the Password attribute is a rule expression that defines the password for new accounts. This rule expression never updates the password of an account. Changes to the password rule expression only affect accounts created after the rule expression was set.

Similarly, a template rule expression for a read-only account attribute affects only accounts created after the rule expression was set. Changing it has no effect on existing accounts.

Recompute Template Rules

If you change the template rule expressions for an initial attribute, you have one chance to apply that change to the accounts. If you decline that option, the value is saved in the template for use when new accounts are created from the template. If you then use Synchronize Accounts with Templates operation on the template in Provisioning Manager, it only updates capability attributes, not the attributes on the accounts.

To force a rule expression, including a constant template account attribute value, so the attribute on all the template's accounts is updated, do the following:

- Make a change to the template (for example, clear the attribute value) and decline to update all accounts.
- Change the template again by restoring the original value and accept the offer to update all accounts.

You can also use this method for Global-User-to-Account propagation. If you do not propagate the change to accounts when you change a global user attribute, you can do it again later by making two changes and accepting the offer to update accounts on the second change.

Account Synchronization

Account synchronization updates capability attributes to ensure that the account has the capabilities specified by the account templates.

Note: Synchronization updates an account's capability attributes, but does not affect the account's initial attributes.

Initial attributes and capability attributes are updated by the Account Template Attribute Changes dialog. When you update capability attributes in an account template, and then apply the changes to the accounts, the attributes are updated automatically.

To synchronize capability attribute changes in an account template with its accounts, use the Account Template Attribute Changes dialog or one of the synchronization menu options discussed in this section.

Check Account Synchronization

You can check account synchronization for accounts, containers, endpoints, global users, account templates, and roles. This action returns a list of accounts that do not comply with account templates. The following table describes what happens when you check the synchronization of accounts on each object:

Object	Synchronizes
Account	Account attributes and ensures they comply with associated account templates.
Container	Account attributes for each account in the container and ensures they comply with associated account templates.
Endpoint	Account attributes for each account on an endpoint and ensures they comply with associated account templates.
Global user	Account attributes for each of a global user's accounts and ensures they comply with associated account templates.
Account Template	Account attributes for each account associated with this account template and ensures they comply with the account template. If the account template uses strong synchronization, the account attributes for each account are checked so they comply with all associated account templates.
Role	Account attributes for each account associated with an account template included in this role and ensures they comply with the account templates in the role.

Synchronize Accounts

You can perform account synchronization on accounts, containers, endpoints, global users, account templates, and roles. The following table lists the effect of account synchronization on each object:

Object	Synchronizes
Account	The account with its associated account templates.
Container	Each account in a container with its associated account templates.
Endpoint	Each account on an endpoint with its associated account templates.
Global user	Each account of a global user with each account template associated to it.
Account Template	Each account associated with the account template.
Role	Each account with each account template in a role.

Chapter 11: Identity Policies

This section contains the following topics:

Identity Policies

An Identity policy is a set of business changes that occurs when a user meets a certain condition or rule. You can use identity policy sets to:

- Automate certain identity management tasks, such as assigning roles and group membership, allocating resources, or modifying user profile attributes.
- Enforce segregation of duties. For example, you can create an identity policy set that prohibits members of the Check Signer role from having the Check Approver role, and restricts anyone in the company from writing a check over $10,000.
- Enforce compliance. For example, you can audit users who have a certain title and make more than $100,000.

  Identity policies that enforce compliance are called *compliance policies*.

The business changes associated with an identity policy include:

- Assigning or revoking roles, including provisioning roles (if you are using a provisioning directory only)
- Assigning or revoking group membership
- Updating attributes in a user profile

For example, a company may create an identity policy which states that all Vice Presidents belong to the Country Club Member group and have the role Salary Approver. When a user’s title changes to Vice President and that user is synchronized with the identity policy, CA Identity Manager adds the user to the appropriate group and role. When a Vice President is promoted to CEO, she no longer meets the condition in the Vice President identity policy so the changes applied by that policy are revoked, and new changes based on the CEO policy are applied.

The change actions that occur based on an identity policy contain events which can be placed under workflow-control and audited. In the previous example, the Salary Approver role grants significant privileges to its members. To protect the Salary Approver role, the company can create a workflow process that requires a set of approvals before the role is assigned, and they can configure CA Identity Manager to audit the role assignment.

To simplify identity policy management, Identity policies are grouped in an identity policy set. For example, the Vice President and CEO policies may be part of the Executive Privileges identity policy set.

Note: CA Identity Manager includes an additional type of identity policy, called a *preventative identity policy* (see page 225). These policies, which execute before a task is submitted, allow an administrator to check for policy violations before assigning privileges or changing profile attributes. If a violation exists, the administrator can clear the violation before submitting the task.

Identity Policy Set Planning Worksheet

An identity policy set contains one or more identity policies. Before you create an identity policy set, use the following worksheet to plan each identity policy in the set.

Question	Your Response
What name do you want to give the identity policy?	
Which users does the identity policy apply to?	
When an identity policy is applied to a user, what actions should CA Identity Manager perform?	
When an identity policy that once applied to a user no longer applies, what actions should CA Identity Manager perform?	
Should CA Identity Manager apply the changes in an identity policy multiple times or only the first time a user meets the conditions in the policy?	

After you complete this worksheet for each identity policy in a policy set, verify that the policies do not conflict with other policies. For example, make sure that a policy does not grant a privilege that another policy revokes.

Create an Identity Policy Set

To create an identity policy set, you must have the System Manager role, or a role that includes the Create Identity Policy Set task.

To create an identity policy set, complete the following steps:

1. Define the Profile for the Identity Policy Set (see page 205)
2. Create a Policy Set Member Rule (see page 206)
3. Create an Identity Policy (see page 206)
4. Specify Owners for the Identity Policy Set (see page 215)

Note: To use policies for an Identity Manager environment, enable identity policies in the Identity Manager Management Console. See the *Configuration Guide* for more information.

Define the Profile for the Identity Policy Set

The Profile tab allows you to define basic properties for an identity policy set.

To define an identity policy set profile

1. Select Policies, Manage Identity Policies, Create Identity Policy Set from the User Console.

   You must be logged into CA Identity Manager as a user with privileges to manage identity policies. The default System Manager role includes these privileges.

2. Choose to create a new identity policy set or create a copy of an existing identity policy set.
3. Enter a name for the identity policy set.
4. Enter a category for the identity policy set.

   The category groups identity policy sets with similar purposes for reporting. The Category field is required.

5. Optionally, enter a description for the identity policy set.
6. If you do not want to make the identity policy set available for use, clear the Enabled check box.
7. When you have completed the Profile tab, select the Policies tab to create the identity policies for the identity policy set.

More information:

Create a Policy Set Member Rule (see page 206)
Create an Identity Policy (see page 206)

Create a Policy Set Member Rule

You can create a member rule for a policy set, so that the policy set applies only to certain users. The rule is evaluated before evaluating identity policies in the set, which can save significant time. For example, if a member rule limits the identity policy evaluation to 10 percent of users, it saves 90 percent of the evaluation time.

To create a Policy Set Member Rule

1. Select the Policies tab.
2. Click the Edit symbol under Policy Set Member Rule.
3. Enter a rule to apply the policy to only certain users.
4. Click OK.

More Information:

Create an Identity Policy (see page 206)

Create an Identity Policy

After you define the profile and member rule for the Identity Policy Set, you can define the identity policies in that policy set.

Note: In large implementations, it may take significant time to evaluate identity policy rules. To reduce the evaluation time for rules that include user-attributes, you can enable the in-memory evaluation option. For more information, see the *Configuration Guide*.

To create an identity policy

1. Select the Policies tab.
2. Click Add.
3. Enter a name for the identity policy.
4. Select the Apply Once check box if you want to apply the policy only when a user first meets the policy.
5. Select the Compliance check box to flag this policy as a compliance policy.

   If this check box is selected:

   - CA Identity Manager can generate reports for users that are not synchronized with compliance policies.
   - The Compliance Violation action is visible in the Action on Apply/Remove Policy list box.
6. Identify the users to which the policy applies in the Policy Condition section.

7. In the Action on Apply Policy section, define the actions that CA Identity Manager takes when the identity policy is applied to a user.
8. In the Action on Remove Policy section, define the actions that CA Identity Manager takes when a user no longer meets the conditions for the identity policy.
9. Click OK.

Note: Before you can use the identity policy set that you created, enable identity policies in the Management Console. See the *Configuration Guide* for more information.

The Apply Once Setting

CA Identity Manager applies an identity policy differently, based on the Apply Once setting.

Enabling the Apply Once Setting

If the Apply Once setting is enabled, CA Identity Manager applies the changes associated with the identity policy when a user *first* meets the condition defined in the policy. The change actions associated with the policy occur only once. Therefore, CA Identity Manager does not apply policy updates to users, if the policy was previously applied.

When a user no longer meets the condition defined in the policy, CA Identity Manager executes the policy’s remove actions.

The Apply Once setting is typically used when provisioning resources. For example, you may have a policy that assigns a cell phone to managers. When a user first becomes a manager, that user is assigned a cell phone. CA Identity Manager only issues the cell phone once, not each time the policy is evaluated. If the cell phone policy is updated to include a newer cell phone model, CA Identity Manager does not issue new cell phones to existing managers.

Note: Resource provisioning is available when CA Identity Manager integrates with a Provisioning Server.

Disabling the Apply Once Setting

If the Apply Once setting is not enabled, the change actions associated with the identity policy are applied each time an identity policy is evaluated. This means that CA Identity Manager applies change actions for every user who meets the condition in the policy, regardless of whether the change actions were applied previously.

Typically, you disable the Apply Once setting in an identity policy that enforces compliance. For example, you can create an identity policy that restricts managers’ spending authority to $5,000. If CA Identity Manager encounters a manager whose spending authority is set to $10,000, it resets the spending authority to $5,000. Each time a manager is synchronized with the identity policy, CA Identity Manager checks to make sure the spending authority is set correctly.

If a manual change that conflicts with a change action is made to a user profile, CA Identity Manager overwrites the change when the user is synchronized with the policy.

In the previous example, if someone manually increases a manager's spending authority to $10,000, CA Identity Manager resets the spending authority to $5,000 when the manager is synchronized with the policy.

The following table summarizes the effects of enabling or disabling the Apply Once setting.

If Apply Once is...	**Then...**
Enabled	■ Change Actions associated with the identity policy are applied only once ■ Manual changes made after the identity policy is applied are preserved ■ Updates are not applied to users who meet the condition in an identity policy, if CA Identity Manager applied the policy previously ■ When a user no longer meets the condition in an identity policy, CA Identity Manager executes the remove actions
Disabled	■ Change actions associated with the identity policy are applied every time a user is synchronized with the policy ■ Manual changes are overwritten when the identity policy is applied ■ Updates to the policy are applied when a user is synchronized ■ When a user no longer meets the condition in an identity policy, CA Identity Manager executes the remove actions

Policy Conditions

Policy conditions are the rules that determine the set of users to which an identity policy applies.

The following table describes the available options.

Syntax	Condition	Example
(all)	The identity policy applies to all users.	
where <user-filter>	The user must match one or more attribute values.	Users where title=manager and locality=east
in <org-rule>	The user must belong to named organizations. **Note:** When you select this option, CA Identity Manager displays a new list box where you can select the following options: ■ organization <organization> [and lower]-- Use an organization search screen to select an organization and, optionally, include the organization's child organizations. ■ Organizations where <org-filter> [and lower]--Specify a filter that selects one or more organizations.	Users in organization sales and lower
where <user-filter> and who are in <org-rule>	The user must match specific user attributes and belong to a specific organization.	title=manager and organization=Sales*

Syntax	Condition	Example
who are members of <group-member-rule>	The user must belong to a group which meets a condition specified by attributes on the group. **Note:** When you select this option, CA Identity Manager displays a new list box where you can select the following options: ■ group <group>--Use a group search screen to select a group. ■ group where <group-filter>--Specify a filter that selects one or more groups.	Users who are members of groups where owner=CIO
who are members of <role-rule>	The user must be a member of a role. The role can be an: ■ access role ■ admin role ■ provisioning role **Note:** To use provisioning roles, CA Identity Manager must integrate with a Provisioning Server. See the *Installation Guide* for more information.	Users who are members of the Help Desk role
who are administrators of <role-rule>	The user must an administrator for a role. The role can be an: ■ access role ■ admin role ■ provisioning role **Note:** To use provisioning roles, CA Identity Manager must integrate with a Provisioning Server. See the *Installation Guide* for more information.	Users who are administrators of the Sales Manager role

Syntax	Condition	Example
who are owners of <role-rule>	The user must be an owner for a role. The role can be an: ■ access role ■ admin role ■ provisioning role **Note:** To use provisioning roles, CA Identity Manager must integrate with a Provisioning Server. See the *Installation Guide* for more information.	Users who are owners of the User Manager role
returned by the query <LDAP-query>	The user must meet a condition based on an LDAP query.	User who meet the conditions of an LDAP query. For example: (departmentNumber= Accounts)
in <administrative-union-constraint>	The user must meet at least one of the conditions in a list of conditions. You can include the following types of filters in an administrative union constraint: ■ Member of access/admin/provisioning role ■ Administrator of access/admin/provisioning role ■ owner of access/admin/provisioning role ■ member of a group	Users who are a member of the Certify Manager role, *or* who are an owner of the Certify Manager role.

Syntax	Condition	Example
in <administrative-intersection-constraint>	The user must all of the conditions in a list of conditions. You can include the following types of filters in an administrative union constraint: ■ Member of access/admin/provisioning role ■ Administrator of access/admin/provisioning role ■ owner of access/admin/provisioning role ■ member of a group	Users who are members of the Contract Initiator role *and* the Contract Approver role.

Actions on Apply/Remove Policies

You can define change actions that CA Identity Manager performs when it evaluates the identity policy. The actions include:

Actions on Apply Policy

A set of actions that CA Identity Manager performs when a user meets the conditions in the policy conditions.

Actions on Remove Policy

A set of actions that CA Identity Manager performs when a user no longer meets the conditions in the policy conditions.

The actions that CA Identity Manager can perform when identity policies are applied or removed are the same. See the following table for more information.

Change Action	Description
Add to group <group-name> [...]	Adds users to a group. When you select this option, CA Identity Manager presents a screen where you can search for the group you want.
Add to <group-name> in user's organization	Adds users to a local group. When you select this option, CA Identity Manager presents a text box where you can enter the name of the group that you want.

Change Action	Description
Set <single-value-user-attribute> to value	Sets the value of an attribute in a user profile. If there is an existing value, CA Identity Manager overwrites it with the value specified in the change action.
Add <value> to <multi-value-user-attribute>	Adds a value to a multi-value user attribute. This option does not overwrite existing values.
Make member of access role	Assigns users to an access role.
Make administrator of access role	Make users administrators of an access role
Make member of admin role	Makes users members of an admin role
Make administrator of admin role	Makes users administrators of an admin role
Make member of provisioning role	Makes users members of a provisioning role, which creates associated endpoint accounts. **Note:** To use provisioning roles, CA Identity Manager must integrate with a Provisioning Server. See the *Installation Guide* for your application server.
Make administrator of provisioning role	Makes users administrators of a provisioning role. **Note:** To use provisioning roles, CA Identity Manager must integrate with a Provisioning Server. See the *Installation Guide* for your application server.
Remove from group <group-name> [...]	Removes users from a group. When you select this option, CA Identity Manager presents a screen where you can search for the group you want.
Remove from <group-name> in user’s organization	Removes users from a local group. When you select this option, CA Identity Manager presents a text box where you can enter the name of the group that you want.
Remove <value> from <multi-value-user-attribute>	Removes a value from a multi-value user attribute.
Remove member from access role	Revokes an access role.

Change Action	Description
Remove administrator from access role	Revokes administrator privileges for a specific access role
Remove member from admin role	Revokes an admin role.
Remove administrator from admin role	Revokes administrator privileges for a specific admin role
Remove member from provisioning role	Revokes a provisioning role.
Remove administrator from provisioning role	Revokes administrator privileges for a specific provisioning role.
Send audit message	Sends a message that you create to the audit database. This message may appear in a report that you create.
Compliance violation	Sends a message that you create to the audit database. If you create a compliance report, the message appears each time the identity policy is applied/removed from a user. See the *Configuration Guide* for more information about auditing. **Note:** You must enable the Compliance check box on the Profile tab for the Identity Policy Set to use the Compliance Violation option.
Accept (Action on Apply Policies only)	Allows the task to submit when there is a preventative identity policy violation. When you select this action, you provide a message that CA Identity Manager writes in the audit database and displays in View Submitted Tasks when a violation occurs.
Reject (Action on Apply Policies only)	Prevents a task from submitting when an identity policy violation occurs. This action is used with preventative identity policies to prevent users from receiving privileges that may result in a conflict of interest or fraud. When you select this action, you also provide a message that CA Identity Manager displays when a violation occurs. The message is stored in the audit database and displayed in the User Console.

Change Action	Description
Warning (Action on Apply Policies only)	Triggers a workflow process when a preventive identity policy violation occurs, if you associate that violation with a workflow approval policy. CA Identity Manager allows the task to submit regardless of whether workflow is configured. **Note:** For information about associating a workflow process with a preventative identity policy, see Workflow and Preventative Identity Policies. (see page 230) When you select this action, you also provide a message that CA Identity Manager displays when a violation occurs. The message is stored in the audit database and displayed in View Submitted Tasks.

More information:

Preventative Identity Policies (see page 225)
Workflow and Preventative Identity Policies (see page 230)

Specify Owners for the Identity Policy Set

On the Owners tab, you define rules about who can be an owner of the identity policy set. An identity policy set owner can modify the basic information about the policy set, and can add, change, or remove identity policies in the set.

To complete the Owners tab:

1. Define owner rules, which determine which users can modify the identity policy set.
2. Click Submit.

Manage an Identity Policy Set

CA Identity Manager includes the following tasks for managing an identity policy set:

- View Identity Policy Set
- Modify Identity Policy Set
- Delete Identity Policy Set

By default, when an administrator uses one of these tasks, CA Identity Manager displays a list of all identity policy sets for which that administrator is an owner. The administrator can then choose the policy set he needs from the list.

In an Identity Manager environment that includes many identity policy sets, you may want to customize the View, Modify, and Delete Identity Policy Set tasks to allow administrators to search for an identity policy set, instead of displaying them in a list.

To customize these tasks:

1. In the User Console, select Roles and Tasks, Admin Roles, Modify Admin Task.

   The Modify Admin Task screen opens.

2. Search for and select the task that you want to customize.

3. On the Scope tab, select All Identity Policy Sets.

   When you select this option, CA Identity Manager uses the Default Identity Policy Set Search screen definition.

4. Click Submit.

How Users and Identity Policies Are Synchronized

When using identity policies, it is important to understand how CA Identity Manager evaluates and applies the policies to users. Without a thorough understanding of the user synchronization process, you may configure identity policy sets that yield unexpected results.

The following procedure describes how CA Identity Manager evaluates and applies identity policies:

1. The user synchronization process begins:

   - **Automatically**—You can configure CA Identity Managertasks to automatically trigger user synchronization

   - **Manually**—Use the Synchronize User task in the User Console to synchronize a user.

2. CA Identity Manager determines the set of identity policies that apply to a user.

3. CA Identity Manager compares the set of identity policies that apply to a user with the list of policies that have already been applied to that user.

   Note: The list of policies that have been applied to a user is stored in the %IDENTITY_POLICY% well-known attribute in the user profile. For information on configuring this attribute, see the *Configuration Guide*.

   - If an identity policy is on the list of applicable policies, *and* the policy has *not* been applied to the user previously, then CA Identity Manager adds the policy to an allocation list.

- If an identity policy is on the list of applicable policies, the policy has been previously applied to the user, and the Apply Once setting for the policy is disabled, CA Identity Manager adds the policy to a reallocation list.
- An identity policy is not on the list of applicable policies, and the policy has been applied to the user, the user no longer matches the policy condition. CA Identity Manager adds these policies to a deallocation list.

4. After CA Identity Manager evaluates all of the policies for a user, it applies policies in the following order:

   a. Identity policies from the deallocation list

   b. Identity policies from the allocation list

   c. Identity policies from the reallocation list

5. After the identity policies have been applied, CA Identity Manager reevaluates the policies to see if any additional changes are needed based on changes that occurred in the first synchronization process (steps 2-4).

   This is to ensure that changes made by applying identity policies did not trigger other identity policies.

6. CA Identity Manager continues to reevaluate and apply identity policies until the user is synchronized with all applicable policies, or until CA Identity Manager reaches the maximum recursion level, which is defined in the Management Console.

   For example, an identity policy may change a user's department when the user is assigned a role. The new department triggers another identity policy. However, if the recursion level is set to 1, the subsequent change is not made until the user is synchronized again.

   For more information about setting the recursion level, see the Management Console Online Help.

Configure Automatic User Synchronization

CA Identity Manager can automatically synchronize user accounts with identity policies at different points during a task’s lifecycle.

A CA Identity Manager task generates *events*, detectable activities that occur during task processing. For example, the default Create User task generates the CreateUserEvent, AddUserToGroupEvent, and the AssignAccessRoleEvent. You can configure CA Identity Manager to synchronize users after a task completes, or when each event completes.

Note: The section Synchronize Users with Identity Policies (see page 216) provides more information on the user synchronization process.

To configure a task to trigger user synchronization

1. Log into CA Identity Manager as a user who can modify admin tasks.
2. Select Roles and Tasks, Admin Tasks, Modify Admin Task.

   CA Identity Manager displays a search screen.
3. Search for and select the admin task that will trigger user synchronization.
4. Select one of the following options in the User Synchronization field on the Profile tab for the task:
   - **Off**—This task will not trigger user synchronization.
   - **On Task Completion**—CA Identity Manager starts the user synchronization process after all of the events have completed. This setting is the default synchronization option for the Create User, Modify User, and Delete User tasks. The default setting for all other tasks is Off.

     Note: If you select the On Task Completion option for a task that includes multiple events, CA Identity Manager does not synchronize users until all of the events in the task complete. If one or more of those events require workflow approval, this may take several days. To prevent CA Identity Manager from waiting to apply identity policies until all events complete, select the On Every Event option.
   - **On Every Event—**CA Identity Manager starts the user synchronization process when each event in a task completes.

     For tasks with a primary and secondary event for the same user, setting user synchronization to On Every Event may result in more evaluations for which policies apply to a user than if the On Task Completion option is selected.

Synchronize Users Manually

You may want to manually synchronize a user with an identity policy set to ensure that a user account has the right privileges, or complies with a compliance policy.

You can manually synchronize a user by using the Synchronize User task in the Identity Manager User Console.

Note: For the Synchronize User task to work properly, the User Synchronization option must be set to Off, and the Account Synchronization option must be set to On Task Completion or On Every Event. For better performance, choose the On Task Completion option. These options are set in the Profile tab for the Synchronize User task.

The Synchronize User task includes the following tabs:

- **Currently Matched Policies**—Displays a list of identity policies that CA Identity Manager will apply to the user when the Synchronize User task is submitted.

  Note: The Currently Matched Policies tab displays only the identity policies that apply to the user at the time you access the Synchronize User task. When the user is synchronized with those policies, changes may occur that trigger other identity policies. To prevent CA Identity Manager from applying the new policies until you have reviewed them, set the recursion level for identity policy sets to 1 in the Identity Manager Management Console. After submitting the Synchronize User task, access it again to review the policies.

- **Policies Already Applied**—Displays a list of identity policies that have already been applied to the user.
- **Synchronization Summary**—Displays all of the identity policies that apply to the user and the change actions for those policies.

To synchronize a user account

1. Log into Identity Manager as a user who can use the Synchronize User task. (By default, users with the System Manager role can use this task.)
2. Select Policies, Synchronize User.

   The Synchronize User task opens.

3. Select the Synchronization Summary tab.
4. Review the policies and associated actions that CA Identity Manager will apply to the user, then click Submit.

Verify User Synchronization

To verify that the appropriate changes take place when a user is synchronized with identity policies, check the Policies Already Applied tab in the Synchronize User task.

1. Log into CA Identity Manager as a user who can use the Synchronize User task. (By default, users with the System Manager role can use this task.)
2. Select Policies, Synchronize User.

   The Synchronize User task opens.

3. Select the Policies Already Applied tab.
4. Review the policies and associated actions that CA Identity Manager applied to the user.

Identity Policy Sets in an Identity Manager Environment

The following sections describe different ways to use identity policies:

- Example: Automatically Populating User Attributes (see page 220)
- Example: Allocating Resources and Entitlements (see page 221)
- Example: Enforcing Compliance (see page 222)
- Example: Enforcing Segregation of Duties (see page 223)

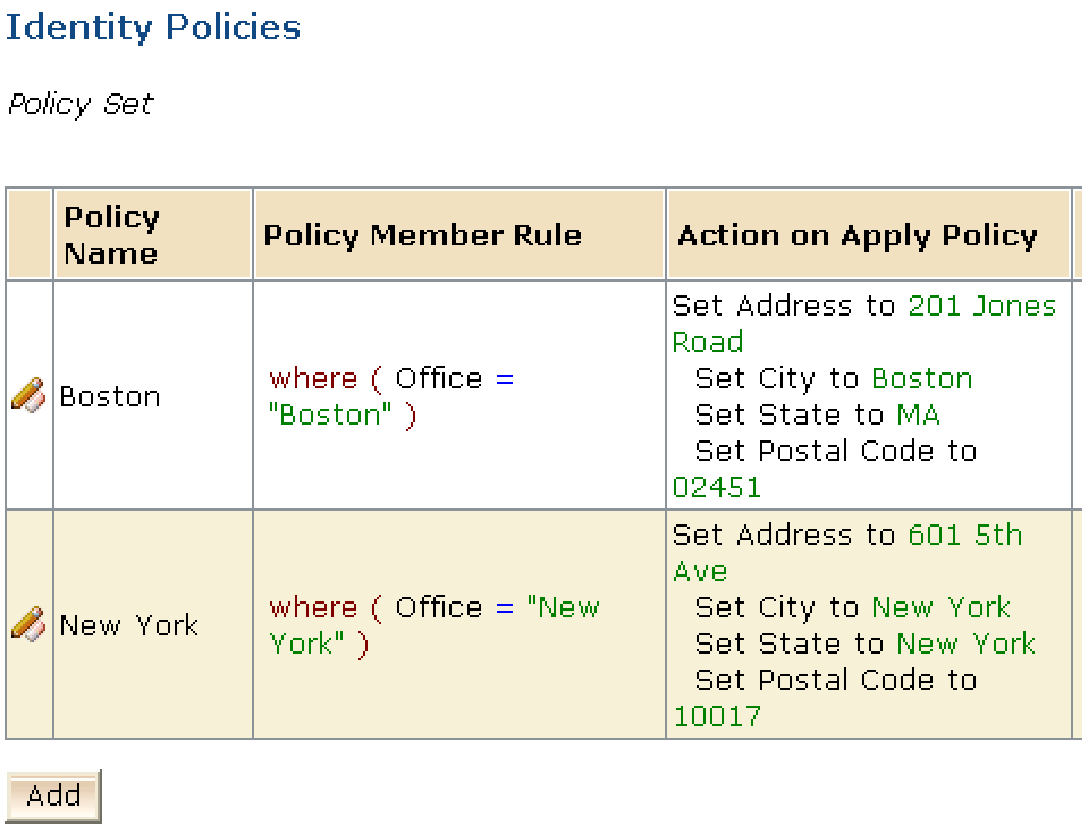
Example: Automatically Populating User Attributes

You can use an identity policy set to automatically assign user attribute values based on another attribute value or user entitlement. For example, you can create an identity policy set that automatically fills in a user's mailing address based on the user's home office.

To configure an identity policy set for employee addresses, create an identity policy with the following settings for each office location:

Setting	Value
Policy Condition	office = <office_location>
Action on Apply Policy	set Street Address = <some street_address> set City = <some city> Set State/Province = <some state or province> Set Postal Code = <some postal code>

The following figure shows sample policies in the Employee Addresses identity policy set.



Identity Policies

Policy Set

	Policy Name	Policy Member Rule	Action on Apply Policy
✎	Boston	where (Office = "Boston")	Set Address to 201 Jones Road Set City to Boston Set State to MA Set Postal Code to 02451
✎	New York	where (Office = "New York")	Set Address to 601 5th Ave Set City to New York Set State to New York Set Postal Code to 10017

Example: Allocating Resources and Entitlements

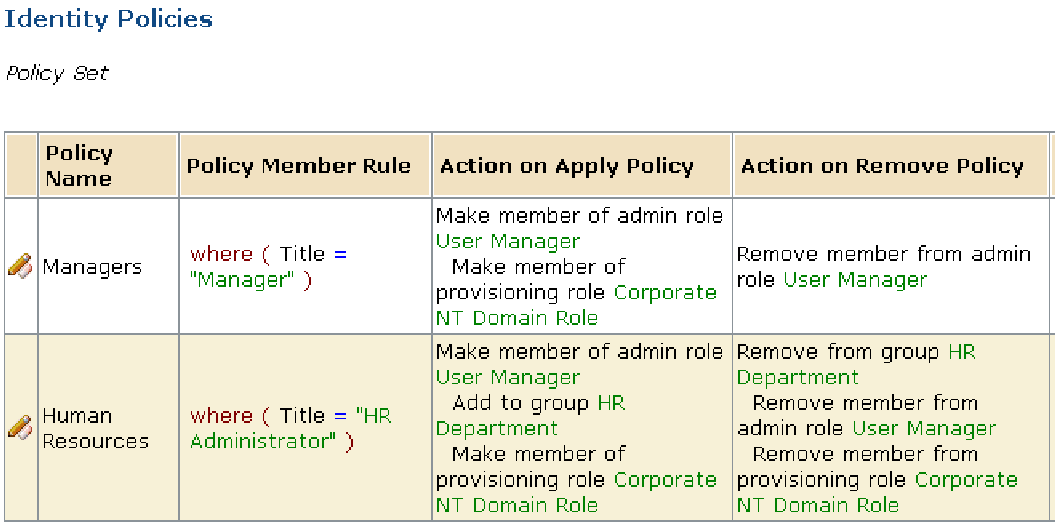
Identity policies can automatically assign resources, such as domain accounts, or grant entitlements, such as making a user a member of a role, when users meet the policy condition. For example, you can create a set of identity policies that assign resources and roles based on a user’s title.

To create an identity policy set for allocating resources and roles, create an identity policy with the following settings for each of the titles in your organization:

Setting	Value
Policy Condition	title = <some_title>

Setting	Value
Action on Apply Policy	Any actions that allocate resources or entitlements to users who meet the policy condition, for example: ■ make member of <some_group> ■ make member of admin role <some_admin_role> ■ make member of provisioning role <some_provisioning role>
Action on Remove Policy	Any actions that remove resources or entitlements when a user no longer meets the policy condition. For example, if Identity Manager made the user a member of a role when the identity policy was applied, you may want to configure Identity Manager to revoke the role when the user no longer meets the policy condition.

The following figure illustrates sample policies in the Employee Resources identity policy set:



Identity Policies

Policy Set

	Policy Name	Policy Member Rule	Action on Apply Policy	Action on Remove Policy
✎	Managers	where (Title = "Manager")	Make member of admin role User Manager Make member of provisioning role Corporate NT Domain Role	Remove member from admin role User Manager
✎	Human Resources	where (Title = "HR Administrator")	Make member of admin role User Manager Add to group HR Department Make member of provisioning role Corporate NT Domain Role	Remove from group HR Department Remove member from admin role User Manager Remove member from provisioning role Corporate NT Domain Role

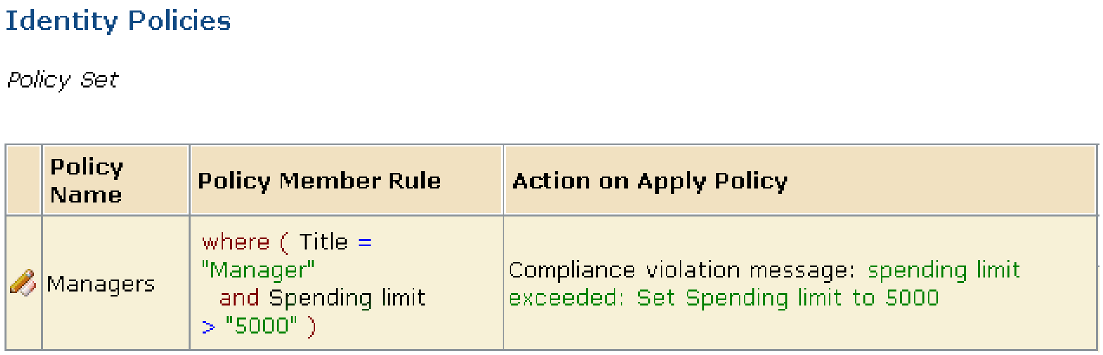
Example: Enforcing Compliance

You can configure identity policies to define conditions that must or must not exist, and to take certain actions based on the evaluation of those conditions. For example, you can define a compliance policy that states that managers must have a spending limit of $5,000. If a manager has a spending limit of $10,000, CA Identity Manager can reset the manager’s spending limit, and record a compliance violation for auditing purposes.

To create a compliance policy set for enforcing spending limits, create an identity policy with the following settings:

Setting	Value
Apply Once	Not enabled
Compliance	Enabled
Policy Condition	Any conditions that define compliance or a compliance violation--for example: title=<some_title> AND Spending Limit > <some spending limit>
Action on Apply Policy	The actions that CA Identity Manager should take when the policy condition applies--for example: ■ Compliance violation message: Spending limit exceeded ■ Set spending limit to <some_value>

The following figure shows the sample compliance policy described in this example.



Identity Policies

Policy Set

	Policy Name	Policy Member Rule	Action on Apply Policy
✎	Managers	where (Title = "Manager" and Spending limit > "5000")	Compliance violation message: spending limit exceeded: Set Spending limit to 5000

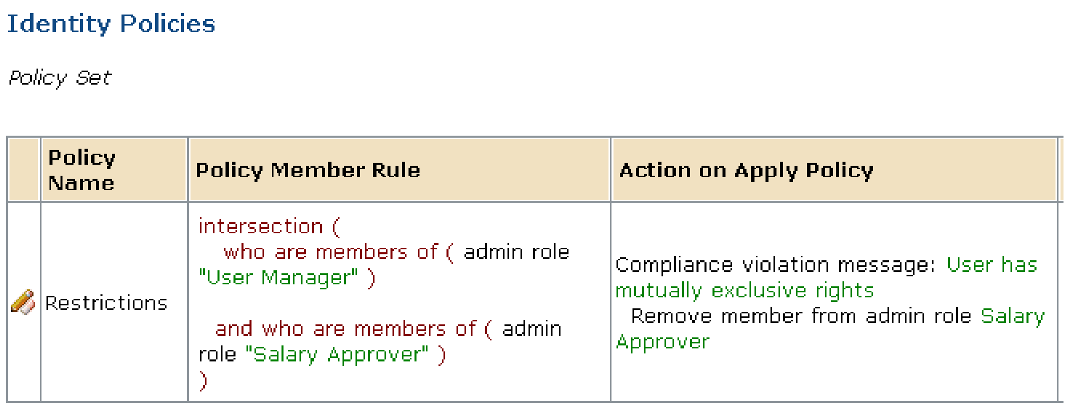
Example: Enforcing Segregation of Duties

Identity policies can define roles that are mutually exclusive and cannot be granted to the same user concurrently. For example, you can prevent a user manager who can grant raises from also being a salary approver.

To create an identity policy set that enforces segregation of duties, create an identity policy with the following settings:

Setting	Value
Apply Once	Not enabled
Compliance	Enabled
Policy Condition	Use the "in <administrative-intersection-constraint>" option to define a set of conditions that violate a business policy. If a user meets all of the conditions, Identity Manager takes the actions in the Action on Apply Policy field. For example, set the policy condition as follows: intersection (who are members of <some_role>) and who are members of <some_other_role>)
Action on Apply Policy	The actions that Identity Manager should take when the policy condition applies--for example: ■ Compliance violation message: User has mutually exclusive roles ■ Remove member from <some_role>

The following figure illustrates the identity policy in this example.



Identity Policies

Policy Set

	Policy Name	Policy Member Rule	Action on Apply Policy
✎	Restrictions	intersection (who are members of (admin role "User Manager") and who are members of (admin role "Salary Approver"))	Compliance violation message: User has mutually exclusive rights Remove member from admin role Salary Approver

Preventative Identity Policies

A *preventative identity policy* is a type of identity policy that prevents users from receiving privileges that may result in a conflict of interest or fraud. These policies support a company's Segregation of Duties (SOD) requirements.

Preventative identity policies, which execute before a task is submitted, allow an administrator to check for policy violations before assigning privileges or changing profile attributes. If a violation exists, the administrator can clear the violation before submitting the task.

For example, a company can create a preventative identity policy that prohibits users who have the User Manager role from also having the User Approver role. If an administrator uses the Modify User task to give a User Manager the User Approver role, CA Identity Manager displays a message about the violation. The administrator can change the role assignments to clear the violation before submitting the task.

You can create preventative identity policies for the following changes:

- **Role membership**

  Prevents users from having certain roles at the same time.

  For example, users cannot have the User Manager and User Approver roles at the same time.

- **Role administrators**

  Prevents users from being administrators of certain roles if they are administrators of other roles.

  For example, users cannot be administrators for the User Manager and User Approver roles at the same time.

- **User attributes**

  Prevents users from having certain profile attributes at the same time.

  For example, users cannot have the title Senior Account and belong to the IT department.

- **Organization attributes**

  Prevents user profiles from being created in a certain organization.

  For example, administrators cannot create employee profiles in the Suppliers organization.

- **Group attributes**

  Prevents users from being members in certain groups.

  For example, users cannot be members of the Project Team group and the Accounting Group.

More information:

Actions for Preventative Identity Policy Violations (see page 226)

Actions for Preventative Identity Policy Violations

When a preventative identity policy applies to a business change, CA performs certain actions to address the violation.

When you specify one of these actions in an identity policy, you specify a message that describes the violation. This message is recorded in the audit database. Depending on the type of action, the message may also be displayed to users in the User Console and recorded in View Submitted Tasks.

You can configure the following actions for a preventative identity policy:

Accept

CA Identity Manager displays a message in View Submitted Tasks that describes the violation, but allows the task to be submitted.

Reject

CA Identity Manager displays a message in the User Console and prohibits the task from submitting.

Warning

CA Identity Manager displays a message in the User Console and in View Submitted Tasks. This action can optionally trigger a workflow process that requires an approval from an appropriate user before CA Identity Manager executes the task.

To trigger a workflow process, you associate the preventative identity policy with a policy-based workflow process (see page 231) in tasks that may cause the violation.

For example, if the violation occurs when a user receives certain roles at the same time, configure the workflow process for all tasks that assign those roles to users.

Note: When you configure the policy-based workflow process for the task, the approval rule must reference the name of the preventative identity policy.

How Preventative Identity Policies Work

The following sample process illustrates how preventative identity policies work:

1. An identity policy administrator creates a preventative identity policy that prohibits users who have the title Senior Accountant from being in the IT department.

   When defining this identity policy, the administrator specifies that CA Identity Manager should reject any changes that violate this policy.

2. An HR administrator uses the Create User task to create a user profile for a new Senior Accountant. The HR administrator correctly selects the user's title, but accidentally selects the IT department.

3. The HR administrator completes the remaining fields in the Create User task and clicks Submit.

4. CA Identity Manager detects that the task involves changes that are defined in an identity policy and evaluates the changes for violations.

5. CA Identity Manager detects the violation, displays a message to the HR administrator, and prevents the task from submitting.

   CA Identity Manager also records the message in the audit database.

6. The HR administrator views the details of the violation in the message and changes the user's department to Finance. Then, the administrator resubmits the task.

7. CA Identity Manager evaluates the proposed changes against all applicable identity policies, and then allows the Create User task to submit.

Important Notes about Preventative Identity Policies

Before you implement preventative identity policies, note the following:

- Preventative identity policies only prevent violations that would occur because of proposed changes in the current task. They do not prevent existing violations.

  For example, a company creates a preventative identity policy that prohibits users from having the User Manager and User Approver roles at the same time. An administrator assigns the Group Manager role to a user who already has the User Manager and User Approver roles. CA Identity Manager allows the new assignment to succeed because that change does not directly cause a violation of the policy.

- If multiple preventative identity policies apply to a set of proposed changes, CA Identity Manager applies policies with Reject actions first.

- Do not specify dynamic groups in preventative identity policy conditions. (Policy conditions determine the set of users that the preventative identity policy applies to.)

  For example, a company has a dynamic group that includes all users who have the title Manager. That company also creates a preventative identity policy that prohibits members of the Managers group from having the Contractors role.

  An administrator changes the title of a user who has the Contractors role to Manager. This change will make the user a member of the Managers group *after* the task submits successfully. However, the user's title is not Manager at the time that CA Identity Manager evaluates the policy, so no violation is detected.

- The role owner filter and the LDAP query filter are not supported in policy conditions for preventative identity policies.

Create a Preventative Identity Policy

Before you create a preventative identity policy, you create an identity policy set, which logically groups a set of identity policies.

Note: See Important Notes about Preventative Identity Policies (see page 227) before you begin.

To create a preventative identity policy set

1. Open Policies, Create Identity Policy Set in the User Console.

   Create a new identity policy set or use an existing identity policy set as a template.

2. Define the profile for the identity policy set (see page 205) on the Profile tab.
3. Create a policy set member rule (see page 206) on the Policies tab.
4. Create a preventative identity policy as follows:

   a. Click Add.

   b. Enter a name for the identity policy.

      Note: The Apply Once and Compliance settings do not apply to preventative identity policies.

   c. Identify the users to which the policy applies in the Policy Condition section.

      Note: The role owner filter and the LDAP query filter are not supported for preventative identity policies.

   d. In the Action on Apply Policy field, define the actions that CA Identity Manager takes when CA Identity Manager detects a policy violation:

      Accept

      CA Identity Manager displays a message in View Submitted Tasks that describes the violation, but allows the task to be submitted.

      Reject

      CA Identity Manager displays a message in the User Console and prohibits the task from submitting.

      Warning

      CA Identity Manager displays a message in the User Console and in View Submitted Tasks. This action can optionally trigger a workflow process (see page 230).

      When you select one of these actions, CA Identity Manager displays a text box where you can specify the message that appears when a violation occurs.

e. Specify the message in the text box.

   Note: If you are localizing the User Console, you can specify a resource key instead of text in the message field. See the *User Console Design Guide* for more information about resource keys.

f. Add additional actions if necessary and click OK.

5. Specify owners for the Identity Policy set (see page 215).

Note: Before you use the identity policy set that you created, make sure that identity policies are enabled in the Management Console. See the *Configuration Guide* for more information.

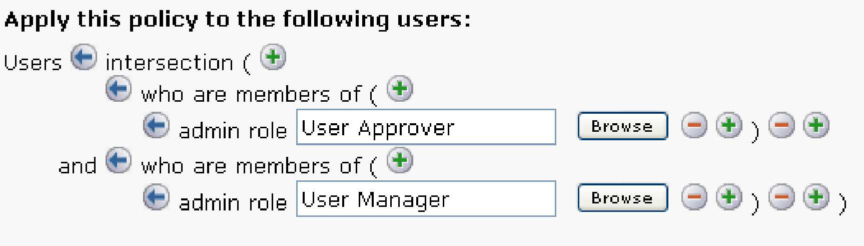
Use Case: Preventing Users from Having Conflicting Roles

Forward, Inc. wants to prevent its employees from having the User Manager role and the User Approver role at the same time. Employees who have both of these roles can modify user attributes, such as salary, and approve them inappropriately.

To prevent this situation, Forward, Inc. creates a preventative identity policy that applies to users who have the User Manager and User Approver Roles. If an administrator attempts to give these roles to a user, CA Identity Manager rejects the task submission and displays a message that explains the violation.

You configure a preventative identity policy to support this use case as follows:

- Create an identity policy set for the policy that you want to create.
- Create a preventative identity policy with the following settings:
  - Policy Condition:



Apply this policy to the following users:

Users intersection (
who are members of (
admin role User Approver)
and who are members of (
admin role User Manager))

  - Action on Apply Policy:
    - Reject with message: User cannot be a member of User Approver and User Manager roles

Workflow and Preventative Identity Policies

When a preventative identity policy is configured to issue a warning, you can define a task level policy-based workflow process, which is associated with the identity policy, for tasks that may trigger a violation. For example, if an identity policy prohibits Senior Accountants from being members of the IT department, you define a task level policy-based workflow process on the Create User and Modify User tasks.

All work items that are generated as a result of task level policy-based workflow must be approved before CA Identity Manager executes the task. Approvers see a work list item when they log into the User Console. When the approver clicks the work list item, an approval task, which includes the warning message that describes the violation, appears. The approver can choose to approve or reject the task, based on the violation.

Policy-based workflow processes are associated with preventative identity policies by the policy name.

More information:

Policy-Based Workflow (see page 375)

Identity Policy Violations in Approval Tasks

When a preventative identity policy is associated with a workflow process for a task, CA Identity Manager generates a work list item for the appropriate approvers. These approvers use an Approval task to approve or reject the change that triggered the policy violation.

The default Approval task includes a section that lists identity policy violations. There may be more than one violation if the proposed changes trigger multiple preventative identity policies.

Each violation can have of the following status:

- **Pending Evaluation**

  CA Identity Manager has not started evaluating the approval rules for the task yet. This is the initial state.

- **Awaiting Approval**

  CA Identity Manager located a match for the identity policy defined in the approval rules and triggered the associated workflow process.

- **Approved**

  An approver approved the proposed changes. CA Identity Manager makes the changes that triggered the preventative identity policy violations.

- **Rejected**

  An approver rejected the proposed change. The task is rejected.

- **No Workflow Configured**

  There is no workflow process configured for this violation. The task executes without any approval required.

How to Configure Workflow for Preventative Identity Policies

You configure workflow for preventative identity policies in the admin tasks that include changes that may trigger an identity policy violation.

For example, if the preventative identity policy prohibits users from having certain admin roles at the same time, configure tasks that assign admin roles to support workflow for preventative identity policies.

Note: Before you configure workflow, create a preventative identity policy with the following settings:

- A unique policy name

  The policy name must be unique across all identity policy sets because workflow processes are associated with preventative identity policies by the policy name.

  If multiple preventative identity policies have the same name, multiple workflow processes may apply.

- Warning in the Action on Apply Policy field

  Warning is the only action that can trigger a workflow process.

After you configure the preventative identity policy, determine the tasks that may trigger the policy violation. Then, create a workflow approval policy (see page 232) for those tasks.

Create a Workflow Approval Policy for Preventative Identity Policies

You can configure a task level policy-based workflow process for an admin task. This workflow process includes one or more approval policies that can associate a preventative identity policy with a workflow. CA Identity Manager executes the workflow when a violation of the associated preventative identity policy occurs.

Note: For more information about task level policy-based workflow processes, see Policy-Based Workflow (see page 375).

To create a workflow approval policy for preventative identity policies

1. Modify the admin tasks that allow changes that might trigger a violation of a preventative identity policy.

   For example, if an identity policy violation occurs because a user has the User Manager and User Approver roles, modify the admin tasks that allow administrators to assign roles, such as Create User, Modify User, and Modify Admin Role Members/Administrators.

2. Click the edit icon next to the Workflow Process field on the Profile tab for the task to add a workflow process.

   CA Identity Manager displays the Task Level Workflow Configuration screen.

3. Select Policy Based, then click Add.
4. In the Approval Rule section, select the Identity Policy Violation object.
5. In the Identity Policy field select a filter that determines which identity policies trigger the workflow associated with the approval policy.

   In the filter, include the identity policy name, *not* the identity policy set name.

6. Configure the Rule Evaluation, Policy Order, and Policy Description fields as needed.
7. Select a workflow process, then click OK.

   When you select a workflow process, CA Identity Manager displays additional fields.

8. Specify approval tasks and approvers as needed.

   CA Identity Manager associates the workflow process with the preventative identity policy.

Use Case: Approving Titles

Forward, Inc has a company policy that states that all managers must be full-time employees. However, Forward, Inc has recently hired many contractors for special projects. To run these special projects efficiently, some of the contractors will be given the Manager title. Forward, Inc wants to require approvals from the Human Resources Director before allowing administrators to assign the Manager title to a contractor.

To automate the approval process in these situations, Forward, Inc creates a preventative identity policy, named Manager Titles for Contractors, that detects when a user title is Manager and user organization is Contractor. Forward, Inc also configures a policy-based approval process on the Modify User task. This approval process is triggered when the Manager Titles for Contractors policy is violated.

When an administrator changes a contractor's title to Manager, CA Identity Manager displays a warning message, and sends a work item to the Human Resources Director for approval. CA Identity Manager does not change the contractor's title until the work item is approved.

To configure support for this use case, you complete the following in CA Identity Manager:

- Create a preventative identity policy called Manager Titles for Contractors with the following settings:
  - Policy Condition: Users where (Title = "Manager" and Organization = "Contractor")
  - Action on Apply Policy: Warning with message "Managers must be full-time employees"
- Modify the Modify User task to include a workflow process with the following settings:
  - Workflow Process: Policy Based
  - Approval Rule Object: Identity Policy Violation
  - Identity Policy: where (Name = "Manager Title for Contractors")
  - Workflow Process: SingleStepApproval

Combining Identity Policies and Preventative Identity Policies

You can combine identity policies and preventative identity policies to address Segregation of Duties (SOD) requirements. In this case, identity policies address existing SOD violations and preventative identity policies prohibit new violations.

To support this use case, you configure an identity policy set with two types of actions:

- Actions that occur during user synchronization

  These actions result in changes to user attributes, group and role members, administrators, or owners. For example, an action of this type may remove a user from a role when a violation is detected.

  These actions differ from preventative actions in that they are not applied when a task is submitted. They are applied only during user synchronization (see page 216).

- Preventative actions

  These actions determine what CA Identity Manager does when a preventative identity policy violation occurs *before* a task is submitted. CA Identity Manager can allow the task to submit, issue a warning and trigger a workflow process, or prevent the task from submitting.

  In each of these cases, the violation is recorded in the audit database.

Consider a company that wants to prevent users from having the HR Administrator and Salary Approver roles at the same time. That company creates an identity policy with two Action on Apply Policy actions:

- Remove the user from role Salary Approver

  This action occurs when CA Identity Manager synchronizes users with identity policies.

  In this case, this company configured user synchronization for the Modify User task. When an administrator modifies a user, CA Identity Manager evaluates all applicable identity policies and applies the actions. In this example, CA Identity Manager removes users who have the HR Administrator role and the Salary Approver Role from the Salary Approver role.

- Reject the task

  This preventative action prohibits administrators from assigning these two roles to a person by not allowing the administrator to submit the task.

Note: When you configure an identity policy with both of these types of actions, verify that the actions do not conflict. For example, you can configure an identity policy that prevents users from having the Manager and Contractor roles. In the policy, you specify two actions:

- A warning that triggers a workflow process, which requires an approval before assigning the roles, and
- An action that removes a user from the Manager role

An approver approves the role assignment for the Manager and Contractor roles, but the second action removes the user from the Manager role when user synchronization occurs.

Chapter 12: Policy Xpress

This section contains the following topics:

Overview

Policy Xpress allows you to create complex business logic (policies) without the need to develop custom code. Policy Xpress tasks are located under the Policies tab and are associated with the Policy Xpress Manager role and the System Manager role, by default.

How Policy Xpress Works

When a trigger (tasks, events, business logic task handlers, and workflow) happens, Policy Xpress is activated and the following steps occur:

1. Policy Xpress checks activation times (Events (see page 243)) to see if there is a policy that should run at that particular time.
2. A list of policies is generated.
3. Policies are ordered based on priority, and Policy Xpress evaluates policies as follows:
   a. All required values (Data (see page 244)) are calculated.
   b. Entry rules (see page 246) are checked to see whether the policy should run.
   c. If the entry rules allow the policy to run, all action rules (see page 247) are checked for matches.
   d. For the matching action rule with the highest priority, the add actions for that rule are executed.
   e. For any action rule that previously matched but no longer matches, remove actions are executed.
4. Once the policy completes, information about the policy that ran is saved on the user object (even if the policy made no changes).

5. Appropriate events related to the action rules are generated. For example, if the policy modifies a user, the ModifyUserEvent is generated.
6. The next policy is loaded.

Note: The previous flow can be changed using action rules. For more information about changing the flow of Policy Xpress, see Flow Control.

More Information:

Flow Control (see page 249)

Policy Xpress Actions as Identity Manager Events

Now that Policy Xpress is integrated within CA Identity Manager, all actions done by Policy Xpress are run as Identity Manager events, when possible. For example, a policy that changes a user's attribute, generates a ModifyUserEvent. This allows for auditing in the system, and for viewing detailed information about tasks generated by Policy Xpress.

As with all CA Identity Manager events, events generated by Policy Xpress can be viewed in the View Submitted Tasks tab (see page 488). If your Policy Xpress policies are not running as expected, you can use the information available in View Submitted Tasks to help with troubleshooting.

Note the following:

- Not all Policy Xpress actions generate events, for example, writing to a log file does not generate an Identity Manager event.
- When viewing events in the View Submitted Tasks tab, an event can show as failed because of a Policy Xpress policy, and not because of the event itself.

How to Create a Policy

To create a policy with Policy Xpress, define the following basic elements of a policy.

Profile

Defines the policy type and priority, and allows for grouping similar policies for easy management.

Events

Define when a policy runs.

Note: Be sure to set the Events parameter carefully. Business logic must run at specific times to prevent data corruption and to increase performance. For example, setting a user as enabled should occur when the user is created. Running this logic at all times may cause user accounts that should be disabled to become enabled again. Another example is giving the user a provisioning role that grants access to a certain system. This role should only be assigned to the user after a different role has been assigned and approved. Policy Xpress allows for the activation of its business logic during event and Business Logic Task Handler processing, much like custom adapters. Therefore, unlike identity policies, the logic can be triggered at any time, and not only at the beginning of a task.

Data (Data Elements)

Specify the data used by the policy. Every type of business logic requires some data to work with. That data can be used to make decisions or it can be used to construct more complex data. Policy Xpress provides many individual components to gather data. These components are referred to as *Data Elements*. An example of a data element is a user's attribute value. For example, Policy Xpress can gather the user's first name and store it as a data element for later use.

Entry Rules

Define the requirements that must be met before execution. Defining entry rules allows you to specify when Policy Xpress evaluates policies, which can simplify policies and improve performance. An example of an entry rule is to run a 'Set Full Name' policy *only* if the first name or the last name has changed.

Action Rules

Define the action taken based on the information gathered. For example, based on a user's department name, Policy Xpress can assign a user to different roles or specify different account values.

Actions

Specify the action to perform. At the end of the process, Policy Xpress performs the actions needed by the business logic. Policy Xpress works by having an action rule attached to multiple actions, so when the rule is met, the actions are performed. Actions can include assigning attribute values to a user or an account, executing a command line, running a SQL command, or generating a new event.

Profile

The profile tab for a Policy Xpress policy contains fields that manage policies and refine policy capabilities.

Note: A policy only applies to the environment it is created in. For example, if you create a policy while logged into the neteauto environment, the policy runs only for the neteauto environment.

Provide the following profile information when creating a policy:

Policy Name

Defines a unique friendly name for the policy.

Policy Type

Defines the listeners (see page 241) that trigger the policy. Each policy type has a different configuration.

Note: You cannot change this field once the policy is saved.

Category

Defines a group of related policies. This field allows you to group policies for easy management.

Description

Specifies a description of the policy.

Priority

If there are multiple policies that run at a single event, this field specifies when the policy runs. Policies are executed based on their priority. The lower the number, the higher the priority (priority 1 runs first, 10 runs second, 50 runs third, and so on). Setting priority is useful for policies which have a dependency on one another, or breaking a complex policy into two simple ones, that run one after the other.
For example, there are three policies which run if there is a specific value in the database. Instead of having each of the policies verify the value in the database, you can create a policy that runs before the other three policies and checks the value. If the new policy matches the required value, Policy Xpress can set a variable. The other three policies only run if that variable is set, which prevents redundant access to the database.

Enabled

Specifies if the policy is active in CA Identity Manager. You can clear this check box if you want to disable a policy without deleting it.

Run Once

Specifies if the policy runs only once. Some policies may need to run every time they meet criteria, and others may need to run only once. This value determines if action rules that have already executed in the past should execute again.

For example, adding an SAP role to a user based on department is an action that should only occur the first time the user matches that department. Alternately, a policy that sets the user's salary level based on title would *not* be set to run once, to make sure that no unauthorized changes take place.

Note: The Run Once option applies to an object, it does not apply globally.

Listeners

Policy Xpress policies are triggered by something that happens in the system. To implement this functionality, listeners that integrate with the system notify Policy Xpress when an event happens, and provide details about the event that occurred.

The following listeners are available:

Event

Listens for every event in the system and all the states associated with the event (before, approved, rejected, and so on). This listener also reports the name of the event to Policy Xpress. The following states are available for the Event listener:

- Before
- Rejected
- Approved
- After
- Failed

UI

Listens for different tasks running in the system during the synchronized state, meaning while a user still has the user interface for the task open. The following states are available for the UI listener:

- Start—when the task starts
- Set subject—when the primary object is found
- Validate On Change (see page 242)—when an attribute set with the Validate on Change flag changes
- Validate On Submit—when clicking the submit button
- Submission—when the task is submitted

Workflow

Listens for workflow processes that have found approvers. This listener is useful for performing logic based on approvers, such as sending an email to the approver.

Submitted task

Listens for submitted tasks not running in the background. This listener is similar to the Event listener, however, it considers the task as a whole, instead of the task's events. The following states are available for the Submitted task listener:

- Task started
- Task completed
- Task failed

Reverse Sync

Listens for notifications in the system that relate to CA Identity Manager's Explore functionality.

On-Screen Attribute Validation

In addition to the defined triggers (policy types), Policy Xpress can also listen to validation on attributes. This allows you to create policies that can run when an on-screen attribute that has been flagged as “validate on change” is updated.

This functionality can be used for creating dependant drop-down lists. For example, if there are two drop-down lists on the screen, Policy Xpress runs when the first drop-down option is selected, then sets the values for the second drop-down list based on the option selected in the first. An unlimited number of drop-down lists and other screen refreshes can be done. This differs from Select Box Data by allowing the drop-down options to be populated using any logic, rather than importing an XML file of static options.

Another use is populating other attributes based on the value of one attribute. For example, when an administrator selects a department, Policy Xpress can automatically populate other attributes, such as department manager, department number, and HR Dept Code. This replaces the need to write logical attribute handler custom code.

To configure validation with a Policy Xpress policy

1. In the User Console, modify a task's profile screen and select the field you want to listen for.
2. Access the field's properties and select Yes in the drop-down list for Validate on Change.
3. In Policy Xpress, create a policy of type 'UI (see page 241)' .
4. Under the Run at Events tab, select the State 'Validate on Change' and the task you modified in Step 1.

Use Case: Checking for Offensive Names

When a new user is created, you may want to check if the username is offensive. The following process outlines how to check for offensive names using a Policy Xpress policy.

1. Be sure that the appropriate fields in the Create User task's profile screen are set to Validate on Change = Yes.
2. In Policy Xpress, create a policy of type 'UI' .
3. Under the Run at Events tab, select the State 'Validate on Change' and the Create User task.
4. Create the following data elements to check the first name:
   - Get the first name attribute (Attributes, User attribute, Get)
   - Parse the first name to all lower case letters (General, String parser, To lower)
   - Check the first name against offensive words in a database table (Data sources, SQL query data).
5. Create similar data elements as in Step 4 to check the last name.
6. Create an action rule as follows:
   - Condition—first name is not equal to "" (this occurs if the query returns a message that the name is offensive)
   - Action—message that displays (Messages, On screen message) indicating the offensive name.

   This rule will force the user to change the name before submitting the Create User task again.
7. Create a similar action rule as in Step 6 for the last name.

Events

Depending on the policy type selected on the profile tab, you can configure activation times to establish when the policy is evaluated. For example, a policy of type Event can be set for evaluation Before a CreateUserEvent. A policy of type Task can be set for evaluation at Set Subject for DisableUserEvent.

To configure an activation time, select the following fields:

State

Specifies the time frame or action related to the event that activates the policy. For example, a policy can be set to run "Before" an event occurs.

Event Name

Specifies the event that activates the policy, such as a CreateUserEvent.

A policy can have more than one activation time. Every time a specified activation time (a state and an event) occurs in the system, Policy Xpress searches for all policies with that activation time, and evaluates each policy based on its order.

Note: If a policy matches an activation time that occurs in the system, it does not mean that the policy is automatically run. Rules criteria evaluated later in the process determine if the policy is completed.

Data Elements

Data elements are used for creating policy data. A policy can contain multiple data elements that represent the information used by the policy.

Policy Xpress uses flexible plug-ins for gathering the data element information. Each plug-in can perform a small, dedicated task. However, several plug-ins can be used together to build more complex policies. An example of a data element plug-in is a user attribute element. The goal of the element is to gather information about a certain attribute which is a part of the user's profile.

Data elements are calculated when they are called, meaning either a rule is using the data element, or another element needing calculation is using the data element as a parameter.
For example, an SQL query data element can retrieve a value from a table, but it needs the user's department to build the query. In this case, the department data element must run before the SQL query data element, and then the value can be used as a parameter (see page 246).

The following fields define a data element:

Name

Defines a friendly name that describes the data element. Some data elements are complex (such as getting variables or retrieving information from the database). Be sure to select a meaningful name to simplify data element management.

Category

Provides a grouping of data elements. This field sorts the data elements and makes selection easier.

Type

Specifies the data element type, each with its own dedicated use. This field is based on the category selected.

Function

Defines possible variations of the same data. Most data elements only support the Get function.

For example, the user attribute data element has the following functions:

- Get—returns the values of the attribute
- is multi valued—returns true if the value is multi-valued
- is logical—returns true if the value is logical

Function Description

Provides a prepopulated description of the function. Each function selected provides a different description to help in understanding its use and what the expected values are.

Parameters

Defines the parameters passed to the data element. Data elements are dynamic and can do different things based on the parameters. A user attribute data element returns different results based on the attribute selected. The sub type option also defines the number of parameters, their names, and the optional values when available.

You can add additional parameters if necessary. The SQL query example accepts two required parameters, the data source and the query itself. The query can use the "?" to be replaced with values (much like a prepared statement). Adding additional parameters allows you to set those values.

Note: When viewing data elements in Policy Xpress, there is a column titled 'In Use'. A checkmark in this column means that the data element is used by a rule, an action parameter, or as a parameter to other data elements.

Use Dynamic Values in Data or Action Elements

Dynamic values are the result of calculated data elements, and their values are only decided at run time. These values can then be used as parameters of other data elements (that are subsequently calculated, based on priority).

To use a dynamic value as a parameter for a data element

1. In the Policy Data tab, locate the parameter you want to set a dynamic value in.
2. In the empty text field, enter any regular text or select the dynamic value from the right drop-down list.
3. Click OK.

Variables

Policy Xpress has variables that are set with actions and saved as data elements (Variables category). Variables are shared across all policies that run at the same time, so a variable that has been set can be used by other policies of lower priority.

For example, a variable can contain a value calculated once by a policy, and then shared across other policies that no longer need to recalculate the value. The initial policy sets a value to the variable, and policies that run later read that value by using a data element that has the variable name as a parameter.

A variable can also be a trigger for other policies. In this case, the policies only run if the policy before them has run.

Entry Rules

Entry Rules define the conditions for when a policy should run. These conditions use the values gathered by the data elements in the policy.

There can be multiple entry rules in a policy, and an entry rule can have multiple conditions. At least one entry rule must be matched, meaning *all* conditions in that entry rule must be met for a policy to move on to the action rules.

The following fields define an entry rule:

Name

Provides a friendly name for the entry rule.

Description

Defines the meaning of the entry rule.

Conditions

Specifies the criteria to match.

Note: Conditions in an entry rule always have an AND operator between them.

More Information:

Conditions (see page 247)

Conditions

A condition is used in entry and action rules and is comprised of the following components:

- Policy Data
- Operator
- Value

For example, you want to create a condition that checks if a user's department was changed. First, define a Department Changed data element, then, in the condition, select the Department Changed data element, set the operator to Equals, and set the value to True.

More Information:

Entry Rules (see page 246)
Action Rules (see page 247)

Action Rules

Action rules are similar to entry rules in structure, but differ in functionality. Action rules define when action should be taken. For example, if you want a policy to perform an action when a user's department has changed to Sales, create an action rule that defines when 'Department = Sales'.

Also, instead of having to match one entry rule, several action rules may be matched. The single action rule with the highest priority (0 being the highest) is the *only* one used.

Action rules also contain one or more actions, and the actions are divided into Add Actions and Remove Actions.

The following fields define an action rule:

Name

Provides a friendly name for the action rule. This name must be unique.

Description

Defines the meaning of the action rule.

Conditions

Specifies the criteria to match.

Priority

Defines which action rule executes, in the case of several action rules matching. This field is useful for defining default actions. For example, if you have multiple rules, each for a department name, it is possible to set a default by adding an additional rule with no conditions but a lower priority (such as 10 if all others are 5). If none of the department rules are matched, then the default is used.

Add Actions

Defines a list of actions taken when the rule is matched. For example, you can configure a rule that states if the user's department matches the one configured in the condition, add a specific Active Directory group. Action rules behave differently, based on the Run Once setting. If the policy is set to run once, the associated actions are performed the first time the rule matches. The actions are not performed again for each subsequent rule match. In the example above, the Active Directory group is added to the user only once. If Run Once is not set, then the actions run again as long as the rule is matched. This field is important for enforcing values.

Remove Actions

Defines a list of actions to perform when the rule no longer matches. For example, the previous example added an Active Directory group to the user, based on the department. If the department changes, then the remove action removes the Active Directory group.

More Information:

Conditions (see page 247)

Actions

Actions perform the business logic after all the decision-making is done. An action works in a similar way to data elements except at the end. When it runs, it performs a task instead of returning a value.

Note: Actions are run in the order they appear in the User Console.

The following fields define an action:

Action Name

Defines the purpose of the action.

Category

Provides a grouping of actions. This field sorts the actions and makes selection easier.

Type and Function

Defines the type and function of the action taken.

Note: For more information about Type and Function, see Data.

Function Description

Provides a prepopulated description of the function. Each function selected provides a different description to help in understanding its use and what the expected values are.

Parameters

Defines the parameters passed to the action.

Flow Control

By default, policies are sorted by priority and then evaluated one by one. While this flow almost always applies, you can change the flow, if necessary.

This flow-changing functionality is represented by an action that can be attached to any action rule. Flow-changing functions are located under the System category of the action.

Important! Use caution when changing process flows. Using these actions may result in an infinite loop. For example, if you set 'Redo the current policy' on an action rule with no conditions, the rule will always be true, and the policy will always restart and never exit.

The following four flow-changing functions can be used:

Stop processing

Causes all policies after the current policy to be ignored, and causes Policy Xpress to exit.
Note: Only Policy Xpress exits. If you want to force CA Identity Manager to stop also, you can use the Exception type action plug-in.

Restart all policies

Stops processing the rest of the policies and goes back to the start of the list. This option is useful in cases where the action of one policy causes another policy, which ran before it and did not execute, to now meet the entry criteria. That policy is now reevaluated.

Redo the current policy

Causes a policy to run again. This option is useful for iteration. For example, creating a unique username requires a policy to run over and over again until it finds a unique name.

Go to a specific policy

This action requires selecting an existing policy. If that policy is running at the same time as the current policy (can be before or after) then Policy Xpress jumps to the selected policy. If the new policy is of lower priority, all policies between the current policy and the selected policy are ignored. If the new policy priority is higher, the process goes back.

Note: Because the action may cause Policy Xpress to skip certain policies, use this action type with caution.

Set Objects Associated with Accounts

When creating an Add Action to set an object that is associated with an account, such as Member Of, a specific relationship format is used to represent the object. The following two types of formats can represent the object in CA Identity Manager:

- To represent simple relationships between the object and the account, for example, Active Directory Groups:

  ```
  NativeGroup=Administrators,Container=Builtin,EndPoint=LocalAD,Namespace=Activ
  eDirectory,Domain=im,Server=Server
  ```

- To represent binding relationships between the object and the account, for example, SAP Roles:

  ```
  {"validFromDate":"2009\/12\/01","roleName":"SAPRole=SAP_AUDITOR_ADMIN,EndPoin
  t=sap endpoint,Namespace=SAP
  R3,Domain=im,Server=Server","validToDate":"2009\/12\/31"}
  ```

  A binding relationship differs from a simple relationship in that the association between the object and the account has additional data on it. In the previous example, the parameters validFromDate and validToDate only contain data related to the association between the account and the SAP role. The validFromDate and validToDate data does not exist on the account, or the role object.

To discern the format for the relationship, create a data element that Gets the value of the object. The value returned is the format you use in the Add Action to set that object.

Example: Active Directory Groups

1. Create a Policy Xpress policy with the following settings:
   - Policy Type: Event
   - Events: After – Modify User
2. In the Action Rule, configure the following Add Action:
   - Category: Attributes
   - Type: Set Account Data
   - Function: Set
   - Endpoint Type: Active Directory
   - Endpoint: *endpoint_name*
   - Account Name: *account*
   - Attribute: Member Of (groupMembership)
   - Value: NativeGroup=Administrators,Container=Builtin,Endpoint=*endpoint_name*,Namespace=ActiveDirectory,Domain=im,Server=Server

Advanced

Policy Xpress allows for many configuration variations and also interacts with external components. Due to this flexibility, errors may occur that are not necessarily bugs, such as an incorrectly configured data source, a missing value returned from a dynamic data element, or an endpoint which is not responding.

Usually when an error occurs, the system will stop the calculation of policies for the current step. However, you can change the default error response, based on the error category. For example, if you have a policy that is non-critical, you can define that the processing should continue in the event of an error.

The Advanced tab allows you to change the default error responses if necessary.

Note: We recommend that these error responses be left to their defaults, but for advanced use cases, these settings can be changed per policy. For example, if you have a policy that is non-critical, you can define that processing should continue even if the policy failed.

The following error categories can be configured on the tab:

- Validation—caused by providing incorrect information to a plug-in. This type of error is reported before the action is attempted.
- Environment—caused by problems in the environment, such as a failing database server for the SQL plug-in.
- Allowed—a non-critical error. The default behavior for this error type is to continue processing the request, such as when sending an email fails.

For each of the previous errors, the following options can be set:

- Fail event—stops the current action. This is the default for most error types.
- Fail policy—stops the current policy and all actions associated with it. The rest of the policies continue.
- Ignore—logs any failure but does not stop the actions or policies.

Policy Xpress Examples

Set a user's full name

Run At Events—when the user is created or modified

Data Elements—get the values of the first name and last name

Entry Rules—if the first name or last name has changed based on the data gathered. It prevents the policy from running otherwise.

Action Rules—set the full name to be the value of the first name, space, and the value of the last name.

Assign different provisioning roles for employees versus contractors

Run At Events—at create user and modify user

Data Elements—get the value of the user's type

Entry Rules—none (action rules are always evaluated)

Action Rules—1) checks if the user type is an employee 2) checks if the user type is not an employee. Only one of the action rules can be met, and assigns the appropriate provisioning role.

Set the user's groups and OU in Active Directory, based on department

Run At Events— at the end of the assign provisioning role event. This ensures that an account is already created when setting the values.

Data Elements—get the user's department, and also the endpoint type and Active Directory domain to make things easier to manage later on

Entry Rules—if the department is not empty

Action Rules—multiple rules for each possible department. Each rule checks if department equals Sales or any other value. There is a default rule in case the department does not meet any requirements. Different actions are configured for each rule, assigning different values. This ensures that a user in a specific department gets the Active Directory groups and OU they need, while a user in a different department gets others, as appropriate.

Write all new users to a table. The table contains some of the user's HR data.

Run At Events—on create user, but only after the user has been created (after the create user event has completed)

Data Elements—gets the required HR information, such as user name, country, department, and any other values

Entry Rules—none (action rules are always evaluated)

Action Rules—execute an SQL query which accepts the values gathered as parameters. The result of activating the query is having a new record in the database for the new user.

Policy Xpress Policy Samples

Policy Xpress policy samples for common use cases are available at the following location:

admin_tools\samples\PolicyXpress

Chapter 13: CA Enterprise Log Manager Integration

This section contains the following topics:

CA Enterprise Log Manager Functionality

When CA Enterprise Log Manager integrates with CA Identity Manager, you get the following functionality:

- The CA Enterprise Log Manager Agent collects CA Identity Manager auditing information and sends it to CA Enterprise Log Manager for conversion into CA Common Event Grammar (CEG).
- The Identity Manager User Console can seamlessly retrieve CA Enterprise Log Manager reports and/or queries with CA Identity Manager context information used to filter the information returned.
- CA Identity Manager is shipped with a number of default reports, and infrastructure for adding CA Enterprise Log Manager reports and/or queries to an existing or new task.
- CA Enterprise Log Manager Agent is installed on CA Identity Manager [Audit Database] machine
- CA Identity Manager Connector is configured on CA Enterprise Log Manager Agent
- CA Enterprise Log Manager Product registration for the Identity Manager environment is created
- Optional CA Enterprise Log Manager Data Access Filter is created for the product registration

CA Enterprise Log Manager Components

When CA Identity Manager integrates with CA Enterprise Log Manager, the following components are added to the Identity Manager architecture:

- A CA Elm Viewer tab lets you embed CA Enterprise Log Manager objects in any new or existing task.

  Note: A configured CA Enterprise Log Manager server connection is required.

- Role definitions that can be imported

Integration Limitations

The following are known limitations of the framework integration with CA Enterprise Log Managers server:

- Retrieving query and report lists at runtime for task configuration can run slow.
- The CA Enterprise and Log Manager APIs only recognize default Java named time zones.
- EQUAL operation is case-sensitive when used in a compound filter.
- The minimum version of CA Enterprise Log Manager server is the GA ELM Server (45.10) with the following subscription updates applied in the order of appearance:
  1. SP-1 subscription patch
  2. M5 content patch
  3. Open API update
- Only one connection to a CA Enterprise Log Manager server at a time is supported.

How to Integrate CA Enterprise Log Manager with CA Identity Manager

Before you can view and manage CA Enterprise Log Manager reports and queries, the following must be done by an administrator:

1. Install the CA Enterprise Log Manager Agent
2. Create a New Connector.
3. Enable Auditing in CA Identity Manager.
4. Configure the CA Enterprise Log Manager Server

CA Enterprise Log Manager Agent Installation Prerequisites

The following must be done before installing the CA Enterprise Log Manager Agent:

- Make sure the CA Enterprise Log Manager Server machine is reachable from the machine running CA Identity Manager or hosting the Identity Manager auditing database.
- Make sure the agent machine is reachable from the server machine.
- Configure Data Source on the agent machine. Click here (see page 257) for instructions.
- Verify that Adobe Flash Player is version 9.0.28 or higher. You can download the player from here:

  http://www.adobe.com/go/getflash
- Download agent binaries. Click here (see page 258) for instructions.
- Get agent authentication key. Click here (see page 258) for instructions.
- Make the server name/IP readily accessible
- Make account information readily accessible, but do not jeopardize security. This is the identity account under which the agent runs as a service (Windows).
- If connector already exists, export default connector information and have it readily available.
- Make sure the machine has 4 GB of RAM.

Configure Data Source on the Agent Machine

Follow this procedure to configure Data Source on the agent machine.

To configure Data Source

1. Navigate to Control Panel, Administrative Tools, Data Sources (ODBC)
2. From the System DSN tab, add the following:

   imsauditevent12 data source (ODBC) pointing to the auditing database.
3. Click Apply/OK.

   The Data Source is configured.

Download Agent Binaries

Follow this procedure to download agent binaries.

To download agent binaries

1. Login to CA Enterprise Log Manager Server with the following URL:

   https://<host>:5250/spin/calm/CALMSpindle.csp

2. Navigate to Administration, Log Collection, Agent Explorer, Download Agent Binaries, <OS> <version>

3. Save to File.

Get Agent Authentication Key

Use this procedure to get the agent authentication key.

To get the agent authentication key

1. From the CA Enterprise Log Manager Server, navigate to Administration, Log Collection, Agent Explorer, Agent Authentication Key.

2. Make the key readily accessible, but do not jeopardize security.

Install the CA Enterprise Log Manager Agent

The CA Enterprise Log Manager agent is responsible for collecting events and dispatching that information to the CA Enterprise Log Manager Server. Install the agent on a Identity Manager database server or endpoint machine to enable logging.

Note: The CA Enterprise Log Manager Agent is supported on Windows and Linux.

To install the CA Enterprise Log Manager Agent

1. On the database server, run the ca-elmagent-<version>.exe installation and specify the following:

   CA Enterprise Log Manager server name/IP address and the authentication code.

   Agent server account information to be used to run the agent as a service/demon.

2. Specify default connectors list file, if available.

3. Login to CA Enterprise Log Manager Server with the following URL:

   https://<host> :5250/spin/calm/CALMSpindle.csp

4. Navigate to Administration, Log Collection, Agent Explorer, Default Agent Group

5. Select the agent machine and launch Status and Command view.

   The status should be running.

Importing Role Definitions

Before you can configure the Enterprise Log Manager Connection in the User Console, you must import the CA Enterprise Role Definitions first.

To Import the role definitions:

1. Log onto the Management Console with the following URL.

   `http://host:port/iam/immanage`

2. Navigate to Environment, Role and Task Settings, Click Import Button, and select Enterprise Log Manager - Enterprise Log Manager Role Definitions.xml.

3. Click Save and Close.

4. From the System Tab in the User Console, click on Configure Enterprise Log Manager Connection, fill out the required information and click Submit.

Create a New Connector

Follow this procedure to create a new connector.

To Create a new connector

1. Login to CA Enterprise Log Manager Server with the following URL:

   ```
   https://<host> :5250/spin/calm/CALMSpindle.csp
   ```

2. Navigate to Administration, Log Collection, Agent Explorer, Default Agent Group

3. Select the agent machine.

4. Switch to Connectors view.

5. Click the Create a new Connector button and enter the following information:

   Connector Details

   Select Integration type CAIdentityManager and change the connector name if desired.

   Connector Configuration

   Connection String

   - Driver={SQL Server} ; Server=<Auditing DB Server> ; Database=<Auditing DB>
   - Driver={Microsoft ODBC for Oracle} ; Dbq=<Auditing DB TNSname>

   Username: <Auditing DB User>

   Password: <Auditing DB User Password>

6. Apply the following connection configuration changes to the CA Identity Manager Connector for use with [assign the value for rn in your book].

   - SourceName: the name of Data Source on the agent machine - imsauditevent12
   - AnchorSQL: select max(id) from imsauditevent12
   - AnchorField: IMS_EVENTID
   - EventSQL:

     ```
     select imsauditevent12.id as IMS_EVENTid ,imsauditevent12.audit_time as
     IMS_AUDITTIME ,imsauditevent12.envname as ENVNAME
     ,imsauditevent12.admin_name as ADMINUNIQUENAME ,imsauditevent12.admin_dn as
     ADMINID ,imsauditevent12.tasksession_oid as TRANSACTIONID
     ,imsauditevent12.event_description as EVENTINFO
     ,imsauditevent12.event_state as EVENTSTATE
     ,imsauditevent12.tasksession_oid as TASKOID
     ,imsaudittasksession12.task_name as TASKNAME
     ,imsauditeventobject12.object_type as OBJECTTYPE ,
     imsauditeventobject12.object_name as
     ```

```
OBJECTUNIQUENAME ,imsauditobjectattributes12.attribute_name as ATTRNAME
,imsauditobjectattributes12.attribute_oldvalue as ATTROLDVALUE
,imsauditobjectattributes12.attribute_newvalue as ATTRNEWVALUE
,imsauditobjectattributes12.attribute_newvalue as ATTRVALUE from
imsaudittasksession12, imsauditevent12, imsauditeventobject12,
imsauditobjectattributes12 where imsauditevent12.id >? and
imsauditevent12.tasksession_id = imsaudittasksession12.id and
imsauditevent12.tasksession_oid = imsaudittasksession12.tasksession_oid
and
imsauditeventobject12.parent_event_id = imsauditevent12.id and
imsauditobjectattributes12.parent_object_id = imsauditeventobject12.id
ORDER BY
imsauditevent12.id ASC;
```

7. Save and Close.

To verify that the connector is working

1. Navigate to Administration, Log Collection, Agent Explorer, Default Agent Group
2. Select the agent machine
3. Switch to Connectors View and click the Launch Status and Command View button.

   The status should be running.

Enable Auditing in CA Identity Manager

To enable auditing in CA Identity Manager

1. Open the Management Console

   `http://host:port//iam/immanage`

2. Navigate to Environments, <Environment>, Advanced Setting, Auditing.

3. Export existing settings and save the file.

4. Modify the saved file with the following and save the modifications:

   - <Audit enabled="true" auditlevel="BOTH" datasource="auditDbDataSource"
   - Add audit profile for Password policies under the last audit profile already defined:

     <AuditProfile objecttype="FWPASSWORDPOLICY" auditlevel="BOTHCHANGED"/>

5. Import the file back into the Management Console and do any of the following to trigger aggregation of auditing information:

   - Tasks performed on User managed object
   - Tasks performed on Group managed object
   - Tasks performed on Password Policies managed object

6. Login to CA Enterprise Log Manager Server with the following URL:

   https://<host> : 5250/spin/calm/CALMSpindle.csp

7. To exercise existing reports, navigate to Queries and Reports, Queries, CA Identity Manager

   Note: You must have the Enterprise Log Manager Server already configured.

8. Depending on what tasks you have performed, open the following default reports to verify that events are coming:

   - System All Events by User task invokes 'CA Identity Manager - System All Events' filtered by user ID
   - Account Management by Host task invokes 'Account Management by Host' as is
   - Account Creations by Account task invokes 'Account Creations by Account' as is
   - Account Deletions by Account task invokes 'Account Deletions by Account' as is
   - Account Lockouts by Account task invokes 'Account Lockouts by Account' as is
   - Certification Process Activity by Host task invokes 'CA Identity Manager - Process Activity by Host' as is
   - Password Policy Modify Activity task invokes 'CA Identity Manager - Policy Modify Activity' as is

Configure the CA Enterprise Log Manager Server

Before you can configure the CA Enterprise Log Manager Server to manage, make sure of the following:

- You must have EiamAdmin credentials
- You must have Adobe Flash Play version 9.0.28 or higher.

Once the CA Enterprise Log Manager Server is configured the following functionality is available:

- Multiple environments producing auditing events are consumed by a single CA Enterprise Log Manager Server or federated hierarchy.
- Data authorization for remote systems can be implemented through CA Enterprise Log Manager's Data Access Filter.

To configure the CA Enterprise Log Manager Server

1. Log into the CA Enterprise Log Manager server product registration page with CA Enterprise Log Manager Administrator credentials using the following URL:

   ```
   https://host:port/spin/calmapi/products.csp
   ```

2. Register you your Identity Manager environment by clicking on the Register button and supplying your certificate name and password.

   Note: Each environment must have separate registration (certificate name/password) pairs.

3. Navigate to Administration, User and Access Management, New Data Access Filter and provide a name for the filter to be created.
4. Proceed to the next step.
5. Leave Selected Identities at "All Identities" and proceed to the next step.
6. Create an access filter by clicking on New Event Filter button.

   Configure the Data Access Filter by restricting the certificate created to machine/environment name only for logs collected from CA Identity Manager. You can also restrict the certificate to access native endpoint information for managed endpoints only.

7. Save and close.
8. Open Access Policies by clicking on the Open Access Policies button.
9. Select Obligation Policies and click on the single policy available.
10. Remove the "All Identities" and add the certificate name.
11. Save the policy.
12. Log into the Identity Manager User Console and Configure the Enterprise Log Management Connection.

Configure Enterprise Log Manager Connection

Use this screen to manage newly added CA Enterprise Log Manager connection tasks.

The fields on this screen are listed below:

Connection Name

Specifies the unique name used for the single CA ELM connection managed object.

This is a read-only field.

Description

Describes the CA ELM connection.

Host Name

Specifies the CA Enterprise Log Manager server hostname or IP address.

This is a required field.

Port #

Specifies the CA Enterprise Log Manager server connection port.

Default: 52520

This is a required field.

Certificate Authority Signed SSL Certificate

When checked, specifies a strict SSL certificate check when connecting to a CA Enterprise Log Manager server.

If you have a self-signed SSL certificate, for example one installed with CA Enterprise Log Manager by default, this check box must not be selected since the trusted path to the root certificate authority does not exist.

Certificate Name

Specifies the name of the CA Enterprise Log Manager certificate to use for authentication.

This is a required field.

Certificate Password

Specifies the CA Enterprise Log Manager password.

This is a required field.

Attribute

Not supported. Version is retrieved on an attempt to save connection information as a test.

Delete Enterprise Log Manager Connection

Select a connection from the list and click Delete. The CA Enterprise Log Manager connection task is deleted.

Integrate Additional CA Enterprise Log Manager Reports or Queries with CA Identity Manager

You can integrate additional CA Enterprise Log Manager reports or queries with CA Identity Manager using the Enterprise Log Manager Viewer tab. These new reports or queries can be combined with existing tasks (including wizards) and new tasks. CA Enterprise Log Manager federated data can also be included if needed. Using the Enterprise Log Manager View tab, you can apply filters to the information retrieved. These filters can use:

- Constant values
- Managed object’s attributes
  - For example, physical - ::MyPhysicalAttribute::

    logical - ::|MyLogicalAttribute|::
- Any field as described by CA Enterprise Log Manager Common Event Grammar (CEG)
  - dest_username
  - dest_objectname
  - dest_uid
  - source_username
  - source_objectname
  - source_uid
  - …

Configure the Enterprise Log Manager Viewer Tab

Configure the CA Enterprise Log Manager Viewer tab to be displayed with any or all or the following fields:

Name

A name you assign to the tab.

Tag

An identifier for the tab that is unique within the task. It must start with a letter or underscore and contain, letters, numbers, or underscores only. The tag is mainly used for setting data values through XML documents or HTTP parameters.

Hide Tab

Prevents the tab from being visible in the task. This option is useful for applications that need to hide the tab, but still have access to attributes on the tab.

Enterprise Log Manager Query

Specifies that CA Enterprise Log Manager queries are to be displayed.

Note: You can specify either CA Enterprise Log Manager Query or CA Enterprise Log Manager Report, but not both.

Enterprise Log Manager Report

Specifies that CA Enterprise Log Manager reports are to be displayed.

Note: You can specify either CA Enterprise Log Manager Query or CA Enterprise Log Manager Report, but not both.

Enterprise Log Manager id

Species the id for either the query or report.

Include Federated Data

Includes or excludes CA Enterprise Log Manager Federated data in the results. By default, this field is unchecked.

Show Prompt

Specifies CA Enterprise Log Manager prompt queries only. By default, this field is unchecked.

Filter

Specifies SQL-based advanced conditions used to narrow results returned by CA Enterprise Log Manager queries or reports. Constant and dynamic values can be included. The following is a sample expression:

```
((source_uid EQUAL ::logical.attribute.X:: ) AND (source_username EQUAL
::logical.attribute.Y:: ))
```

Supported operations include:

- equals (EQUAL)
- not equals (NEQ)
- less (LESS)
- greater (GREATER)
- less or equals (LEQ)
- greater or equals (GREATEQ)
- like (LIKE)
- not like (NOTLIKE)
- in set (INSET)
- not in set (NOTINSET)

Support conjunctions include:

- AND
- OR

Parenthese are mandatory. If the value on the left side in condition expression does not have the "::" marker on both ends, the value is considered a constant and sent to CA Enterprise Log Manager as is.

Parameter/Value Table

Specifies the fields and and values to be used for scoping.

Only queries or reports matching tags and tags logic of scoping are selected.

Parameter

Specifies the values for the Start, Stop, and Limit parameters. The following parameters are supported:

- Time granularity (for trends only)
- Start time
- End time
- Earliest group event is dated after (for grouped queries only)
- Latest grouped event is dated after (for grouped queries only)
- Latest grouped event is dated before (for grouped queries only)
- The minimum number of events in the grouping (for grouped queries only)
- The maximum number of events in the grouping (for grouped queries only)

Chapter 14: Task Persistence

This section contains the following topics:

Automated Task Persistence Garbage Collection and Archiving

In this release, an administrator is able to schedule and modify jobs with specific parameters using the Cleanup Submitted Tasks task to clean up and archive task and event information in the task persistence database and also delete these recurring tasks as needed.

From the System Tab, you can launch a wizard by selecting Cleanup Submitted Tasks. From there, the wizard walks you through setting up and scheduling jobs and whether or not to archive the data. You can also choose to delete the recurring jobs when needed by selecting Delete Recurring Tasks from the System Tab.

By scheduling the tasks to clean up and archive task data, the potential for performance problems or system outages are greatly reduced. With the archive feature, you can back up the tasks to the archive database before deleting them from the runtime database. If you need to go back and view these deleted tasks, select the Search the archive check box on View Submitted Tasks to search and view a list of all tasks that have been deleted and archived.

Recurrence Tab

Use this tab to schedule your job. The fields in this tab are as follows:

Execute now

Runs the job immediately.

Schedule new job

Schedules a new job.

Modify existing job

Specifies that you want to modify a job that already exists.

Note: This field only appears if a job has already been scheduled for this task.

Job Name

Specifies the name of the job you want to create or modify.

Time Zone

Specifies the server time zone.

Note: If your time zone is different from the server's time zone, a drop-down box is displayed so you can select either your time zone or the server's time zone when scheduling a new job. You cannot change the time zone when modifying an existing job.

Weekly schedule

Specifies that the job is run on a specific day or days and time during a week.

Advanced schedule

Specifies additional scheduling information.

Day of Week

Specifies the day or days of the week the job is run.

Execution Time

Specifies the time of day, in 24-hour format, the job is run. For example, 14:15.

Cron Expression

For information on filling out this field, see the following:

http://www.opensymphony.com/quartz/api/org/quartz/CronExpression.html

Note: This field appears when Advanced schedule is selected.

More Information

Execute a Job Now (see page 272)
Schedule a New Job (see page 272)
Modify an Existing Job (see page 273)
Delete a Recurring Task (see page 273)

Cleanup Submitted Tasks Tab

Use this tab to specify the minimum age, archive, audit timeout, time limit, and task limit of the task. Click Finish once you have completed all required fields. The fields in this tab are as follows:

Minimum Age

Specifies the minimum age of tasks that are in a final state (Completed, Failed, Rejected, Cancelled, or Aborted) to be cleaned up. For example, if 1 month is specified, any tasks that have reached a final state in the last month are retained. Any tasks that have reached a final state more than a month ago are subject to cleanup and archiving.

This is a required field.

Archive

Backs up tasks to the archive database before deleting them from the runtime database.

Once the job is run, if archive is selected, the data is committed to the archive database and removed from the runtime task persistence database. Data is not removed until a successful commit to the archive database happens.

Audit Timeout

Specifies the length of time before tasks in the audit state are subject to cleanup. Tasks in the audit state are not considered to be in a final state until this length of time has elapsed. Tasks in the audit state have not been submitted

Time Limit

Limits cleanup to a specific amount of time.

Task Limit

Limits cleanup to a specific number of tasks.

Execute a Job Now

To execute a job immediately, use the Cleanup Submitted Tasks wizard.

From the System tab

1. Select Cleanup Submitted Tasks from the left pane.

   The Recurrence step of the wizard appears.

2. Select Execute Now and Next.

   The Cleanup Submitted Tasks step of the wizard appears.

3. Enter the minimum age, archive, audit timeout, time limit, and task limit information and click Finish.

   The job is submitted immediately.

Schedule a New Job

To schedule a new job, use the Cleanup Submitted Tasks wizard.

From the System tab

1. Select Cleanup Submitted Tasks from the left pane.

   The Recurrence step appears.

2. Select Schedule a new job, enter the job name and scheduling information for the job and click Next.

   The Cleanup Submitted Tasks step appears.

3. Enter the minimum age, archive, audit timeout, time limit, and task limit information and click Finish.

   The new job is scheduled.

Modify an Existing Job

To modify an existing job, use the Cleanup Submitted Tasks wizard.

From the System tab

1. Select Cleanup Submitted Tasks from the left pane.

   The Recurrence step appears.

2. Select Modify an existing job and choose an existing job, modify the scheduling information, and click Next.

   The Cleanup Submitted Tasks step appears.

3. Modify the minimum age, archive, audit timeout, time limit, and task limit information and click Finish.

   The existing job is modified.

Delete a Recurring Task

To delete a recurring task, follow this procedure.

From View Submitted Tasks

1. Select Delete Recurring Task
2. Select the task you want to delete.
3. Click Submit.

How to Migrate the Task Persistence Database

In previous releases, migration was done 'on the fly' and using the Management Console. A command line migration tool has been provided to remove performance bottlenecks when migrating large amount of tasks. You can also fine tune your migration to a specific environment, state of the task, and the tasks that were created and run during a specific date range. The command line tool, runmigration is located in the following folder:

```
admin_tools/tools/tpmigration
```

In order to migrate the task persistence database, you must do the following:

1. Update the tpmigration125.properties file
2. Set the JAVA_HOME variable.
3. Run the runmigration tool.

Update the tpmigration125.properties File

To set up the task persistence database migration, you must update the tpmigration.properties file with the object store and task persistence information including the store values. The tpmigration125.properties file is located in the following location:

<IAM suite folder>/tools/tpmigration/com/ca/tp/migratetpto125

To set up migration, complete the following information in the properties file:

```
###########################################################
# The object store is required to obtain the environment details.
###########################################################
os.db.hostname=<hostname>
os.db.dbname=<database-name or SID>
os.db.username=<db user name>
os.db.password=<db user's password>
os.db.port=<db port number>
os.db.dbType=<type of the database.  For ex. for SQL server sql2005 and for oracle
'oracle'>

###########################################################
# Task persistence data where the old and new tables are.
###########################################################
tp.db.hostname=<hostname>
tp.db.dbname=<database-name or SID>
tp.db.username=<db user name>
tp.db.password=<db user's password>
tp.db.port=<db port number>
tp.db.dbType=<type of the database.  For ex. for SQL server sql2005 and for oracle
'oracle'>
```

Set the JAVA_HOME Variable

In order for the runmigration tool to run properly, you must make sure the environment variable JAVA_HOME is set.

Run the runmigration Tool

To start the migration, use the following procedure.

From a command line

1. Run the runmigration tool.

   For windows:

   ```
   runmigration.bat
   ```

   For UNIX:

   ```
   runmigration.sh
   ```

2. Enter the following information:

   - The Environment protected Alias ('all' for all environments).

     Note: If you do not specify all, only one environment can be entered.

   - The task state.
     Note: If you do not specify all, only one task state can be entered.

   - The CA Identity Manager version to migrate from (1-8.x, 2-12.0).

   - Do you want to specify a date range for the tasks to be migrated (y/n).

     Note: If you choose 'y', you must enter the following:

     - Enter the Start Date (mm/dd/yy)

     - Enter the End Date (mm/dd/yy)

   The migration starts.

After the migration completes, the status indicates how many tasks were migrated.

Chapter 15: Reporting

This section contains the following topics:

Overview

Within CA Identity Manager, you can run two different types of reports:

- Snapshot Reports—Include data from the Snapshot Database, which contains information from the Identity Manager object store and the Identity Manager user store. An example of a Snapshot Report is the User Profile report. You define the data that is added to the Snapshot Database using Snapshot Definitions that specify the information to include.
- Non-Snapshot Reports—Include data from other data sources, such as the Audit Database. For example, Identity Manager includes default audit reports. (These reports have the prefix "Audit - " in their name in the User Console). By default, CA Identity Manager only includes Audit reports, but you can create your own custom reports that include data from any data source, such as the Workflow or Task Persistence databases.

Each report within CA Identity Manager requires initial configuration before you can run it. The configuration steps depend on the type of report that you want to run.

For Snapshot Reports (see page 280), do the following:

1. Create a snapshot definition file to define the data that is added to the snapshot database.
2. Capture snapshot data for the report.
3. Modify the Report Task in CA Identity Manager and perform the following actions:
   a. Associate a snapshot definition with the task.
   b. Add the rptParamConn connection object to the task.

4. Request the report using one of the following methods:
   - Run the report immediately
   - Schedule the report
5. View the report in the User Console.

For Non-Snapshot Reports (see page 298), do the following:

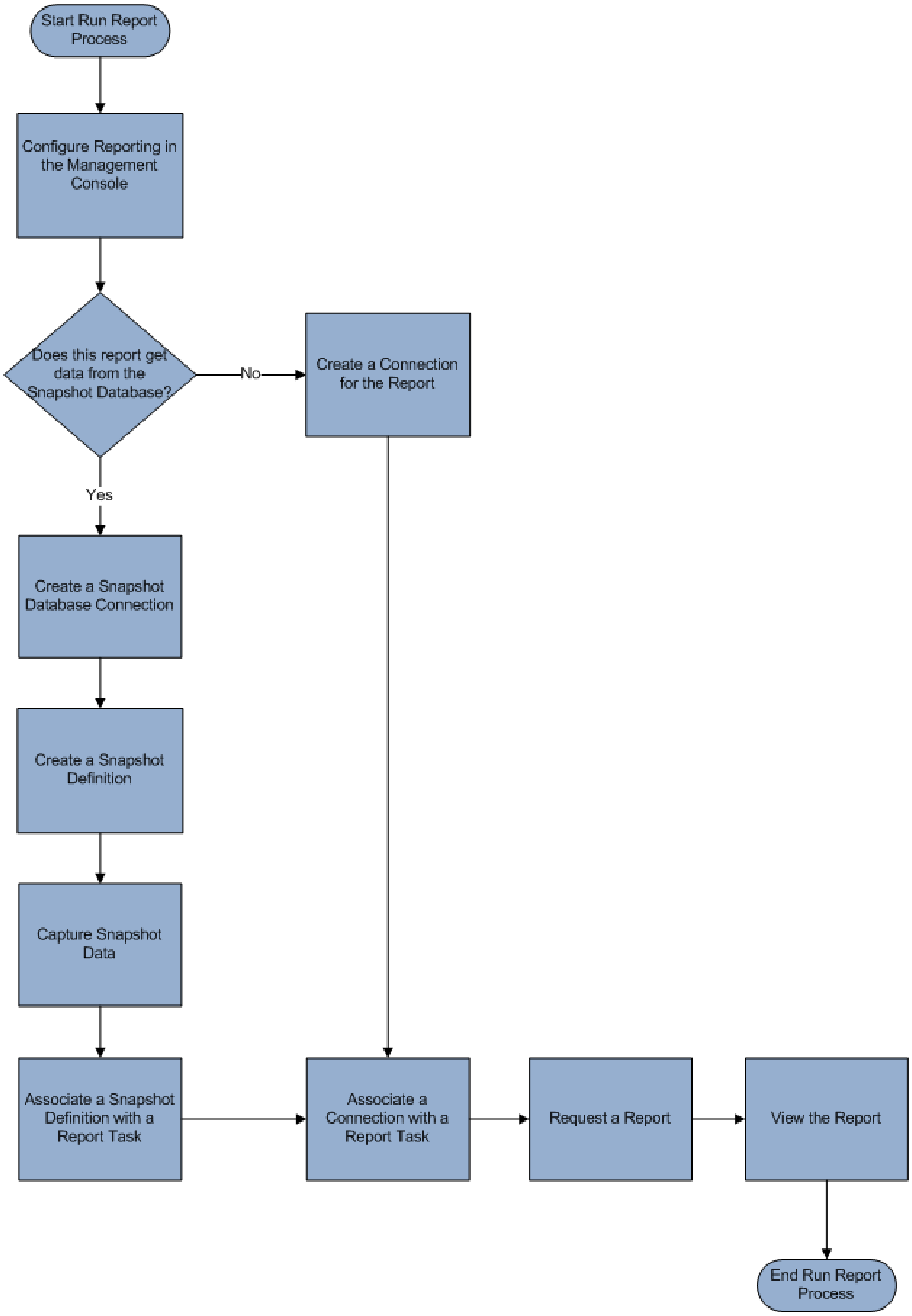
1. Create a connection object with the data source information for the report.
2. Modify the Report Task in CA Identity Manager and add the connection object to the task.
3. Request the report using one of the following methods:
   - Run the report immediately
   - Schedule the report
4. View the report in the User Console.

Once the initial configuration for your report is complete, you can then request a report within CA Identity Manager. You can run a report immediately, or you can schedule a report to run at a later time. You can also create a recurring schedule for your report within CA Identity Manager.

Lastly, you can view the report within the User Console, or you can export the report to various formats.

The Report Process

The following graphic details the process required to run and view reports:


Start Run Report Process
Configure Reporting in the Management Console
Does this report get data from the Snapshot Database?
No
Create a Connection for the Report
Yes
Create a Snapshot Database Connection
Create a Snapshot Definition
Capture Snapshot Data
Associate a Snapshot Definition with a Report Task
Associate a Connection with a Report Task
Request a Report
View the Report
End Run Report Process

How to Run Snapshot Reports

The following table describes the steps to run Snapshot Database reports in CA Identity Manager:

Step	Refer to...
1. Configure reporting in the Management Console.	Configure Reporting (see page 280)
2. Create a Snapshot Database connection.	Create a Snapshot Database Connection (see page 281)
3. Create a snapshot definition.	Create a Snapshot Definition (see page 281)
4. (Optional) Capture the snapshot data.	Capture Snapshot Data (see page 293)
5. Associate a snapshot definition and a connection with the report task.	Associate a Snapshot Definition and Connection with a Report Task (see page 295)
6. Request a report.	Request a Report (see page 296)
7. View the report.	View the Report (see page 297)

Configure the Report Server Connection

Configure the connection between CA Identity Manager and the Report Server.

Note: We recommend that all systems involved in reporting be set to the same time zone and time.

To configure reporting

1. In the User Console, click System, Reporting, Report Server Connection.
2. Enter the Report Server settings. Note the following:
   - Host Name and Port—hostname and port number of the system where the Report Server is installed.
   - Reports folder name—location of the default CA Identity Manager reports.
   - User ID—user created for the Report Server.
   - Password—password for the user created in the Report Server.
   - Web Server—Set to Non-IIS for Tomcat

3. Click Test Connection to verify the connection.
4. Click Submit.

The reporting connection is established.

Create a Snapshot Database Connection

CA Identity Manager needs to know where to export snapshot data to. Create a database connection from CA Identity Manager to the Snapshot Database.

To create a snapshot database connection

1. In the User Console, go to Reports, Snapshot Tasks, Manage Snapshot Database Connection, Create Snapshot Database Connection.
2. Create a new snapshot database connection by completing all the necessary fields.
3. Click Submit.

   A new Snapshot Database connection is created.

Create a Snapshot Definition

A snapshot reflects the state of objects in CA Identity Manager at a given time. You use this snapshot data to build a report. To capture CA Identity Manager object data, you create a snapshot definition that exports the data to the Snapshot Database.

To create a snapshot definition

1. In the User Console, go to Reports, Snapshot Tasks, Manage Snapshot Definition, Create Snapshot Definition.
2. Create or Copy an object of type Snapshot Type.
3. Enter the following details under the Profile tab:

   Snapshot Definition Name

   Specifies the unique name given for the snapshot definition.

   Snapshot Definition Description

   Displays any additional information to describe the snapshot.

   Enabled

   Specifies that CA Identity Manager creates a snapshot based on the current snapshot definition at the scheduled time.

   Note: If this option is not selected, the snapshot is not captured at the scheduled time. Also, the snapshot definition is not listed in the Capture Snapshot Data screen.

Snapshot Parameter XML File

Specifies the Snapshot Parameter XML file (see page 285) that defines the objects and their attributes, which are exported into the Snapshot Database. Select the XML file associated with the report you want to run.

The sample Snapshot Parameter XML files are located in the following directory:

```
iam_im.ear\config\com\netegrity\config\imrexport\sample
```

Important! ExportAll.xml is the default XML file, but it is intended as a sample XML file *only*. If you use the ExportAll.xml file, it exports *all* of your data for reporting and can take a long time to complete. We recommend that you use the default XML files that only export the data you need to run a specific report.

Keep Last

Specifies the number of successful snapshots stored in the Snapshot Database.

Note: The number of snapshots should be greater than zero. If you do not specify a value for this field, CA Identity Manager stores unlimited snapshots.

4. Click Submit.

   CA Identity Manager is configured to create snapshots of the objects mentioned in the Snapshot Parameter XML file.

The Snapshot Parameter XML File

CA Identity Manager reports enable you to see the current state of an Identity Manager environment. You can use this information to ensure compliance with internal business policies or external regulations.

You generate CA Identity Manager reports from management data which describes the relationship between objects in an Identity Manager environment. Examples of management data include the following:

- A user’s profile attributes
- A list of roles that contain a certain task
- The members of a role or group
- The rules that comprise a role

Use the appropriate Snapshot Parameter XML file to define the management data used in the report.

The following table lists the default XML files and their associated reports:

Snapshot Parameter XML File	Report that uses the XML file	Objects Exported by the XML file
AccountDetailsReportSnapshot.xml	Account Details Report	■ Provisioning Role objects ■ Endpoint object that includes account details
AdministrationReportSnapshot.xml	Administration Report	■ Admin, Access, and Provisioning roles with their scope rules ■ Role owners ■ Role administrators ■ Role members ■ Tasks assigned to each role
EndpointAccountsReportSnapshot.xml	Endpoint Accounts Report	■ Global users and their account relationships ■ Endpoint object that includes endpoint details with its accounts
EndpointDetailsReportSnapshot.xml	Endpoint Details Report	Endpoint object that includes endpoint details with its accounts
NonStandardsAccountsReportSnapshot.xml	Non-Standard Accounts Report	■ Global users and their account relationships ■ Endpoint object that includes endpoint details with its accounts
NonStandardsAccountsTrendReportSnapshot.xml	Non-Standard Accounts Trend Report	■ Global users and their account relationships ■ Endpoint object that includes endpoint details with its accounts

Snapshot Parameter XML File	Report that uses the XML file	Objects Exported by the XML file
OrphanAccountsReportSnapshot.xml	Orphan Accounts Report	■ Accounts assigned to the [default user] ■ Endpoint details
PoliciesReportSnapshot.xml	Policies Report	Details about all the identity policies for an environment
RoleAdministratorsReportSnapshot.xml	Role Administrators Report	■ Admin, Access, and Provisioning roles ■ Role administrators
RoleMembersReportSnapshot.xml	Role Members Report	■ Admin, Access, and Provisioning roles ■ Role Members
RoleOwnersReportSnapshot.xml	Role Owners Report	■ Admin, Access, and Provisioning roles ■ Role owners
RolesReportSnapshot.xml	Roles Report	■ Admin, Access, and Provisioning roles with their scope rules ■ Role owners ■ Role administrators ■ Role members ■ Tasks assigned to each role
TaskRolesReportSnapshot.xml	Task Roles Report	■ Admin, Access, and Provisioning roles ■ Tasks assigned to each role
UserAccountsReportSnapshot.xml	User Accounts Report	■ Global users and their account relationships ■ Endpoint object that includes endpoint details with its accounts

Snapshot Parameter XML File	Report that uses the XML file	Objects Exported by the XML file
UserEntitlementsReportSnapshot.xml	User Entitlements Report	■ Global users and their account relationships ■ Endpoint object that includes endpoint details with its accounts ■ Groups and group members ■ Roles and role members
UserPolicySyncStatusReportSnapshot.xml	User Policy Sync Status Report	■ Global users and their policy allocation, deallocation, and reallocation information ■ Identity policy details
UserProfileReportSnapshot.xml	User Profile Report	■ Global user details ■ Organization details
UserRolesReportSnapshot.xml	User Roles Report	Global user details with the roles (admin, access, and provisioning) associated with them
ExportALLTemplate.xml	Used by all reports	Sample XML to export the selected objects (users, roles, groups, user accounts, and endpoints.) Replace the text surrounded by ## to export only the selected object values.

Create a Custom Snapshot Parameter XML File

To customize the data that CA Identity Manager exports, create a custom Snapshot Parameter XML file. In this file, list the objects to export and, optionally, supply additional export criteria. Only objects that meet the criteria are exported. For example, you can export information about users who have a certain attribute value.

The Snapshot Parameter XML file has the following format:

```
<IMRExport>
    <export object="user">
        <where attr="%USER_ID%" satisfy="ANY">
            <value op="EQUALS">abc*</value>
        </where>
        <exportattr attr="%USER_ID%"/>
        <exportattr attr="title"/>
        <exportattr attr="|groups|" />
        <exportattr attr="|roles|" />
        <exportattr attr="|identitypolicystatus|" />
    </export>
</IMRExport>
```

The Snapshot Parameter XML file contains the following elements:

<export>

Indicates the object to export. For example, the <export> element can export user data.

The <export> element can include one or more <exportattr> and <where> elements, which enable you to export only data that meets certain criteria. If there are no <exportattr> or <where> elements specified, all of the data for the object is exported.

The <export> element has only the object parameter.

<where>

Filters the data that is exported based on specific criteria defined by the <value> element. A <where> element must include at least one <value> element. Also, you can specify multiple <where> elements to refine your filter (they act as OR elements).

For example, you can use <where> and <value> elements to export the tasks for enabled roles:

```
<export object="role">
  <where attr="enabled" satisfy="ALL">
    <value op="EQUALS">Yes</value>
  </where>
  <exportattr attr="|tasks|">
</export>
```

The following table describes the parameters for the <where> element:

Parameter	Description
attr	Indicates the attribute to use in the filter. For example, if you specify the enabled attribute, CA Identity Manager checks the value of the enabled attribute to determine whether to export the role.

Parameter	Description
satisfy	Indicates whether some or all of the value evaluations must be satisfied for the object or attributes to be exported. ■ ALL—An attribute or object must satisfy all of the value evaluations. ■ ANY—An attribute or object must satisfy at least one value evaluation.

<value>

Defines, in a <where> element, the condition that an attribute or an object must meet to be exported. The <value> element requires the operator (op) parameter. The operator can be EQUALS or CONTAINS.

<exportattr>

Indicates a specific attribute to export. Use the <exportattr> element to export a subset of attributes for the object you are exporting. For example, you can use the <exportattr> element to export only a user's ID.

Also, when exporting an endpoint object, you can use the <exportattr> element to define the account attributes to be exported with a particular endpoint type, as follows:

```
<exportattr objecttype="endpoint_type">
<objattr name="description"/>
<objattr name="fullName"/>
<objattr name="lastLogin"/>
</exportattr>
```

The <exportattr> element has the attr or objecttype parameter.

<objattr>

Specifies an endpoint attribute to export. Used within the <exportattr> element when objecttype is the parameter.

The following table shows attributes that can be used in a <where> element or an <exportattr> element, by object:

Object	Attributes you can use in a <where> element	Attributes you can use in an <exportattr> element
role	You can filter with the name attribute. name—the roles with names that satisfy the filter roletype—the type of roles that satisfy the filter, such as "access", "admin", or "provision" roles.	You can export any of the following attributes: ■ |tasks|—all tasks associated with the role ■ |rules|—all member, admin, owner, and scope rules that apply to the role ■ |users|—all members, administrators, and owners of the role ■ |rolemembers|—all role members ■ |roleadmins|—all role administrators ■ |roleowners|—all role owners

Object	Attributes you can use in a <where> element	Attributes you can use in an <exportattr> element
user	Any well-known or physical attribute and any of the following attributes: ■ |groups|—the members of a group ■ |roles|—the members of a role ■ |orgs|—users whose profiles exist in organizations that satisfy the filter	You can export any of the following attributes: ■ |all_attributes|—all available user attributes ■ |groups|—all groups where the user is a member or admin ■ |roles|—all roles where the user is a member, admin, or an owner. ■ |identitypolicystatus|—all identity policies that apply to a specific user or set of users ■ |allocations|—all policies to be applied to a user for the first time ■ |reallocations|—alll policies to be reapplied to a user ■ |deallocations|—all policies that no longer apply to a user because the user no longer matches the policy condition

Object	Attributes you can use in a <where> element	Attributes you can use in an <exportattr> element
group	Any well-known or physical attribute or the following attribute: |groups|—the list of nested groups within a group that satisfies the filter	You can export any well-known or physical attribute or any of the following attributes: ■ |all_attributes|—all attributes defined for the Group object in the directory configuration file (directory.xml) ■ |groups|—all nested groups within the group ■ |users|—all members of the group ■ |groupadmins|—all users who are administrators of the specified group ■ |groupmembers|—all users who are members of the specified group ■ |users|—all group administrators and members
organization	Any well-known or physical attribute	You can export any well-known or physical attribute or any of the following attributes: ■ |all_attributes|—all attributes defined for the Organization object in the directory configuration file (directory.xml) ■ |orgs|—all nested organizations within the organization ■ |groups|—all groups in the organization ■ |users|—all users in the organization

Object	Attributes you can use in a <where> element	Attributes you can use in an <exportattr> element
useraccount	Any well-known or physical attribute or any of the following attributes: ■ name—the accounts that satisfy the filter ■ |groups|—the members of a group ■ |roles|—the members of a role ■ |orgs|—users whose profiles exist in organizations that satisfy the filter ■ |endpoints|—the endpoints that satisfy the filter ■ |endpoint_types|—the endpoint types that satisfy the filter **Note:** Only EQUALS is supported in the <where> element for endpoints and endpoint_types filters.	You can export any account-specific attribute by specifying the attribute names in the endpoint type mapping file (use imname) or by using any of the following attributes: ■ |all_attributes|—all available user attributes ■ |accountdata|—account name, endpoint, container, domain, and type ■ |statistics|—when the account was created and modified ■ |assignmentinfo|—who created and approved the account and why ■ |syncwithroles|—whether the account is redundant to user provisioning roles or not ■ |entitlementattributes|—all entitlement attributes that exists in the mapping file ■ |users|—users that meet the filter criteria ■ |groups|—friendly name of a group. This search returns group members ■ |roles|—friendly name of a role. This search returns role members ■ |orgs|—friendly name of an organization. This search returns organization members ■ |allocations|—This contains the names of policies to be allocated to the user for the first time ■ |reallocations|—This contains the names of policies to be reallocated to the user ■ |deallocations|—This contains the names of policies to be deallocated from the user ■ |identitypolicystatus|—This triggers the inclusion of allocations, reallocations, and deallocations in the user

Object	Attributes you can use in a <where> element	Attributes you can use in an <exportattr> element
endpoint	Any well-known or physical attribute or the following attributes: ■ name—the endpoints that satisfy the filter ■ |accounts|—explored accounts on the endpoint **Note:** User objects are exported tool. ■ |endpoint_types|—endpoint type information	You can export any of the following attributes: ■ |all_attributes|—all available endpoint attributes ■ |endpoint_groups|—groups on the endpoint, if applicable ■ |accounts|—all endpoint accounts ■ |accounttemplates|—account templates associated with the endpoint
identityPolicySet	You can filter with the name attribute. name—the identity policy sets that satisfy the filter	You can export any of the following attributes: ■ |all_attributes|—all policy sets, policies, and actions ■ |identitypolicystatus|—all identity policies that apply to a specific user or set of users
PolicyXpress	You can filter with the name attribute. name—the Policy Xpress policies that satisfy the filter	You cannot use the <exportattr> parameter with this object. A fixed set of attributes is exported.
ReverseNewAccount Policy	You can filter with the name attribute. name—the Reverse New policies that satisfy the filter	You cannot use the <exportattr> parameter with this object. A fixed set of attributes is exported.
ReverseModifyAccountPolicy	You can filter with the name attribute. name—the Reverse Modify policies that satisfy the filter	You cannot use the <exportattr> parameter with this object. A fixed set of attributes is exported.

Object	Attributes you can use in a <where> element	Attributes you can use in an <exportattr> element
Email	You can filter with the name attribute. name—the email notification policies that satisfy the filter	You cannot use the <exportattr> parameter with this object. A fixed set of attributes is exported.
BulkTaskDef	You can filter with the name attribute. name—the bulk task definitions that satisfy the filter	You cannot use the <exportattr> parameter with this object. A fixed set of attributes is exported.

Manage Snapshots

CA Identity Manager lets you view, modify and delete your snapshot definitions. When you view or modify a snapshot definition, the Profile and Maintenance tabs are shown. The Maintenance tab will only appear after a snapshot has been captured once. From the Maintenance tab, you can delete your snapshots (even if the status of the snapshot is failed).

To view, modify, or delete a snapshot definition, go to Reports, Snapshot Tasks, Manage Snapshot Definition and click on the task you want to execute.

Note: If a snapshot definition is being used to export data to the Snapshot Database, you cannot delete the snapshot definition. When you delete a snapshot definition that is being used, the export of the data to the Snapshot Database will stop, but the snapshot definition will still be available.

Capture Snapshot Data

If you want to capture snapshot data immediately or schedule the snapshot data export at a later time or on a recurring schedule, run the Capture Snapshot Data task. This task exports the data immediately (defined by the snapshot definition) to the Snapshot Database.

Important! Exporting snapshot data can take a long time if you have a large amount of data to export. We recommend you schedule your snapshots when exporting a lot of data.

To capture snapshot data

1. In the User Console, go to Reports, Snapshot Tasks, Capture Snapshot Data.
2. Select Execute now to run the data export immediately, or select Schedule new job (see page 294) to run the data export at a later time or on a recurring schedule.

3. Click Next.
4. Choose a snapshot definition.
5. Click Submit.

   Snapshot data is exported to the Snapshot Database.

Note: If the Capture Snapshot Data task seems to be taking a long time, you can check the progress of the task by going to the System tab and clicking View Submitted Tasks.

Recurrence Tab

Use this tab to schedule your job. The fields in this tab are as follows:

Execute now

Runs the job immediately.

Schedule new job

Schedules a new job.

Modify existing job

Specifies that you want to modify a job that already exists.

Note: This field appears only if a job has already been scheduled for this task.

Job Name

Specifies the name of the job you want to create or modify.

Time Zone

Specifies the server time zone.

Note: If your time zone is different from the server's time zone, a drop-down box is displayed so you can select either your time zone or the server's time zone when scheduling a new job. You cannot change the time zone when modifying an existing job.

Daily schedule

Specifies that the job runs every certain number of days.

Every (number of days)

Defines how many days between job runs.

Weekly schedule

Specifies that the job runs on a specific day or days and time during a week.

Day of Week

Specifies the day or days of the week the job runs.

Monthly schedule

Specifies a day of week or day of month that the job runs on a monthly basis.

Yearly schedule

Specifies a day of week or day of month that the job runs on a yearly basis.

Advanced schedule

Specifies additional scheduling information.

Cron Expression

For information about filling out this field, see the following:

http://www.opensymphony.com/quartz/api/org/quartz/CronExpression.html

Execution Time

Specifies the time of day, in 24-hour format, that the job is run. For example, 14:15.

Associate a Snapshot Definition with a Report Task

Assign a snapshot definition to a report task so CA Identity Manager knows which snapshot definition to use when running the report. Also, information for Identity Manager reports can come from multiple sources, and each report should be associated with a specific data source, depending on the information you want to view in the report.

To associate a snapshot definition and connection with a report task

1. In the User Console, go to Roles and Tasks, Admin Tasks, Modify Admin Task.
2. Search for the report task you want to associate a snapshot definition with.
3. Go to the Tabs tab and click the ▶ next to the Associate Snapshot Definitions tab.
4. Click Add.
5. Search for the snapshot definition to associate with the report task and click Select.

   When associating a snapshot definition with a report task, note the following:

   - A report can be associated with one or more snapshot definitions.
   - A snapshot definition can be associated with more than one report.
   - Multiple snapshots associated with a single report task must not use the same recurrence time.
6. Click Ok.
7. Go to the Search tab and click Browse to locate the search screens.
8. Edit the search screen for the report task and choose rptParamConn under Connection Object for the Report.

9. Click Ok.
10. Click Select.
11. Click Submit.

Associate a Connection with a Report Task

Information for Identity Manager reports can come from multiple sources and each report should be associated with a specific data source, depending on the information you want to view in the report.

To associate a connection with a report task

1. In the User Console, go to Roles and Tasks, Admin Tasks, Modify Admin Task.
2. Search for the report task you want to associate a connection with.
3. Go to the Search tab and click Browse to locate the search screens.
4. Edit the search screen for the report task and choose the Snapshot Database Connection object.
5. Click Ok.

Request a Report

You can generate reports within CA Identity Manager.

To generate a report

1. Log in to the User Console as a user who has access to the report tasks.
2. Go to Reports, Reporting Tasks, Request a Report.

   A list of reports appears in the left frame.
3. Select the report you want to generate.

   A parameters screen appears.
4. Provide any parameter information required.

   Note: If you are running a snapshot report and no snapshots are available for this report, you must first capture a snapshot.
5. Click Schedule Report.
6. Select a schedule for your report, and click OK.

   The report is submitted to the Report Server.

More Information

Report Scheduler (see page 301)

Report Scheduler

Some reports may take a long time to run, or you may want to view the same report multiple times without re-running the report each time you view it. The report scheduler allows you to schedule the automatic generation of a report to occur at a later time. Once the report is generated, you can view the report multiple times without re-running the report.

You can use the following options to schedule reports. Based on the scheduling option you select, CA Identity Manager displays more options.

Now

Specifies that the report runs immediately.

Once

Specifies that the report runs only once. Select the start date, end date, start time, and end time when you want to generate the report.

Manage Report Recurrence Schedules

CA Identity Manager lets you view, modify, and delete your report recurrence schedules.

To view, modify, or delete a report recurrence schedule, go to Reports, Reporting Tasks, Manage Report Recurrence Schedules and click the task you want to execute.

Note: If you modify a report recurrence schedule, the Next Run Time field is not updated until the last scheduled report instance completes. For example, if you schedule a report to run Daily, the report recurrence schedule displays details on when the next instance will run, such as tomorrow at 10AM. If you now modify the report recurrence schedule from Daily to Monthly, the Report Server does not update Next Run Time immediately. The report recurrence schedule still shows that the next instance will run tomorrow at 10AM. Once this final daily report instance completes, Next Run Time is updated to reflect the new monthly schedule.

View the Report

To view reports

1. In the User Console, go to Reports, Reporting Tasks, and click View My Reports.

2. Search for the report you want to view.

   Both recurrence reports and on-demand report instances are displayed.

3. Select the report that you want to view.

   Note: In order to view reports in CA Identity Manager using the View My Reports task, enable third party session cookies in your browser.

4. (Optional) Click Export this report (top left corner) to export the report to the following formats:

   - Crystal Report
   - Excel
   - PDF

How to Run Non-Snapshot Reports

The following table describes the steps to run Non-Snapshot reports (such as Audit reports) in CA Identity Manager:

Step	Refer to...
1. Configure reporting in the Management Console.	Configure Reporting (see page 280)
2. Create a JDBC connection for the report task.	Create a Connection for the Report (see page 299)
3. Associate a connection with the report task.	Associate a Connection with a Report Task (see page 296)
4. Request a report.	Request a Report (see page 296)
5. View the report.	View the Report (see page 297)

Configure the Report Server Connection

Configure the connection between CA Identity Manager and the Report Server.

Note: We recommend that all systems involved in reporting be set to the same time zone and time.

To configure reporting

1. In the User Console, click System, Reporting, Report Server Connection.
2. Enter the Report Server settings. Note the following:
   - Host Name and Port—hostname and port number of the system where the Report Server is installed.
   - Reports folder name—location of the default CA Identity Manager reports.
   - User ID—user created for the Report Server.
   - Password—password for the user created in the Report Server.
   - Web Server—Set to Non-IIS for Tomcat
3. Click Test Connection to verify the connection.
4. Click Submit.

The reporting connection is established.

Create a Connection for the Report

Information for Identity Manager reports can come from multiple sources. To specify connection details to another data source for the report, create a JDBC Connection within CA Identity Manager.

To create a JDBC Connection

1. In the User Console, go to System, JDBC Connection Management, Create JDBC Connection.
2. Create a new connection object, or choose a connection object based on a specific JNDI data source.
3. Complete all the necessary fields, and click Submit.

   A new JDBC Connection is created.

Important! We recommend that you do *not* use the Identity Manager object store database for generating reports.

Associate a Connection with a Report Task

Information for Identity Manager reports can come from multiple sources and each report should be associated with a specific data source, depending on the information you want to view in the report.

To associate a connection with a report task

1. In the User Console, go to Roles and Tasks, Admin Tasks, Modify Admin Task.
2. Search for the report task you want to associate a connection with.
3. Go to the Search tab and click Browse to locate the search screens.
4. Edit the search screen for the report task and choose a connection under Connection Object for the Report.
5. Click Ok.
6. Click Select.
7. Click Submit.

Request a Report

You can generate reports within CA Identity Manager.

To generate a report

1. Log in to the User Console as a user who has access to the report tasks.
2. Go to Reports, Reporting Tasks, Request a Report.

   A list of reports appears in the left frame.
3. Select the report you want to generate.

   A parameters screen appears.
4. Provide any parameter information required.

   Note: If you are running a snapshot report and no snapshots are available for this report, you must first capture a snapshot.
5. Click Schedule Report.
6. Select a schedule for your report, and click OK.

   The report is submitted to the Report Server.

More Information

Report Scheduler (see page 301)

Report Scheduler

Some reports may take a long time to run, or you may want to view the same report multiple times without re-running the report each time you view it. The report scheduler allows you to schedule the automatic generation of a report to occur at a later time. Once the report is generated, you can view the report multiple times without re-running the report.

You can use the following options to schedule reports. Based on the scheduling option you select, CA Identity Manager displays more options.

Now

Specifies that the report runs immediately.

Once

Specifies that the report runs only once. Select the start date, end date, start time, and end time when you want to generate the report.

Note: To access the following recurrence options for a report, select Enable Recurrence Option on the Report Server Scheduler tab.

(Audit Report Only) Hourly

Specifies that the report is generated at the start time and subsequently every 'n' hours; 'n' denotes the interval between successive reports. Select the start date, end date, start time, end time, and the interval between successive reports.

(Audit Report Only) Daily

Specifies that the report is generated at the start time and subsequently every 'n' days; 'n' denotes the interval between successive reports. Select the start date, end date, start time, end time, and the interval between successive reports.

(Audit Report Only) Weekly

Specifies that the report is generated every week on the selected day from the start date. Select the start date, end date, start time, and end time when you want to generate the report.

(Audit Report Only) Monthly

Specifies that the report is generated monthly from the start date and subsequently every 'n' months. 'n' denotes the interval between successive reports. Select the start date, end date, start time, end time, and the interval between successive reports.

(Audit Report Only) Run the report on a specific day of the month

Specifies that the report is generated on the specific day of the month you have mentioned. Select the start date, end date, start time, and end time when you want to generate the report.

(Audit Report Only) First Monday

Specifies that the report is generated every first Monday of the month. Select the start date, end date, start time, and end time when you want to generate the report.

(Audit Report Only) Last day of the month

Specifies that the report is generated on the last day of the month. Select the start date, end date, start time, and end time when you want to generate the report.

(Audit Report Only) On a specific day of a specific week of every month

Specifies that the report is generated on a specific day in a specific week of every month. Select the start date, end date, start time, and end time when you want to generate the report. For example, you can generate a report on a Friday in the 3rd week of every month.

Manage Report Recurrence Schedules

CA Identity Manager lets you view, modify, and delete your report recurrence schedules.

To view, modify, or delete a report recurrence schedule, go to Reports, Reporting Tasks, Manage Report Recurrence Schedules and click the task you want to execute.

Note: If you modify a report recurrence schedule, the Next Run Time field is not updated until the last scheduled report instance completes. For example, if you schedule a report to run Daily, the report recurrence schedule displays details on when the next instance will run, such as tomorrow at 10AM. If you now modify the report recurrence schedule from Daily to Monthly, the Report Server does not update Next Run Time immediately. The report recurrence schedule still shows that the next instance will run tomorrow at 10AM. Once this final daily report instance completes, Next Run Time is updated to reflect the new monthly schedule.

View the Report

To view reports

1. In the User Console, go to Reports, Reporting Tasks, and click View My Reports.

2. Search for the report you want to view.

   Both recurrence reports and on-demand report instances are displayed.

3. Select the report that you want to view.

   Note: In order to view reports in CA Identity Manager using the View My Reports task, enable third party session cookies in your browser.

4. (Optional) Click Export this report (top left corner) to export the report to the following formats:

   - Crystal Report
   - Excel
   - PDF

Set Reporting Options

Configure the number of report instances a user can generate for a specific report.

To modify the reporting options

1. Select Reports, Reporting Tasks, Set Reporting Options.

   CA Identity Manager connects to the IAM Report Server and retrieves a list of all the reports.

2. Choose a report, and click Modify.

   The report's attributes pane appears.

3. Edit the following fields:

   Name

   Specifies the display name for the selected report.

   Number of Instances

   Specifies the number of allowed instances that can be generated by a user for this report.

4. Click Ok.

   The reporting attributes are changed.

How to Create and Run Custom Reports

CA Identity Manager allows you to create and customize reports to suit your business needs.

The following table describes the steps to create custom reports in CA Identity Manager:

Step	Refer to...
1. Create a report in Crystal Reports Developer.	Create a Report in Crystal Reports (see page 304)
2. Create the Report Parameter XML file.	Create the Report Parameter XML File (see page 305)
3. Upload the report and Report Parameter XML file to the Report Server.	Upload the Report and Report Parameter XML File (see page 309)
4. Create the Report Task	Create the Report Task (see page 310)
5. Run the report.	How to Run Snapshot Reports (see page 280) How to Run Non-Snapshot Reports (see page 298)

Create a Report in Crystal Reports

CA Identity Manager lets you create you own custom reports to meet your business needs. In order to use custom reports in CA Identity Manager, create a report (RPT file) in Crystal Reports Developer. For more information on how to create a report in Crystal Reports, refer to your Crystal Reports documentation.

Important! If you need to reference the Identity Manager schema in order to create custom reports, the Identity Manager database schema is in the following location:

C:\Program Files\CA\Identity Manager\IAM Suite\Identity Manager\db\objectstore

Create the Report Parameter XML File

In CA Identity Manager, reports provide their own search screen so that a user can enter or select required data during the generation of a report. A parameter is one of the fields in a report that can be used to filter reports. You can generate a report by filtering the data using parameters. To allow the customization of the report search screen, each report (RPT file) is associated with a Report Parameter XML file.

Note: You only need a report parameter XML file if the report queries attributes on the object.

Important! The Report Parameter XML file must have the same name as the report (RPT file) with a .xml extension. For example, if you upload a report named test1.rpt into the Report Server, your XML file should be named test1.xml.

The Report Parameter XML file has the following elements:

<product>

Identifies the product for which the parameters are used. You can create different parameters for multiple products using the same parameter XML file.

<screen>

Defines the parameters that displayed on a screen. You can use the screen element to bind the parameters to a specific screen. The screen ID is alphanumeric and unique, and is used to identify the screens and their parameters.

<parameters>

Specifies the collection of parameters for a screen.

<param>

Defines the parameter element that passes along specified data to the report. The following attributes are used in the <param> element:

id

Defines which parameter in the report to associate with.

Note: This should have the same name as the parameter in the Crystal Report.

name

This field is not currently used by CA Identity Manager. Set this attribute to the same value as id.

displaytext

Specifies the user-friendly text to be displayed in the screen for the parameter.

type

Defines the type of parameter. The screen display changes based on this attribute. The parameter types supported are as follows:

- **Text Box**

  Example: <param id="param1" displaytext="First Name" name="param1" type="string"/>

- **Date and Time**

  Example: <param id="dateVal" displaytext="Date" name="dateVal" type="date_str"/>

  <param id="timeVal" displaytext="Time" name="timeVal" type="time_str"/>

  <param id="datetimeVal" displaytext="Date &amp; Time" name="datetimeVal" type="date_time_str"/>

- **Drop-down List**

  Example: <param id="lastname1" displaytext="Name" name="lastname1" type="dropdown" default="key1%1FMy Value1%1Ekey2%1FMy Value2" selected_value="My Value2"/>

- **List Box**

  Example: <param id="lstlastname1" displaytext="Name" name="lstlastname1" type="listbox" rows="10" default="key1%1FSuper%1Ekey2%1Fsql2kSuser01%1E key1F%Super"/>

- **Radio Box**

  Example: <param id="optionslist" displaytext="Option 1" name="optionslist" type="radiobox" value="option1"/>

  <param id="optionslist" displaytext="Option 2" name="optionslist" type="radiobox" value="option2"/>

  <param id="optionslist" displaytext="Option 3" name="optionslist" type="radiobox" value="option3"/>

- **Check Box**

  Example: <param id="enabled" displaytext="Enabled" name="enabled" type="checkbox"/>

row

Defines how many rows are visible in a list box.

Default: 5

default

Defines the default value displayed on the screen for a given parameter. This attribute can be used with the string, list box, and drop-down list types.

SQL

You can define SQL queries as part of a list box or drop-down box in the Report Parameter XML file. To use SQL in the drop-down box or list box parameter, provide a valid SQL statement in the sql attribute.

Example:

```
<param id="lstlastname2" displaytext="Name" name="lstlastname2" type="sqlstr"
multiselect="true" sql="select lastname, lastname from tblusers where firstname like
'S%/>
```

In the previous example, all the last names of users with a first name that starts with “S” will be provided to the report.

However, the condition of the first name that starts with “S” is a static one. This is not flexible enough for a user to load the value based on the parameter value entered in one of the previous screens that was used in the same report parameter group. In order to use a value that was previously entered in another screen, the SQL statement can be augmented with “##<parameter id>##".

For example, if you have a parameter with the id=User, which was of type String:

```
<param id="User" displaytext="First Name" name="firstname" type="string"/>
```

and you want to use the input value for that parameter in SQL, the SQL statement could be as follows:

```
<param id="lstlastname2" displaytext="Name" name="lstlastname2" type="sqlstr"
multiselect="true" sql="select lastname, lastname from tblusers where firstname like
'##User##'/>
```

CA Identity Manager will replace ##User## with the value entered for the parameter with the id=User.

Note: The parameter value to be substituted cannot be in the same screen as the SQL parameter. For example, if the “lstlastname2” is in screen 3, the User parameter should be in one of the previous screens.

Java Beans

If using SQL is not ideal, you can use java beans to calculate values and provide the list of <key, value> pairs to CA Identity Manager. The java beans should be in the classpath of CA Identity Manager.

Example:

```
<param id="lastname2" displaytext="Name using Javabean" name="lastname2"
type="dropdown" class="com.ca.ims.reporting.unittests.TestDataCollector"/>
```

In the previous example, the TestDataCollector retrieves the values in its own way and sends the data for the drop-down list to the report. The <key, value> pairs are separated by %1F.

Be sure the java bean is in the iam_im.ear\custom directory.

Note: For more information about implementing java beans, see your Business Objects documentation.

String Literals

The simplest way of representing the parameter values for a list or drop-down box is by using string literals. The key value will be delimited by %1F and each <key, value> pair will be separated by %1E.

Example:

```
<param id="lastname1" displaytext="Name" name="lastname" type="dropdown"
default="key1%1FMy Value1%1Ekey2%1FMy Value2" selected_value="My Value2"/>
```

Hidden Parameters

Hidden parameters are used to pass sensitive data, such as a password, within the context of the report. The hidden data can be used by the report, by SQL, or by the JavaBean to process business logic without the knowledge of the user.

Example:

```
<param id="city" displaytext="User1" name="city" hidden="true" type="string"
class="com.ca.ims.reporting.unittests.TestDataCollector"/>
```

In the previous example, the value of the city parameter is processed by the TestDataCollector JavaBean, but is not seen by the user.

Be sure the JavaBean is in the iam_im\custom directory.

Example Report Parameter XML File

The following is an example of the Report Parameter XML file:

```
<?xml version="1.0" encoding="UTF-8"?>
<product xmlns="http://www.w3.org/2001/XMLSchema-instance"
xmlns:xsi="http://www.example.org/Parameters"
xsi:schemaLocation="http://www.example.org/Parameters
../../../reporting/src/com/ca/ims/reporting/utils/Parameters.xsd ">
<screen id="1">
<parameters>
<param id="param1" displaytext="User" name="User" type="string"/>
</parameters>
</screen>
<screen id="Test">
<parameters>
<param id="Test" displaytext="Test" name="Test" type="sqlstr"
conn_id="rptParamConn"
multiselect="true" rows="3" sql="select CUSTOMERID, CONTACTNAME from customers where
customerid like '##param1##'" />
</parameters>
</screen>
</product>
```

Upload the Report and Report Parameter XML File

After you create the report (RPT) and the corresponding Report Parameter XML file, upload both files to the Report Server (Business Objects).

To upload a report and the Report Parameter XML file

1. Log in to the Business Objects Central Management Console.
2. Click on Folders.
3. Select the IM Reports folder.
4. Click on New Object and ensure the object is of type Crystal Reports.
5. Browse for the new report (RPT) you created.
6. Ensure you have the IM Reports folder selected as the folder to save the report in.
7. Click Submit.
8. Click on IM Reports in the top, left corner.
9. Click on New Object and ensure the object is of type Text.
10. Browse for the new Report Parameter XML you created.
11. Ensure you have the IM Reports folder selected as the folder to save the report in.

12. Click Submit.
13. Go to the IM Reports folder and verify that both new files are available.

Create the Report Task

Report tasks are used to create, manage, view, and delete the templates for the reports that are generated in the User Console. The process for creating a report task is similar to creating an admin task in CA Identity Manager.

To create a task for reports

1. In the User Console, go to Roles and Tasks, Admin Tasks, Create Admin Task.
2. Select Create a new admin task and click OK.
3. Complete the profile tab (see page 310).
4. Complete the search tab (see page 311).
5. Complete the tabs tab (see page 312).

Note: A report (RPT file) can only be associated with *one* report task.

Profile Tab for Report Task

To enter the profile information for a report task, click on the Profile tab and complete the following fields:

Name

Defines the name of the report. Each report task name should be unique.

Tag

Defines a unique identifier for the task. It is used in a URL, a web service, or a properties files. It must consist of letters, numbers, and/or underscores, beginning with a letter or underscore.

Category

Specifies the category to which the current task belongs.

Note: Select the Reports category.

Category 2

Specifies the sub-category to which the current task belongs. Enter any string in this field.

Primary Object

Specifies the object on which the task operates.

Note: Select Report Instance as the primary object.

Action

Specifies the action that is performed on the primary object.

Note: Select Create as the action.

Search Tab for Report Task

The search screen limits the scope of the task and control the fields that users can search. You can configure the search screen for reports based on whether or not you want to pass parameters dynamically to the reports.

You must create a separate search screen for each of the reports. The search screen defines the parameters that you can use to filter the report data. When you generate a report, based on the search screen configuration, CA Identity Manager prompts you to enter the parameters to be used to filter report data. Based on your input, CA Identity Manager connects to the Report Database and retrieves the data that satisfies your criteria.

To enter the search information for a report task, click the Search tab and select a search screen.

Note: Every report has a search screen associated with it. If you do not find the appropriate search screen for your report, create a new search screen. For more information on creating new search screens for reports, see Create Search Screen for Reports (see page 311).

Create New Search Screen for Report Task

A report search screen is based on the default Report Type Selection screen.

To create a search screen for a report

1. Click Browse to locate the search screens.

   The list of available search screens is displayed.

2. Click New.

   The Create Screen pane appears.

3. Select Report Template Selection Screen from the list, and click OK.

   CA Identity Manager connects to the Report Server and displays all the reports.

4. Complete the following fields:

   Name

   Defines the name of the report. Each report task name should be unique.

   Tag

   Acts as a unique identifier within a task. It can contain ASCII characters (a-z, A-Z), numbers (0-9), or underscore characters, beginning with a letter or underscore.

   Title

   Defines the title of the new search screen. The title must be unique.

   Report Template

   Identifies the report to associate with the search screen.

   Note: Choose one of the reports you added to the Report Server.

   Connection Object for the Report

   Defines the connection details of the data source to be used for the report.

   The new search screen is created for reports.

5. Click Ok.

Tabs Tab for Report Tasks

Tabs organize the fields that are required to execute a task. The Tabs tab in a report allows you to associate a report with a snapshot definition and make a report scheduler available.

To configure the Tabs tab for a report task

1. Click Tabs.

   The tabs that will be visible to the user will be displayed.

2. Select the Standard Tab Controller.

3. Do *one* of the following:

   - If your report uses a snapshot definition, perform the following steps:

     a. From Which tabs should appear in this task?, select Associate Snapshot Definitions.

        The Associate Snapshot Definitions tab is added to the list of tabs.

     b. Click ▶ to edit the Associate Snapshot Definitions tab.

        The Configure Associate Snapshot Definitions screen appears.

     c. Click Add to associate the report task with a snapshot definition.

        A list of available snapshot definitions (see page 282) appear.

d. Select a Snapshot Definition and click OK.

The report task is associated with a snapshot definition.

- If your report does *not* use a snapshot definition, do the following:

  From Which tabs should appear in this task?, select the Report Server Scheduler.

  The Scheduler tab is added to the list of tabs.

4. Click Submit.

   The report task is created.

5. Assign the newly created report task to an Admin role.

   The Identity Manager user who is part of the Admin role specified will be able to use the newly created report task.

Default Reports

CA Identity Manager installs default reports you can customize to suit your needs. The default reports are located in the following directory:

MSSQL

```
C:\Program Files\CA\Identity Manager\IAM Suite\Identity
Manager\tools\imrexport\ReportDefinitions\CR11\Ms-SQL Reports
```

Oracle

```
C:\Program Files\CA\Identity Manager\IAM Suite\Identity
Manager\tools\imrexport\ReportDefinitions\CR11\Oracle Reports
```

The following table describes the default reports:

Report	Description
Account Details	Displays a list of account templates with associated provisioning roles, endpoint types, endpoints, and accounts.
Administration	Displays a list of administrators with their administrative entitlements.
Audit-Assign/Revoke Provisioning Roles	Displays a list of provisioning role events.
Audit-De-Provisioning	Displays a list of users and their accounts that were de-provisioned.
Audit Details	Displays tasks and events with related status details.

Report	Description
Audit-Pending Approval Tasks	Displays a list of pending approval tasks.
Audit-Reset Password	Displays the list of users' passwords that have been reset for a given period of time.
Endpoint Accounts	Displays accounts per endpoint (you can choose which endpoint to view).
Endpoint Details	Displays a list of all endpoint types, endpoints, and the endpoint attributes.
Non-Standard Accounts	Displays all orphan, system, and exception accounts.
Non-Standard Accounts Trend	Displays non-standard accounts trends for orphan accounts, system accounts, and exception accounts.
Orphan Accounts	Displays all endpoint accounts with no global user in the Provisioning Server.
Policies	Displays all identity policies.
Role Administrators	Displays roles and their administrators.
Role Members	Displays the roles in the report database and lists the members of those roles.
Role Owners	Displays roles and their owners.
Roles	Displays the following information for each role in the report database: ■ Tasks associated with the role ■ Member policies and role members ■ Administrator policies and role administrators ■ Owner policies and role owners
Snapshots	Displays all exported snapshots.
Task Roles	Displays the tasks in the report database and the roles with which they are associated.

Report	Description
User Account	Displays a list of users and their accounts. **Note:** The list of account attributes presented in this report depends on the attributes exported.
User Entitlements	Displays user’s roles, groups and accounts. **Note:** The list of account attributes presented in this report depends on the attributes exported.
User Policy Sync Status	Displays the user’s status per policy (which policies should be allocated, deallocated or reallocated).
User Profile	Displays the following information for users: ■ Name ■ User ID ■ Groups where the user is a member or administrator ■ Roles where the user is a member, administrator, or owner
User Roles	Displays the roles assigned to a user.

Troubleshooting

The following section details troubleshooting topics around reporting.

Viewing a Report Redirects To the Infoview Login Page

When viewing a report in CA Identity Manager, you may be re-directed to the Business Objects Infoview login page.

View the report if redirected

1. Be sure that you are using the fully-qualified domain name of the CA Report Server (Business Objects).
2. Right-click on the Infoview login web page and select View Source.
3. Find the URL for the report.
4. Copy and paste the URL into a new browser window.

5. If you do not see the report, use an HTTP trace tool to provide more information.
6. If you do see the report, try the following to fix the browser settings:
   - Accept third-party cookies.
   - Allow session cookies.
   - Remove High security settings.

Generating User Accounts for over 20,000 Records

If over 20,000 records exist, some extra steps are necessary to generate user accounts report.

To generate a user accounts report for over 20,000 records

1. Open the Business Objects Central Management console.
2. Click Servers and select *servername*.pageserver.
3. Select Unlimited records for the entry Database Records To Read When Previewing Or Refreshing a Report.
4. Using Crystal Reports designer, open the user accounts report.
5. Using Database, Set Datasource Location, set the database location to your snapshot database.
6. Save this change.
7. Using Database, Datasource Expert, right-click Command on the right side window.

   It shows the SQL syntax on the left side and the Parameter List.
8. Enter the parameter name as you find it in the Parameters Fields in the report template.
9. Change the query in the left side and add that parameter in the query.

   For example, if you have reportid parameter, the query will be:

   ```
   Select *  from endPointAttributes, endpointview, imreport6
   where endPointAttributes.imr_endpointid = endpointview.imr_endpointid and
   endPointAttributes.imr_reportid = endpointview.imr_reportid
    endpointview.imr_reportid = imreport6.imr_reportid and imreport6.imr_reportid
   = {?reportid}
   ```
10. Save the report.

Chapter 16: Workflow

This section contains the following topics:

Workflow Overview

The CA Identity Manager workflow feature allows a Identity Manager task to be controlled by a workflow process. A *workflow process* is one or more steps that must be performed before CA Identity Manager can complete a task that is under workflow control. A *job* is a runtime instance of a workflow process.

WorkPoint Designer is software from Workpoint LLC, a subsidiary of Planet Group, Inc., that is integrated with Identity Manager. WorkPoint Designer lets you manage workflow processes and workflow jobs.

A workflow process consists of one or more steps, called *activities*, that must be performed in order to accomplish some business task, such as creating or modifying an employee user account. Typically, a workflow process includes one or more manual activities which require an authorized user, or participant, to approve or reject the task.

A *participant* is a person who is authorized to perform a workflow activity. In CA Identity Manager, participants are also called *approvers*, since they must approve or reject the task under workflow control. A *participant resolver* is a rule or set of criteria for determining who the participants are.

The individual manual activities in a workflow are called *work items* in CA Identity Manager.

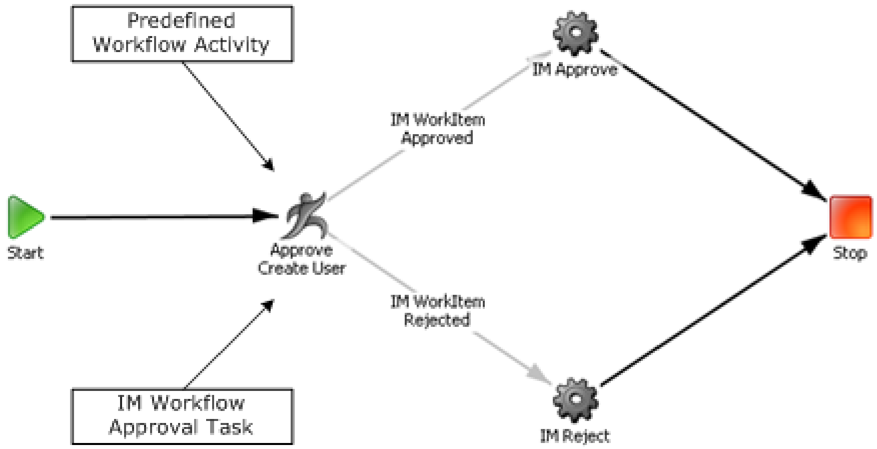
A *work list* is a workflow-generated list of approval tasks, or *work items*, that appears in the User Console of the participant authorized to approve the task.

WorkPoint Process Diagram

In general, Identity Manager tasks trigger Identity Manager events. For example, to create a user, an administrator selects a Create User task. When this task is initiated, the event CreateUserEvent is triggered.

The following diagram is an example of a simple workflow process (the predefined process CreateUserApproveProcess) as it appears in WorkPoint Designer. This process is invoked by a CreateUserEvent if the Create User task is under workflow control.

The process includes a manual activity, Approve Create User, which corresponds to a Identity Manager workflow approval task of the same name. The participant must approve or reject the approval task, typically by clicking a button in the User Console, before the task under workflow control can run to completion.



Workflow and Email Notification

When you initiate a task, CA Identity Manager submits the task for processing and displays an acknowledgement message as follows:

```
Confirmation:  Task completed.
```

However, if the task is under workflow control and requires approval, the message is as follows:

```
Alert:  Task pending.
```

In addition to on-screen messages, CA Identity Manager can automatically generate email notifications when:

- An event or task requiring approval or rejection by a workflow approver is pending.
- An approver approves an event or task.

- An approver rejects an event or task.
- An event or task is completed.

More Information:

Email Notifications (see page 413)

WorkPoint Documentation

For general information about workflow concepts and for instructions about workflow processes, activities, and jobs in WorkPoint Designer, see the WorkPoint documentation. To do so, open the following HTML page:

```
admin_tools\WorkPoint\docs\designer\default.htm
```

admin_tools

Defines the installation directory of the Identity Manager administrative tools. The default installation directory is as follows:

- **Windows:** C:\Program Files\CA\Identity Manager\IAM Suite\Identity Manager\tools
- **UNIX:** /opt/CA/IdentityManager/IAM_Suite/Identity_Manager/tools

Note: Workpoint is a third-party product installed with CA Identity Manager. CA Identity Manager supports a subset of functionality in WorkPoint. For example, CA Identity Manager does not support the WpConsole. However, the WorkPoint documentation describes all functionality in the product. Portions of the Workpoint documentation do not apply to CA Identity Manager users.

Workflow Control Methods

CA Identity Manager provides two methods of placing tasks under workflow control.

Template Method

CA Identity Manager includes workflow process templates you can use to place tasks under workflow control. The *template method* lets you use these templates to configure and manage workflow entirely from within the User Console. Introduced in CA Identity Manager r12, these generic process templates can be configured to control most Identity Manager tasks and events.

The template method enables the following new features:

- Both task-level and event-level workflow control
- Simplified participant resolver configuration for workflow approvers

- Work item delegation, which covers out-of-office scenarios by letting a user delegate another user to approve work items
- Work item reassignment, which lets a running task be reassigned to another user for approval

WorkPoint Method

CA Identity Manager also includes a set of predefined workflow processes with default event mappings that correspond to specific Identity Manager tasks. The *WorkPoint method* requires you to configure and customize these processes from within WorkPoint Designer. These predefined processes are compatible with releases prior to CA Identity Manager r12.

The WorkPoint method also enables the following new features:

- Both task-level and event-level workflow control
- Work item delegation, which covers out-of-office scenarios by letting a user delegate another user to approve work items
- Work item reassignment, which lets a running task be reassigned to another user for approval

Note: For greater flexibility and ease of use, CA recommends that you use the template method whenever possible.

More Information:

Template Method (see page 325)
WorkPoint Method (see page 346)

How to Enable Workflow

You must have workflow enabled before you can use it to control Identity Manager tasks. By default, workflow is disabled.

To enable workflow

1. In the Management Console, select an Environment.
2. Go to Advanced Settings, Workflow.
3. Select the Enabled check box, and click Save.

   Note: The Event Mappings on this screen apply only if you use the WorkPoint method to configure workflow. If you use the template method (recommended), do not map events to processes using this Management Console.

4. Restart the application server.
5. (Optional) Configure the WorkPoint Administrative Tools (see page 321).

More Information:

Workflow Control Methods (see page 319)
Map a Process to an Event Globally (see page 350)

Configure WorkPoint Administrative Tools

WorkPoint Designer is software from Workpoint LLC, a subsidiary of Planet Group, Inc., that is integrated with Identity Manager. WorkPoint Designer lets you manage workflow processes and workflow jobs. WorkPoint Administrative Tools include WorkPoint Designer and WorkPoint Archive. In order to configure WorkPoint Administrative Tools, install the Identity Manager Administrative Tools. If you have not installed the Identity Manager Administrative Tools, you can run the installer and select the Identity Manager Administrative Tools option.

Note: To use the Administrative Tools for workflow, a supported JDK must be installed on the system where the Administrative Tools are installed. For a complete list of supported platforms and versions, see the CA Identity Manager Support Matrix on the CA Identity Manager support site.

The workflow client tools are located in the WorkPoint directory in the Identity Manager Administrative tools. The Administrative Tools are placed in the following default locations:

- **Windows:** C:\Program Files\CA\Identity Manager\IAM Suite\Identity Manager\tools
- **UNIX:** /opt/CA/IdentityManager/IAM_Suite/Identity_Manager/tools

The tools in this directory let you do the following:

- Create the workflow database schema
- Load the default workflow scripts
- Design and monitor Workflow processes and jobs

Configure WorkPoint Administrative Tool on JBoss

To configure the WorkPoint Administrative Tools on JBoss, edit the init.bat/sh and the workpoint-client.properties files.

Edit init.bat/init.sh

To edit init.bat/init.sh

1. In a text editor, edit one of the following files:
   - **Windows:**

     admin_tools\Workpoint\bin\init.bat
   - **UNIX:**

     *admin_tools/*Workpoint/bin/init.sh
2. Uncomment the EJB_CLASSPATH line in the JBoss section of the file.

   Note: Be sure that all sections for other application servers are commented.
3. Copy the jbossall-client.jar from *jboss_home*\client\ to:

   admin_tools\Workpoint\lib

Edit workpoint-client.properties

Edit the workpoint-client.properties file based on the type of application server you selected during the CA Identity Manager installation.

To configure the workpoint-client.properties file

1. Open *admin_tools*\Workpoint\conf\ workpoint-client.properties in a text editor.

   admin_tools is the installed location of the Administrative tools. The Administrative Tools are placed in the following default locations:
   - **Windows:** C:\Program Files\CA\Identity Manager\IAM Suite\Identity Manager\tools
   - **UNIX:** /opt/CA/IdentityManager/IAM_Suite/Identity_Manager/tools
2. Locate the section titled JBOSS SETTINGS.
3. Uncomment all of the property values in that section.

   For example:

   ```
   java.naming.provider.url=localhost
   java.naming.factory.initial=org.jnp.interfaces.NamingContextFactory
   java.naming.factory.url.pkgs=org.jboss.naming
   ```

   Note: You may need to edit the java.naming.provider.url property value. For example, replace localhost with jnp://*server_name or ip*:*port*. Ensure you use the jnp port number 1099.
4. Save the file.

Configure WorkPoint Administrative Tools on WebLogic

To configure the WorkPoint Administrative Tools on WebLogic, edit the init.bat/sh and the workpoint-client.properties files.

Edit init.bat/init.sh

To edit init.bat/init.sh

1. In a text editor, edit one of the following files:
   - **Windows:**

     admin_tools\Workpoint\bin\init.bat
   - **UNIX:**

     admin_tools/Workpoint/bin/init.sh
2. Uncomment the EJB_CLASSPATH in the WebLogic section of the file:

   Note: Be sure that all sections for other application servers are commented.
3. Copy the wlclient.jar file from *weblogic_home*\server\lib to the following location:

   admin_tools\Workpoint\lib\

Edit workpoint-client.properties

Edit the workpoint-client.properties file based on the type of application server you selected during the CA Identity Manager installation.

To configure the workpoint-client.properties file

1. Open *admin_tools*\Workpoint\conf\ workpoint-client.properties in a text editor.
2. Locate the WebLogic section of the file.
3. Uncomment all property values in that section.
4. Save the file.

   Note: The java.naming.provider.url property must point to the fully-qualified domain name and WebLogic port number of the system on which you installed the Identity Manager Server.

Configure WorkPoint Administrative Tools on WebSphere

To configure the WorkPoint Administrative Tools on WebSphere, edit the init.bat/sh and the workpoint-client.properties files.

Edit init.bat/init.sh

To edit init.bat/init.sh

1. In a text editor, edit one of the following files:
   - **Windows:**

     admin_tools\Workpoint\bin\init.bat
   - **UNIX:**

     admin_tools/Workpoint/bin/init.sh
2. Uncomment the IBM WebSphere section.

   Note: Do not comment the WP_CLASSPATH entry in the COMMON WP_CLASSPATH section.
3. Be sure that all sections for other application servers are commented.
4. If necessary, replace the values for JAVA_HOME and WAS_HOME with the appropriate paths for your environment.

Edit workpoint-client.properties

Edit the workpoint-client.properties file based on the type of application server you selected during the CA Identity Manager installation.

To configure the workpoint-client.properties file

1. Open *admin_tools*\Workpoint\conf\workpoint-client.properties in a text editor.

   admin_tools is the installed location of the Administrative tools. The Administrative Tools are placed in the following default locations:
   - **Windows:** C:\Program Files\CA\Identity Manager\IAM Suite\Identity Manager\tools
   - **UNIX:** /opt/CA/IdentityManager/IAM_Suite/Identity_Manager/tools
2. Locate the section titled IBM WEBSPHERE SETTINGS.
3. Uncomment all of the property values in that section.

   For example:

   ```
   java.naming.factory.initial=com.ibm.websphere.naming.WsnInitialContextFactory
   java.naming.provider.url=iiop://localhost:bootstrap_port
   ```

   Note: The bootstrap port number must match the port number specified in the WebSphere Administrative Console. To locate the correct port number, go to Server, Endpoints, Bootstrap server address.

4. Update BOOTSTRAP_ADDRESS port for the WebSphere profile as follows:
   a. In the WebSphere Administrative Console, navigate to Application Servers, server_name, Communications.
   b. Expand Ports.
   c. Edit the workpoint-client.properties file under iam_im.ear/config.
   d. Change the default port 2809 in the WebSphere section to the profile's port for the BOOTSTRAP_ADDRESS.
5. Save the file.

Starting WorkPoint Designer

To start WorkPoint Designer, run the following file:

- **Windows:** *admin_tools*\WorkPoint\bin\Designer.bat
- **UNIX:** *admin_tools*/WorkPoint/bin/Designer.sh

where *admin_tools* is the installation directory of the Identity Manager administrative tools. The Administrative Tools are placed in the following default locations:

- **Windows:** C:\Program Files\CA\Identity Manager\IAM Suite\Identity Manager\tools
- **UNIX:** /opt/CA/IdentityManager/IAM_Suite/Identity_Manager/tools

Note: You must have workflow components installed and configured before you can run WorkPoint Designer. For instructions, see the "Configure WorkPoint Administrative Tools" section for your application server.

More Information:

Configure WorkPoint Administrative Tool on JBoss (see page 321)
Configure WorkPoint Administrative Tools on WebLogic (see page 323)
Configure WorkPoint Administrative Tools on WebSphere (see page 323)

Template Method

Introduced in CA Identity Manager r12, the template method allows you to configure workflow process templates in the User Console, without having to open WorkPoint Designer.

Template method advantages are:

- Multi-stage process templates can address most workflow needs without requiring customization within WorkPoint Designer.
- Templates support both task-level and event-level workflow control.
- The same workflow process template can be configured for use with many different tasks while the process design itself remains unchanged.
- Participant resolvers can be specified easily in the User Console.
- Work item delegation can be performed in the User Console.

Process Templates

A workflow process template has the following characteristics:

- Defined in WorkPoint Designer.
- Has manual activities, which correspond to Identity Manager approval tasks.
- Includes special attributes which contain information to identify participants (also called approvers).

Workflow process templates include no information for selecting specific participants. This is provided by CA Identity Manager after a user configures a workflow and its participant resolvers. This information is mapped to an event for event-level workflow control, and to a task for task-level workflow control.

When using the template method, all workflow and participant configuration is done within the User Console.

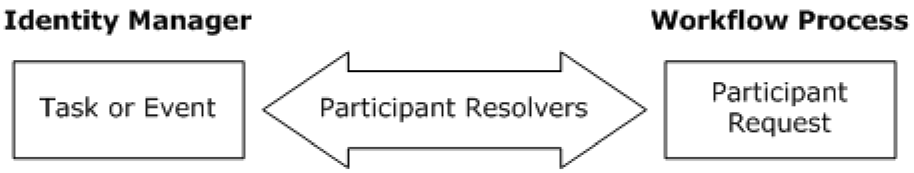
There are three process templates for use with the template method:

- SingleStepApprovalProcess
- TwoStageApprovalProcess
- EscalationApprovalProcess

How a Process Template Works

A workflow process template contains a number of places where it requests lists of participants. When the template is mapped to a Identity Manager task or event, you need to configure participant resolvers for these lists.

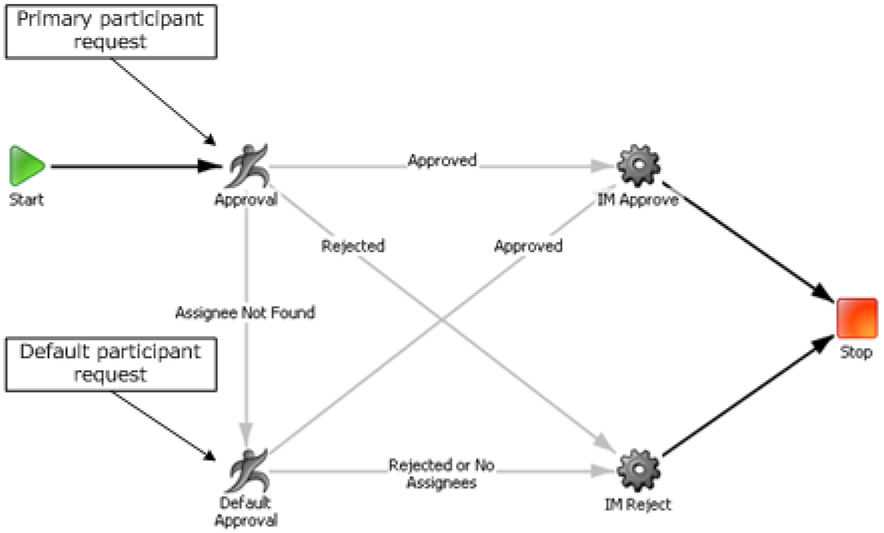
At runtime, as shown in the following figure, CA Identity Manager provides the participant lists to the workflow process based on your configured information:



Single Stage Template Diagram

The following diagram illustrates the SingleStageApproval process template as it appears in WorkPoint Designer. The process template includes two manual activities:

- An approval node for the primary participant. If this user approves or rejects the request, the process runs to completion.
- An approval node for a default participant. This user can approve or reject the request if the primary participant is not found.

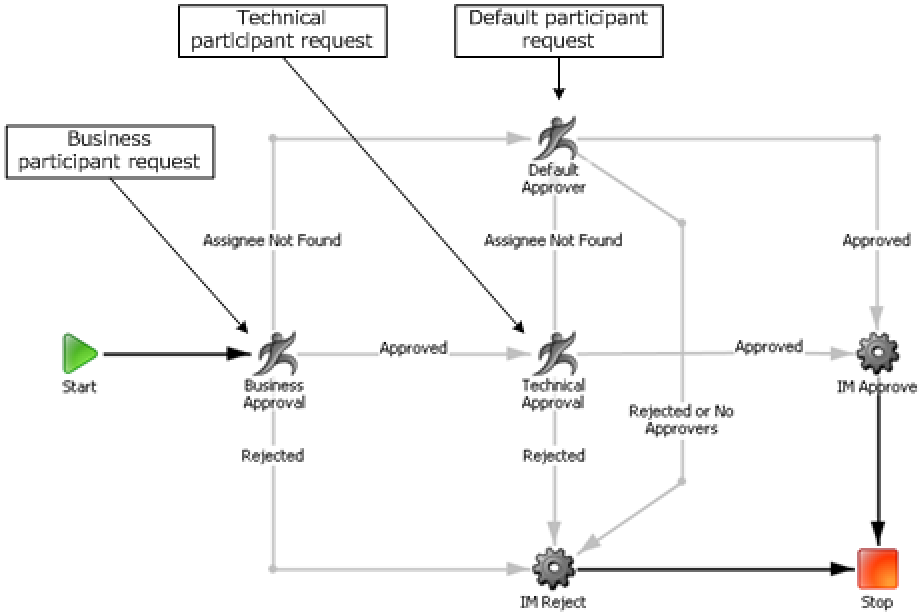


Two Stage Template Diagram

The following diagram illustrates the TwoStageApproval process template as it appears in WorkPoint Designer. The TwoStageApproval process template includes three manual activities:

- An approval node for the business participant. If this user approves the request, the process proceeds to the technical approver and, if this user rejects the request, the process runs to completion.

- An approval node for the technical participant. If this user approves or rejects the request, the process runs to completion.
- An approval node for a default participant. This user can approve or reject the request if either the business or technical participant is not found.

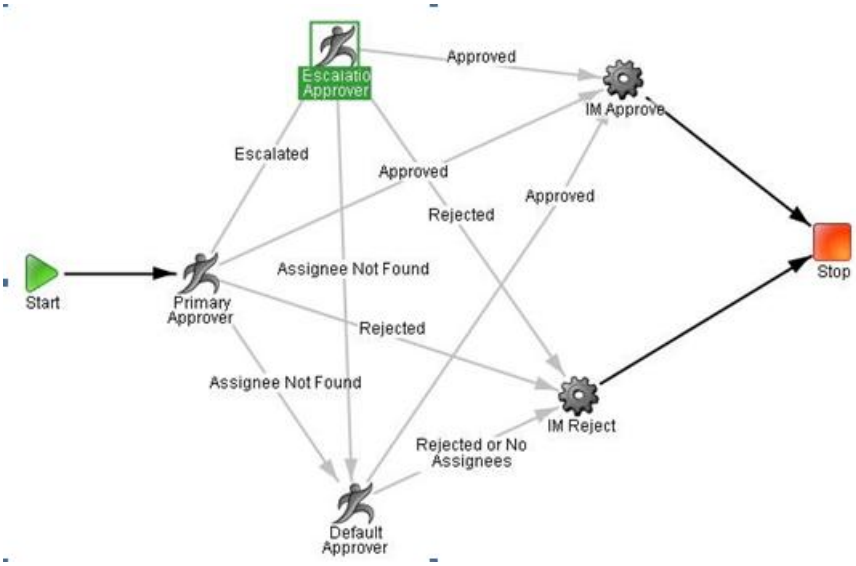


Escalation Approval Template Diagram

The following diagram illustrates the EscalationApproval process template as it appears in WorkPoint Designer. The process template includes the following manual activities:

- An approval node for the primary participant. If this user approves or rejects the request, the process runs to completion.
- An approval node for a default participant. This user can approve or reject the request if the primary participant is not found.

- A timed transition approval node from the primary approver to the escalation approver. This user can approve or reject the request if the primary participant is found but does not respond in the configured time out period.



Note: To add the timeout option to an existing process, add the user data field PARTICIPANT_TIMEOUT to the activity node andadd 'Escalated' Transition to the node where you need the work item to be escalated.

Using the Escalation Approval Template

To use the Escalation Approval Template, import the following ZIP file when upgrading from r12.5 to [assign the value for rn in your book]:
`12.5to12.5SPUpgradeWFScripts.zip`

The ZIP file is located in the following default locations:

- Windows: C:\Program Files\CA\Identity Manager\IAM Suite\Identity Manager\tools\WorkflowScripts
- UNIX: /opt/CA/IdentityManager/IAM_Suite/Identity_Manager/tools/WorkflowScripts

How to Use the Template Method

This section lists the high-level steps involved with placing admin tasks under workflow control using the template method.

To use the template method

1. In the User Console, open the Modify (or Create) Admin Task screen for the task you want under workflow control.

2. To implement task-level workflow:
   a. On the Profile tab, click the Workflow Process button.
   b. On the task-level workflow configuration tab, select a process template and configure participant resolvers.
3. To implement event-level workflow:
   a. On the Events tab, select one or more events.
   b. On the event-level workflow configuration tab, select a process template and configure participant resolvers.

   Note: If EscalationApprovalProcess is selected, a field called Approval Timeout (min) is displayed. This field is specified in minutes and cannot be empty. By default, the time is set to 60 minutes. If a non-numeric/non-integer/non-positive timeout value is specified, a validation error is displayed.
4. After workflow control is configured, the user with the appropriate role performs the admin task.
5. The designated workflow participant approves or rejects the task or event.

More Information:

Event-Level Workflow (see page 334)
Task-Level Workflow (see page 330)
Participant Resolvers: Template Method (see page 337)

Tasks and Events

CA Identity Manager lets you associate workflow processes with either tasks or events. This means that participants can approve or reject either an entire Identity Manager task, or a specific event within a task.

For example, some Identity Manager tasks generate several events, and an approver may need to review all events before deciding to approve or reject a request. This is possible under task-level workflow. When a workflow process is associated with a specific event within a task, an approver cannot see the overall task context within which a request is made.

Task-Level Workflow

Task-level workflow lets approvers review all events before deciding to approve or reject a request.

Task-level workflow occurs before any task activity is processed. No events or nested tasks execute before the workflow process job begins.

If task-level workflow is rejected, no part of the task is executed.

You configure task-level workflow mapping and participant resolvers in the Profile tab for Modify Admin Task or Create Admin Task.

Both policy-based and non-policy based workflow mapping can be configured for task level workflow.

Note: To configure policy-based workflow for tasks, see the Policy-Based Workflow (see page 375) section.

Note: A task that is configured for task-level workflow control can also be configured for event-level workflow control at the same time. Concurrent event-level workflow may be applied globally or for a specific task.

More Information

Event-Level Workflow (see page 334)
Global Process to Event Mapping (see page 348)

Task-Level Process Attribute

Workflow processes that are compatible with task-level workflow all have a special attribute defined within WorkPoint Designer. This process level user data attribute, called TASK_LEVEL, is set to true by default in the following process templates:

- SingleStepApproval
- TwoStageApprovalProcess
- EscalationApprovalProcess

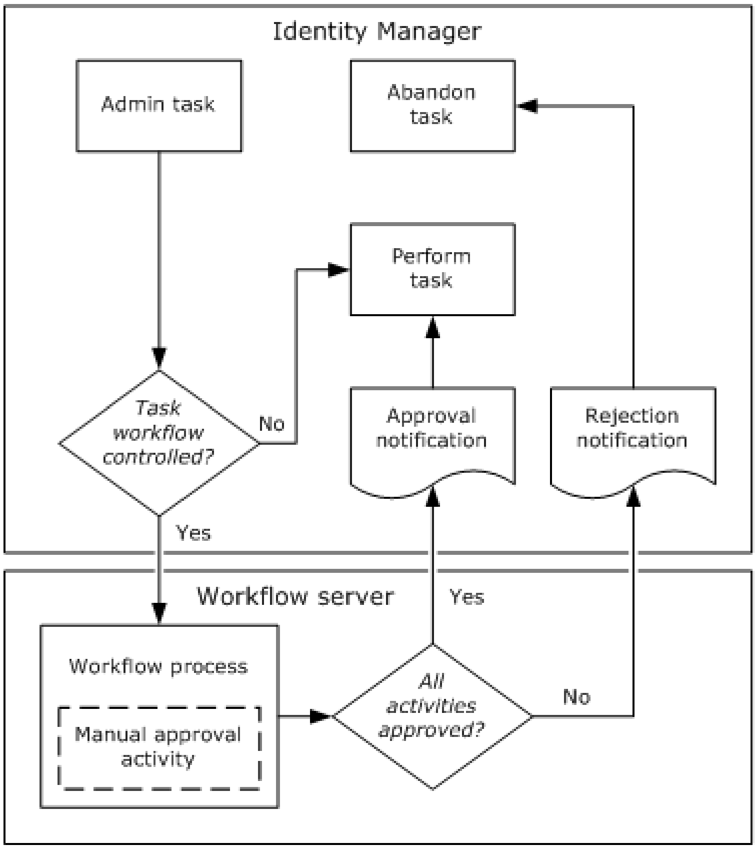
When you select an admin task for task-level workflow, only these process templates are available.

Note: Although TASK_LEVEL is set to true, the process templates can still be used for event-level workflow. Do not change this TASK_LEVEL attribute value.

Task-Level Control Diagram

The following diagram illustrates the interaction between CA Identity Manager and the workflow server when a typical task-level workflow process is initiated:

Task-Level Workflow Control



More Information:

Event-Level Control Diagram (see page 335)

How to Configure Task-Level Workflow

Task-level workflow occurs before any task activity is processed. No events or nested tasks execute before the workflow process job begins.

To configure non-policy based task-level workflow

1. In the User Console, select Roles and Tasks, Admin Tasks, Modify (or Create) Admin Tasks.

   A Select Admin Task screen appears.

2. Search for the task you want under workflow control, and click Select.

   A Modify (or Create) Admin Task screen appears.

3. On the Profile tab, verify that Enable Workflow is checked.
4. On the Profile tab, click the Workflow Process button.

   The Task Level Workflow Configuration tab appears.

5. Select one of the following process templates from the Workflow Process list:

   - SingleStepApprovalProcess
   - TwoStageApprovalProcess
   - EscalationApprovalProcess

   The Task Level Workflow Configuration tab expands.

6. Configure participant resolvers as required by the process template.

   The participant requests are added to the process.

7. Click OK.

   CA Identity Manager saves your task-level workflow configuration.

8. Click Submit.

   CA Identity Manager processes the task modification.

Note: To configure policy based task-level workflow see the Policy-Based Workflow (see page 375) section.

More Information:

Participant Resolvers: Template Method (see page 337)

Event-Level Workflow

An Identity Manager event can be mapped to a workflow process. When an event that is mapped to a workflow process is triggered, the workflow process begins. The task that triggered the event is placed in a pending state and is considered under workflow control.

Both policy-based and non-policy based workflow mapping can be configured for event level workflow.

A workflow process may require an Identity Manager participant to approve or reject an event or task before the process can be complete. A task that requires manual workflow approval by a participant takes longer to complete than a task not under workflow control.

After all activities in a workflow process have been carried out, the event mapped to the workflow process is released from workflow control. When all events triggered by a given task are released from workflow control, the workflow-controlled task is complete.

While the task is under workflow control, the contents of the task screens are saved in the task persistence database. The workflow job state (workflow-relevant data) is stored in the WorkPoint database.

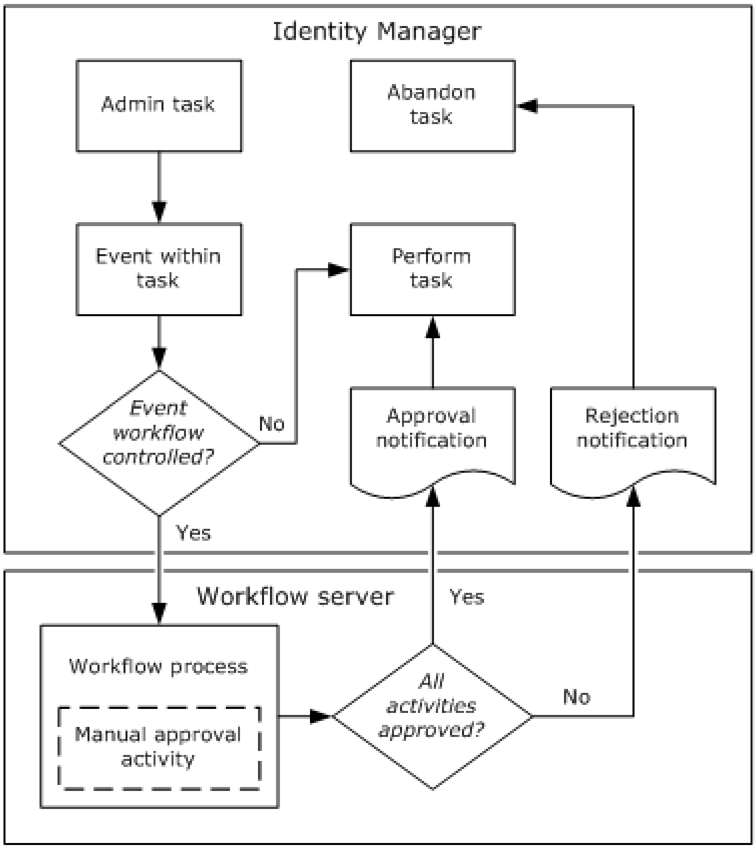
You configure event-level workflow mapping and participant resolvers in the Events tab for Modify Admin Task or Create Admin Task.

Note: The Events tab lists the events that are generated by each tab in a task. After adding a new tab to a task, you must submit and then reopen the task using Modify Admin Task before the new events are displayed on the Events tab.

Event-Level Control Diagram

The following diagram illustrates the interaction between CA Identity Manager and the workflow server when a typical event-level workflow process is initiated:

Event-Level Workflow Control



More Information:

Task-Level Control Diagram (see page 332)

How to Configure Event-Level Workflow

Event-level workflow begins when an event that is mapped to a workflow process is triggered. The task that triggered the event is placed in a pending state until the participant approves or rejects the task.

To configure non-policy based event-level workflow

1. In the User Console, select Roles and Tasks, Admin Tasks, Modify (or Create) Admin Task.

   A Select Admin Task screen appears.

2. Search for the task you want under workflow control, and click Select.

   A Modify (or Create) Admin Task screen appears.

3. On the Profile tab, verify that Enable Workflow is checked.
4. On the Events tab, select an event to map to a process template.

   The workflow mapping screen appears.

5. Select one of the following process templates from the Workflow Process list:
   - SingleStepApproval
   - TwoStageApprovalProcess
   - EscalationApprovalProcess

   The workflow mapping screen expands.

6. Configure participant resolvers as required by the process template.

   The participant requests are added to the process.

7. Click OK.

   CA Identity Manager saves your event-level workflow configuration.

8. Repeat steps 3 - 6 for each event you want under workflow control.
9. Click Submit.

   CA Identity Manager processes the task modification.

To configure policy-based event level workflow, see the Policy-Based Workflow (see page 375)section.

Note: The Workflow Process list includes processes for use with both the template method and the WorkPoint method:

- When a template method process is selected (either SingleStepApproval, TwoStageApprovalProcess, or EscalationApproval), the page expands to enable participant resolver configuration.
- When a WorkPoint method process is selected, the page does not expand. Participant resolvers are configured in WorkPoint Designer.

More Information:

Participant Resolvers: Template Method (see page 337)

Participant Resolvers: Template Method

To specify participants using the process template method, define the following activity properties in the User Console:

- The name of the approval task
- The type of participant resolver
- Additional information as required by the participant resolver

Participant resolvers are configured on the following User Console screens:

Task-level workflow

Workflow configuration screen, selected from the Modify (or Create) Admin Task Profile tab.

Event-level workflow

Workflow mapping screen, selected from the Modify (or Create) Admin Task Events tab.

Types of Participant Resolvers

For the template method, there are seven types of participant resolvers:

Approval Task Role Members

Specifies the participants are members of roles that grant access to the approval task.

User List

Specifies the participants are a specified list of users.

Group Members

Specifies the participants are members of a specified list of groups.

Admin Role Members

Specifies the participants are members of a specified list of admin roles.

Admin Task Members

Specifies the participants are members of admin roles associated with a specified list of admin tasks.

Dynamic Resolver

Specifies the participants are dynamically selected depending on the task or event being approved.

Null Resolver

Resolves to a null list with no users.

Custom

Specifies the participants are determined by a custom participant resolver.

Approval Task Role Members

This resolver assigns the activity to all members of all Identity Manager roles that grant access to the approval task. This resolver requires no further configuration.

To configure an approval task role members resolver

1. On the User Console workflow configuration screen, select Approval Task Role Members from the Participant Resolver list.

   The workflow configuration screen changes according to the participant resolver selection.

2. Click OK to save the participant resolver configuration.

   The admin task profile tab reappears.

3. Click Submit to save your admin task workflow changes.

User List

This resolver assigns the work item to a specified list of users.

Scoping is not enforced. Any user may be added to or removed from the list by anyone who has access to the workflow configuration screen.

This resolver has the following validation rules:

- At least one user name must be provided.
- The user names must be those of a currently existing users.

To configure a user list resolver

1. On the User Console workflow configuration screen, select User List from the Participant Resolver list.

   The workflow configuration screen changes according to the participant resolver selection.

2. Click Add User to add a participant to the list.

   A select user screen appears.

3. Search for and select one or more participants.

   The participants are added to the user list.

4. Click OK to save the participant resolver configuration.

   The admin task profile tab reappears.

5. Click Submit to save your admin task workflow changes.

Group Members

This resolver assigns the work item to all members of all groups specified in the group list.

Evaluation of who the group members are is performed at the time the work item is created, not at the time the participant resolver is specified.

Scoping is not enforced. Any group may be added to or removed from the list by anyone who has access to the workflow configuration screen.

This resolver has the following validation rules:

- At least one group must be specified
- The group names must be those of currently existing groups

To configure a group members resolver

1. On the User Console workflow configuration screen, select Group Members from the Participant Resolver list.

   The workflow configuration screen changes according to the participant resolver selection.

2. Click Add Groups to add a group to the list.

   A select group screen appears.

3. Search for and select one or more groups.

   The groups are added to the group list.

4. Click OK to save the participant resolver configuration.

   The admin task profile tab reappears.

5. Click Submit to save your admin task workflow changes.

Admin Role Members

This resolver assigns the work item to all members of the admin roles specified in the admin role list.

Evaluation of who the role members are is performed at the time the work item is created, not at the time the participant resolver is specified.

Scoping is not enforced. Any role may be added to or removed from the list by anyone who has access to the workflow configuration screen.

This resolver has the following validation rules:

- At least one admin role must be specified.
- The admin role names must be those of currently existing admin roles.

To configure an admin role members resolver

1. On the User Console workflow configuration screen, select Admin Role Members from the Participant Resolver list.

   The workflow configuration screen changes according to the participant resolver selection.

2. Click Add Admin Roles to add a role to the list.

   A select role screen appears.

3. Search for and select one or more roles.

   The roles are added to the role list.

4. Click OK to save the participant resolver configuration.

   The admin task profile tab reappears.

5. Click Submit to save your admin task workflow changes.

Admin Task Members

This resolver assigns the work item to all members of all admin roles associated with the admin tasks specified in the admin task list.

Scoping is not enforced. Any task may be added to or removed from the list by anyone who has access to the workflow configuration screen.

Evaluation of who the role members are and what roles are present on the tasks is performed at the time the work item is created, not at the time the participant resolver is specified.

This resolver has the following validation rules:

- At least one admin task must be specified.
- The admin task names must be those of currently existing admin tasks.

To configure an admin task members resolver

1. On the User Console workflow configuration screen, select Admin Task Members from the Participant Resolver list.

   The workflow configuration screen changes according to the participant resolver selection.

2. Click Add Admin Task to add a task to the list.

   A select task screen appears.

3. Search for and select one or more tasks.

   The tasks are added to the task list.

4. Click OK to save the participant resolver configuration.

   The admin task profile tab reappears.

5. Click Submit to save your admin task workflow changes.

Dynamic Resolver

This resolver returns a list of users according to a dynamic rule resolved at run-time. Use the following selection to set dynamic rule constraints:

Approvers

Specifies the type of user to approve this task.

Note: This only shows those objects that can contain users (or approvers).

User or Object

Specifies the user or object where the approvers can be found.

- Object associated with the event—The event under workflow control.
- Initiator of this task—The user who initiated the admin task.
- Primary object of this task—The object being created/modified by the task.
- Previous approver of this task—The previous approvers of this task.

Attribute

Specifies the attribute that contains the approvers.

Note: The Attribute list is sorted in alphabetical order and contains a list of unique display names. Extended attributes are excluded from the list.

Event Object Type

Specifies the type of object from the event.

Note: This appears only if "Object associated with the event" is selected.

Note: Dynamic Resolver with Create Group requires existence of the object. Group membership/administrators information can be used with dynamic/match attribute resolvers for existing groups only.

The resolver has been enhanced to add the previous approver to the supported object list. If the physical attribute hosting manager information is selected, the configuration routes an approval to a manager.

To configure the resolver for Manager Approval Resolver:

- Set approvers to Users
- Select "Previous approver of this task" from User or Object drop-down list
- Set the attribute to physical attribute containing manager information

Adding previous approver to the supported object list of the resolver lets usage of the dynamic resolver with escalation approval process. Since the modification is done solely for usage with the escalation approval process, there is no singling out of the person who actually did the approval. The entire population of Users, identified as approvers for the previous work item of the current job are inspected for requested information (manager UID, and so forth.). All individuals identified by this inspection are the approvers for the current work item (escalation).

Matching Attribute Resolver

This resolver works on objects of type User only. A value from any object available is matched against a field on the user object. Use the following selection to set matching attribute rule constraints:

Approvers

Specifies the type of user to approve this task.

User or Object

Specifies the value that approvers will have in the attribute selected below.

Note: The value retrieved from the user or object should be an acceptable value for a search on user for the selected attribute.

- Object associated with the event—The event under workflow control.
- Initiator of this task—The user who initiated the admin task.
- Primary object of this task—The object being created/modified by the task.(Only available for task level event mapping.)
- Previous approver of this task—The previous approvers of this task.

Use or Object Attribute

Specifies the attribute that contains the value to use in the search for approvers.

Approver Search Attribute

Specifies the attribute that is used in the search to match the value identified above.

You must import the upgrade scripts for escalation approval process for previous approver information to be available (UpgradeWFScripts.zip). Import the scripts from the workflowScripts folder under the Administrative Tools in following default locations:

- Windows: C:\Program Files\CA\Identity Manager\IAM Suite\Identity Manager\tools
- UNIX: /opt/CA/IdentityManager/IAM_Suite/Identity_Manager/tools

When importing the WorkPoint scripts with the archiver tool on upgrade, the administrator should specify that this is an import into an existing database and override existing scripts.

Note: When you set 'Approve Create User' task as a Match Attribute Resolver that works on Users, Participant Resolver, you must change the method signature for the imApprovers script on workpoint designer to point to the unique name for TwoStageProcessDefinition.

Null Resolver

The null resolver returns no users. Depending on how the workflow process is designed, this can cause the process to skip the approval entirely. The null resolver requires no further configuration.

To configure a null resolver

1. On the User Console workflow configuration screen, select Null Resolver from the Participant Resolver list.

   The workflow configuration screen changes according to the participant resolver selection.

2. Click OK to save the participant resolver configuration.

   The admin task profile tab reappears.

3. Click Submit to save your admin task workflow changes.

Custom Participant Resolver

The custom participant resolver is a Java object that determines workflow activity participants and returns a list to CA Identity Manager, which then passes the list to the workflow engine. Typically, you write a custom participant resolver only if the standard participant policies cannot provide the list of participants that an activity requires.

Note: You create a custom participant resolver using the Participant Resolver API. For more information, see the *Programming Guide for Java*.

To configure a custom participant resolver

1. On the User Console workflow configuration screen, select Custom: <*resolverName*> from the Participant Resolver list.

   The workflow configuration screen changes according to the participant resolver selection.

2. Add input parameters as required by your custom participant resolver.

3. Click OK to save the participant resolver configuration.

   The admin task profile tab reappears.

4. Click Submit to save your admin task workflow changes.

Workflow Example: Create User

A company's Identity Manager administrator needs to define a workflow and user roles to handle the following scenario:

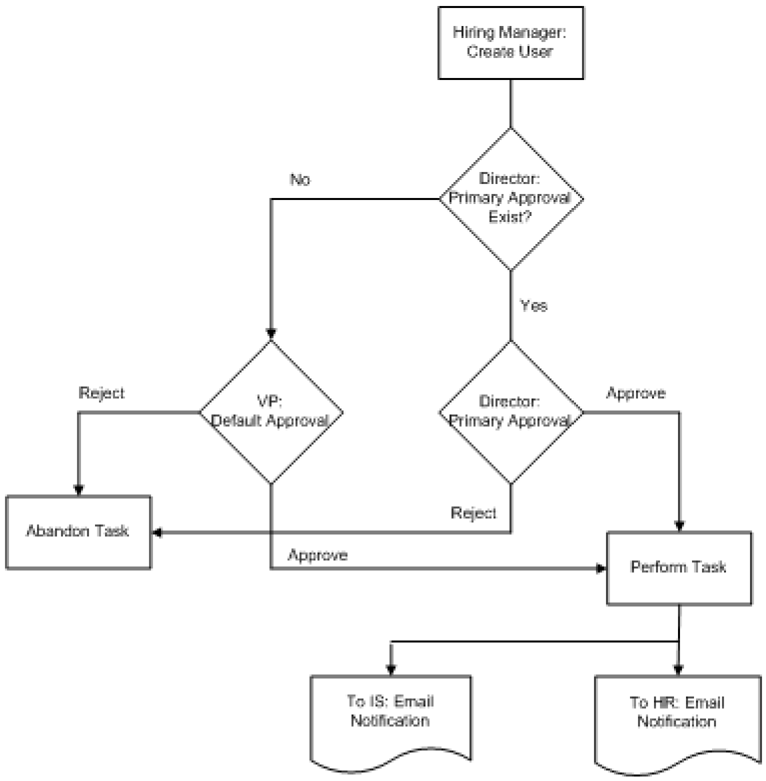
- The company Sales Manager hires a new Sales Representative. The Sales Manager must be able to create a Identity Manager user for the new hire.
- To streamline the hiring process, the participants want to perform only a single work item to approve (or reject) the task.

- The Sales Director should be primary approver for all new hires. If the Sales Director is not found, the VP of Sales should be the default approver.
- If the new hire is approved, CA Identity Manager should send new user email notifications to both the Human Resources (HR) and Information Services (IS) departments.

Create User Control Diagram

The following diagram illustrates the logic flow for the create user scenario:

Task-Level Workflow Example: Create User


Hiring Manager: Create User
No
Director: Primary Approval Exist?
Yes
Reject
VP: Default Approval
Director: Primary Approval
Approve
Reject
Abandon Task
Approve
Perform Task
To IS: Email Notification
To HR: Email Notification

Workflow Example Implementation

To implement this example scenario, the administrator needs to perform the following tasks:

- Ensure that the task initiator is a member of the required admin role.

  The Sales Manager needs to be a member of the User Manager admin role. This role gives the Sales Manager the required authority to initiate the Create User admin task for the new hire Sales Representative.

- Enable task-level workflow for the Create User admin task.

  Task-level workflow guarantees that only one work item is generated to complete the Create User task. Because there are several individual events associated with the Create User task, event-level workflow would generate several work items, and also would be harder to configure.

- Configure the participant resolvers.

  The number of possible participant resolvers is determined by the selected workflow process template. The SingleStageApproval template includes primary and default approvers, other templates allow for more.

  Because this scenario requires only two individuals approvers, the User List participant resolver provides the simplest solution. This resolver allows individual approvers to be selected by name, rather than multiple users to be selected by role or group.

- Configure email notification.

  The Management Console allows email notification for specific tasks and events. For this scenario, task email is enabled and email notifications are sent when the Create User task completes.

  A custom email template is required to send email to the HR and IS departments with the appropriate subject line and message text.

More Information

How to Use the Template Method (see page 329)
How to Configure Task-Level Workflow (see page 333)
Participant Resolvers: Template Method (see page 337)
Email Notifications (see page 413)

WorkPoint Method

The WorkPoint method applied to CA Identity Manager releases prior to r12. There are 14 predefined WorkPoint workflow processes that by default are mapped to specific Identity Manager events. You must use WorkPoint Designer to configure participant resolvers and otherwise modify workflow processes.

The WorkPoint method also requires you to use the Management Console to map a workflow process to an approval event to place the corresponding task under workflow control at a global level within the environment.

How to Use the WorkPoint Method

This section lists the high-level steps involved with placing admin tasks under workflow control using the WorkPoint method.

Note: For greater flexibility and ease of use, CA recommends that you use the template method whenever possible.

To use the WorkPoint method

1. In the Management Console:
   a. Ensure workflow is enabled.
   b. (Optional) For global event mapping, associate one or more events to the appropriate predefined workflow process.
   c. If necessary, restart the Identity Manager environment.
2. In the User Console:
   a. For task-specific event mapping, associate one or more events to the appropriate predefined workflow process. (optional)
3. In WorkPoint Designer:
   a. Associate an approval task with a workflow process (optional).
   b. Configure participant resolvers with a workflow process (optional).
4. In the User Console:
   a. After workflow control is configured, the user with the appropriate role performs the admin task.
   b. The designated workflow participant approves or rejects the event.

More Information:

Mapping Processes to Events (see page 349)
Associate a Workflow Activity with an Approval Task (see page 354)
Participant Resolvers: WorkPoint Method (see page 355)

WorkPoint Processes

CA Identity Manager includes a number of workflow processes that are predefined in WorkPoint Designer. You can use the predefined processes with their default event mappings, map the workflow processes to other events, modify workflow processes by adding or removing activities, and create new workflow processes.

Global Process to Event Mapping

The mapping of a workflow process to an event at a global level can be non-policy based or policy-based.

For more information on how to map an event to a workflow process using policy-based workflow, see Global Event Policy-Based Workflow Mapping.

This table shows the default global workflow process and event mappings, specified in the Management Console.

Important: These are global mappings. The mapped workflow process executes whenever the corresponding event is generated by any task in the environment.

Workflow Process	Mapped Event
CertifyRoleApproveProcess	CertifyRoleEvent
CreateGroupApproveProcess	CreateGroupEvent
CreateOrganizationApproveProcess	CreateOrganizationEvent
CreateUserApproveProcess	CreateUserEvent
DeleteGroupApproveProcess	DeleteGroupEvent
DeleteOrganizationApproveProcess	DeleteOrganizationEvent
DeleteUserApproveProcess	DeleteUserEvent
ModifyAccessRoleMembershipApproveProcess	AssignAccessRoleEvent RevokeAccessRoleEvent
ModifyAdminRoleMembershipApproveProcess*	
ModifyGroupMembershipApproveProcess*	
ModifyOrganizationApproveProcess	ModifyOrganizationEvent
ModifyObjectApproveProcess	ModifyObjectEvent
SelfRegistrationApproveProcess	SelfRegisterUserEvent

Note: Workflow processes marked with an asterisk (*) are not mapped to events by default.

More Information:

Map a Process to an Event Globally (see page 350)
Map a Process to an Event in a Specific Task (see page 351)

Mapping Processes to Events

You create and modify workflow processes in WorkPoint Designer. When you create a workflow process for CA Identity Manager, you do so with a particular Identity Manager task in mind. The execution of this task is controlled by the workflow process.

In addition to creating the workflow process, you must also do the following:

- Identify the event that is generated by the Identity Manager task, described in Admin Tasks and Events. You can create a workflow process for any Identity Manager task that generates an event.
- Map the workflow process to an event by doing one of the following:
  - Assign a Workflow Process to an Event Globally.

    With this global mapping, the workflow process occurs whenever the event is generated in the environment, regardless of the task that generates the event.
  - Assign a Workflow Process to an Event Generated by a Specific Task.

    With this task-specific mapping, the workflow process occurs only when the specified task generates the event.

  Note: If you map an event to a workflow process both globally and to a specific task, the workflow process associated with the specific task takes precedence.
- Specify a participant resolver for the workflow activity in the workflow process.
- Associate a workflow activity with an approval task.

More Information:

Map a Process to an Event Globally (see page 350)
Map a Process to an Event in a Specific Task (see page 351)
Workflow Activities (see page 352)
Participant Resolvers: WorkPoint Method (see page 355)

Map a Process to an Event Globally

You map a workflow process to an event globally so the workflow process executes when the event is generated by any task in the environment.

Note: Although the following procedure works, the Global Event Level Policy-Based (see page 390) procedure is the now recommended method of mapping a process to an event.

To map a non-policy based workflow process to an event globally

1. Open the Management Console by entering the following URL in a browser:

   ```
   http://hostname/iam/immanage
   ```

   hostname

   Defines the fully qualified domain name of the server where CA Identity Manager is installed. For example, myserver.mycompany.com:port.

2. Click Environments, and select the name of the appropriate CA Identity Manager environment.
3. Click Advanced Settings, and then click Workflow.
4. Do the following to map an event to a workflow process:
   a. Select an event from the Event list box.
   b. Select a workflow process from the Approve Process list box.
   c. Click Add.
5. After you finish mapping events to workflow processes, click Save.
6. Restart the Identity Manager environment for changes to take effect.

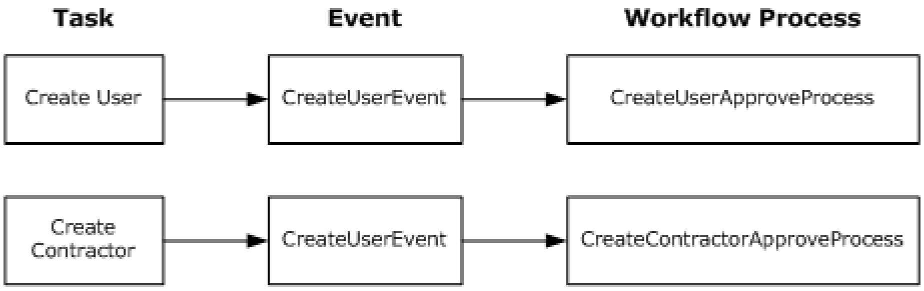
More Information:

Global Process to Event Mapping (see page 348)

Map a Process to an Event in a Specific Task

You can assign a workflow process to an event that is generated by a particular task. In this case, the workflow process occurs only when the mapped event is generated by the specified task.

Task-specific mapping provides variable control over the workflow processes that can be executed for the same event. For example, the following diagram shows two different tasks generating the same event but triggering two different workflow processes:



In this diagram, each task uses a different workflow process.

Create User

Specifies the default admin task that triggers CreateUserEvent, which is mapped to CreateUserApproveProcess, a default workflow process.

Create Contractor

Specifies a custom task based on Create User. In this case, CreateUserEvent is mapped to CreateContractorApproveProcess, a custom workflow process created for approving new contractor accounts.

To map a non-policy based workflow process to an event in an existing task

1. In the User Console, select Roles and Tasks, Admin Tasks, Modify Admin Task.
2. Search for an administrator task.
3. Select a task (for example, the Modify User or Create User tasks) and click Select.
4. On the Events tab, select a workflow process for the event in the task.

   Note: Workflow must be enabled for the event names and the workflow process drop-down menu to appear on this tab.
5. Click the Edit button to view the Workflow mapping screen.
6. Using the Workflow Process drop-down menu, assign a workflow process to the event name and click OK.
7. Click Submit.

To map a non-policy based workflow process to an event in a new task

1. In the User Console, select Roles and Tasks, Admin Tasks, Create Admin Task.

   Note: Be sure you select an existing workflow approval task (such as Approve Create Group or Approve Create User) as the template for your new workflow approval task.

2. On the Profile tab, enter the information in the appropriate fields.
3. On the Events tab, select a workflow process for the event in the task.

   Note: Workflow must be enabled for the event names and the workflow process drop-down menu to appear on this tab.

4. Using the Workflow Process drop-down menu, assign a workflow process to the event name and click OK.
5. Click Submit.

Note: To map a policy-based workflow process to an event, see the Policy-Based Workflow (see page 375) section.

Note: The Workflow Process list includes processes for use with both the template method and the WorkPoint method:

- When a template method process is selected (either SingleStepApproval, TwoStageApprovalProcess, or EscalationApproval), the page expands to enable participant resolver configuration.
- When a WorkPoint method process is selected, the page does not expand. Participant resolvers are configured in WorkPoint Designer.

More Information:

Global Process to Event Mapping (see page 348)

Workflow Activities

CA Identity Manager includes a number of workflow activities that are predefined in the WorkPoint Designer. These activities are assigned to predefined workflow processes.

The predefined workflow processes are single-step processes—that is, each process contains a single predefined activity.

Each predefined activity corresponds to a workflow approval task with the same name that is predefined in CA Identity Manager. You can use the predefined activities in other workflow processes, and you can create new activities.

You can use the predefined workflow processes without modification or add more activities to them. For information about adding an activity to a workflow process, see the WorkPoint documentation.

Processes, Tasks, and Activities

The table below lists the predefined workflow activities and the predefined workflow process that each activity is assigned to by default.

Note: The predefined workflow activities and their corresponding workflow approval tasks have the same name.

Workflow Process	Workflow Task/Activity
CertifyRoleApprovalProcess**	Approve Certify Role
Consultation Process*	
CreateGroupApproveProcess	Approve Create Group
CreateOrganizationApproveProcess	Approve Create Organization
CreateUserApproveProcess	Approve Create User
DeleteGroupApproveProcess	Approve Delete Group
DeleteOrganizationApproveProcess	Approve Delete Organization
DeleteUserApproveProcess	Approve Delete User
ModifyAccessRoleMembershipApproveProcess	Approve Modify Access Role Membership
ModifyAdminRoleMembershipApproveProcess	Approve Modify Admin Role Membership
ModifyGroupMembershipApproveProcess	Approve Modify Group Membership
ModifyIdentityPolicySetApproveProcess	Approve Modify Identity Policy Set
ModifyOrganizationApproveProcess	Approve Modify Organization
ModifyUserApproveProcess	Approve Modify User
SelfRegistrationApproveProcess	Approve Self Registration
SingleStepApproval*	
TwoStageApprovalProcess*	

Note: Workflow processes marked with one asterisk (*) are designed for use with the template method. They are configured in the User Console, and therefore have no default associated tasks or activities. The CertifyRoleApprovalProcess (**) is a sample process demonstrating a custom participant resolver.

Associate a Workflow Activity with an Approval Task

To associate a workflow activity with a workflow approval task, you define a name/value pair in WorkPoint Designer.

Note: If a name/value pair is not defined for a workflow activity by default, CA Identity Manager uses a task with a name that matches the approval task.

To associate a workflow activity with an approval task

1. Start WorkPoint Designer.
2. Click File, Open, Process.
3. Select a workflow process and click Open.
4. Right click the activity node in the process, and select Properties.
5. Select Text from the Type drop-down menu.
6. Enter the following in the User Data tab:
   - **Name**—TASK_TAG.
   - **Value**—Approval Task Tag name.
7. Click Add.
8. Click OK to save your changes.

Create Approval Tasks for Endpoints

You can create Approval Tasks for account management screens. For tasks that approve account modifications, the approval screen must be specific to an endpoint type, so that the approver can see the changed values. To create an approval task for a Create or modify task, follow this procedure:

To create an approval task for an endpoint

1. In the User Console, click Roles and Tasks, Admin Tasks, Create Admin Task.
2. Select "Create a copy of an admin task" used to manage accounts on the endpoint.

   The name would start with create and state the name of the endpoint type. Create Active Directory Account is an example.
3. Make the following changes on the Profile tab.
   - Change the name of the new task.
   - Change the task tag.
   - Change the action to Approve Event.
4. Make the following changes on the Tabs tab:
   a. Remove all Relationships tabs.

   b. Copy and then edit the approval screens on the tabs as necessary.

   Note: You may run into problems when using the account screens in an approval task and changes may need to be made to the default account screen to make them work in an approval task.
5. Click Submit.

Participant Resolvers: WorkPoint Method

To specify participants using the WorkPoint method, define the following activity properties in WorkPoint Designer:

- The name of the predefined CA Identity Manager script which enables communication between CA Identity Manager and the workflow server. The script issues a request to CA Identity Manager for activity participants, and supplies that list to the workflow server.
- References to one or more participant resolvers.

Types of Participant Resolvers

Rather than entering a specific list of participants in workflow activity properties, the participants are referenced by an arbitrary name that is mapped to a *participant resolver*.

For the predefined process model, there are four types of participant resolvers:

Role Participant Resolver

Specifies the participants are members of a particular role.

Group Participant Resolver

Specifies the participants are members of a particular group.

Custom Participant Resolver

Specifies the participants are determined by a custom participant resolver.

Filter Participant Resolver

Specifies the participants are selected through a search filter.

Role Participant Resolvers

With role type participant resolvers, CA Identity Manager retrieves all of the members for that role and returns those members as participants.

If no resolver type is specified in the UserData parameter of the Activity dialog box, the role type resolver is used by default.

If you do not specify any participant resolvers in the User Data tab of the WorkPoint Activity Properties dialog box, by default, CA Identity Manager finds all available roles containing this approval task and returns back those role members as participants.

To configure role participant resolvers

1. Start WorkPoint Designer.
2. Click File, Open, Process.
3. Select a workflow process and click Open.
4. Right click the activity node in the process, and select Properties.
5. Select Text from the Type drop-down menu.
6. Enter the following in the User Data tab:
   - **Name**—APPROVER_ROLE_NAME
   - **Value**—The name of a Identity Manager role (for example, Security Manager)

7. Click Add.

   Note: This role does not need to contain any approval tasks.

8. Select Text from the Type drop-down menu.

9. In the User Data tab, enter the following name/value pair (optional):

   Value—APPROVERS_REQUIRED

   Value—YES.

10. Click Add.

    Note: The default approval setting is APPROVERS_REQUIRED=NO. In this case, an activity is approved automatically if no participants are found.

    If APPROVERS_REQUIRED=YES and CA Identity Manager finds no participants, the activity is not successfully completed.

11. Click OK to save your changes.

Group Participant Resolvers

With group type participant resolvers, CA Identity Manager retrieves all of the members for that group and returns those members as participants.

To configure group participant resolvers

1. Start WorkPoint Designer.
2. Click File, Open, Process.
3. Select a workflow process and click Open.
4. Right click the activity node in the process, and select Properties.
5. Select Text from the Type drop-down menu.
6. Enter the following in the User Data tab:
   - **Name**—APPROVER_GROUP_UNIQUENAME
   - **Value**—The name of a Identity Manager group
7. Click Add.
8. Select Text from the Type drop-down menu.
9. In the User Data tab, enter the following name/value pair (optional):
   - **Name**—APPROVERS_REQUIRED
   - **Value**—YES.
10. Click Add.

Note: The default approval setting is APPROVERS_REQUIRED=NO. In this case, an activity is approved automatically if no participants are found.

If APPROVERS_REQUIRED=YES and CA Identity Manager finds no participants, the activity is not successfully completed.

11. Click OK to save your changes.

Custom Participant Resolvers

The custom participant resolver is a Java object that determines workflow activity participants and returns a list to CA Identity Manager, which then passes the list to the workflow engine. Typically, you write a custom participant resolver only if the standard participant policies cannot provide the list of participants that an activity requires.

Note: You create a custom participant resolver using the Participant Resolver API. For information, see the *Programming Guide for Java*.

To configure a custom participant resolver

1. Open the Management Console by entering the following URL in a browser:

   ```
   http://hostname/iam/immanage
   ```

   hostname

   Defines the fully qualified domain name of the server where CA Identity Manager is installed. For example, myserver.mycompany.com:port.

2. Click Environments, and select the name of the appropriate CA Identity Manager environment.

3. Click Advanced Settings, Workflow Participant Resolver.

4. On the WorkFlow Participant Resolver screen, click New and enter:

   Name

   Specifies the custom participant resolver name, for example, GroupFinder.

   Description

   Specifies a description of the custom participant resolver.

   Class

   Specifies the Java class name, for example, com.netegrity.samples.GroupFinder

5. Click Save.

6. Start WorkPoint Designer.

7. Click File, Open, Process.

8. Select a workflow process and click Open.

9. Right click the activity node in the process, and select Properties.

10. Select Text from the Type drop-down menu.
11. Enter the following in the User Data tab:

    Name

    APPROVER_CUSTOMRESOLVER_NAME

    Value

    Specifies a unique name for the custom resolver. This must match the name you entered on the Custom Type Participant Resolver screen in the Management Console, for example, GroupFinder.

12. Click Add.

    Note: The default approval setting is APPROVERS_REQUIRED=NO. In this case, an activity is approved automatically if no participants are found.

    If APPROVERS_REQUIRED=YES and CA Identity Manager finds no participants, the activity is not successfully completed.

13. Click OK to save your changes.

Filter Participant Resolvers

A filter participant resolver enables CA Identity Manager to search for users or groups that match the filter criteria. You specify a search filter in WorkPoint Designer, and CA Identity Manager returns matching approvers for the corresponding workflow activity.

You create a filter participant resolver on the User Data tab of the WorkPoint Activity Properties dialog box.

Participant Resolvers Filter Syntax

The following are three required attributes that combine to make a search filter:

- Approver attribute, such as title
- Approver attribute operation, such as equals
- Approver attribute value, such as manager

The required search filter attributes combine together in the following order:

attribute operation value

For example:

title equals manager or *department contains payroll*

Required Participant Resolver Filter Attributes

The following are *required* participant resolver filter attributes:

Note: For each filter, n is a positive integer indicating the search filter number. The default is 1.

APPROVER_FILTER_n_ATTRIBUTE

Specifies the approver attribute. For example, Title, Department, User ID. (Approver attribute name strings must match Identity Manager user attribute name strings.)

APPROVER_FILTER_n_OP

Specifies the operation associated with the approver attribute. For example, equals, not_equals, or contains. (Operation keywords are not case-sensitive.)

The following are valid entries for this filter:

- EQUALS
- STARTSWITH
- NOT_EQUALS
- CONTAINS
- ENDS_WITH
- GREATER_THAN
- LESS_THAN
- GREATER_THAN_EQUALS
- LESS_THAN_EQUALS

APPROVER_FILTER_n_VALUE

Specifies the value associated with the approver. For example, manager, payroll, engineering.

Optional Participant Resolver Filter Attributes

The following are *optional* participant resolver filter attributes.

APPROVER_OBJECTTYPE

USER or GROUP (not case-sensitive)

The default is USER.

APPROVER_ORG_UNIQUENAME

A unique name for an approver's organization. (Organization name strings must match Identity Manager organization name strings.)

The default is root.

APPROVER_ORG_AND_LOWER

The approver's organization or sub-organizations:

- 0 means search in the approver's organization.
- 1 means search in all sub-organizations of the approver's organization.

The default is 1.

APPROVER_FILTER_NO

The number of search filter that you are using. If you have two filters, then this number would be 2.

The default is 1.

Note: This filter is required if the number of filters is greater than one.

APPROVER_FILTER_n_CONJ_TYPE

You can combine search filters using OR or AND conjunction types.

Note: Filters separated by the OR conjunction take precedence over those separated by AND.

For example, you can specify the AND conjunction type if you are searching for "title equals manager" AND "department equals development."

Note: n is a positive integer greater than 1 indicating the search filter number.

Add a Participant Resolver Filter

To add participant resolver filters

1. Start WorkPoint Designer.
2. Click File, Open, Process.
3. Select a workflow process and click Open.
4. Right click the activity node in the process, and select Properties.
5. Select Text from the Type drop-down menu.
6. Enter the following in the User Data tab:
   - **Name**—APPROVER_FILTER_1_ATTRIBUTE
   - **Value**—A unique role identifier (for example, title).
7. Click Add.
8. Repeat steps 6 and 7 for each attribute in the search filter.

Note: The default approval setting is APPROVERS_REQUIRED=NO. In this case, an activity is approved automatically if no participants are found.

If APPROVERS_REQUIRED=YES and CA Identity Manager finds no participants, the activity is not successfully completed.

9. Click OK to save your changes.

Example: Filter Participant Resolver

The user store in the following table contains four users—Holly, Sarah, John, and Dave—with user ID, job title, and department attributes.

User	ID	Title	Department
Holly	admin1	sysadmin	administration
Sarah	test1	sysadmin	development
John	admin2	manager	development
Dave	admin3	sysadmin	accounting

CA Identity Manager applies the three filters defined in the following table against the preceding user store:

Name	Value
APPROVER_FILTER_NO	3
APPROVER_FILTER_1_ATTRIBUTE	uid
APPROVER_FILTER_1_OP	equals
APPROVER_FILTER_1_VALUE	admin*
APPROVER_FILTER_2_CONJ_TYPE	AND
APPROVER_FILTER_2_ATTRIBUTE	department
APPROVER_FILTER_2_OP	equals
APPROVER_FILTER_2_VALUE	administration
APPROVER_FILTER_3_CONJ_TYPE	OR
APPROVER_FILTER_3_ATTRIBUTE	title
APPROVER_FILTER_3_OP	equals
APPROVER_FILTER_3_VALUE	sysadmin

CA Identity Manager applies the filters in the following sequence:

1. Evaluates the second and third filters connected by the OR conjunction.

   "department equals administration" OR "title equals sysadmin"

   This excludes John and returns Holly, Sarah, and Dave.

2. Evaluates the first and second filters connected by the AND conjunction, (where * is a wild card character.

   "uid equals admin*" AND "department equals administration"

   This excludes Sarah, and returns Holly and Dave.

The final users returned from the user store are Holly and Dave.

Participant Resolver Order of Precedence

If you do not specify any participant resolvers, by default Identity Manager identifies all available roles containing the approval task and returns those role members as participants.

If you specify more that one participant resolver, Identity Manager evaluates them using this order of precedence:

1. Custom
2. Role
3. Filter
4. Group

Identity Manager identifies and applies the first resolver in this order of precedence, and ignores any subsequent remaining resolvers.

You should only have one resolver at a time. Also, make sure that the resolver is configured properly so that Identity Manager correctly identifies participants.

Specify Workflow Resource Script

Identity Manager is shipped with a script, named IM Approvers, that passes information between Identity Manager and the workflow server.

When a list of participants is required for a workflow activity, the script passes to Identity Manager the activity name, the participant identifier provided on the User Data tab of the WorkPoint Activity Properties dialog box, and any other information provided on the User Data tab. Identity Manager searches for the participants and passes the list back to the script. The script then provides the list to the workflow server.

When you have a new workflow process definition and the workflow process activity is an Identity Manager workflow approval task, the IM Approvers script must be specified in the Resources tab of the WorkPoint Activity Properties dialog box.

To specify the IM Approvers script in WorkPoint Designer

1. In the Resources tab, click Select.
2. In the Select Resources dialog box, select Rule from the drop-down list. This action lists the rules (scripts) that you can associate with the activity.
3. Select the script name IM Approvers and click Add.
4. Click OK, and then click Apply on the Activity Properties dialog box.

Note: Do not modify the IM Approvers script.

Specify Participants for Certify User Tasks

Certify User tasks generate the event CertifyRoleEvent. This event can be subject to workflow approval through the predefined process CertifyRoleApproveProcess.

Identity Manager also includes the predefined participant resolver CertifyRoleParticipantResolver, which appears in your environment by default. Participants for activities in a CertifyRoleApprovalProcess are specified through CertifyRoleParticipantResolver.

To provide participant configuration information

1. Open the Management Console by entering the following URL in a browser:

   ```
   http://hostname/iam/immanage
   ```

   hostname

   Defines the fully qualified domain name of the server where CA Identity Manager is installed. For example, myserver.mycompany.com:port.

2. Click Environments, and select the name of the appropriate CA Identity Manager environment.
3. Click Advanced Settings and then click Miscellaneous.
4. Define name/value pairs that specify the approvers for each role to be certified:
   - In the Property field, use the format: *role-type.role-name*

     role-type must be one of these roles: admin, access, provisioning.

     role-name is the name of any existing role.

     The role-name and role-type must be separated by a period (.).
   - In the Value field, specify the IDs of the approvers, and separate the IDs with a semi-colon (;).

In the following example, user certification can be approved for the following roles and by the following participants:

- jsmith01 and ajones19 can approve certification for the User Manager role
- plewis12 is the only approver for the System Manager role
- rtrevor8 and pkitt3 can approve certification for My Access Role

Property	Value
admin.User Manager	jsmith01;ajones19
admin.System Manager	plewis12
access.My Access Role	rtrevor8;pkitt3

Note: Any unspecified roles will not have approvers for a CertifyRoleEvent.

Processes in WorkPoint Designer

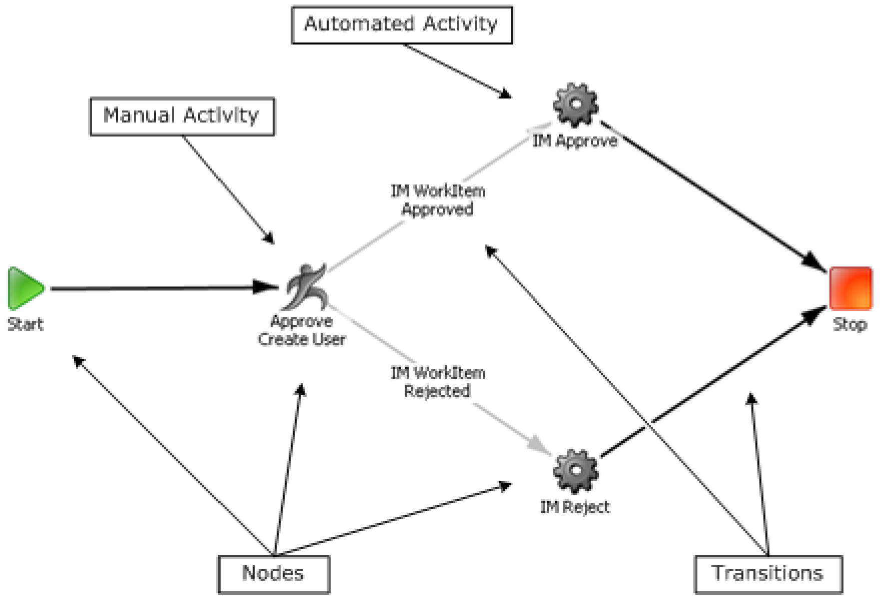
In WorkPoint Designer, you can customize the default workflow processes and activities that come with Identity Manager, and you can create new ones.

This document presents WorkPoint workflow information that is specific to Identity Manager. For complete information, see the WorkPoint Designer documentation.

Note: When creating a workflow process, consider doing so by making a copy of an existing Identity Manager process, and then modifying the new process to suit your needs. A workflow process created in this way includes default Identity Manager-specific elements and nodes such as transition scripts and automated activities.

WorkPoint Process Diagram

The following diagram shows a typical workflow process with the minimum set of components for a process that controls an Identity Manager task. The diagram illustrates the predefined process CreateUserApproveProcess, which controls the execution of a Create User task.



WorkPoint Process Components

The workflow process contains the following nodes and transitions:

Start

Every workflow process begins with this node.

Stop

Every workflow process ends with this node.

Manual activity

A manual activity requires the approval or rejection of an Identity Manager task by a participant, and must have the same name as an Identity Manager workflow approval task.

A workflow process that controls an Identity Manager task must include at least one manual activity requesting approval for that task.

Automated activity

An automated activity is assigned one of two scripts:

- Notify IM Approve—Informs Identity Manager to execute the Identity Manager task under workflow control.
- Notify IM Reject—Informs Identity Manager to cancel execution of the Identity Manager task.

In general, the Notify IM Approve script is activated if all manual activities are approved, and the Notify IM Reject script is activated if any manual activity is rejected.

Unconditional transition

An unconditional transition is a path from one node in the workflow process to another, and is not associated with a condition script.

Conditional transition

A conditional transition represents is an alternative path from one node in the workflow process to another, and is associated with a condition script.

A condition script determines whether the transition occurs by evaluating the outcome of the associated activity. If the script returns true, the transition is performed and the process moves to the next indicated node.

It is possible to have two or more condition scripts return true. This allows an activity to be performed in parallel, since each script is associated with a different transition.

Note: You can use custom scripts in conditional transitions. For instructions, see the *Programming Guide for Java*.

Manual Activity Properties

Property settings specific to Identity Manager are listed in the following table. These settings are defined in the specified tabs of the WorkPoint Designer Activity Properties dialog box.

Property Tab	Property Descriptions
Resources	IM Approvers—Specified in the Include list. This script passes information between Identity Manager and the workflow server.
Agents	Nobody Auto Complete—Specified in the Asynchronous list and associated with the Available state. This script determines whether an activity should be considered approved if no activity participants exist.
User Data	Define name/value pairs that Identity Manager uses to retrieve activity participants. Optionally, you can also define data to be passed to a custom participant resolver.

Conditional Transition Properties

The following default scripts appear in the Condition tab of the Transition Properties dialog box:

IM WorkItem Approved

Returns true if the associated activity is approved. The workflow process flows to the next node indicated by the transition.

IM WorkItem Rejected

Returns true if the associated activity is rejected. The workflow process flows to the next node indicated by the transition.

Jobs and Process Instances

A *workflow process* defines the steps that must take place before Identity Manager can complete a particular task. A *job* is a runtime instance of a workflow process.

For example, the default workflow process CreateUserApproveProcess defines the steps that must occur for a new user to be approved. When a new user is actually created in Identity Manager and the task is submitted for approval, a job instance of CreateUserApproveProcess is created in WorkPoint Designer.

You can open, view, and modify jobs in WorkPoint Designer using an interface that is very similar to that used for editing workflow processes.

Multiple jobs based on the same process can exist simultaneously.

Filtering Jobs

WorkPoint Designer includes filtering, which lets you search for jobs based on various criteria. For example, you can search for jobs that:

- Are based on one or more selected workflow processes
- Have a user-defined job reference or a unique job ID
- Are in a particular state (such as active, complete, or suspended)
- Were created or were started within a specified date range

Note: For instructions and reference information about job filtering, see the WorkPoint Designer documentation.

Job Status and Properties

When you open a job, the job's workflow diagram is displayed. Workflow activity nodes and transitions are rendered in color indicating whether that have been performed.

You can view, and in some cases modify:

- Properties of a job, including participant and job history information
- The state of an open job, for example whether it has completed
- Properties of individual nodes and transitions in a job

Activity and Work Item Properties

You can view, and in some cases, modify job activity properties and process activity properties, including the following:

- Activity state information
- Activity approval information
- Approval task (called *work item* in WorkPoint Designer) information, for example:
    - If no participant has the work item reserved (which removes the item from the work lists of other approvers), the state is Available, and no participant user ID is displayed.
    - If a participant has reserved but not yet completed the work item, the state is Open, and the participant's user ID and the reservation time are displayed.
    - If the work item has been completed, the state is Complete. The user ID of the participant who approved or rejected the task under workflow control is displayed, along with the time of completion.

Specific work item properties include:

- The work item name and current state
- State history information, including the user IDs of the participants responsible for given states
- Authorized work item participants information

Note: For more information about job, activity, and work item properties, see the WorkPoint Designer documentation.

Performing Workflow Activities

In a workflow process, a manual activity is performed by a person designated as an activity participant, who approves or rejects an event associated with an approval task. Participants perform this activity in Identity Manager.

The following operations take place when an activity associated with an Identity Manager approval task is performed:

1. Identity Manager notifies the participants.
2. A participant approves or rejects the task.
3. The workflow server completes the activity.

Find and Notify the Participants

When a workflow activity associated with an Identity Manager approval task begins, the workflow server passes information about activity participants to Identity Manager. This information is defined in the activity properties. Identity Manager uses this information to retrieve activity participants and alert them that an approval task is pending.

After identifying the participants, Identity Manager adds a new work item (the approval task) to each participant's work list. Optionally, Identity Manager also sends an email notification about the new work item to each participant.

Note: If the APPROVERS_REQUIRED activity property is set to false and no participants are found, the task is considered approved by default.

Note: A circle in the Status column indicates that the approval task is available for any participant to claim. A check mark indicates that the work list owner has accepted the approval task but has not yet completed it.

Accept and Perform the Approval Task

Once participants are found, the activity cannot be completed until one participant accepts the approval task and either approves or rejects the task under workflow control.

A participant accepts an approval task by clicking the work item name in the Workflow Activity Console, and then clicking Reserve Item. (Reserving an item removes it from the work lists of other approvers.)

Once a participant accepts an approval task, he commits to making the approval or rejection decision for the task under workflow control. And, since multiple participants cannot accept the same approval task, the approval task is removed from the work lists of other participants.

After a participant accepts an approval task, an approval screen appears, in which the participant can take one of these actions:

- Approve or reject the task under workflow control immediately.
- Release the approval task to make it available to other participants.
- Close the dialog box and complete the activity later. To reopen the Approve Create User dialog box shown above, the participant clicks the name of the approval task in his work list.

Additionally, the participant can update one or more modifiable fields, if any, on the approval screen. You can make fields on this screen modifiable when you create the task.

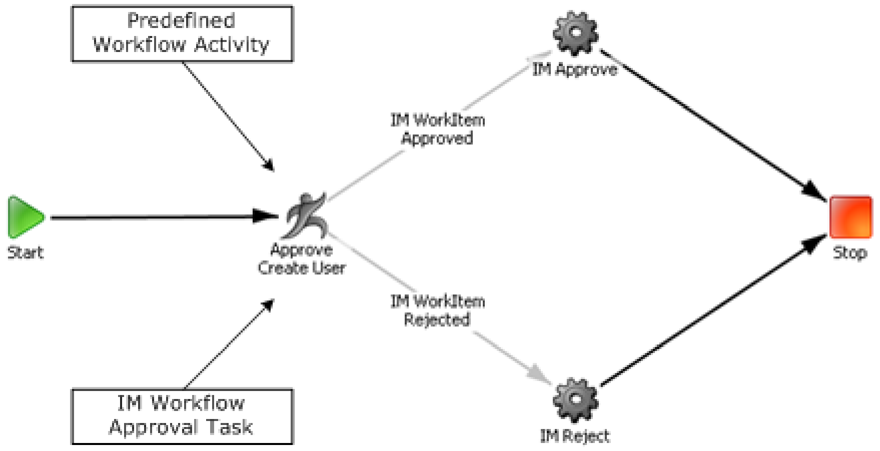
After the participant approves or rejects the task under workflow control, the activity is complete, and the workflow process can continue along the path determined by the outcome of the activity, as described in the next section.

Workflow Server Completes the Activity

A manual activity appears in the Designer window with two or more conditional transitions leading from it.

Each conditional transition is associated with a script. When a participant completes the activity, the scripts evaluate the activity outcome. The result of these evaluations determines the direction of the process flow.

The following illustration shows the Approve Create User activity in the Designer and the corresponding approval task of the same name in Identity Manager.



When the activity participant (or approver) clicks the Approve or Reject button in Identity Manager:

1. The Approve Create User activity in the process job instance ends. The scripts associated with the conditional transitions evaluate the outcome of the activity.
2. The job instance continues, depending on which conditional transition evaluates to true:
   - If the activity is approved, script IM WorkItem Approved returns true. The workflow takes the IM WorkItem Approved transition to the next node. This automated activity, IM Approve, notifies Identity Manager to execute the Create User task.
   - If the activity is rejected, script IM WorkItem Rejected returns true. The workflow takes the IM WorkItem Rejected transition to the next workflow node. This automated activity, IM Reject, notifies Identity Manager to cancel the Create User task.

Workpoint Job View

You can view the runtime status of Workpoint jobs in the User Console from the following:

- Approval tasks
- View Submitted Tasks.

In new environments, all approval tasks include the View Job tab by default. Only events created in this release support viewing the job images for all process definitions invoked for the selected event or task in View Submitted Tasks. Events created in earlier releases do not support the Workflow Job View feature.

Add the View Job Tab to Existing Approval Tabs

For Approval Tasks you must add the new View Job Tab to all existing tasks in order to view the job image for that work item.

Note: New environments contain this tab for all approval tasks.

To add the Job View tab to an existing task

1. From the Admin Tasks and Role category, execute the ModifyAdminTask by selecting Admin Task, Modify Admin Task
2. Click Search and select an approval task (for example, Approve Create User), and click Select.

   The Modify Admin Task: Approve Create User dialog appears.
3. Click the Tabs tab and from the drop-down menu, select View Job (JobView) and click Submit.

   The View Job Tab has been added to the approval task.

   Repeat for all existing approval tasks.

Configure View Job Tab

Configure this tab with the following:

Name

A name you assign to the tab.

Tag

An identifier for the tab that is unique within the task. It must start with a letter or underscore and contain, letters, numbers, or underscores only. The tag is mainly used for setting data values through XML documents or HTTP parameters.

Hide Tab

Prevents the tab from being visible in the task. This option is useful for applications that need to hide the tab, but still have access to attributes on the tab.

Job View Tab

This tab shows the job image for the specified work item.

View the View Job Tab on an Approval Task

To view the View Job tab on an approval task, follow this procedure.

To view the View Job tab

1. From the Worklist dialog, select the approval task to view
2. Click the View Job tab to view the runtime status of the task.

   From here, you can Approve, Reject, Reserve, or close the tab.

Alternately, you can click on the Home Tab and View my Worklist to get to the Worklist dialog.

View a Workflow Job for EventLevel Workflow

To view a workflow job for EventLevel Workflow in View Submitted Tasks, follow this procedure.

To view a workflow job

1. From the Systems Tab, select View Submitted Tasks, enter your search criteria, and select Search.
2. Select a task, select the event, and click the pencil to view the event details.
3. Under Event Workflow Job View, select the process and click the pencil to view the job image for this event.

View a Workflow Job for TaskLevel Workflow

To view a workflow job for TaskLevel Workflow in View Submitted Tasks, follow this procedure.

To view a workflow job

1. From the Systems Tab, select View Submitted Tasks, enter your search criteria, and select Search.
2. Select the task and click the pencil to view the task details.
3. Under Task Workflow Job View, select the process and click the pencil to view the job image for this tasks.

Policy-Based Workflow

Policy-based workflow allows you to place an event or an admin task under workflow control based on the evaluation of a rule. This means that instead of an event or an admin task always launching a workflow process, the workflow process runs and generates a work item only if a rule associated with the event or an admin task is true.

An *approval rule* is a condition that determines whether to start a workflow process. If started, the workflow process places the event or an admin task under workflow control by adding a work item to an approver's work list.

An *approval policy* is the combination of the approval rule, the rule evaluation type, policy order, policy description, and the workflow process.

For example, when creating a new group, you can define an approval policy that places the CreateGroupEvent under workflow control and creates a work item only if the new group is part of a designated parent organization. If the new group is not part of that organization, the workflow process does not run and no work item is created.

If an event has multiple rules, then all workflow process associated with the event need to be approved in order for the event to be approved. Similarly for an admin task, you can define an approval policy that places the CreateGroupTask under workflow control and creates a work item only if the name of the new group starts with Sales. If the name of the new group does not start with Sales, the workflow process does not run and no work item is created.

You can create a policy rule that is always evaluated or only when a specified attribute of a managed object changes, for example, when an employee's salary changes value.

Note: In earlier versions of policy-based workflow, if any approver made any change to the attributes, they were sent for re-approval. With attribute level approve and reject, changes at any stage are approved only once. The work item is never submitted for re-approval even if the attribute contained in the rule is modified. Once an approver approves a change, they will not see the work item again until a new change is submitted or the task is resubmitted.

More Information:

Policy Order (see page 378)
Rule Evaluation (see page 377)
Event-Level Workflow (see page 334)
Task-Level Workflow (see page 330)

Workflow Processes

All workflow templates and predefined workflow processes support workflow rules as follows:

- **Process templates** – These allow you to configure approvers (or participant resolvers) in the User Console.
- **Predefined workflow processes** – These require you to configure participant resolvers in WorkPoint Designer.

You can also create custom workflow processes for use with workflow rules.

More Information:

WorkPoint Processes (see page 347)

Objects of Rules

A Identity Manager administrator can create approval policies for an event or admin task based on the following objects. The following are the objects for an event if they apply to a given event and are present during event execution:

- **Initiator of the task** – The Identity Manager administrator who executes the task.
- **Primary object of the event** – The primary object associated with the event.
- **Secondary object of the event** – The secondary object associated with the event relative to the primary object.

The following are the objects for an admin task:

- **Primary Object of the Task** – The primary object associated with the task
- **Initiator of the Task** - The Identity Manager administrator who executes the task.
- **Identity Policy Violations** - For identity policy violations, the rules are based on the policy name of the identity policy that caused the violation, for example, Policy Name EQUALS TitlePolicy. The violation message is displayed on the Task Details tab of the Approval Screen which is the same as the View Submitted Tasks Task Details. The SOD violation message is displayed under a new section heading named Identity Policy Violation. An approver can view these messages and decide to approve or reject the task.

  Note: If a rule is based on Identity Policy Violation, the evaluation is different from normal evaluation. An SOD violation once approved does not invoke any other workflow process even if there are other rules that may evaluate to true for that particular SOD violation. With normal evaluation, all workflow processes one-by one even if the same change while the normal evaluation is, it will invoke all the workflow processes one-by-one even if the same change has been approved by other approvers.

Rule Evaluation

Policy rules can be evaluated for an event in the following two ways:

- Always

  A policy with evaluation type of Always gets invoked if the policy evaluates to True irrespective of whether any attributes contained in the policy are changed or not. On the approval screen for a work item that was generated as a result of a policy evaluation type of Always, an approver can change any editable attribute on the approval screen.

  Note: If the approver clicks the Reject button, the event is rejected.

  For Always, evaluation type behaviour is the same for tasks and events.

- Only if an attribute specified in the approval condition changes

  A policy with evaluation type of OnChange gets invoked only if the policy evaluates to True and any of the attributes contained in the policy changed. On the approval screen for a work item that was generated as a result of a policy with evaluation type of Onchange, the approver can only change the value of those attributes contained in the policy, if those attributes have a permission of readwrite for that approval screen. All other attributes that exist on the approval screen have read-only permissions.

  Note: For event level workflow, if the approver clicks the Reject button, only changes made to the attributes contained in the approval policy are rejected and the next approval policy in order, gets evaluated.

  For task level workflow, if the approver clicks the reject button, the event is rejected.

  Note: For both rule types OnChange and Always, when an approver un-does all changes and clicks Approve, the changes are rejected and audited accordingly.

More Information:

Policy Order (see page 378)
Objects of Rules (see page 376)

Rule Evaluation Example

Consider the following policies, all for ModifyUserEvent in the Modify User admin task:

Policy	Rule	Evaluation
Policy1	User where (User ID = Smith01)	Always
Policy2	User where (Title = Manager)	When the Title attribute changes
Policy3	User where (Salary >= 80000)	When the Salary attribute changes

Policy1 is evaluated every time administrator invokes the Modify User task for user Smith01, regardless of which attribute changes.

Policy2 is evaluated when the administrator invokes the Modify User task to change the Title attribute for any user object. Policy2 is true if Title changes to Manager.

Policy3 is evaluated when the administrator invokes the Modify User task to change the Salary attribute for any user object. Policy3 is true if salary changes to 80000 or more.

In this example, if an administrator uses the Modify User task to change the Title attribute to Manager for user Smith01, then both Policy1 and Policy2 evaluate to true, and their respective workflow processes are started. In this case, the standard ordering priority applies.

Conditional rule evaluation allows an approver of one work item to change an attribute that affects another work item for the same event while the event is still pending. This is only possible for approval policies that have an evaluation type of Always. In the preceding example, if an administrator changes an attribute for user Smith01, then Policy1 is true and generates a work item. While approving the work item generated by Policy1, that approver may, on the same approval screen, change the Salary attribute for Smith01. In this case, the new Salary value for Smith01 determines whether or not Policy3 generates a work item for the same instance of ModifyUserEvent. If the approver changes the salary to 90000, then Policy3 generates a new work item which must be approved before the event itself is approved. Standard ordering priority applies.

Policy Order

All approval policies contain a Policy Order field in which a positive integer value, ordered from lowest to highest, specifies priority. The priority for each policy determines the following:

- The order in which approval rules are evaluated
- For rules that are true, the order in which workflow processes are started

A policy with a lower integer value has a higher priority, and its rule is evaluated before a policy with a higher integer value. For all policies for an event or admin task that are true, the policy with the highest priority starts its workflow process first.

Policy Order Example

This simple example demonstrates how policy ordering works. In this example, assume the policy rules are always evaluated.

If an event has multiple policies that are always evaluated, then for the event itself to be approved, all policies must be approved. However, if one policy associated with the event which has a policy evaluation type as ALWAYS is rejected, the event itself is rejected.

Note: If a policy associated with the even has an evaluation type as Onchange, only the changes associated with the attributes contained in that policy are rejected. The event itself is not rejected and the next policy in line is evaluated.

In this example, Policy1, Policy2, and Policy3 all have a policy evalutation type of ALWAYS. Policy1 evaluates to false, the workflow process named Process1 does not execute, and no work item is generated for User1. Event control immediately passes to Policy2. Policy2 and Policy3 both evaluate to true. Because of its higher priority, workflow Process2 runs first, and generates a work item for User2.

If User2 approves the work item, workflow Process3 runs and generates a work item for User3, who must then approve the work item for the event itself to be approved. These actions are shown in the following table:

Priority	Policy	Result	Workflow	Approver	Action
1	Policy1	False	Process1	User1	—
2	Policy2	True	Process2	User2	Approved
3	Policy3	True	Process3	User3	Approved

However if User2 rejects the work item, the event itself is rejected, and no work item is generated for User3, as shown in the following table:

Priority	Policy	Result	Workflow	Approver	Action
1	Policy1	False	Process1	User1	—
2	Policy2	True	Process2	User2	Rejected
3	Policy3	True	Process3	User3	—

Next, Policy1, Policy2, and Policy3 all have a policy evaluation type of ONCHANGE. If User2 rejects the work item, only changes associated with the attributes contained in Policy2 are rejected. Policy3 is then evaluated and Workflow Process3 runs and generates a work item for User3. If User3 rejects the work item, the event is rejected as all changes to this event were rejected. If User3 approves the work item, the event is approved and attribute changes contained in Policy3 get persisted.

Priority	Policy	Result	Workflow	Approver	Action
1	Policy1	False	Process1	User1	—
2	Policy2	True	Process2	User2	Rejected
3	Policy3	True	Process3	User3	Approved

Policy Description

An optional, non-searchable string description attribute has been added to the Approval policy managed object and appears on resulting work items.

Maximum number of characters supported: 255 characters

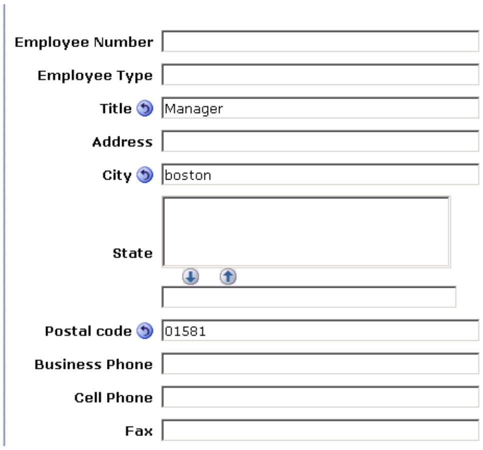
You can enter bundle/key information in the following format for the description:

```
$ (bundle=<fully qualified resource bundles name> : key=<key>)
```

Highlighting Changed Attributes on Approval Screens

In order for an approver to know what attributes have been modified or to undo the changes to those attributes if needed, an undo icon has been added to the approver profile screen that lets the approver know that this attribute has been changed.

The approver can see the original value for the editable attributes by clicking the undo button and can also change the value of the attribute to any other value.



Employee Number	
Employee Type	
Title ↺	Manager
Address	
City ↺	boston
State	
Postal code ↺	01581
Business Phone	
Cell Phone	
Fax	

Approval Policies and Multivalued Attributes

If a rule was set up for a multivalued attribute, there was no way to say that this rule should apply only on newly added or removed values for the multivalued attribute. By looking at the Policy Evaluation Type for a rule based on a multivalued attribute, this is now achieved. If the rule evaluation type is Onchange then this rule can only be applied to the new added or removed values of the multivalued attribute and not on all values of the multivalued attribute.

If the rule must be based on all values of the multivalued attribute irrespective of whether they were newly added or removed, the evaluation type for that rule must be Always.

Changes made to multivalued attributes are highlighted on the profile screen with an undo icon. If a rule evaluated to true because a new value was added or removed to a multivalued attribute, the approver approving this change sees ALL values contained in the multivalued attribute. Clicking the undo icon reverts the value for that attribute back to its original value. If an approver wants to see the removed values, clicking the Undo icon shows the original set of values.

Clicking the redo icon shows the new set of values letting the approver differentiate which were the removed values and which were the added ones. Clicking the approve button approves all the changes to this multivalued attribute. Clicking the reject button rejects all changes to this multivalued attribute. All subsequent rules pertaining to this multivalued attribute are not evaluated unless there is a new delta of values for this multivalued attribute.

Note: For rules based on multivalued attributes, the values contained in the multivalued attribute are the actual values and not the display values. For example, the display value for the state MA is Massachusetts. When creating an approval policy that is based on the state attribute, the rule should look like state=MA.

Consider the following example policies, all for ModifyUserEvent in the Modify User admin task:

Policy	**Rule**	**Evaluation**
Policy1	User where (State = MA)	OnChange
Policy2	User where (state = DC)	Always

Policy1 is evaluated every time an administrator invokes the ModifyUser task to change the state attribute and evaluates to true if the value MA is either added or removed from the state attribute.

Policy 2 is evaluated every time the administrator invokes the Modify User task for a user whose state contains the value DC.

Attributes Highlighted as Changed on Workflow Approval Screens

On an approval screen, additional attributes may appear highlighted as changed even if an administrator did not change them in the original task. This is because the screen can contain scripts that can change values of various attributes contained on the screen as a part of screen initialization or screen validation for a change of some other attribute.

Policy Examples

The following business use case examples demonstrate how you can apply workflow approval policies for an event:

Example 1:

Use Case – An administrator modifies a relational database account belonging to an employee.

Admin Task – ModifyMSSQLAccount

Event – ModifyMSSQLAccountEvent

Approval Rule – User where (Title = RDBAcctManager)

Workflow Process – ModAcctApproval (custom workflow process)

Object – Initiator of the task

Evaluation – Always evaluate the rule

Example 2:

Use Case – An administrator modifies an employee's salary to reflect a new raise.

Admin Task – Modify User

Event – ModifyUserEvent

Approval Rule – User where (Salary >= 100000)

Workflow Process – SalaryChangeApproval (custom workflow process)

Object – Primary object of the event (user)

Evaluation – Evaluate only when the Salary attribute changes

Example 3:

Use Case – An administrator adds a user to the Contractors group when that user’s title changes to Contractor. This example could be divided into the following two approval policies:

Policy 1:

Admin Task – Modify User

Event – ModifyUserEvent

Approval Rule – User where (Title = Contractor)

Workflow Process – SingleStepApproval (default process template)

Object – Primary object of the event (user)

Evaluation – Evaluate only when the Title attribute changes

Policy 2:

Admin Task – Modify Group (or Modify Group Membership)

Event – AddToGroup

Approval Rule – Group where (Group Name = Contractors)

Workflow Process – SingleStepApproval (default process template)

Object – Secondary object of the event (group)

Evaluation – Always evaluate the rule

The following business use case examples demonstrate how you can apply workflow approval policies for a task:

Example 1:

Use Case – An administrator modifies a Active Directory account belonging to an employee.

Admin Task – ModifyActiveDirectoryAccount

Object – Initiator of the task

Approval Rule – User where (Title = ActiveDirectoryManager)

Workflow Process – Single Step Approval

Evaluation – Always evaluate the rule

Example 2:

Use Case – An administrator modifies a user whose employee code is HighSecurity.

Admin Task – Modify User

Object – Primary Object of the Task

Approval Rule – User where (employeenumber = HighSecurity)

Workflow Process – Single Step Approval

Evaluation – Always evaluate the rule

Example 3:

Use Case – An administrator modifies a user to assign admin roles CheckApprover and CheckSigner.

Admin Task – Modify User

Object – Identity Policy Violation

Approval Rule – IdentityPolicy where (Name = CheckRoles)

Workflow Process – Single Step Approval

Evaluation – Always evaluate the rule

How to Configure Policy-Based Workflow for Events

The procedure for configuring policy-based workflow is similar to that for configuring event-level workflow, with the additional steps of defining the approval policies which determine whether the workflow executes.

To Configure Policy-Based Workflow

1. In the User Console, select Roles and Tasks, Admin Tasks, Modify (or Create) Admin Task.

   A Select Admin Task screen appears.

2. Search for the task you want under workflow control, and click Select.

   A Modify (or Create) Admin Task screen appears.

3. On the Profile tab, verify that Enable Workflow is checked.

4. On the Events tab, select an event to map to a process template.

   The workflow mapping screen appears.

5. Select the Policy-Based radio button, and then click Add.

   The Approval Policy screen appears.

6. Configure an approval policy (see page 388).

7. Configure participant resolvers as required by your selected workflow process.

   The participant requests are added to the process.

8. Click OK.

   CA Identity Manager saves your event-level workflow configuration.

9. Click Submit.

   CA Identity Manager processes the task modification.

Note: The Workflow Process list includes processes for use with both the template method and the WorkPoint method:

- When a template method process is selected (either SingleStepApproval, TwoStageApprovalProcess, or EscalationApproval), the page expands to enable participant resolver configuration.
- When a WorkPoint method process is selected, the page does not expand. Participant resolvers are configured in WorkPoint Designer.

More Information:

How to Configure an Approval Policy (see page 388)
Participant Resolvers: Template Method (see page 337)
Participant Resolvers: WorkPoint Method (see page 355)

How to Configure Policy-Based Workflow for Tasks

The procedure for configuring policy-based workflow for tasks is similar to that for configuring task-level workflow, with the additional steps of defining the approval policies which determine whether the workflow executes.

To Configure Policy-Based Workflow

1. In the User Console, select Roles and Tasks, Admin Tasks, Modify (or Create) Admin Task.

   A Select Admin Task screen appears.

2. Search for the task you want under workflow control, and click Select.

   A Modify (or Create) Admin Task screen appears.

3. On the Profile tab, verify that Enable Workflow is checked

4. On the Profile tab, click on the pencil icon next to the Workflow Process field

   The workflow mapping screen appears.

5. Select the Policy-Based radio button, and then click Add.

   The Approval Policy screen appears.

6. Configure an approval policy (see page 388).

7. Configure participant resolvers as required by your selected workflow process.

   The participant requests are added to the process.

8. Click OK.

   CA Identity Manager saves your task-level workflow configuration.

9. Click Submit.

   CA Identity Manager processes the task modification.

Note: The Workflow Process list includes processes for use with the template method for task-level policy-based workflow:

- When a template method process is selected (either SingleStepApproval or TwoStageApprovalProcess), the page expands to enable participant resolver configuration.

More Information

How to Configure an Approval Policy (see page 388)

How to Configure an Approval Policy

Configuring an approval policy for an event or task involves the following steps.

1. Select an object to test.
2. Define an approval rule for the object.
3. For primary objects, decide if this is a conditional evaluation.
4. Enter the order of policy evaluation.
5. Configure a workflow process to run if the rule is true.

To configure an Approval Policy

1. On the Approval Policy screen, select an object for the rule to test from the drop-down list.

   The screen changes to reflect your selection.

2. From the new drop-down next to the object name, select a condition expression template.

   The screen changes to reflect your selection.

3. Create and edit your condition expression as required.
4. Select the Rule Evaluation option button to indicate if the rule is always evaluated, or only if an attribute in the approval condition changes.
5. Enter a positive integer value to specify the policy evaluation order (in case there are multiple policies for the event).
6. Select and configure the workflow process that executes if the rule evaluates to true.
7. Click OK to save the approval policy.

More Information:

How to Configure Policy-Based Workflow for Events (see page 385)
How to Configure Policy-Based Workflow for Tasks (see page 387)
How to Configure Event-Level Workflow (see page 336)

Policy-Based Workflow Status

Identity Manager administrators can display the status of tasks containing workflow approval policies using the following standard system tools:

- View Submitted Tasks tab
- User History tab
- Reports and logs

The submitted task and task history information includes:

- Task and event information
- Workflow and approval rule information
- Approval rule evaluation results

See the System tab documentation for submitted task history descriptions.

More Information:

Task Status in Identity Manager (see page 486)
Description of Event Status (see page 493)

Global Event Level Policy-Based Workflow Mapping

An event can be mapped to a workflow process from the Management Console, or be associated with policy-based workflow approval policies in a specific task. The new Configure Global Policy-based Workflow for Events task, lets administrators set up policy-based workflow mapping for events at the environment level. Unlike setting up policy-based workflow for an event in an admin task, the configured policy-based workflow mappings are applied to all tasks that generate the event.

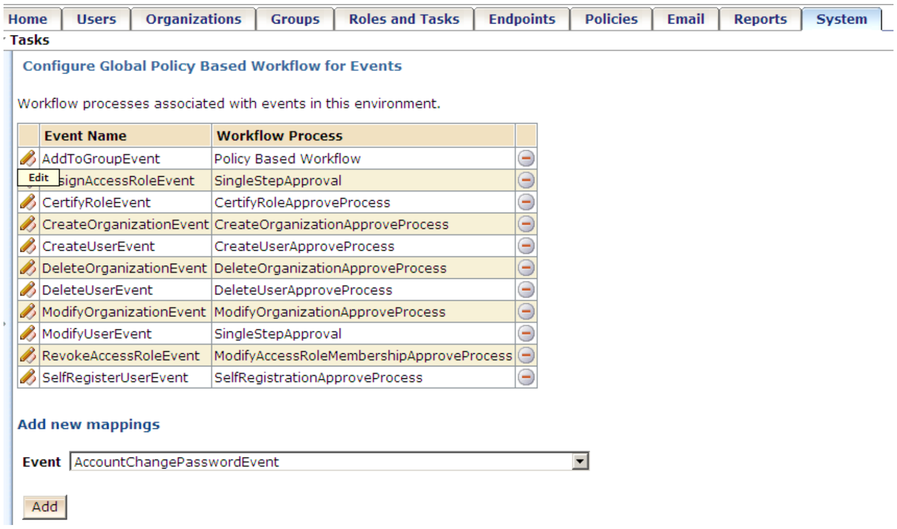
Note: The Configure Global Policy Based Workflow for Events task works only when workflow is enabled. Executing this task when workflow is disabled throws an error.

This task has been added to the System tab. When a task is submitted, the workflow process of each event in this task is retrieved in the following way:

Any workflow configured for the event for that admin task takes precedence. An event can be configured for either policy-based or non-policy based workflow. If policy-based workflow is configured for the event for that admin task the workflow process associated with the policy is invoked. If no rule matched, no workflow is invoked for the event. Likewise, if non-policy based workflow is configured for the event for that admin task, the workflow process associated with the policy is invoked. If no workflow was configured for the event for that admin task, global workflow configuration for that event takes precedence.

Configure Global Policy Based Workflow for Events Task Screen

The Configure Global Policy Based Workflow for Events tasks lets an administrator configure policy or non-policy based workflow for all events in the current environment. Clicking the task displays the default event mapping to workflow process definitions. Each event mapping can be modified or deleted, and new event mappings can be added for events that have not been configured.



Configure Global Policy Based Workflow for Events

Workflow processes associated with events in this environment.

Event Name	Workflow Process
AddToGroupEvent	Policy Based Workflow
signAccessRoleEvent	SingleStepApproval
CertifyRoleEvent	CertifyRoleApproveProcess
CreateOrganizationEvent	CreateOrganizationApproveProcess
CreateUserEvent	CreateUserApproveProcess
DeleteOrganizationEvent	DeleteOrganizationApproveProcess
DeleteUserEvent	DeleteUserApproveProcess
ModifyOrganizationEvent	ModifyOrganizationApproveProcess
ModifyUserEvent	SingleStepApproval
RevokeAccessRoleEvent	ModifyAccessRoleMembershipApproveProcess
SelfRegisterUserEvent	SelfRegistrationApproveProcess

Add new mappings

Event AccountChangePasswordEvent

The fields on this screen are as follows:

Workflow processes associated with events in this environment.

Specifies the workflow processes associated with approval policies.

Add New Mappings

Specifies an approval policy to map to a workflow process.

Add Button

Adds the new mapping.

Adding or modifying a mapping opens the Workflow Mapping screen where you can select the process mappings and approval policies. The behavior is the same as the event level workflow configuration. Clicking the Add button on the Workflow Mappings page brings up another page where you can configure an approval policy.

More Information

How to Configure Policy-Based Workflow for Events (see page 385)
How to Configure an Approval Policy (see page 388)

Configure Global Policy Based Workflow for Events

Configure this tab for global policy-based workflow for events.

Name

A name you assign to the tab.

Tag

An identifier for the tab that is unique within the task. It must start with a letter or underscore and contain, letters, numbers, or underscores only. The tag is mainly used for setting data values through XML documents or HTTP parameters.

Hide Tab

Prevents the tab from being visible in the task. This option is useful for applications that need to hide the tab, but still have access to attributes on the tab.

User Search Screen

Defines the search screen to use to display users.

User List Screen

Defines the screen that determines the columns and sorting on this tab.

Group Search Screen

Defines the search screen to use to display the groups.

Group List Screen

Defines the screen that determines the columns and sorting on this tab.

Admin Role Search Screen

Defines the search screen to use to display the admin roles.

Admin Role List Screen

Defines the screen that determines the columns and sorting on this tab.

Admin Task Search Screen

Defines the search screen to use to display the admin tasks.

Admin Task List Screen

Defines the screen that determines the columns and sorting on this tab.

Online Requests

Identity Manager lets you create general purpose online request tasks. The default online request implementation is comprised of a set of related tasks for both self-modification requests and administrative user modification requests. However, the online request feature could easily be implemented for other Identity Manager request tasks.

A user modification request triggers a workflow process which generates a work item. Workflow participants can either approve and implement the work item, or reject it. The user initiating the task enters a description of the request in the history editor, a text area which Identity Manager uses to maintain a history of the request. This history editor can be configured to allow participants to leave comments about the action they perform on the work item. These comments become part of the cumulative work item history.

New actions in addition to (or in place of) the standard approve and reject actions are also possible. For example, a business participant can clarify or comment on the request, and a technical participant can implement the request. These new activities can be represented by new workflow action buttons like “Clarify” and “Implement” which you can add to the standard “Approve” and “Reject” buttons on the approval task.

Online Request Tasks

There are five tasks that work together to make up the default online request implementation. These tasks demonstrate the use of custom requests, history, and workflow action buttons:

Note: The admin tasks (Change My Account and Create Online Request) are configured by default for event-level workflow using the Consultation Process template.

Change My Account

This is a self-modification admin task that creates a user account change request. It has a Request tab with a history editor for describing the request, and a Profile tab with read-only user details.

Create Online Request

This is a user modification admin task that creates an account change request for a particular user. It has a Request tab with a history editor for describing the request, and a Subject Profile tab with read-only user details.

Approve Online Request

This is an approval task that allows the business participant to approve or reject the task, or to request further clarification of the task. This task has a Request tab with a history display and a history editor for queries or comments, a read-only Subject Profile tab, and an Assignees tab.

Clarify Online Request

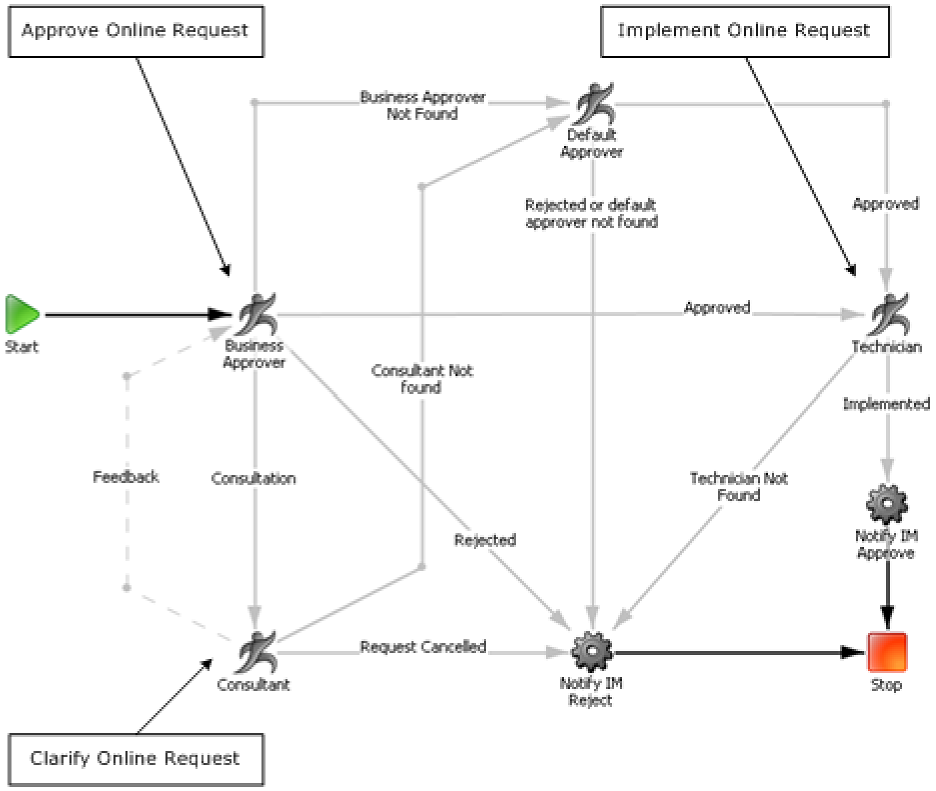
This is an approval task that allows the clarifying participant to respond to a clarification request, and sends the task back to the business participant for approval. It has a Request tab with a history display and a history editor for comments, and a read-only Subject Profile tab.

Implement Online Request

This is an approval task that allows the technical participant to implement the task and to add a comment to the task history. It has an Implement Request tab with a history display and a history editor for comments, a read-only Subject Profile tab, and an Assignees tab.

Online Request Process

The online request tasks are controlled by a workflow process template called Consultation Process, shown as it appears in WorkPoint Designer:



The Consultation Process includes four manual activities which correspond to approval tasks in the online request implementation:

- An activity for the business approver, who rejects the work item, approves the work item and passes it on to the technician, or requests further clarification from the consultant.
- An activity for the consultant, who clarifies the work item and sends it back to the business approver.

- An activity for a default approver, who takes over if either the business approver or consultant cannot be contacted.
- An activity for the technician, who implements the request and completes the work item.

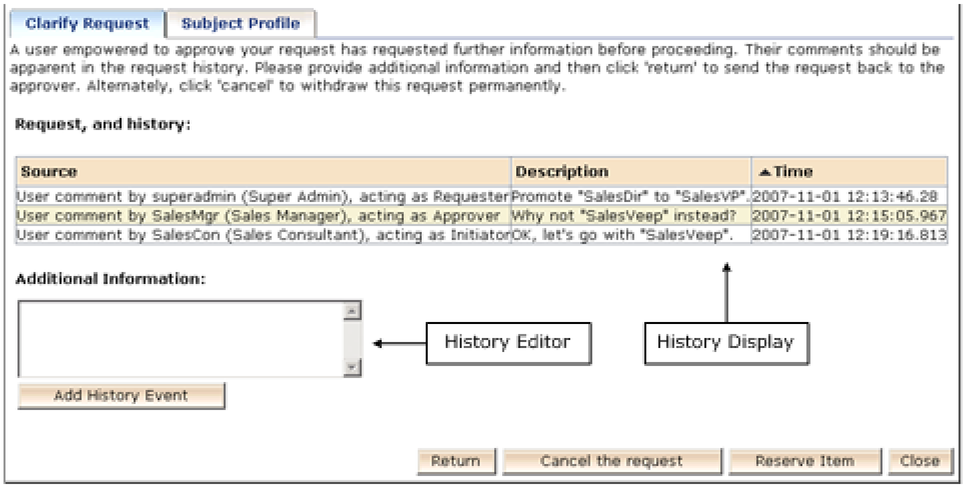
Online Request History

The online request history feature allows participants to create a record of work item actions. As responsibility for the work item passes from one participant to another, the new participant is able to review work item history before taking action.

Two controls are used to implement online request history:

- The history display is a read-only table containing details of previous history entries in chronological order.
- The history editor is a text box for creating new history entries. It also has an optional button for adding multiple entries without submitting the work item.

By default, the history editor and history display appear on the Request tabs for all tasks associated with the online request implementation. The following screen illustrates the history controls in the Clarify Online Request task:



A user empowered to approve your request has requested further information before proceeding. Their comments should be apparent in the request history. Please provide additional information and then click 'return' to send the request back to the approver. Alternately, click 'cancel' to withdraw this request permanently.

Request, and history:

Source	Description	▲Time
User comment by superadmin (Super Admin), acting as Requester	Promote "SalesDir" to "SalesVP".	2007-11-01 12:13:46.28
User comment by SalesMgr (Sales Manager), acting as Approver	Why not "SalesVeep" instead?	2007-11-01 12:15:05.967
User comment by SalesCon (Sales Consultant), acting as Initiator	OK, let's go with "SalesVeep".	2007-11-01 12:19:16.813

Additional Information:

Using Online Requests

The following steps describe the online request workflow process. For each step, the generated IM task appears in parentheses. At every step in the process, the participant can add a comment in the history editor. This comment appears in the history display to the next participant in the workflow process.

1. The Task Initiator requests a modification to an IM user (Create Online Request).
2. The Business Approver receives a work item, and does one of the following:
   - Approves the work item (Approve Online Request).
   - Rejects the work item and terminates the workflow process. No new task is generated.
   - Requests a clarification from the consultant (Clarify Online Request).
3. The Consultant receives a work item, and does one of the following:
   - Adds a clarification and returns the work item to the Business Approver. No new task is generated.
   - Cancels the work item and terminates the workflow process. No new task is generated.
4. The Technician receives a work item, and implements the request (Implement Online Request).

Workflow Action Buttons

Approval tasks in Identity Manager historically have Approve and Reject action buttons that appear on their corresponding work item screens. Workflow action buttons allow administrators to extend the functionality of Identity Manager tasks and workflows by adding action buttons to approval tasks, and by removing or modifying existing buttons. (The standard Approve and Reject buttons are implemented in the same manner as custom workflow action buttons.)

For example, a workflow process might require an action that allows mid-level participants to escalate certain cases to a more senior participant for final approval or rejection. These mid-level participants could add a comment or recommendation using the history editor, and then send the work item to the senior participant to review and approve or reject.

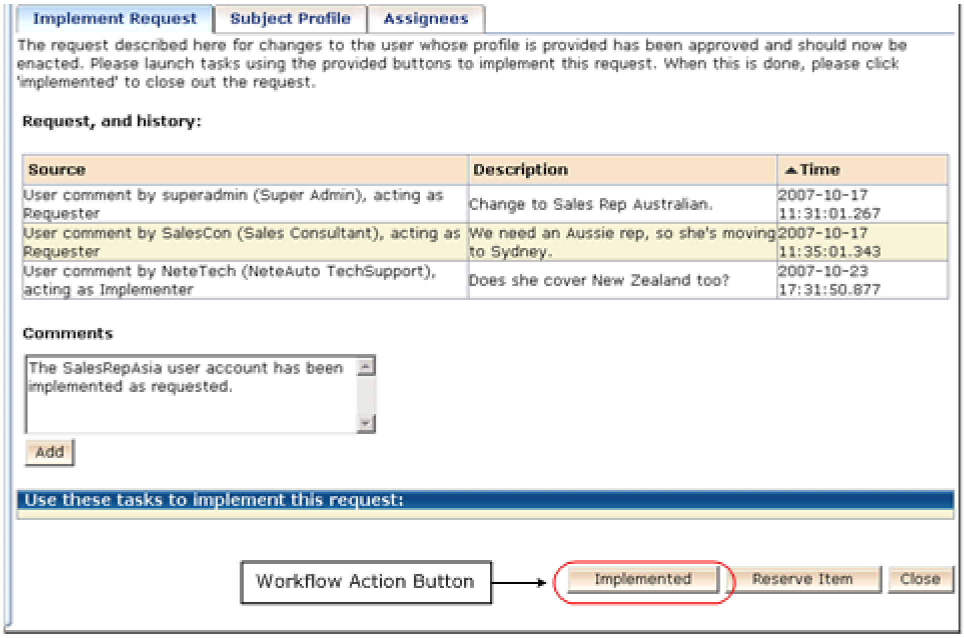
Adding or removing workflow action buttons requires appropriate changes to the WorkPoint workflow process that provides the business logic for handling these new actions.

More Information:

Workflow Buttons in Approval Tasks (see page 396)
Button Configuration In Identity Manager (see page 397)
Button Configuration in WorkPoint Designer (see page 399)

Workflow Buttons in Approval Tasks

Workflow action buttons correspond to transition nodes pointing away from manual activity nodes on a WorkPoint process diagram. For example, in the Consultation Process, the Technician activity node has a single transition called Implemented. This corresponds to the "Implemented" button on the Implement Online Request approval task, shown in the following figure:



The request described here for changes to the user whose profile is provided has been approved and should now be enacted. Please launch tasks using the provided buttons to implement this request. When this is done, please click 'implemented' to close out the request.

Request, and history:

Source	Description	▲Time
User comment by superadmin (Super Admin), acting as Requester	Change to Sales Rep Australian.	2007-10-17 11:31:01.267
User comment by SalesCon (Sales Consultant), acting as Requester	We need an Aussie rep, so she's moving to Sydney.	2007-10-17 11:35:01.343
User comment by NeteTech (NeteAuto TechSupport), acting as Implementer	Does she cover New Zealand too?	2007-10-23 17:31:50.877

Comments

The SalesRepAsia user account has been implemented as requested.

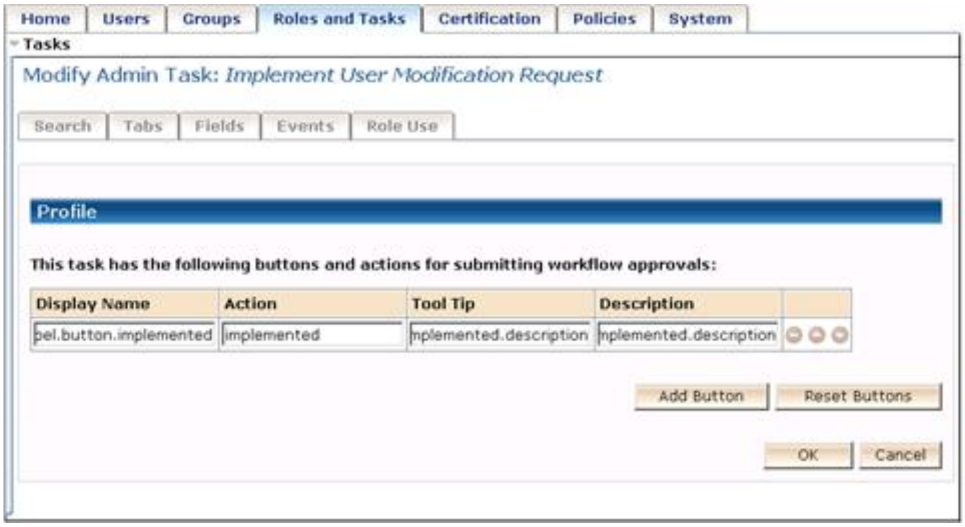
Note: The "Reserve Item" and "Close" buttons are governed by Identity Manager programming logic and are not under workflow control.

More Information:

Workflow Action Buttons (see page 395)
Button Configuration In Identity Manager (see page 397)

Button Configuration In Identity Manager

To configure a workflow action button, click the button named Workflow Action Buttons on the Profile tab of an Approval task. The following button Profile tab appears:



Modify Admin Task: *Implement User Modification Request*

Profile

This task has the following buttons and actions for submitting workflow approvals:

Display Name	Action	Tool Tip	Description
pel.button.implemented	implemented	nplemented.description	nplemented.description

The button Profile tab has a table with a row for each workflow action button. Each button row has the following four properties, which correspond to columns in the table:

Display Name

The name that appears on the button in the approval screen. This is a conditionally localized value, which can be either a string or a key for a localized string in a resource file.

Action

The value passed back to the workflow process when the option is selected. This value is an attribute of the corresponding transition node in the WorkPoint process diagram. This is a non-localized string. The default settings are “approved” and “rejected”.

Tool Tip

A short description (or tool tip) of the button action which appears when a user hovers the mouse cursor over the button. This is a conditionally localized value, which can be either a string or a key for a localized string in a resource file.

Long Description

A longer description of the button action which adds a message describing the action on the "View Submitted Task" screen. If this is blank, the message displayed on the "View Submitted Task" screen is the button name. This is a conditionally localized value, which can be either a string or a key for a localized string in a resource file.

More Information:

Button Configuration in WorkPoint Designer (see page 399)

Adding Workflow Action Buttons

To add a new button to an existing workflow process, perform the following high-level steps:

1. Add the workflow button in Identity Manager.

   For instructions, see How to Add a Workflow Action Button (see page 398).

2. If necessary, add localization keys.

   For instructions, see the *Configuration Guide*.

3. Add any new required nodes in WorkPoint Designer.

   For instructions, see the WorkPoint Designer online help.

4. Define a script in the WorkPoint Designer transition node.

   For instructions, see Button Configuration in WorkPoint Designer (see page 399).

More Information:

How to Add a Workflow Action Button (see page 398)
Button Configuration in WorkPoint Designer (see page 399)

How to Add a Workflow Action Button

You can add workflow action buttons to approval tasks in CA Identity Manager.

To add a workflow action button to an admin task

1. In the User Console, select Roles and Tasks, Admin Tasks, Modify Admin Task.

   The Select Admin Task screen appears.

2. Search for the approval task, and click Select.

   The Modify Admin Task screen appears.

3. On the Profile tab, click the button named Workflow Action Buttons.

   The Workflow Action Button Profile tab appears.

4. Click "Add Button" to add a new button to the approval task.

5. Enter the button property information.

6. Click OK.

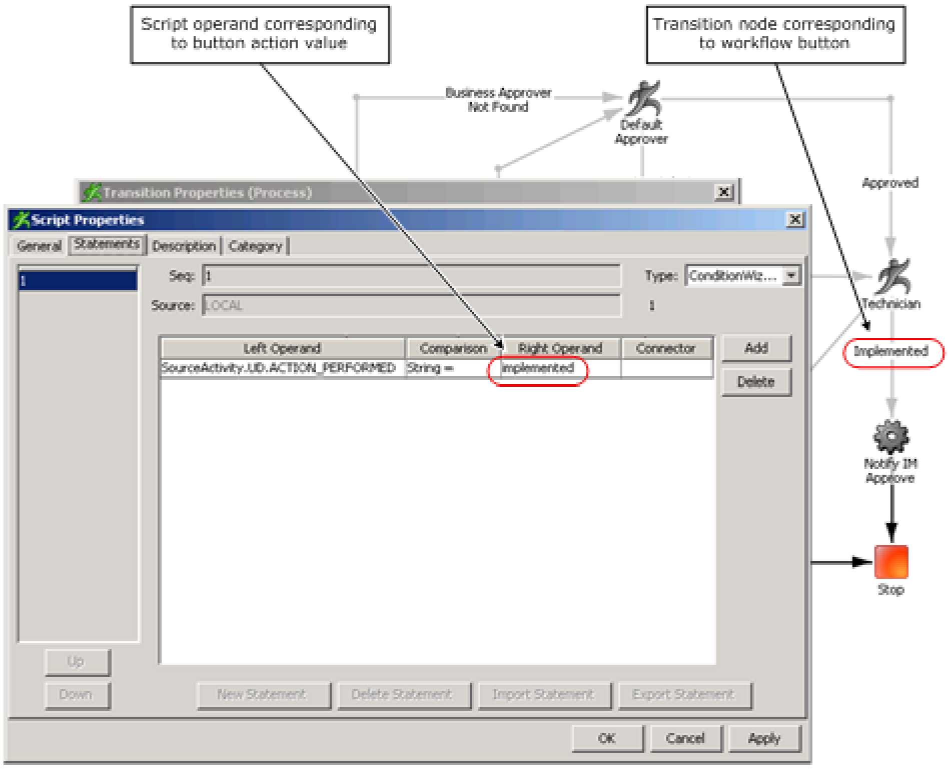
   CA Identity Manager saves the new button information.

7. Click Submit.

   CA Identity Manager processes the task modification.

Button Configuration in WorkPoint Designer

In WorkPoint Designer, workflow action buttons are configured using transition node script properties, as shown in the following figure:



Script operand corresponding to button action value

Transition node corresponding to workflow button

Seq: 1

Source: LOCAL

Type: ConditionWiz...

Left Operand	Comparison	Right Operand	Connector
SourceActivity.UD.ACTION_PERFORMED	String =	implemented	

By default, workflow action buttons use the following script properties to perform a string comparison:

- Left Operand--ACTION_PEFORMED, which is defined in the User Data properties of the preceding manual activity node.
- Right Operand--The Action value of the button, which is defined in the button profile tab of the User Console.

Note: See the WorkPoint Designer online help for information about activity node and transition node scripts and properties.

More Information:

Button Configuration In Identity Manager (see page 397)

Work Lists and Work Items

A *work list* is a list of work items (or approval tasks) that appears in the User Console of the participant authorized to approve the task. Work items correspond to manual activities in a workflow process. Work items are represented as rows in the work list.

Work items can be added to a work list in the following ways:

- A participant resolver determining a list of approvers.
- Receiving delegated work items from another user.
- Reassigning it to another user.

Work items can be removed from a work list in the following ways:

- Completing (approving or rejecting) the work item.
- Reassigning it to another user.
- Reserving it. This removes it from the work list of all other participants.

Note: When you accept or reject a work item, the change is not immediate. For example, if you reject a work item, that item still appears in you work list until the workflow process records the information and progresses the process to the next node.

The information tabs that appear on a work item depend on whether the work item was generated by workflow under task-level or event-level control:

- **Profile**—Provides profile information about the object affected by the event (event-level only).
- **Task Details**—Provides detailed information for all events within the task (task-level only).
- **Approvers**—Lists all individual approvers and delegators for the task or event (task-level and event-level)

Displaying a Work List

Your work list appears automatically when you log into the User Console if you have been assigned as a participant to approve tasks (or work items) initiated by other users.

To display your work list manually

1. In the User Console, select Home, View My Work List.

   Your work list appears.

2. Click the name of a work item to display it.

   The selected work item appears.

Administrators can manage work items for users over whom they have scope.

Note: Managing a user's work items allows administrators to reserve a work item. Viewing a user's work list does not allow work item changes of any kind.

To view the work list of another user

1. In the User Console, select Users, Manage Work Items, View User's Work List.

   A select user screen appears.

2. Search for the user whose work list you want to view, and click Select.

   The user's work list screen appears.

To manage work items for another user

1. In the User Console, select Users, Manage Work Items, Manage User's Work Items.

   A select user screen appears.

2. Search for the user whose work items you want to manage, and click Select.

   The user's work list screen appears.

3. Click the name of a work item to display it.

   The selected work item appears.

Reserving Work Items

You can reserve a work item to "check it out" and remove it from the work list of other participants. Reserving a work item holds it for the user performing the reservation.

If the reserving user releases the work item, it becomes available again on the work list of other participants. If the reserving user approves or rejects the work item, it is completed, and no longer available to other participants.

More Information:

Delegation and Reserved Work Items (see page 402)
Reassignment and Reserved Work Items (see page 402)

Reassignment and Reserved Work Items

If a user has a work item reserved while it is reassigned, the user keeps it reserved. But if the user then releases that work item, he loses access to it.

An administrator can reassign, reserve, or release another user's work item, but cannot approve or reject another user's work item. Only the assigned work item participant can do that.

More Information:

Reassigning Work Items (see page 409)

Delegation and Reserved Work Items

While a delegation is active, either the delegate or the delegator may reserve a work item. A work item reserved by one user cannot appear on another user’s work list.

For example, if a delegate has a work item reserved while the delegation is withdrawn, the delegate keeps the work item reserved. But if the delegate then releases that work item, he loses access to it.

If a user who is a delegate is deleted while the delegate has a work item reserved, the delegate still retains the work item. If the delegate then approves the work item, auditing can no longer determine who delegated it.

If a delegate has a work item reserved while the delegation is withdrawn, the delegate retains access until the work item is completed or released.

More Information:

Reserving Work Items (see page 401)
Delegating Work Items (see page 403)

How to Reserve or Release a Work Item

You reserve a work item to "check it out" and remove it from the work list of other participants.

You release a reserved work item to make it available on the work list of other participants.

Note: The only way to free a reserved work item is to explicitly release it.

To reserve or release a work item

1. In the User Console, select Home, View My Work List.

   Your work list appears.

2. Select the work item you want to reserve or release.

   The expanded work item screen appears.

3. Click Reserve Item or Release Item.

   CA Identity Manager confirms your action.

Delegating Work Items

Work item *delegation* lets a user (the delegator) specify that another user (the delegate) is allowed to approve tasks in the delegator's work list. A delegator can assign work items to another approver during periods when the delegator is “out of the office.” Delegators retain full access to their work items during the delegation period.

Delegated work items are not changed in any way. Logging indicates whether a work item was delegated.

Delegation works by allowing the delegate to “impersonate” the delegator and view the items on the delegator's work list. When viewing a work list, delegates see their own work items as well as the delegator's work items.

Delegation is not transitive. A delegate can only see work items that the delegator has assigned directly. For example, If user A delegates work items to user B, and user B delegates work items to user C, user C can only see work items belonging to user B, and not any work items that may have been work items delegated to user B by user A.

More Information:

Delegation and Reserved Work Items (see page 402)

Delegation Well-Known Attribute

Delegation uses the following well-known attribute:

%DELEGATORS%

This well-known attribute stores the names of users who are delegating to the user with the attribute, as well as the time when the delegation was created.

How to Enable Delegation

You must have workflow approval delegation enabled before you can use a delegate work items to another user. By default, delegation is disabled.

To enable workflow approval delegation

1. Open the Management Console by entering the following URL in a browser:

   ```
   http://hostname/iam/immanage
   ```

   hostname

   Defines the fully qualified domain name of the server where CA Identity Manager is installed. For example, myserver.mycompany.com:port.

2. Click Environments, and select the name of the appropriate CA Identity Manager environment.
3. Click Advanced Settings, and then click Workflow Approval Delegation.
4. Select the Enabled check box, and then click Save.

More Information:

How to Delegate for Yourself (see page 404)
How to Delegate for Another User (see page 407)

How to Delegate for Yourself

You can delegate work items to another user during periods when you are "out of the office." Delegators still retain full access to their work items during the delegation period.

To delegate work items for yourself

1. In the User Console, select Home, Out of Office Assistant.

   The Out of Office Assistant screen appears.

2. Click Add User.

   A select user screen appears.

3. Search for and select one or more users to act as delegate.

   The users are added to the delegate list.

4. Click Submit.

   The task is submitted and the delegation is saved.

Note: Users who are already delegates do not appear in the search results when adding a delegate.

More Information:

How to Enable Delegation (see page 403)

Time-Based Work Item Delegation

In previous releases, you could specify the start time, but not the end time for delegations. Newly created delegations have their dates for delegation set to true, with the Default start time set to now.

At modification time, start and end dates can be changed. The default end time is one week from start date.

To change the Start or End dates, do the following:

1. From the User Console's Home tab, select Out of Office Assistant.
2. Click the pencil icon next to the User ID whose delegation information want to change.

   The Edit Delegation Details screen appears.
3. Click on the Calendar next to Start Date to change the delegation start date.

   Note: An error message is displayed when the Delegation Start Date selected is before the current date.
4. If you want to select an end date, check the Has End Date checkbox.

   The End Date field is now available to set the end date.
5. Click on the Calendar next to End Date to set a date for the delegation to end.
6. Once the dates have been set, Click OK.

Alternately, you can do the same from the Delegate Work Items tab when Creating or Modifying a user.

Enable Time-Based Work Item Delegation

To enable time based work item delegation in an existing environment on upgrade, do the following:

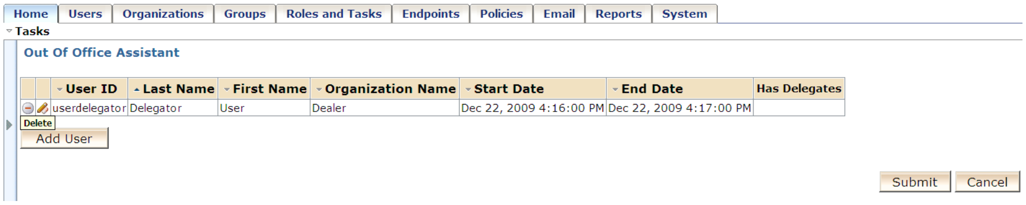
From the Management Console

1. Navigate to the Environments page.
2. Drill down into the selected Environment, Advanced Settings, Work Item Delegation.
3. Uncheck Enabled check box.
4. Save the changes and restart the Environment.
5. Drill down into Advanced Settings, Work Item Delegation.
6. Check Enabled checkbox.
7. Save the changes and restart the Environment.

Note: This procedure is for existing environments only. Time-based workflow item delegation is enable for new environments.

Out of Office Assistant Screen

You use the following Out of Office Assistant screen to add and remove delegate for yourself:



Out Of Office Assistant

		User ID	Last Name	First Name	Organization Name	Start Date	End Date	Has Delegates
⊖	✎	userdelegator	Delegator	User	Dealer	Dec 22, 2009 4:16:00 PM	Dec 22, 2009 4:17:00 PM	

The Out of Office Assistant screen displays a list of your current delegates. In addition to columns that identify the delegate, three additional columns are included in the list:

Start Date

Displays the date the delegation was created.

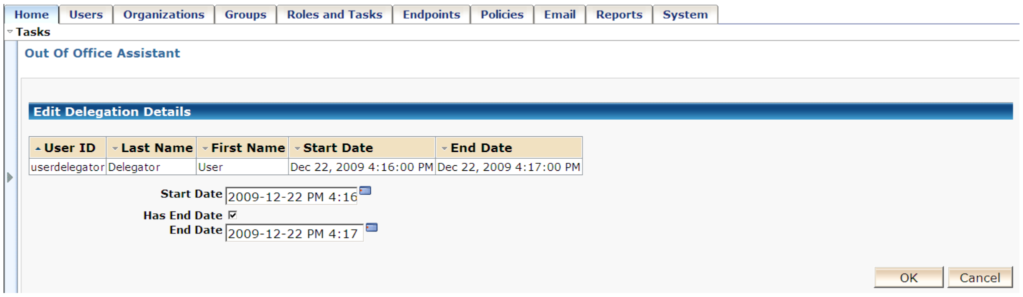
End Date

Displays the date the delegation is to end.

Has Delegates

Indicates whether the delegate has delegated work items to another user.

When you click the pencil icon next to the selected User ID, the Edit Delegation Details screen appears where you can change the Start Date and specify the End Date for the delegation.



User ID	Last Name	First Name	Start Date	End Date
userdelegator	Delegator	User	Dec 22, 2009 4:16:00 PM	Dec 22, 2009 4:17:00 PM

Start Date 2009-12-22 PM 4:16

Has End Date ☑

End Date 2009-12-22 PM 4:17

How to Delegate for Another User

Administrators can delegate work items from one user (the delegator) to another. For example, a user may be out of the office unexpectedly, or an administrator may need to assign a large workload to multiple users.

Administrators can only delegate work items for users over whom they have scope. Similarly, they can only add or remove users they manage from the list of delegates.

To delegate work items for another user

1. In the User Console, select Users, Manage Work Items, Delegate Work Items.

   A select user screen appears.

2. Search for the user whose work items you want to delegate (the delegator), and click Select.

   A delegate work items screen appears.

3. Click Add User.

   A select user screen appears.

4. Search for and select one or more users to act as delegate.

   The users are added to the delegate list.

5. Click Submit.

   The task is submitted and the delegation is saved.

Note: Users who are already delegates do not appear in the search results when adding a delegate.

More Information:

How to Enable Delegation (see page 403)

How to Remove a Delegation

If a user logs into CA Identity Manager with delegations in place, CA Identity Manager displays the following reminder:

```
You have delegations in place. Please check that they are still required.
```

To remove a delegation for yourself

1. In the User Console, select Home, Out of Office Assistant.

   The Out of Office Assistant screen appears.

2. Click the minus sign (-) for delegates you want to remove.

   The delegates disappear from the list.

3. Click Submit.

   The task is submitted and the delegation is removed.

To remove a delegation for another user

1. In the User Console, select Users, Manage Work Items, Delegate Work Items.

   A user search screen appears.

2. Search for and select the user whose delegations you want to remove.

   The delegates list appears.

3. Click the minus sign (-) for delegates you want to remove.

   The delegates disappear from the list.

4. Click Submit.

   The task is submitted and the delegation is removed.

Note: You can only remove a delegate if you have scope over that user.

Reassigning Work Items

Reassignment allows users and administrators to change the assignees of a work item after it is created. An administrator can:

- View another user's work list
- Add and remove work item assignees
- Change the reserve status of work items

For example, an administrator can reassign a work item or release a reserved work item from a user who is not acting on it.

If a user has a work item reserved while it is reassigned, the user keep it reserved. But if the user then releases that work item, he loses access to it.

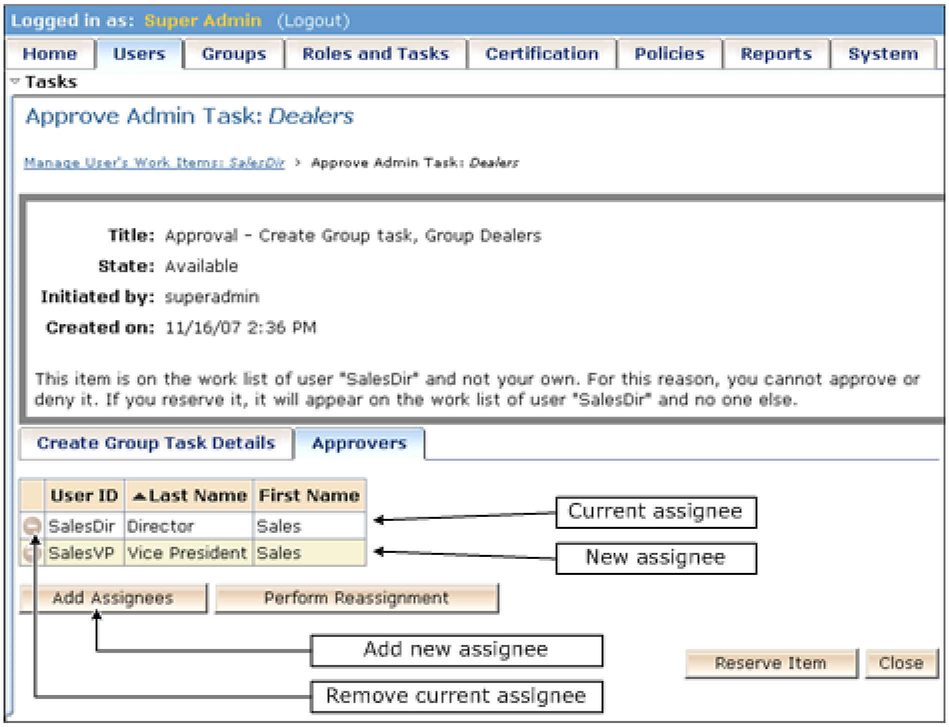
If a delegate has a work item reserved while the delegation is withdrawn, the delegate retains access until the work item is completed or released.

More Information:

Reassignment and Reserved Work Items (see page 402)

The Approvers Tab

You perform reassignment on the Work Item Approvers tab, which displays a list of current work item approvers (or assignees). When you perform reassignment, you assign the open work item to all approvers in the list. Therefore, to reassign a work item to a new assignee, you also need to explicitly remove the current assignee, as shown in the following figure:



Title: Approval - Create Group task, Group Dealers
State: Available
Initiated by: superadmin
Created on: 11/16/07 2:36 PM

This item is on the work list of user "SalesDir" and not your own. For this reason, you cannot approve or deny it. If you reserve it, it will appear on the work list of user "SalesDir" and no one else.

	User ID	▲Last Name	First Name
⊖	SalesDir	Director	Sales
⊖	SalesVP	Vice President	Sales

How to Reassign Work Items

Reassigning a work item from one user to another is a two-step process:

- Select a new approver.
- Remove the current approver.

Note: You must have scope over users to whom you want to reassign.

To reassign a work item for yourself

1. Select Home, View My Work List.

   Your work list appears.

2. Select a work item to expand it.

3. Select the Approvers tab.

   The list of all current approvers appears, including the user whose work list you are managing.

4. Click Add Assignees.

   A select user screen appears.

5. Search for and select one or more users to whom you want to reassign.

6. Click the minus sign button (-) to remove yourself as an assignee.

7. Click Perform Reassignment.

   The work item appears on the work lists of the reassigned users.

Note: An administrator can reassign, reserve, or release another user's work item, but cannot approve or reject another user's work item. Only the owner of the work item can do that.

To reassign a work item for another user

1. Select Users, Manage Work Items, Manage User's Work Items.

   A select user screen appears.

2. Search for the user whose work items you want to reassign, and click Select.

   The Manage User's Work Items screen appears.

3. Select a work item to expand it.

4. Select the Approvers tab.

   The list of all current approvers appears, including the user whose work list you are managing.

5. Click Add Assignees.

   A select user screen appears.

6. Search for and select one or more users to whom you want to reassign.

7. Click the minus sign button (-) to remove the current assignee.

8. Click Perform Reassignment.

   The work item appears on the work lists of the reassigned users.

Bulk Operations on Work Items

With this release of CA Identity Manager, the following bulk operations can be performed on selected work items:

- Approve
- Reject
- Reserve
- Release

In the User Console, the Configure Work List tab has been enhanced to include a new Supports bulk workflow operations check box. When this check box is enabled, the user can bulk approve, reject, release, and reserve work items that they own or work items from the delegators from the View My Work List screen. However, administrators can only perform bulk reserve or release of items on behalf of the existing user on the Manage User's Work Items screen.

Note: Bulk operations cannot be enabled for View and View My Tasks.

Configure Work List Tab for Bulk Operations

To configure the Work List tab to support bulk operations on work items, follow this procedure.

From the Roles and Task Tab in the User Console

1. Select Manage Tasks, Modify Admin Tasks and Click Search.
2. Select Manage User's Work Items.
3. From the Tabs Tab, click the pencil icon next to Work List.

   The Configure Work List screen appears.
4. Select Support bulk workflow operations.
5. Save the the changes and submit the task.

   Bulk operations on work items are now available.

Chapter 17: Email Notifications

This section contains the following topics:

Email Notifications in CA Identity Manager

Email notifications inform CA Identity Manager users of tasks and events in the system. For example, CA Identity Manager can send an email to approvers when an event or task requires an approval.

CA Identity Manager provides the following methods for configuring email notifications:

- **Email Notification Policies**

  Email notification policies enable business administrators to create, view, modify, and delete email notifications by using tasks in the User Console. No coding is required to create email notifications.

  Administrators can define the content of an email, when it is sent, and who receives it. The content of the email, which is defined in an HTML editor, can contain dynamic information, such as the current date or event information, which CA Identity Manager populates when the email is sent. For example, you can configure an email notification that is sent to an approver when a new user is created. The email can contain the user's login information, date of hire, and manager.

  Note: Email notification policies are Policy Xpress policies (see page 237) that are created and managed by a separate set of tasks.

- **Email templates**

  In this method, email notifications are generated from email templates. CA Identity Manager provides default email templates that can used as installed, or that can be customized by system administrators. These administrators use an Email Template API to specify dynamic content, such as the list of recipients, and information about the event that triggers the email.

CA Identity Manager can generate email notifications when the following occurs:

- An event requiring approval or rejection by a workflow approver is pending

  Note: If you have a Workpoint approval process that has more than one approval activity, the email notification configured in the User Console tasks sends a notification for each activity. If you use the email templates for the same notification, only one email is sent to approvers (when the event reaches the pending state).

- An approver approves an event or task
- An approver rejects an event or task
- An event or task starts, fails, or completes
- A user is created or modified

To use CA Identity Manager email notifications, configure your SMTP settings (see page 416). If you are using the email template method, you also enable email notifications in CA Identity Manager.

How to Select an Email Notification Method

The following table summarizes the differences between email notification policies and the email templates:

Activity	Email Management Tasks	Email Templates
Configuring email notifications	Administrators use admin tasks in the User Console to create, modify, view, and delete email notifications.	Administrators modify default templates in the Identity Manager Administrative Tools.
Configuring when emails are sent	CA Identity Manager can generate email notifications certain events or tasks occur. The email management tasks and the email templates support the same events and tasks, however, the email management tasks provide more granularity in some cases. Email notifications are supported for the following tasks and events: ■ An event requiring approval or rejection by a workflow approver is pending ■ **Note:** If you have a Workpoint approval process that has more than one approval activity, the email notification configured using the email management tasks sends a notification for each activity. If you use the email templates for the same notification, only one email is sent to approvers (when the event reaches the pending state). ■ An approver approves an event or task ■ An approver rejects an event or task ■ An event or task starts, fails, or completes ■ A user is created or modified	
Adding dynamic content to emails	Administrators add dynamic content to the body of an email message by selecting from a list of options in the Content tab of the Create Email or Modify Email tasks. CA Identity Manager automatically populates the dynamic content based on information in the event ot task that triggers the notification.	Administrators use the Email Template API to customize the default email templates, which are used to generate email notifications.

Activity	Email Management Tasks	Email Templates
Supporting existing email notifications	Email notifications that are configured using the email management tasks are based on Policy Xpress policies. If you upgraded from CA Identity Manager Option Pack 1 to CA Identity Manager [assign the value for rn in your book], the email notifications that you configured in Policy Xpress will continue to work. However, you manage those email notifications using the email management tasks, instead of Policy Xpress.	Email notifications that you created using the email template method in previous versions of CA Identity Manager will continue to work in CA Identity Manager [assign the value for rn in your book].

Configure SMTP Settings

Before enabling email notifications, configure the SMTP settings. See the following sections to configure SMTP settings for your application server.

Configure SMTP Settings on JBoss

1. In a text editor, open the mail service deployment descriptor as follows:

   Single node: *jboss_home*\server\default\deploy\mail-service.xml

   Cluster: *jboss_home*\server\all\deploy\mail-service.xml

2. Modify the mail.smtp.host property with the name of your SMTP server as follows:

   ```
   <-- Change to the SMTP gateway server -->
   <property name="mail.smtp.host" value="your_smtp_server "/>
   ```

   For example:

   ```
   <property name="mail.smtp.host" value="smtp.mailserver.company.com"/>
   ```

3. Save the mail-service.xml file.

4. In a text editor, open the following email properties file:

   Single node:
   jboss_home\server\default\deploy\iam_im.ear\config\com\netegrity\config\email.properties

   Cluster:*jboss_home*\server\all\farm\iam_im.ear\config\com\netegrity\config\email.properties

5. To set the email return address used by workflow generated email, locate the admin.email.address property and set the value to the appropriate email address. For example:

   ```
   admin.email.address=admin@company.com
   ```

6. If you are using the email template method, enable email notifications in the Management Console.

   You do not need to enable email notifications in the Management Console if you are using email notification policies.

Configure SMTP Settings on WebLogic

You configure email settings in the WebLogic Server Administration Console and in an email.properties file.

To configure email settings for WebLogic

1. In the WebLogic Server Administration Console, create a mail session with the following properties:
   - **mail.smtp.host** property: Set this value to your SMTP server. For example, mail.smtp.host=mymailserver.company.com
   - **mail.transport.protocol** property: Set this value to SMTP. For example, mail.transport.protocol=smtp
   - **JNDI Name**: nete/Mail
   - **Target**: the WebLogic server name
2. In a text editor, open the following email properties file for CA Identity Manager:

   weblogic_domain\applications\iam.ear\config\com\netegrity\config\email.properties

3. Set the email return address used by workflow generated emails by locating the admin.email.address property and setting the value to the appropriate email address. For example:

   ```
   admin.email.address=admin@company.com
   ```

4. Enable email notification in the Management Console.

   Note: You do not need to enable email notifications in the Management Console if you are using email notification policies.

Configure SMTP Settings on WebSphere

The imsSetup utility that you run after installing the CA Identity Manager components configures a new mail session object called mailMail.

For the email notification feature to work correctly, specify the server that WebSphere connects to when sending email in the Mail Transport Host field for the mailMail session.

The mailMail session is located in Resources, Mail Providers, Built-in Mail Provider, Mail Sessions, mailMail in the WebSphere Administrative Console.

Note: To view the mailMail object, change the Scope to Server in the Mail Session screen. If you do not change the scope to Server, the mailMail object is not displayed.

For more information on configuring a WebSphere mail provider, see the WebSphere documentation.

If you are using the email template method, enable email notification in the Management Console after you configure the SMTP settings.

Note: You do not need to enable email notifications in the Management Console if you are using email notification policies.

How to Create Email Notification Policies

You can use the User Console to create email notification policies that send emails when certain actions take place. For example, you can create an email notification policy that sends an email to notify approvers when a new user is created.

To create an email notification policy

1. Under the System tab, select Email, Create Email.
2. Select one of the following options:
   - Create a new object of type Managed Email

     Creates a new email notification policy.
   - Create a copy of an object of type Managed Email

     Uses an existing email notification policy as a template for creating a policy.
3. Provide basic information about the email notification policy in the Profile tab.

4. Specify when CA Identity Manager sends the email in the When to Send tab.

   The When to Send tab provides several options that allow you to specify the actions that trigger email notifications.

5. Specify the recipients of the email in the Recipients tab.

6. Define the subject and content of the email in the Content tab.

   You can specify dynamic content, such as the date, task or event name, and user attributes in the email content.

More Information:

Email Notification Profile Tab (see page 419)
When to Send Tab (see page 420)
Recipients Tab (see page 422)
Content (see page 423)

Email Notification Profile Tab

The Profile tab in email management tasks allows you to specify basic information about an email notification policy. This tab includes the following fields:

Email Name

Identifies the email notification policy in the User Console.

Note: The email name is not displayed when the email is sent. The name is only used to manage the email notification policy in the User Console.

Category

Groups email notification policies to simplify management.

Specify an existing category by selecting it from the drop-down list, or select the second option button and enter the name of a new category.

Description

Describes the email notification policy to administrators.

The description is not displayed when the email is sent.

Enabled

Specifies that CA Identity Manager will send the email when the conditions defined on the When to Send tab are met.

Custom Data

Creates a custom data element in Policy Xpress that can be used to configure custom recipients or custom content.

Custom data elements can also be used as parameters in other data elements.

Note: The section Data (see page 244) provides more information about data elements.

When you click Custom Data, CA Identity Manager opens a screen where you can add new data elements.

Entry Rules

Defines rules for when CA Identity Manager sends email notifications in cases where the default rules in the When to Send tab are not granular enough.

For example, the When to Send tab provides a default rule that sends email when any attribute of a user profile is modified. If you want CA Identity Manager to send an email only when a user's department changes, you can create a custom entry rule. (In this case, you create a custom data element that identifies when the department changes, and then you create an entry rule that uses the custom data element you created.)

Note: The section Entry Rules (see page 246) provides more information.

More information:

Data Elements (see page 244)
Entry Rules (see page 246)

When to Send Tab

CA Identity Manager provides several default options that determine when email is sent. Some of these options require additional information, such as a task or event name. For example, sending an email when a task starts requires selecting the task that triggers the email.

You can select one or more of the following When to Send options:

User Created

Sends an email when a user has been created. The email is sent when the CreateUserEvent reaches completion.

User Modified

Sends an email when a user has been modified. The email is sent when the ModifyUserEvent reaches completion.

Workflow Pending

Sends an email when a workflow process assigns approvers. When you select this option, specify the applicable workflow process.

Event Started

Sends an email when an event reaches the Before state. When you select this option, specify the event.

Note: If you specify Event Started, and the email fails to send, the event associated with the notification will not execute.

Event Ended

Sends an email when an event reaches the After state. When you select this option, specify the event.

Event Approved

Sends an email when an event reaches the Approved state. When you select this option, specify the event.

Event Rejected

Sends an email when an event reaches the Rejected state. When you select this option, specify the event.

Event Failed

Sends an email when an event fails. When you select this option, specify the event.

Task Submitted

Sends an email when the task starts processing. When you select this option, specify the task.

Task Complete

Sends an email when the task completes. When you select this option, specify the task.

Task Failed

Sends an email if the task fails. When you select this option, specify the task.

Recipients Tab

You can configure multiple recipients for the To, CC, or BCC fields of an email. The recipient list may be static, or it may depend on the type of action that triggers the email, and the users involved.

To specify recipients, select the Edit icon next to the To, CC, or BCC field in the Recipients tab. Then, select one of the following options, which allow you to configure the list of recipients:

Workflow Approvers

Sends the email to all approvers in the workflow process. This option is only applicable if the email is sent for a workflow pending event.

Manager

Sends the email to the manager of the user whom the task has been performed on.

Note: To use the Manager recipient option, configure the manager attribute for the environment. To configure the manager attribute, go to Environments, *EnvironmentName*, Advanced Settings, Miscellaneous in the Management Console. Set managerattribute to the name of the physical attribute that stores the unique name of a user's manager.

For relational databases, specify the attribute using the following format:

tablename.attribute

Group members

Sends the email to all members of a group. Selecting this option opens a drop-down list with available group names.

Role members

Sends the email to all members of an admin role. Selecting this option opens a drop-down list with available role names.

Static address

Sends the email to a selected email address. You can specify the email address in the additional text area available.

Note: Do not specify more than one address in the text area.

User

Sends the email to the user whom the task was performed on.

Initiator

Sends the email to the person who made the request.

Custom

Allows you to select a custom data element to define the recipients.

When you select the custom option, a drop-down list appears with the custom data elements that are available for use.

Note: The section Data (see page 244) provides more information about data elements.

Content

You can define the subject and body of an email using simple text, or add them with dynamic content that is calculated when the email is sent.

The subject line is a plain text field where you can write your message. This message is the subject of the email.

The body is displayed in an HTML editor. You can insert and format any text to form the email body.

To include dynamic content, you select options from a drop-down list. The editor adds dynamic content indicators, which resemble the following, where the cursor is located:

{*type*}

type represents one of the supported dynamic content types.

For example, when you select the Attribute dynamic content type and specify the FirstName attribute, the HTML editor displays the following in the Content tab:

{'Attribute: FirstName'}

Note: To add dynamic content to the subject line, use the drop-down list below the subject line. To add dynamic content in the email body, use the drop-down list below the content box.

When the email message is sent, CA Identity Manager replaces the dynamic content with the appropriate text. The text retains the formatting, such as bold characters, specified in the HTML editor.

Dynamic content types include the following:

Date

Specifies today's date in the format you specify.

Task

Specifies the task for which the email is sent.

Object Name

Specifies the name of the object in the event that triggers the email. If the event is a user event, this field is the user login name.

The object can be something other than a user. For example, it can be any managed object such as a group, admin role, and so on.

Attribute

Specifies the value of one of the user attributes. The user is the subject of the task. This option requires selecting the attribute from a drop-down list.

Manager Attribute

Specifies the value of one of the attributes of the user's manager. The user is the subject of the task. This option requires selecting the attribute from a drop down list.

Note: To use the Manager recipient option, configure the manager attribute for the environment. To configure the manager attribute, go to Environments, *EnvironmentName*, Advanced Settings, Miscellaneous in the Management Console. Set managerattribute to the name of the physical attribute that stores the unique name of a user's manager.

For relational databases, specify the attribute using the following format:

tablename.attribute

Custom

Allows you to select a custom data element to define the recipients.

When you select the custom option, a drop-down list appears with the custom data elements that are available for use.

Note: The section Data (see page 244) provides more information about data elements.

Modify Email Notification Policies

You modify an existing email notification policy to suit your business requirements.

To modify an email notification policy

1. Go to System, Email, Modify Email.

   CA Identity Manager displays a search screen.

2. Search for and select the email notification policy to modify.

3. Change the settings in the Profile, When to Send, Recipients, and Content tabs as needed.

Disable Email Notification Policies

You can enable or disable email notification policies using the Enabled check box on the Profile tab when you create or modify an email notification policy. When an email notification policy is disabled, the selected email is not active and no email is sent.

Note: Email notification policies are enabled by default.

Use Case: Sending a Welcome Email

When a new employee is hired, Forward, Inc, wants to send an email to that user welcoming them to the company. The email must provide important information to the new employee, such as links to the employee home page, and information about their manager and department.

To create the email, the Human Resources administrator uses the Create Email task in the User Console to configure the following settings:

- On the When to Send tab, select User Created.
- On the Recipients tab, complete the following steps:
  - Click the Edit icon next to the To field.

    Select User, then click the plus sign. Select the Manager using the same method, then click OK.
  - Click the Edit icon next to the CC field.

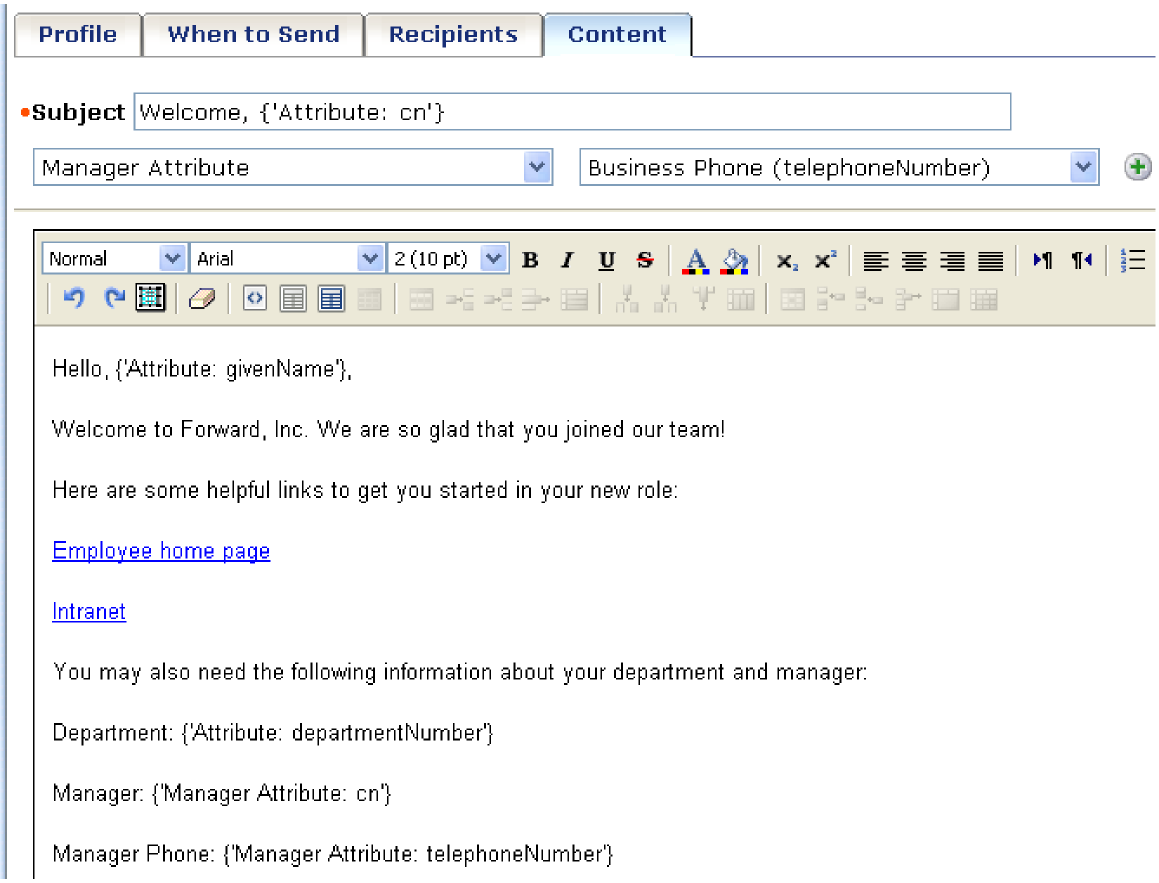
    Select Initiator, click the plus sign, and then click OK to send a copy of the email to the user who created the employee in CA Identity Manager.
- On the Content tab, complete the following steps:
  - In the Subject field, enter the following text: Welcome,

    With the cursor at the end of the text that you entered, select Attribute from the drop-down list. Then, select Full Name from the second drop-down list, then click the plus sign.

    The subject line resembles the following:

    Welcome, {'Attribute: eTFullName'}

    Note: The attribute name depends on the user store and attribute that you are using.
  - In the Content box, add any welcome text. Include links to the Employee portal and use the dynamic content options under the content box to display the user's department, manager, and manager's telephone number, as follows:



•Subject Welcome, {'Attribute: cn'}

Manager Attribute

Business Phone (telephoneNumber)

Hello, {'Attribute: givenName'},

Welcome to Forward, Inc. We are so glad that you joined our team!

Here are some helpful links to get you started in your new role:

Employee home page

Intranet

You may also need the following information about your department and manager:

Department: {'Attribute: departmentNumber'}

Manager: {'Manager Attribute: cn'}

Manager Phone: {'Manager Attribute: telephoneNumber'}

How to Use Email Templates

CA Identity Manager includes default email templates that you can use to generate email messages. You can use the default templates as installed, or customize them to suit your business needs.

To use email templates

1. Configure SMTP settings to enable CA Identity Manager to send email notifications.
2. Enable email notification in the Management Console (see page 428).
3. Configure an event or task to send an email. (see page 428)
4. (Optional) Customize the default templates (see page 433), as needed.

Enable Email Notification

You can enable or disable email notification for an Identity Manager environment. If you enable email notifications, CA Identity Manager sends email notifications for events and tasks you specify.

Note: To use the Forgotten Password feature, enable email notification.\

Before you enable email notifications in CA Identity Manager, configure the SMTP settings (see page 416) for your application server.

To enable email notifications

1. In the Management Console, click Environments.

   A list of Identity Manager environments is displayed.

2. Click the appropriate Identity Manager environment.
3. Go to Advanced Settings, Email.
4. Select the Enabled check box.
5. Configure the events and tasks that trigger email (see page 428).
6. Click Save.
7. Restart the instance of the application server on which CA Identity Manager is installed.

Configure an Event or Task To Send Email

If email notifications are enabled, you can specify a list of events and tasks that trigger email notifications. For example, you may want email sent in the following circumstances:

- To a system administrator, at the completion of a Reset User Password task.
- To a new employee's manager, at the completion of a Create User task. In addition, when the AddToGroupEvent generated within the Create User task is approved, another email can be sent to all members of a group to which the new user is being added.

To specify events and tasks that trigger email notifications

1. In the Management Console, click Environments.

   A list of Identity Manager environments is displayed.

2. Click the appropriate Identity Manager environment.
3. Go to Advanced Settings, Email.

   The Email Properties screen opens.

4. Select the following Enable check boxes that apply:

   - Events E-mail Enabled

     Enables email notification for Identity Manager events

   - Tasks Email Enabled

     Enables email notification for Identity Manager tasks

5. Enter the location of the email templates that CA Identity Manager uses to create the email messages.

   The email templates are located in a subdirectory in the following location:

   iam_im.ear\custom\emailTemplates

   Note: When you create an email template file with a file name using a different language, the operating system session should be operating in a language that supports the character set.

6. Specify the events for which email notifications are sent as follows:

   - To add an event, select the event in the Event list box, and click Add.

     CA Identity Manager adds the event you selected to the list of events for which email notifications are sent.

     Note: If you select an event that is not associated with a workflow process, CA Identity Manager sends an email notification when the event completes.

   - To delete an event, select the event's check box, then click Delete.

7. Specify the tasks for which email notifications are sent as follows:

   - To add a task, search for the task by selecting a condition in the first field, and entering a task name in the second field. Click Search.

     You can enter a partial task name by using the wildcard (*) character. For example, to search for a Create task, enter Create*.

     Select one or more tasks from the search results. Click Add.

     Note: Task-level email notifications are not available for tasks that have the action type View or Self View. To see the action type of a task, go to Modify Admin Task, Select a Task, and check the action field in the task profile.

   - To delete a task, select the task's check box, then click Delete.

     Deleting a task removes the task from the Task table. It does not delete the task.

8. When you finish configuring the tasks and events that trigger email notifications, click Save.

9. Restart the application server on which CA Identity Manager is installed.

Email Content

Email notifications consists of a generic template plus task-specific details that are added to the email through the email API. For example, the following information can be inserted into an email for a Create User task:

- The name of the administrator who is executing the task
- The name of the new user
- The user's email address, department name, and other attribute data
- The organization where the user is being created
- Workflow approval status and approval time
- The task name and the names of the events in the task

Email Templates

Email notifications are generated from email templates. CA Identity Manager provides default email templates that you can use as installed, or that you can use to create your own email templates.

Each email template contains the following:

- **Delivery information**--A list of email recipients. CA Identity Manager automatically generates the list of recipients, based on users involved in the task. For example, an approval email is sent to all Approvers for the task.
- **Subject--**The text used in the message's subject line.
- **Content**--The message body. The body typically contains both static text and variables, which CA Identity Manager resolves based on the task or event that triggers the email.

The default email templates are located in an emailTemplates directory where the Identity Manager administrative tools are installed. The default installation location for the administrative tools is:

- For Windows--C:\Program Files\CA\IAM Suite\Identity Manager\tools\emailtemplates
- For UNIX--<home_directory>/CA/IAM Suite/Identity Manager/tools/emailtemplates

The emailTemplates directory contains five folders. Each folder is associated with a task or event state:

Directory	Contents
Approved	defaultEvent.tmpl--Informs recipients that an event has been approved
Completed	■ CertificationNonCertifiedActionCompletedNotification.tmpl--Informs the manager that a non-compliance action has been applied to an employee. ■ CertificationNonCertifiedActionPendingNotification.tmpl--Informs the manager that a non-compliance action will be applied to an employee. ■ CertificationRequiredFinalNotification.tmpl--Final reminder to a manager that the Certify User task must be completed for an employee. ■ CertificationRequiredNotification.tmpl--Informs the manager that a certification process has begun for an employee. The manager must complete a Certify User task for this employee. ■ CertificationRequiredReminderNotification.tmpl--Reminds the manager that the Certify User task must be completed for an employee. ■ Certify Employee.tmpl--Informs an administrator that the certification process for an employee is complete. ■ CreateProvisioningUserNotificationEvent.tmpl--Sends a temporary password to a user when that user's account is created in the provisioning directory. ■ defaultTask.tmpl--Informs recipients that Identity Manager has completed a task. ■ ForgottenPassword.tmpl--Sends a temporary password to users who have used the forgotten password feature. ■ ForgottenUserID.tmpl--Sends a user ID to users who have used the forgotten user ID feature. ■ Self Registration.tmpl--Informs a user that a self-registration task has completed successfully.
Invalid	■ AssignProvisioningRoleEvent.tmpl--Informs recipients that a request to add a user to a provisioning role failed ■ DefaultEvent.tmpl--Informs recipients that an event failed ■ DefaultTask.tmpl--Informs recipients that an Identity Manager task failed

Directory	Contents
Pending	■ defaultEvent.tmpl--Informs approvers that a work list item requires attention ■ ModifyUserEvent.tmpl--Same as the default template, but includes methods for retrieving the attributes of the User managed object
Rejected	defaultEvent.tmpl--Informs recipients that an event has been rejected

Use the Identity Manager templates and template directory structure that are installed in the <*im_admin_tools_dir*>\Identity Manager\tools\ emailTemplates directory as a base for creating custom email templates.

Template Directories

Each template directory described in Email Templates (see page 430) is associated with a particular task or event state. For example, if an email is to be sent for an event that has been rejected in a workflow process, Identity Manager looks in a deployed rejected directory for the template to use. Identity Manager then generates the email from the appropriate email template in the directory.

Email Templates in a Directory

Each deployed template directory contains one or more email templates. When a task or event occurs for which email is enabled, Identity Manager searches the appropriate template directory for a template name that is the same as the name of the task or event. If such a template cannot be found, Identity Manager uses the default template in the directory. Default template names are listed in Email Templates (see page 430). For example, Identity Manager uses defaultEvent.tmpl in the Pending directory to inform approvers that they have a new work list item.

Sets of Template Directories

A set of template directories contains an approved, completed, pending, and rejected directory. You can deploy multiple sets of template directories and specify one set to be used for a given Identity Manager environment.

Email Template Deployment (see page 451) provides information on deploying sets of template directories.

For information on configuring email template directories so that Identity Manager uses the correct set for a given environment, see the *CA Identity Manager Configuration Guide*.

Create Email Templates

To create custom email messages

1. Open the template that you want to modify.

   For example, if you want to create an email message for a pending Create User event, open defaultEvent.tmpl in the Pending directory.

2. Save the template in the same directory with a new name. The name must match the name of the event to which the email applies, and have the extension .tmpl.

   For example, name the message for the pending Create User event as follows:

   CreateUserEvent.tmpl

   Note: When you create an email template file with a file name using a different language, the operating system session should be operating in a language that supports the character set.

3. Modify the message template as needed, as described in the next section, Custom Email Templates (see page 433).

Custom Email Templates

An email template is a dynamic file that supports both HTML and embedded server-side JavaScript. A template lets you insert variable values into static text, allowing case-specific messages to be generated from a single template.

The same template can be used any number of times to print out boilerplate static text (such as the phrase has been approved) along with variable text specific to a given context (such as the name of the event being approved).

For example, here is a template for reporting the approval of an event:

```
<!-- Define the E-mail Properties --->
<%
   _to = _util.getNotifiers("ADMIN");
   _cc = "" ;
   _bcc = "";
   _subject = _eventContextInformation.getEventName() + " approved";
%>
<!--- Start of Body --->
<html>
<body text="Navy">
```

```
Event: <b> <%=_eventContextInformation.getEventName()%> </b><br>
<%=_eventContextInformation.getPrimaryObjectTypeName()%>:
<b><%=_eventContextInformation.getPrimaryObjectName()%></b><br>
In <%=_eventContextInformation.getSecondaryObjectTypeName()%>:
<b><%=_eventContextInformation.getSecondaryObjectName()%></b><br>
Status: <b>Approved</b>
</body>
</html>
```

Note: The Identity Manager objects _util and _eventContextInformation used in the above example are described in Email Template API (see page 436).

If an approval is generated for the event CreateUserEvent, and user John Jones is created in organization HR, the body of the email notification generated from the approval template might look like this:

```
Event: CreateUserEvent
USER: John Jones
In ORGANIZATION: HR
Status: Approved
```

The following sections describe the syntax and Identity Manager objects that make dynamic email messages possible.

Template Elements

Identity Manager email templates support:

- Standard HTML tags.
- Server-side JavaScript.
- One or more implicit objects that Identity Manager makes available to an instance of the template--that is, to an email message.
- Identity Manager tags that let you embed JavaScript in the template, call the methods in the implicit Identity Manager objects, and insert variable values into the template's static text.

Identity Manager Tag Extensions

Email templates support the following tags:

<% %>

Embeds JavaScript into an email template.

<%= %>

Inserts a variable value into static text.

The tags are described in the following sections.

<% %>

This tag lets you embed JavaScript for in-line execution into an email template.

You can use any JavaScript object within the embedded JavaScript. You can also call Identity Manager implicit object methods within the embedded JavaScript.

For example, the following code modifies the body of the approval template shown in Custom Email Templates (see page 433). JavaScript is used to determine if a secondary object is involved in the event (such as an ORGANIZATION object when a USER primary object is added). If there is no secondary object, the text relating to the secondary object is omitted from the message:

```
Event: <b> <%=_eventContextInformation.getEventName()%> </b><br>
<%=_eventContextInformation.getPrimaryObjectTypeName()%>:
<b><%=_eventContextInformation.getPrimaryObjectName()%></b><br>
<%
var secondaryType =        _eventContextInformation.getSecondaryObjectTypeName();
if (secondaryType != "") {
   template.add("In " + secondaryType + ": ");
   template.add("<b> "+_eventContextInformation.getSecondary
                                ObjectName()+" </b><br>");
   }
%>
Status: <b>Approved</b>
```

<%= %>

This tag lets you insert a variable value into static text. The value can be:

- A variable defined in some previously executed JavaScript in the template--for example:

  ```
  <%
  var secondaryType
  =      _eventContextInformation.getSecondaryObjectTypeName();
  ...           // More JavaScript processing
  %>
  ...           // More HTML
  The primary object was created in <%=secondaryType%>.
  ```

- A value returned from a method in an Identity Manager implicit object--for example:

  ```
  Event <%=_eventContextInformation.getEventName()%> is approved.
  ```

Email Template API

When a message is generated from a template, Identity Manager makes the implicit objects below available to the message. These objects let you insert instance-specific information into a message by calling methods in the Email Template API.

A template can call the methods in any of the following objects:

- _contentType. Specifies the contentType for the email.
- _priority. Specifies the priority for the email.
- _to. Adds recipients to the message’s To field.
- _cc. Adds recipients to the message’s cc (send copy to) field.
- _bcc. Adds recipients to the message’s bcc (send blind copy to) field.
- _subject. Specifies the subject of the email.
- _encoding. Specifies the encoding for the email.
- _additionalHeaders. Allows you to specify extra email header attributes in the email template.
- template. Lets you add a string of text to a message from lines of JavaScript code.
- _util. A utility object.
- _eventContextInformation. Contains information about the event generated by the current task, such as event name and approval status.
- _taskContextInformation. Contains a collection of information about the current task, such as task name, organization name, and constituent events.

These objects are described in the following sections.

_contentType

Specifies the contentType for the email.

If no contentType is specified through _contentType variable, the default contentType “text/html” applies.

Methods: None.

Example:

```
<% _contentType = "text/html"; %>
```

_priority

Specifies the priority for the email. Specify 0 for no priority (default) and 1 for high priority.

Methods: None.

Example:

```
<% _priority = "1"; %>
```

_to

Adds recipients to the message’s To field.

The value of the _to variable is a JavaScript string. Multiple recipients are permitted, but the string must conform to JavaScript syntax, as shown in the following example.

Methods: None.

Example:

```
<%
_to =
_util.getNotifiers("USER") + ',' +
_util.getNotifiers("USER_MANAGER","ManagerLookup=managerattribute");
_cc = "" ;
_bcc = "" ;
_subject = "Your new password ";
%>
```

Note: When emails alert participants that a task is in a Pending state and under workflow control, the _to object is pre-populated with the addresses of the participants. You cannot use the _to object in a Pending template.

_cc

Adds recipients to the message’s cc (send copy to) field.

The value of the _to variable is a JavaScript string. Multiple recipients are permitted, but the string must conform to JavaScript syntax, as shown in the following example.

Methods: None.

Example:

```
<%
_cc =
_util.getNotifiers("USER") + ',' +
_util.getNotifiers("USER_MANAGER","ManagerLookup=managerattribute");
%>
```

_bcc

Adds recipients to the message’s bcc (send blind copy to) field.

Email addresses specified in this field do not appear in the email.

The value of the _to variable is a JavaScript string. Multiple recipients are permitted, but the string must conform to JavaScript syntax, as shown in the following example.

Methods: None.

Example:

```
<%
_bcc =
_util.getNotifiers("USER") + ',' +
_util.getNotifiers("USER_MANAGER","ManagerLookup=managerattribute");
%>
```

_subject

Specifies the subject of the email.

Methods: None.

Example:

```
<% _subject=_eventContextInformation.getEventName()+" approved";%>
```

_encoding

Specifies the encoding for the email.

If no encoding is specified either through _encoding or through the LANG variable, characters in the email may not be correctly displayed. Be sure to set _encoding or LANG for the appropriate locale.

Methods: None.

Example:

```
<% _encoding = "UTF-8"; %>
```

_additionalHeaders

_additionalHeaders

Specifies extra email header attributes in the email template.

You must assign a HashMap() to this attribute. The names and values stored in the HashMap must be strings.

Example: Add custom header attributes

The following example shows you how to add two custom header attributes, “X-TCCCSWD” and “myheader”:

```
<!-- Define the E-mail Properties --->
<%
_to = "siteadmin@ca.com";
_cc = "" ;
_bcc = "" ;
_subject = _eventContextInformation.getEventName() +" completed";
var additionalHeaders = new java.util.HashMap();
additionalHeaders.put("header_a","1");
additionalHeaders.put("header_b","foo");
_additionalHeaders = additionalHeaders;
%>
```

template

Lets you add a string of text to a message from lines of JavaScript code (that is, lines within the <% %> tag). The string can contain HTML tags, static text, and/or variable values returned by methods in Identity Manager implicit objects.

Note: The template object is not preceded by the underscore (_) character.

Method:

- add(String)

  The argument must evaluate to a string, including any calls to methods in an Identity Manager implicit object. In the example below, see _eventContextInformation.getSecondaryObjectName().

Example:

```
<%
var secondaryType =        _eventContextInformation.getSecondaryObjectTypeName();
if (secondaryType != "") {
   template.add("In " + secondaryType + ": ");
   template.add("<b> "+_eventContextInformation.getSecondary
                                ObjectName()+" </b><br>");
   }
%>
```

_util

Utility object.

Method:

- getNotifiers(String [,String])

  Returns email IDs based on a notification rule.

  The first argument supports the following predefined notification rules, enclosed in quotes:

  - "ADMIN". Sends the email to the administrator who initiated the task.
  - "USER". Sends the email to the user in the current context.
  - "USER_MANAGER". Sends the email to the manager of the user in the current context.

  You can also reference a custom notification rule that you create with the Notification Rule API. For information, see the *Programming Guide for Java*.

  The second argument is optional. You can use it to pass one or more user-defined name/value pairs into a custom notification rule. Separate each name/value pair with a comma, in the following format:
  "*name1*=*value1*,*name2*=*value2*,..."

Examples:

```
<%
_to = _util.getNotifiers("ADMIN");
_cc = "";
%>
<%
_to = _util.getNotifiers("MYRULE","type=loan,district=3");
_cc = "";
%>
```

Notifying a User's Manager

You can use the USER_MANAGER notification rule to send email to any user's manager. Identity Manager uses this rule in the email templates supporting user entitlement certification.

Note: The USER_MANAGER Notification Rule only applies to events or tasks that create or manage a single user.

Because there are a number of different ways a user-to-manager relationship can be specified within a user directory, the default User Manager Notification Adapter resolves this relationship based on an attribute expression specified in the second parameter of the getNotifiers() method.

Example:

```
<%
_to = _util.getNotifiers("USER_MANAGER","ManagerLookup=managerattribute");
_cc = "";
%>
```

The User Manager Notification Adapter supports two look-up options:

- managerattribute **= <***Manager AttributeName***>**- where the User object maintains an attribute that indicates the DN or UserID of that user's manager
- commonattribute **= <***AttributeName***>** - where the user and the user's manager share a common attribute value, such as "department"

You configure these lookup options in the Miscellaneous Properties for an environment in the Identity Manager Management Console.

To configure the USER_MANAGER notification rule:

1. In the Identity Manager Management Console, select Identity Manager Environments. Then, select the environment for which you are configuring email notification.
2. Select Advanced Settings>Miscellaneous Properties.

3. In the Miscellaneous Properties page, complete the configuration steps for the lookup option that you want to use:

   - To use the managerattribute=<Manager AttributeName> lookup option:

     a. In the Property field, enter managerattribute.

     b. In the Value field, enter the attribute that stores the manager's DN or user ID.

     c. Click Add.

     d. Click Save.

   - To use the commonattribute=<AttributeName> lookup option:

     a. In the Property field, enter commonattribute.

     b. In the Value field, enter the attribute that the user and the user's manager have in common.

     c. Click Add.

     d. In the Property field, enter
     ismanagerfilter.

     e. In the Value field, enter a search expression using the following syntax:

     <attribute> <operator> <filter>

     For example, title EQUALS manager

     f. Click Add.

     g. Click Save.

You can also write a custom adapter and create your own rules for notifying a user's manager. See the *Programming Guide for Java*.

_eventContextInformation

Contains information about the event generated by the current task, such as event name and approval status. This information is called *context* information for the event.

The _eventContextInformation object is created from the ExposedEventContextInformation class in package com.netegrity.imapi.

This object is available for email messages based on Approved, Pending, and Rejected templates. For information about these templates, see Email Templates (see page 430).

Methods: All the following methods return a String.

Method	Description
getAdminName()	Returns the name of the person who submitted the task that generated the event. Deprecated in CA Identity Manager 5.6. Use one of the following inherited methods: ■ getAdministrator() ■ getAdminFriendlyName()
getApprovalStatus()	Returns the approval status of the event. One of these values: APPROVAL_STATUS_APPROVED APPROVAL_STATUS_REJECTED
getApprovalTime()	Returns the time the event was approved.
getEventName()	Returns the name of the event. For a list of event names, see Identity Manager Events.
getOrgName()	Returns the friendly name of the organization where the task is being executed. Deprecated in CA Identity Manager 5.6. Use the inherited method getObjectOrganizationFriendlyName().
getPassword()	If the primary objects is type USER, returns the user's password.
getPrimaryObjectTypeName()	Returns the type of primary object. Primary object types returned: ACCESSROLE ACCESSTASK ADMINROLE ADMINTASK GROUP ORGANIZATION USER

Method	Description
getPrimaryObjectName()	Returns the name of the primary object affected by the event. A *primary object* is the object directly affected by the event. A *secondary object* is the object that the primary object is bound to, if any. For example: ■ The primary object type for CreateUserEvent is USER. The secondary object is the object where the user is created--that is, ORGANIZATION. ■ The primary object type for CreateAdminRoleEvent is ADMINROLE. This object is not bound to other objects, so no secondary object exists. With a primary object of type USER, getPrimaryObjectName() might return John Jones.
getSecondaryObjectTypeName()	If a secondary object was affected by the event, returns the object type. Secondary object types returned: ACCESSROLE ACCESSTASK ADMINROLE ADMINTASK GROUP ORGANIZATION USER
getSecondaryObjectName()	If a secondary object was affected by the event, returns the object name. See getPrimaryObjectName() for information about primary and secondary objects. With a secondary object of type ORGANIZATION, the method getSecondaryObjectName() might return HR.

Note: The methods in _eventContextInformation are provided through the interface ExposedEventContextInformation. Since ExposedEventContextInformation inherits methods in the core CA Identity Manager API, _eventContextInformation can also call these methods from an email template, along with the methods in the above table. For more information about these inherited methods, see Additional Methods (see page 448).

Example--Email notification about a Pending event:

```
<%
_cc = "" ;
_bcc = "";
_subject = _eventContextInformation.getEventName() +
                                             " Approval Request";
%>
<!--- Start of Body --->
<html>
<body text="Navy">

The following item has been added to your work list for approval:
<br><br><br>
Event: <b><%=_eventContextInformation.getEventName()%></b> <br>
<%=_eventContextInformation.getPrimaryObjectTypeName()%>:
<b><%=_eventContextInformation.getPrimaryObjectName()%></b><br>
In <%=_eventContextInformation.getSecondaryObjectTypeName()%>:
<b><%=_eventContextInformation.getSecondaryObjectName()%></b><br>
</body>
</html>
```

Possible email body:

From: `lsmith@security.com [mailto:lsmith@security.com]`
To: `vimperioso@security.com`
Subject: `CreateUserEvent Approval Request`

`The following item has been added to your work list for approval:`

`Event:` **CreateUserEvent**
`USER:` **Richard Ferrigamo**
`In ORGANIZATION:` **Mortgages & Loans**

Note: The value of the From field is derived from the email.properties file. To change the value, edit the following file:

`<`*`iam_im.ear`*`>\config\com\netegrity\config\email.properties`

where <*iam_im.ear*> is the installed location of CA Identity Manager in the application server domain--for example:

For WebLogic:

`<`*`WebLogic_home`*`>\user_projects\<domain>\applications\iam_im.ear`

For JBoss:

```
<Identity Manager_home>\jboss-3.2.2\server\default\deploy\iam_im.ear
```

For WebSphere:

```
<im_admin_tools_dir >\WebSphere-ear\iam_im.ear
```

To add additional information about the user affected by the event to the email in the previous example, add text that resembles the following:

```
<% user = _eventContextInformation.getEvent().getUser(); %>
<b>User information:</b><br>
Last Name: <b><%=user.getAttribute("%LAST_NAME%")%></b><br>
First Name: <b><%=user.getAttribute("%FIRST_NAME%")%></b><br>
Full Name: <b><%=user.getAttribute("%FULL_NAME%")%></b><br>
Email: <b><%=user.getAttribute("%EMAIL%")%></b><br>
Organization Membership: <b><%=user.getAttribute("%ORG_MEMBERSHIP%")%></b><br>
```

Possible email body:

```
From: lsmith@security.com [mailto:lsmith@security.com]
To: vimperioso@security.com
Subject: CreateUserEvent Approval Request

The following item has been added to your work list for approval:

Event: CreateUserEvent
USER: Richard Ferrigamo
In ORGANIZATION: Mortgages & Loans
User information:
Last Name: Ferrigamo
First Name: Richard
Full Name: Richard Ferrigamo
Email: rferrigamo@mybank.org
Organization Membership: Mortgages & Loans
```

_taskContextInformation

Contains a collection of information about the current task, such as task name, organization name, and constituent events. This information is called *context* information for the task.

This object is available for email messages based on Completed templates. For information about this template, see Email Templates (see page 430).

Methods: All the methods below return a String except for the method getExposedEventContexts(), which returns a Java Vector.

Method	Description
getAdminName()	Returns the name of the person submitting the task. Deprecated in Identity Manager 5.6. Use one of the following inherited methods: ■ getAdministrator() ■ getAdminFriendlyName()
getExposedEventContexts()	Returns a Java Vector of all events associated with the task. Each object in the Vector is an event context object. You can use the methods listed in _eventContextInformation to retrieve context information for a given event object. The return object is a standard Java Vector object. You can use any of the Vector object's methods--for example, get() and size()--to manage the elements in the Vector.
getOrgName()	Returns the name of the organization where the task is being executed. Deprecated in Identity Manager 5.6. Use the inherited method getObjectOrganizationFriendlyName().
getTaskName()	Returns the name of the task being executed. Deprecated in Identity Manager 5.6. Use one of the following inherited methods: ■ getAdminTask() ■ getTaskFriendlyName()

Note: The methods in _taskContextInformation are provided through the interface ExposedTaskContextInformation. Since ExposedTaskContextInformation inherits methods in the core Identity Manager API, _taskContextInformation can also call these methods from an email template, along with the methods in the above table. For more information about these inherited methods, see Additional Methods (see page 448).

Example--Body of an email notification template for a password change:

```
<%
var imsEventContexts
=              _taskContextInformation.getExposedEventContexts();
if(imsEventContexts != null)
   {
   for(var i=0;i<imsEventContexts.size();i++)
      {
      var eventContext = imsEventContexts.get(i);
      template.add("Hi "+
eventContext.getPrimaryObjectName()
           + ",");
      template.add("<br>Your new password is: <b>"+
                              eventContext.getPassword());</br>
      template.add("<hr>");
      }
   }
%>
```

Possible email body:

Hi Victor Imperioso,
Your new password is: LFH7F1226

Additional Methods

The methods in _taskContextInformation and _eventContextInformation are provided through the Identity Manager objects ExposedTaskContextInformation and ExposedEventContextInformation, respectively.

These objects inherit methods in the core Identity Manager API. Consequently, the inherited methods are also available to _taskContextInformation and _eventContextInformation.

The following methods inherited from the TaskInfo object are particularly useful to an email template:

- getAdministrator(). Retrieves a User object for the administrator who is executing the current task.
- getAdminTask(). Retrieves an AdminTask object for the current task.

These retrieved objects allow you to insert administrator-specific and task-specific information into an email. For example:

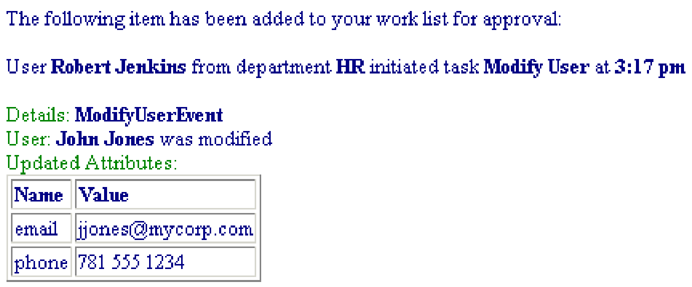
```
<!-- Define the E-mail Properties --->

<%
   _cc = "" ;
   _bcc = "" ;
   _subject = _eventContextInformation.getEventName() +
                                              " Approval Request";
%>
<!--- Start of Body --->
<html>
<body text="Navy">

The following item has been added to your work list for approval:<br>
<br>
User <b><%= _eventContextInformation.getAdministrator().
               getAttribute(Packages.com.netegrity.llsdk6.imsapi.
                managedobject.User.PROPERTY_FRIENDLY_NAME)%> </b>
               from department <b><%= _eventContextInformation.
               getAdministrator().getOrg(null).getFriendlyName()
               %></b> initiated task <b><%= _eventContextInformation.
               getAdminTask().getFriendlyName() %></b>at
<b><%=                _eventContextInformation.getSessionCreateTime() %></b>
<br><br>
<font color="green">Details: </font><b><%=_eventContextInformation.
                                          getEventName()%></b><br>
<font color="green"><%=_eventContextInformation.
                              getPrimaryObjectTypeName()%>:</font>
<b><%=_eventContextInformation.getPrimaryObjectName()%></b>
                                                      was modified
<br>
<font color="green">Updated Attributes:</font>
<table border="1">
<tr>
  <td><b>Name</b></td>
  <td><b>Value</b></td>
</tr>
```

```
<%
   var event = _eventContextInformation.getEvent();
   if(event instanceof Packages.com.netegrity.imapi.UserEvent) {
      var user = event.getUser();
      var attributes = user.getAttributes().keys();
      while(attributes.hasMoreElements()) {
         var attr = attributes.nextElement();
         var value = user.getAttribute(attr);
         if(user.hasAttributeChanged(attr)) {
            template.add("<tr><td>" + attr +"</td>");
            template.add("<td>" + value +"</td></tr>");
         }
      }
   }
%>
</table>
<br>
</body>
</html>
```

Possible email body:



The following item has been added to your work list for approval:

User **Robert Jenkins** from department **HR** initiated task **Modify User** at **3:17 pm**

Details: **ModifyUserEvent**
User: **John Jones** was modified
Updated Attributes:

Name	**Value**
email	jjones@mycorp.com
phone	781 555 1234

For more information about the inherited methods that are available to the Email Template API, see the objects ExposedTaskContextInformation and ExposedEventContextInformation objects in the Identity Manager Javadoc.

Java Standard Output Stream

An email message can also make calls to the Java standard output stream from inside the JavaScript tag (<% %>). For example, the following call sends the message Done to the server console:

```
<%
...       // JavaScript processing
out.println("Done.");
%>
```

Javadoc Reference

For information about the ExposedTaskContextInformation and ExposedEventContextInformation objects, including the methods they inherit from the core Identity Manager API, see the Identity Manager Javadoc.

The Javadoc pages are integrated with an HTML version of the Programming Guide for Java, which is available in the Identity Manager Bookshelf.

Email Template Deployment

When CA Identity Manager is about to send email, it searches for templates from which to generate the email in the following root location within your application server:

`iam_im.ear\custom\emailTemplates`

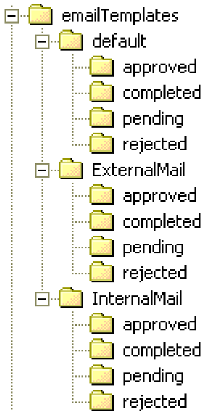
The email templates deployed in this root are contained in template sets that have the same directory structure--that is, there is an approved, completed, pending, and rejected directory in each set.

Template Sets

You can deploy several sets of email templates under emailTemplates. For example, during installation, the following set of email templates is created under iam_im.ear\custom\emailTemplates:

```
default\approved
default\completed
default\pending
default\rejected
```

The default email template set contains the installed templates that are described in Email Templates (see page 430). You can add custom templates within the default set. You can also deploy other sets of email templates in directory structures that you define at the same level as the default set. For example, iam_im.ear\custom might contain the following deployed email templates:



```
emailTemplates
    default
        approved
        completed
        pending
        rejected
    ExternalMail
        approved
        completed
        pending
        rejected
    InternalMail
        approved
        completed
        pending
        rejected
```

Note: For information about how CA Identity Manager chooses a particular email template within a template set, see Template Directories (see page 432).

How to Specify a Template Set for an Environment

When you configure email for an Identity Manager environment, you specify the email template set that you want to use for that environment. For information about configuring email for an Identity Manager environment, see the *CA Identity Manager Configuration Guide*.

Template Names

The directories in a custom template set should contain default templates with the same name as those that were installed in the default template set. The default names are listed in Email Templates (see page 430). Identity Manager uses the default templates when it can find no other template with a name that matches the task or event being executed.

Optionally, you can add additional templates to one or more directories in a template set if you want an email to be generated from a particular template. To do so:

- Assign the template the same name as the task or event for which the email will be generated.
- Place the template in the directory associated with the task or event state for which the email will be generated.

For example, if you want emails to be generated from a particular template when a CreateUserEvent is rejected, place a template named CreateUserEvent.tmpl in the rejected directory of the environment’s template set.

Chapter 18: Access Roles

This section contains the following topics:

Access Roles in CA Identity Manager

Access roles provide an additional way to provide entitlements in CA Identity Manager or another application. For example, you can use access roles to accomplish the following:

- Provide indirect access to a user attribute
- Create complex expressions
- Set an attribute in a user profile, which is used by another application to determine entitlements

Access roles are similar to identity policies in that they apply a set of business changes to a user or group of users. However, when you use an access role to apply business changes, you can see which users the changes apply to by viewing the members of the access role.

In most cases, access roles are not associated with tasks.

Note: When CA Identity Manager integrates with CA SiteMinder, access roles can also provide access to applications that are protected by CA SiteMinder. In this case, access roles do include access tasks. For more information, see the chapter on SiteMinder integration in the *Configuration Guide*.

How Access Roles Manage Entitlements

You can use access roles to manage entitlements by specifying change actions, which occur when a user is added or removed as a member or administrator of a role.

To use access roles, you complete the following steps:

1. An administrator creates an access role.
2. On the Members tab, the administrator specifies add or remove actions, which determine the actions that CA Identity Manager takes when the access role is assigned to a user.

3. The administrator specifies administrator and owner policies, as needed, and submits the task to create the access role.
4. Access role administrators assign the access role to users.
5. CA Identity Manager completes the add actions specified in the role.

Example: Indirect Profile Attribute Modification

You can use access roles to indirectly change an attribute in a user's profile. For example, a company may not want to allow any user to directly change another user's title. That company can create an access role that changes a title when an administrator assigns the role to a user.

To indirectly change an attribute, you set the change actions for the access role. When an administrator assigns the role, the change action can make one or more changes to an attribute in the user's profile.

To use an access role to indirectly modify an attribute, do the following:

1. Create an access role.
2. On the Members tab, select the Administrators Can Add or Remove Members of this Role checkbox, and click the arrow icon.

   CA Identity Manager displays additional Add Action and Remove Action fields.
3. In the Add Action or Remove Action fields, select an action from the list box.

   CA Identity Manager displays additional fields based on the option you selected.
4. Configure the Add or Remove actions as needed.
5. Select the Administrator tab to specify the administrators who can add members to the access role you are creating.
6. Select the Owners tab to specify the administrators who can modify the access role definition.
7. Click Submit to complete the access role creation.
8. Assign the access role to users, as needed.

Create an Access Role

Creating an access role involves these steps:

- Begin Access Role Creation (see page 457)
- Define the Profile of an Access Role (see page 457)
- Define Member Policies for an Access Role (see page 457)
- Define Admin Policies for an Access Role (see page 458)
- Define Owner Rules for an Access Role (see page 458)

Begin Access Role Creation

1. Log into an Identity Manager account with a role that includes a task for creating access roles.
2. Click Access Roles, Create Access Role.

   Choose the option to create a new role or a copy of role. If you select Copy, search for the role.
3. Continue with next section, Define the Profile of an Access Role.

Define the Profile of an Access Role

To define the profile of an access role

1. Enter a name, description, and complete any custom attributes defined for the role.

   Note: You can specify custom attributes on the Profile tab that specify additional information about access roles. You can use this additional information to facilitate role searches in environments that include a significant number of roles.
2. Select Enabled if you are ready to make the role available for use as soon as you create it.
3. Continue with the next section, Define Member Policies for an Access Role (see page 457).

More Information:

User-defined Custom Attributes for Roles (see page 51)

Define Member Policies for an Access Role

On the Members tab:

1. Select Add to define the member policies.
2. (Optional) On the Member Policy page, optionally define a member rule for who should be able to use this role.

   This automatically assigns the role to users who match the criteria in the member policy.

3. Verify that the Member Policy appears on the Members tab.

   To edit a policy, click the arrow symbol on the left. To remove it, click the minus sign icon.

4. On the Members tab, enable the Administrators can add and remove members of this role check box.

   Once you enable this feature, you define the Add Action and Remove Action. These actions define what happens when a user is added or removed as a member of the role.

5. Continue with the next section, Define Admin Policies for an Access Role (see page 458).

Define Admin Policies for an Access Role

On the Administrators tab:

1. If you want to make the Manage Administrators option available, enable the Administrators can add and remove administrators of this role check box.

   Once you enable this feature, define the actions for when a user is added or removed as an administrator of the role.

2. On the Administrators tab, add admin policies that include admin and scope rules and administrator privileges. Each policy needs at least one privilege (Manage Members or Manage Administrators).

   You can add several admin policies with different rules and different privileges for administrators who meet the rule.

3. To edit a policy, click the arrow symbol on the left. To remove it, click the minus sign icon.

4. Continue with the next section, Define Owner Rules for an Access Role (see page 458).

Define Owner Rules for an Access Role

On the Owners tab:

1. Define owner rules, which determine which users can modify the role.

2. Click Submit.

   A message appears to indicate that the task has been submitted. A momentary delay may occur before a user can use the role.

Chapter 19: System Tasks

This section contains the following topics:

Default System Tasks

CA Identity Manager includes the following tasks that help administrators to manage an Identity Manager environment:

- View Submitted Tasks tasks

  Allows administrators to view the status of tasks in the environment. Also removes obsolete tasks from the View Submitted Task screens.

- Bulk Loader tasks

  Uploads feeder files that are used to manipulate large numbers of managed objects simultaneously.

- Bulk Task

  Runs a task on an object, such as User, based on the attributes of the object, such as department, city, termination date, and so on. You can run this task periodically, such as every Saturday.

  You can also use this task to make bulk user changes.

- Select Box Data tasks

  Allows administrators to upload files that are used to populate options in fields, such as select boxes, in admin tasks.

- Logical Attribute Handler tasks

  Allows administrators to manage logical attributes, which are used to display user store attributes (called physical attributes) in a user-friendly format on task screens.

- JDBC Connection Management tasks

  Configures the database server connection details in CA Identity Manager.

- Email Tasks

  Manages email notification policies.

Bulk Tasks

You can use bulk tasks to perform the following actions:

- Run a task on an object, such as User, based on the attributes of the object, such as department, city, termination date, and so on.
- Run a task on specific objects periodically, such as every Saturday.
- Make bulk user changes, such as modifying all users within a selected department.

This functionality differs from the scheduled task functionality in CA Identity Manager by providing a population filter. Unlike scheduled tasks, the population of objects affected by the bulk task is unknown when you configure the bulk task. Also, bulk tasks affect many objects, while scheduled tasks only affects one.

To access bulk tasks, assign the Bulk Task Manager role to the user you want to manage bulk tasks.

Create a Bulk Task Definition

To run a bulk task, first create a bulk task definition. The following components make up a bulk task definition:

- The initiator of the task
- The object type
- The task to perform
- The population filter

Bulk Task Profile

The Profile tab allows you to define the initiator of the bulk task, the task performed, and the object type to perform the task on. The following fields must be configured:

Name

Defines the name of the bulk task.

Description

Explains the use case for the bulk task.

Initiator

Defines the user who runs the bulk task once it is triggered. By default, the Initiator is set to the user defining the bulk task.

The default user scope of the Bulk Task Manager role only allows a user to set themselves as the initiator. This limitation prevents security issues, such as users disguising their identity by setting the initiator to another user when running bulk tasks.

However, you can use this field to run a bulk task as another user, for example, a system administrator running a bulk user task on behalf of the Human Resources director. To allow bulk task users to change the initiator to another user, change the user scoping of the Bulk Task Manager role.

Note: The user you choose as the initiator affects the tasks available and the population filter results, as both are based on the initiator's scope.

Object Type

Defines the type of object that the bulk task modifies. You can add object types to the drop-down list, by modifying the Object Types field in the Profile tab configuration. To modify the Profile tab configuration, modify the admin task that includes the drop-down list, select the Tabs tab, and edit the Profile tab.

Default: User object types only.

Note the following:

- If you add object types, be sure to modify the Profile tab of both the Create *and* Modify tasks.
- If you add object types, be sure to add scope rules for that object type on the role.

Task

Specifies the task to perform on the objects that match the population filter. This task list includes most CA Identity Manager admin tasks, except the following:

- Tasks of type View or Create (such as View User and Create User)
- Approval tasks

Note: Not all tasks are available for all users. The list of tasks depends on the object type and the initiator's scope.

(Optional) Attributes

Define a list of attributes to set on objects that match the population filter. These attributes are useful with tasks that involve attribute changes, such as Modify User. For example, you can select Department Name as the attribute and 'Sales' as the value, and for every user that matches the population filter, CA Identity Manager changes the Department Name attribute to Sales.

Set Optional Attributes

You can add optional attributes if you want to make attribute changes on any object found in the population filter.

To set optional attributes

1. Click the Attributes button.

   A drop-down list of the attributes associated with the task appears.

2. Select the attribute you want to set.
3. Click Add (plus button).

   A new line appears in a table with an empty Values text box next to the attribute.

4. Enter the values you want to set on the attribute.
5. Repeat Steps 2 through 4 for any attribute you want to set.
6. Click Ok.

Note: When you select a multi-valued attribute, you can click the Add (plus) button to set multiple values for that attribute.

Population

The Population tab allows you to find objects for which the bulk task applies. You can define the population filter with the following fields:

Object Filter

Defines the object population using standard CA Identity Manager filters. The attributes available for the search are based on the object type selected on the profile tab of the bulk task.

Date Filter

Refines the population filter further using attributes that contain dates, such as a hire date attribute.

Date Format

Defines the date format that the date filter uses.

Preview

Displays a list of objects that meet the population filter criteria when the Preview button is clicked. This Preview button helps verify that the filter is configured correctly, but the population can change over time. Therefore this list should *not* be used to indicate objects that will be changed in the future.

Note: CA Identity Manager filters put a higher priority on the OR operator than the AND operator. For example, "City equals NYC **AND** Department equals Sales **OR** Department equals Purchase" is treated as "(City equals NYC) **AND** (Department equals Sales **OR** Department equals Purchase)".

Date Filter Components

Filtering on dates within bulk tasks is useful as the population can change daily. For example, an object filter that searches for users whose expiration date has passed can change every day.

Important! If objects are in an LDAP user store, date searches may cause a significant performance reduction due to the dates being represented as regular strings.

The following fields make up the date filter:

Attribute

Defines an attribute in the object that contains a date. All attributes for the object are available. If the filter uses an attribute, CA Identity Manager assumes the attribute contains a date.

Attribute values must match the date format set in the population tab. Objects that have an invalid date format will be ignored.

Operator

Refers to past or future dates compared to today.

Day Offset

Defines a lag time from today. For example, if you want to send an email to all users whose profile expires in the next week, the operator is 'Today or earlier' and the offset is 7, indicating 7 days from today. If you set the offset to -7, however, the email is sent to all users expired for more than a week. The following table outlines the behavior of the offset:

Today's Date	Operator	Day Offset	Result
1/10/2010	Today or Earlier	7	Any date on or before 1/17/2010
1/10/2010	Today or Earlier	-7	Any date on or before 1/3/2010
1/10/2010	Today or Later	7	Any date on or after 1/17/2010
1/10/2010	Today or Later	-7	Any date on or after 1/3/2010

Execute a Bulk Task

The Execute a Bulk Task task allows you to schedule a bulk task or manually start a bulk task right away. Bulk tasks are usually scheduled, but starting a bulk task manually does not interfere with any scheduling already configured on the bulk task, and the bulk task runs immediately. Once you select Execute a Bulk Task, select Execute now to start the bulk task manually.

To schedule a bulk task to run periodically, use the CA Identity Manager recurrence functionality. Once you select Execute a Bulk Task, select Schedule new job and choose the options you want.

The Preview button allows you to see what objects will be affected by the bulk task before starting it.

When a bulk task is run in CA Identity Manager, a single, long-running Bulk Task Event is generated. For every object that is affected by the Bulk Task Event, a new nested task is generated. The Bulk Task Event remains in a pending state until all nested tasks for every object in the population filter are generated.

Note: If your bulk task population includes 500 objects, 500 nested tasks are created; one for each object. For performance reasons, we recommend scheduling bulk tasks with large populations.

In View Submitted Tasks, the Bulk Task Event displays the status of which nested tasks have been opened and on what object, and how many objects are left to address.

Bulk Task Recovery

If a failure occurs while the event is running, the main bulk task event shows as Failed. You can retry the bulk task event (through View Submitted Tasks) which causes CA Identity Manager to restart the bulk task at the place where the failure occurred.

Recurrence Tab

Use this tab to schedule your job. The fields in this tab are as follows:

Execute now

Runs the job immediately.

Schedule new job

Schedules a new job.

Modify existing job

Specifies that you want to modify a job that already exists.

Note: This field appears only if a job has already been scheduled for this task.

Job Name

Specifies the name of the job you want to create or modify.

Time Zone

Specifies the server time zone.

Note: If your time zone is different from the server's time zone, a drop-down box is displayed so you can select either your time zone or the server's time zone when scheduling a new job. You cannot change the time zone when modifying an existing job.

Daily schedule

Specifies that the job runs every certain number of days.

Every (number of days)

Defines how many days between job runs.

Weekly schedule

Specifies that the job runs on a specific day or days and time during a week.

Day of Week

Specifies the day or days of the week the job runs.

Monthly schedule

Specifies a day of week or day of month that the job runs on a monthly basis.

Yearly schedule

Specifies a day of week or day of month that the job runs on a yearly basis.

Advanced schedule

Specifies additional scheduling information.

Cron Expression

For information about filling out this field, see the following:

http://www.opensymphony.com/quartz/api/org/quartz/CronExpression.html

Execution Time

Specifies the time of day, in 24-hour format, that the job is run. For example, 14:15.

Use Case: Bulk User Changes

You want to perform a mass change so that all users in the Sales department will now be in the Purchasing department.

1. Under the Profile tab of Bulk Tasks, create a bulk task definition with the name Change To Purchasing.
2. Set the object type to user.
3. Select Modify User as the task to run.
4. Click Attributes and set the value of department to 'Purchasing.'
5. Under the Population tab, set 'department equals Sales'.
6. Select Execute Bulk Task to run the definition immediately.

Use Case: Using Attributes that Contain Dates

You want to create an automated process to disable temporary users twenty days before their termination date.

1. Under Bulk Tasks, create a bulk task definition with the name Disable Contractor.
2. Set the object type to User.
3. Set the task to perform as Disable User.
4. Enter the following values in the date filter:
   - Attribute: Termination Date
   - Operator: Before Today
   - Disposition: 20

   You can add any other attribute in the population filter, such as Employee Type = Contractor. In this case, only contractors are affected.

CA RCM Integration

CA Role & Compliance Manager (CA RCM) is an identity lifecycle management product that enables you to develop, maintain, and analyze role models. CA RCM also provides centralized identity compliance policy controls and automates processes associated with meeting compliance demands.

When you integrate CA Identity Manager and CA RCM, you can do the following:

- Validate that Identity Manager user privileges are granted in accordance with business security policies
- Get suggested roles and compliance checking when creating or modifying Identity Manager users, roles, and accounts
- Understand what roles exist in your organization, establish a role model that fits your organization, and re-create the desired role model within CA Identity Manager
- Analyze and maintain the role model as the business evolves

Change the CA RCM Export Administrator

To run tasks associated with the CA RCM export in Identity Manager, an administrative user is selected to run the task. Identity Manager selects an administrative user that has the System Manager role. If you want to change the administrative user to run CA RCM export tasks, go to System, CA RCM Configuration, Change Export Administrator and select a new user.

The selected user will be a member of the role associated with the web services configuration of CA RCM export. This user does not have to have a system manager role.

Define CA RCM Configuration

Use this task to modify a connection to a CA RCM server when CA Identity Manager integrates with CA RCM. You can also use this task to modify global Smart Provisioning settings, and to configure continuous updates.

The Define RCM Connection task contains three tabs:

- Connection Settings (see page 468)
- Smart Provisioning (see page 470)
- Continuous Update (see page 473)

Connection Settings

Use this tab to view connection settings for CA RCM and to disable that connection, if necessary.

Host

The fully qualified name or IP address of the system where CA RCM is installed.

Port

The port number for CA RCM.

User ID

The name for an account that has privileges to access CA RCM.

Password

The password for the account specified in the User ID field.

Secure Connection (HTTPS)

Enables an HTTPS connection between CA Identity Manager and CA RCM.

Note: You must have SSL configured to secure the connection between CA Identity Manager and CA RCM.

Test Connection

Use this button to test the connection between CA Identity Manager and CA RCM.

Universe

The name of the universe in CA RCM that CA Identity Manager communicates with.

A universe is a virtual location in CA RCM that encompasses the data collected from CA Identity Manager.

Note: You create a universe in the CA RCM Portal. For more information, see the *CA Role & Compliance Manager Portal User Guide*.

Enable Connection

Determines whether the connection to CA RCM is enabled for use.

Smart Provisioning Settings

Use this tab to enable Smart Provisioning functionality and set global defaults for suggested roles and compliance checking across all tasks.

Note: If any task must be configured differently than the global settings, you can adjust the settings at the task level. Task-level settings override global settings.

Enable Smart Provisioning

Enables Smart Provisioning functionality for the Identity Manager Environment.

Note: Smart Provisioning can be disabled even though a connection with CA RCM exists.

Global Tab Settings

Define configuration settings that apply to all tabs that support Smart Provisioning functionality.

You can override these global settings for certain tabs by specifying tab-level configuration when you modify the tab settings.

Analytics Suggest Search Screen

Defines the search screen used for the role suggest feature.

Display Advanced Suggestion Configuration for Results

Determines whether the Advanced Suggestion Configuration section appears on the results page of the role suggest feature, after a search is performed.

The Advanced Suggestion Configuration section allows administrators to enter new criteria for a suggested roles search. Administrators can select the type of criteria (Matched Rule and Matched Attributes).

Enable 'Matched Rules' Analytics by Default

Determines whether CA Identity Manager suggests provisioning roles if the current user matches the rule that determines membership in a CA RCM role.

You can override this default setting during the search using the Advanced Suggestion configuration screen.

Enable 'Matched Attributes' Analytics by Default

Determines whether CA Identity Manager suggests provisioning roles that other users who have similar profile attributes also have.

You can override this default setting during the search using the Advanced Suggestion configuration screen.

Display Weighted Score Column for 'Matched Attributes' Analytics

Determines the display of columns in the list of suggested provisioning roles. When this option is selected, CA Identity Manager displays the Weighted Score column, which indicates the highest score the suggested provisioning role received across all the criteria in the search.

Weighted Score Threshold for 'Matched Attributes' Analytics

Defines a threshold for 'Matched Attributes' search results returned by the suggest role feature. For each suggested role, CA RCM returns a score from 1 to 100 percent depending on the level of attribute matching. Roles suggested with a score less than the threshold are not displayed.

Note: Some Identity Manager attributes may be more important to you than others, therefore CA RCM allows you to customize the weight of any attribute in order to provide more useful analytics. For more information about setting attribute weights, see the *CA RCM Configuration Guide*.

Bulk Loader Task Settings

Define settings for the bulk loader task.

The Bulk Loader task allows you to create or modify many users at once. To avoid having to assign provisioning roles manually to each user one by one, you can enable Smart Provisioning on the Bulk Loader task. Smart Provisioning automatically assigns provisioning roles to each user based on suggestions from CA RCM.

Automatically Assign Roles that Match Rule

Determines if the Bulk Loader task uses ‘Matched Rules’ to search for roles. Any roles returned are automatically assigned.

Automatically Assign Roles that Match Attributes

Determines if the Bulk Loader task uses ‘Matched Attributes’ to search for roles. Any roles returned that exceed the Weighted Score Threshold are automatically assigned.

Weighted Score Threshold for 'Matched Attributes' Analytics

Defines a threshold for 'Matched Attributes' search results returned by the suggest role feature. For each suggested role, CA RCM returns a score from 1 to 100 percent depending on the level of attribute matching. Roles suggested with a score less than or equal to the threshold are not assigned.

Note: Some Identity Manager attributes may be more important to you than others, therefore CA RCM allows you to customize the weight of any attribute in order to provide more useful analytics. For more information about setting attribute weights, see the *CA RCM Configuration Guide*.

Compliance Settings

Define settings for enabling Out of Compliance analytics for all tasks.

Out of Compliance Analytics Level

Determines the level of information from the CA RCM compliance analysis that CA Identity Manager displays.

You can set the following levels:

- No Analytics
- Issue Info Messages
- Issue Warning Messages
- Issue Error Messages

Note: For more information about the behavior of the different levels, see Types of Violations.

Out of Compliance Severity Threshold

Indicates the minimum severity score of compliance violations to display. For example, if you specify 75, CA Identity Manager only displays compliance violations that have a severity score of 75 or above.

This setting limits the number of compliance violations that appear for the task.

If Issue Error Messages is selected, this setting also affects which tasks can be submitted. For example, if you set the cutoff to skip errors with low scores, users can submit tasks that contain errors.

Enforce Compliance Check on Submit

When selected, compliance checks occur automatically when a task is submitted. Users do *not* have to manually select the Check Compliance button to see compliance violations.

Note: If enabled, tasks executed by TEWS also enforce compliance checks on submit. This option does not apply to bulk loader tasks.

Continuous Update Settings

When Smart Provisioning functionality is enabled, CA Identity Manager notifies CA RCM of changes at frequent intervals, instead of waiting for an import from CA Identity Manager to CA RCM. Continuous updates, which are sent using web services, provide CA RCM with the most current Identity Manager information.

When a provisioning role, account, or account template change occurs, CA Identity Manager generates a notification and adds it to a queue. At specified intervals, CA Identity Manager creates an aggregate notification with all the information in the queue (up to the maximum batch size) and sends it to CA RCM.

Define the following settings for continuous update:

Post Notifications to Queue

Enables the queuing of notifications for all Identity Manager tasks that complete successfully. If you clear this check box, no notifications are queued to be sent to CA RCM.

Note: This check box can be selected even if the CA RCM connection is disabled, meaning notifications are queued until the connection is re-established.

Send Queued Notifications

Enables the sending of notifications queued up in the analytics queue. If you clear this check box, CA Identity Manager suspends the sending of notifications to CA RCM. If the CA RCM connection is disabled, no notifications from the analytics queue are sent to CA RCM. If the Queue Notification check box is cleared, this check box is cleared also. No notifications can be sent if you do not queue the notifications.

Note: You may want to disable the sending of notifications if the CA RCM Server is unavailable.

Maximum Notification Batch Size

Defines the maximum number of notifications that are read from the queue and sent to CA RCM in a batch for that interval.

Default: 1000 notifications

Notification Batch Transmit Interval

Specifies the interval in seconds, minutes, or hours between times when CA Identity Manager sends a batch of notifications from the queue to CA RCM.

Default: 59 seconds

Minimum: 1 second

JDBC Connection Management

Information for CA Identity Manager reports can come from multiple sources and each report should be associated with a specific data source, depending on the information you want to view in the report.

To establish different data sources for reporting (such as an auditing database or task persistence database), create a connection managed object in CA Identity Manager. After creating the connection, you can associate a report with a specific connection managed object by modifying the report task and setting the Connection Object for the Report under the report task's search tab.

Create JDBC Connection

Use the following steps to provide connection details within CA Identity Manager.

To create a JDBC Connection

1. Click System, JDBC Connection Management, Create JDBC Connection.
2. Create a new connection object, or choose a connection object based on a specific JNDI data source.
3. Complete all the necessary fields, and click Submit.

   A new JDBC Connection is created.

Logical Attribute Handlers

CA Identity Manager logical attributes allow you to display user store attributes (called physical attributes) in a user-friendly format on task screens. CA Identity Manager administrators use task screens to perform functions in CA Identity Manager. Logical attributes do not exist in a user store. Typically, they represent one or more physical attributes to simplify presentation. For example, the logical attribute date may represent the physical attributes month, day, and year.

Logical attributes are processed by logical attribute handlers, which are Java objects that are written using the Logical Attribute API. (See the *Programming Guide for Java*.) For example, when a task screen is displayed, a logical attribute handler might convert physical attribute data from the user store into logical attribute data, which is displayed on the task screen. You can use pre-defined logical attributes and logical attribute handlers included with CA Identity Manager, or create new ones using the Logical Attribute API.

Note: For more information on logical attributes, see the *Programming Guide for Java*.

In the User Console, the Environment category contains tasks for managing logical attribute handlers. The list includes pre-defined handlers shipped with CA Identity Manager and any custom handlers defined at your site.

From the Environment task category, you can do the following:

- Create a new logical attribute handler with CA Identity Manager
- Copy a handler
- Delete a handler
- Modify an existing handler configuration

Note: To change the order of execution for logical attribute handlers, use the Management Console.

Create a Logical Attribute Handler

To create a logical attribute handler

1. Select System, Create Logical Attribute Handler.
2. In the Create Logical Attribute Handler screen, select Create Standard Logical Attribute Handler and click OK.
3. In the Create Logical Attribute Handler screen, configure the settings for the logical attribute handler.

   For a description of each field, click the Help link from this screen.
4. Click Submit.

   The handler is added to the list of handlers on the Logical Attribute Handlers screen.

Note: You do not need to restart the application server after configuring logical attribute handlers using the User Console.

Copy a Logical Attribute Handler

To copy a logical attribute handler

1. Select System, Create Logical Attribute Handler.
2. In the Create Logical Attribute Handler screen, select Create a copy of a logical attribute handler definition and click Search.
3. Select a logical attribute handler (for example, ConfirmPasswordHandler) and click OK.

4. In the Create Logical Attribute Handler screen, configure the settings for the logical attribute handler.

   For a description of each field, click the Help link from this screen.

5. Click Submit.

   The handler is added to the list of handlers on the Logical Attribute Handlers screen.

Note: You do not need to restart the application server after configuring logical attribute handlers using the User Console.

Create a ForgottenPasswordHandler Logical Attribute Handler

The ForgottenPasswordHandler logical attribute handler uses separate logical attributes for the following:

- configuration
- runtime questions and answers

To create a ForgottenPasswordHandler logical attribute handler

1. Select System, Create Logical Attribute Handler.
2. In the Create Logical Attribute Handler screen, select Create Standard Logical Attribute Handler and click Search.
3. Select the ForgottenPasswordHandler and click OK.
4. In the Create Logical Attribute Handler: ForgottenPasswordHandler screen, configure the settings for the logical attribute handler.

   For a description of each field, click the Help link from this screen.

5. Click Submit.

   The handler is added to the list of handlers on the Logical Attribute Handlers screen.

Note: You do not need to restart the application server after configuring logical attribute handlers using the User Console.

Delete a Logical Attribute Handler

To delete a logical attribute handler

1. Select System, Delete Logical Attribute Handler.
2. In the Delete Logical Attribute Handler screen, select the check box to the left of each logical attribute to delete.

3. Click Select.

   CA Identity Manager displays a confirmation message.

4. Click Yes to confirm the deletion.

Modify a Logical Attribute Handler

To modify a logical attribute handler

1. Select System, Modify Logical Attribute Handler**.**
2. In the Modify Logical Attribute Handler screen, select the handler that you want to modify and click Select.
3. Select a logical attribute handler (for example, ConfirmPasswordHandler) and click OK.
4. In the Modify Logical Attribute Handler screen, configure the settings for the logical attribute handler.

   For a description of each field, click the Help link from this screen.

5. Click Submit.

Note: You do not need to restart the application server after configuring logical attribute handlers using the User Console.

View a Logical Attribute Handler

To view a logical attribute handler

1. Select System, View Logical Attribute Handler**.**
2. In the View Logical Attribute Handler screen, select the handler that you want to view and click Select.
3. View the logical attribute handler's properties and click Close.

Select Box Data

You can populate the options that are available in the following fields:

- Check Box Multi-Select
- Dropdown
- Dropdown Combo
- Multi-Select
- Option Selector

- Option Selector Combo
- Radio Button Single-Select
- Single-Select

These options are stored in Select Box Data XML files. For example, you can use the Select Box Data XML files to populate options for a City or State drop down box on a Profile tab for the Create User task.

You can also use the Select Box Data XML file to configure a dependency between two fields in an admin task. For example, the options that are available in the City field may depend on the option a user chooses in the State field.

Note: For more information about select box data, see the *User Console Design Guide.*

Bulk Loader

You can use the Bulk Loader tab to upload feeder files that are used to manipulate large numbers of managed objects simultaneously. For example, you can create 1000 users in CA Identity Manager manually, or you can use the Bulk Loader. The advantage of the Bulk Loader method is that you can automate the process of manipulating many managed objects using an information (feeder) file. The Bulk Loader task can also be mapped to a workflow process.

Note: For more information about how to map a Bulk Loader task to workflow, see the Workflow Overview (see page 317).

A Bulk Loader Client exists for batch processing. We recommend using the Bulk Load Client if your CA Identity Manager environment is in a cluster (for load-balancing purposes). The Bulk Loader Client can be found on the Provisioning Components media.

How to Use the Bulk Loader

Perform the following steps to manipulate a large number of users, groups, or organizations.

1. Create a CSV or XLS feeder file.
2. Upload the feeder file.
3. Configure the Loader Records Details.

   This tab allows you to specify the action and identifier fields in the feeder file.
4. Provide the Loader Actions Mapping.

   This tab allows you to select the primary object and specify what task to execute for the action on an object.

5. Provide the Loader Notification Details.

   This tab allows you to select users to certify Bulk Loader task changes.

6. View and modify the progress of the Bulk Loader task from View Submitted Tasks under the System tab.

Note the following:

- If the Identity Manager Server goes down during a long-running task, such as uploading a large number of objects, restart the task under View Submitted Tasks. When the task restarts, it begins from the last successfully executed record.
- If you are using LDAP as a user store with Solaris, the Bulk Loader can hang during import. To fix this issue, see the Specify LDAP Connection Settings topic in the *Configuration Guide* and apply the settings outlined there.

Create a Feeder File

Each feeder file contains data that can be used to manage large numbers of primary objects automatically.

To create a feeder file

1. Create a CSV or XLS file using a text editor. Use the appropriate file format (see page 479).
2. Save the file.

   You can upload this file into the Environment where you want to manipulate large numbers of primary objects.

Feeder File Format

A Bulk Loader file is used to automate repeated actions performed on a large number of managed objects. When you upload a feeder file, CA Identity Manager parses and reads the feeder file.

The feeder file must have a CSV or XLS extension, and have the following properties:

- The file must contain a header line which specifies physical attributes, logical attributes, or well-known attribute names of a managed object.
- The header line must include a column that indicates the action to be performed on the records.
- Each row in the feeder file is named a record. The records contain the values for each of the attributes specified by the header line. The following options are acceptable values for an attribute:
  - Value—the attribute is set to the value you specify.
  - Value;Value;Value;...—the attribute is set to the multivalued attribute you specify.

- ' ' (blank)—the attribute is not changed.
- NULL—the attribute is deleted. The deletion sequence is set to NULL by default, but can be edited in the Bulk Loader File Upload Search screen.

Note: To use a hash (#) in the feeder file, enclose the hash mark in double quotes, for example, user#1 should be specified as "user#1".

Important! The feeder file must be saved with UTF-8 encoding.

Example Feeder File

Example CSV Feeder File

```
action,%USER_ID%,%FIRST_NAME%,%LAST_NAME%,%FULL_NAME%,%PASSWORD%,%EMAIL%
create,JD,John,Doe,John Doe,test,Johndoe@a.com
Modify,MD,Jane,Doe,Jane Doe,test,Marydoe@a.com
create,BD,Baby,Doe,Baby Doe,test,Babydoe@a.com
```

In the preceding code, the feeder file has the following properties:

Header

The first line of the code is the header line. The header line has physical attributes or well-known attributes for the managed object 'User'.

Action

The action column identifies the task to be performed for each record. For example, the preceding file specifies that a 'create' action should be performed on the First Name 'John'.

Loader Records Details Tab

The Loader Records Details tab displays a short preview of the records available in your feeder file. The preview table displays a maximum of 5 records. The preview table is to help users identify if they are uploading the correct file. Also, this tab allows you to identify the action you want to perform on the managed objects specified in your feeder file. You must complete the following fields:

What field represents the action to perform on the object?

Identifies the fields from the feeder file that mention the action you want to perform on the managed objects. For example, you can use a feeder file with a field 'action' that takes the values Create, Modify, and Delete. You must map each of these actions to an admin task in Loader Actions Mapping (see page 481).

What field will be used to uniquely identify the object?

Identifies the field from the feeder file that can uniquely identify the primary object.

Note: If the feeder file has an invalid header line, the feeder file records will not be displayed in the Loader Records Details tab. Select another feeder file in the case of invalid header lines. If the feeder file contains some invalid records, the detailed status of the upload will be in View Submitted Tasks under the System tab.

Loader Actions Mapping Tab

The Loader Actions Mapping tab allows you to select a primary object on which the actions specified in the feeder file will be performed. You must also map the actions from the feeder file to admin tasks for the selected primary object.

What is the Primary Object?

Identifies the primary object to be manipulated by CA Identity Manager using the feeder file. You can select any one of the following primary objects:

- User
- Groups
- Organization

Select a task to execute for 'action'

Identifies the admin tasks to be performed for each action specified by the feeder file, such as the Delete or Modify tasks.

Note: You have to map all the actions in the feeder file to an admin task. Also, the admin tasks displayed in this field are dependent on the primary object selected. For example, if you select 'User' as the primary object, only the admin tasks related to 'User' are displayed.

Select a task for non-existing object for 'action'

Identifies the alternate admin tasks to be performed for an action specified in the feeder file in the event that the managed object does not yet exist within CA Identity Manager, such as the Create task.

Loader Notification Details Tab

Important! By default, this tab isn't included in the Bulk Loader wizard. You must add it manually by modifying the Bulk Loader task and adding the Loader Notification Details tab. Also, this tab requires you to enable workflow in the environment.

The Loader Notification Details tab allows you to select certification managers for the Bulk Loader task. When a Bulk Loader task completes, CA Identity Manager creates a Bulk Loader Notification for all certification managers configured for the task. This notification appears in the Home tab under Bulk Loader Notifications. Clicking on the notification displays details for tasks initiated by the bulk load operation. Certification managers can then review and acknowledge the changes detailed in the notifications.

Note: To provide a list of certification managers, use any of the available participant resolvers in the drop-down list. For more information about Participant Resolvers, see the Workflow section of this guide.

Acknowledge Bulk Loader Task Changes

The Bulk Loader Notifications contain details on all the changes that the Bulk Loader task initiated. Certification managers can review and acknowledge any changes initiated by a Bulk Loader task.

To review and acknowledge Bulk Loader task changes

1. Log in to the User Console as a user that is listed as a certification manager for a Bulk Loader task.
2. Go to Home, View my Bulk Loader Notifications.
3. Select the Bulk Loader Notification you want to review.

   The Manage Bulk Loader Notifications screen appears and displays a table listing all the Bulk Loader task changes that were initiated.

   From this screen, you can do the following:

   - To review specific task details for a create or modify object, click the hyperlink under the Description column.
   - If there are compliance violations, or if you want to remove a role that was added to a user, you can edit the user directly from the notification screen by clicking the Edit icon next to the User ID.
   - To review any roles added to a user, click the hyperlink under the Requested Role Assignments column associated with the User ID.

4. Once you have reviewed all the changes for a specific object, select the Acknowledge check box for that object.

5. Once you are done acknowledging changes, click Acknowledge to remove all selected change notifications from the list.

   Note: You can select Acknowledge All to acknowledge all of the changes in a Bulk Loader notification. This deletes the Bulk Loader Notification from the Home tab. Also, you can select the check box at the top of the Acknowledge column to select all of the change notifications on the screen at that time, and acknowledge changes screen by screen.

   When all user changes associated with a Bulk Loader task are acknowledged, the Bulk Loader Notification disappears from the Home tab.

Enable Email Notification for Feeder Tasks

To set email notifications for Bulk Loader tasks as part of a workflow process, enable email notifications in the Management Console for the BulkLoader Event or the Bulk Loader task.

Note: For more information about Email Notifications, see the Management Console Online Help.

Schedule a Bulk Loader Task

The Bulk Loader task can be scheduled in CA Identity Manager. To schedule the Bulk Loader task, add a Scheduler tab (see page 64) to the task.

Modify the Parser File for the Bulk Loader

To modify the parser CA Identity Manager uses to parse feeder files, configure the corresponding admin task.

To modify the Bulk Loader admin task

1. Click Roles and Tasks, Admin Tasks, Modify Admin Task.

2. Search for the Bulk Loader task.

3. Select the Bulk Loader task, and click Select.

4. Select the Search tab for the Bulk Loader task.

5. Click Browse to locate search screens.

   The list of available search screens is displayed.

6. Select a Search screen and click Edit.

   The Search screen details appear.

7. (Optional) Edit the Parser Fully Qualified Name.

   The Parser Fully Qualified Name must match the name of your parser file.

   Note: For more information about creating a custom CSV parser, see the Javadoc for the FeederParser class. If you use JBoss as your application server and you create a custom parser, the custom parser file must be in the iam_im.ear/user_console_war/WEB-INF/classes directory.

8. Click OK.

Web Service Support for the Bulk Loader

The Bulk Loader has a web service API that can be called using the CA Identity Manager Task Execution Web Service (TEWS) interface. TEWS allows client applications to submit remote tasks to CA Identity Manager for execution. This interface implements the WSDL and SOAP open standards to provide remote access to CA Identity Manager.

CA Identity Manager includes Java client samples that demonstrate calling the Bulk Loader as a web service. The Java samples are located in the following source file:

admin_tools\samples\WebService\Axis\optional\ObjectsFeeder.java

Data samples and documentation for calling the Bulk Loader as a web service are located in the following directory:

admin_tools\samples\Feeder\

Note: For more information, see the *Programming Guide for Java*.

Bulk Loader Memory Considerations

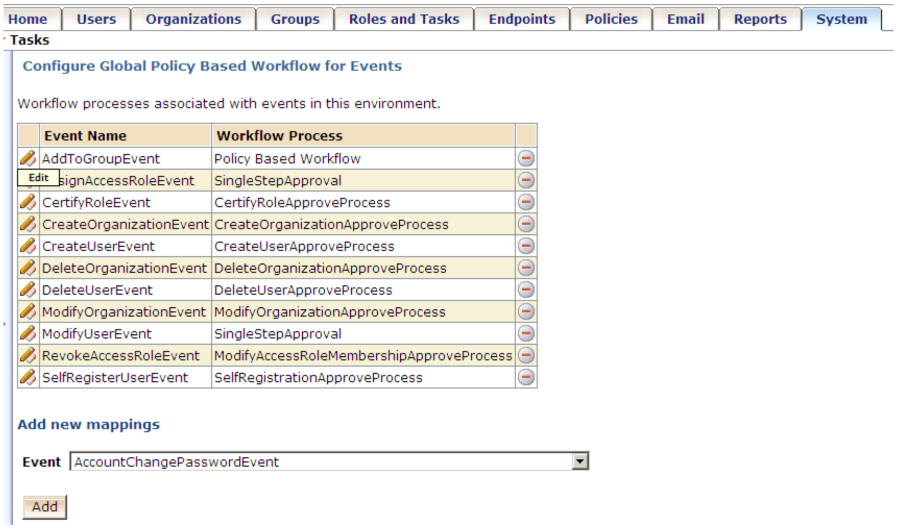
If you use the Bulk Loader to import a large number of users, you may see out-of-memory exceptions. To address this issue, tune the following heap size memory parameters:

- -Xmx
- -XX:maxPermSize

Note: For more information about tuning memory parameters, see your application server documentation.

Configure Global Policy Based Workflow for Events Task Screen

The Configure Global Policy Based Workflow for Events tasks lets an administrator configure policy or non-policy based workflow for all events in the current environment. Clicking the task displays the default event mapping to workflow process definitions. Each event mapping can be modified or deleted, and new event mappings can be added for events that have not been configured.



Configure Global Policy Based Workflow for Events

Workflow processes associated with events in this environment.

Event Name	Workflow Process
AddToGroupEvent	Policy Based Workflow
signAccessRoleEvent	SingleStepApproval
CertifyRoleEvent	CertifyRoleApproveProcess
CreateOrganizationEvent	CreateOrganizationApproveProcess
CreateUserEvent	CreateUserApproveProcess
DeleteOrganizationEvent	DeleteOrganizationApproveProcess
DeleteUserEvent	DeleteUserApproveProcess
ModifyOrganizationEvent	ModifyOrganizationApproveProcess
ModifyUserEvent	SingleStepApproval
RevokeAccessRoleEvent	ModifyAccessRoleMembershipApproveProcess
SelfRegisterUserEvent	SelfRegistrationApproveProcess

Add new mappings

Event AccountChangePasswordEvent

The fields on this screen are as follows:

Workflow processes associated with events in this environment.

Specifies the workflow processes associated with approval policies.

Add New Mappings

Specifies an approval policy to map to a workflow process.

Add Button

Adds the new mapping.

Adding or modifying a mapping opens the Workflow Mapping screen where you can select the process mappings and approval policies. The behavior is the same as the event level workflow configuration. Clicking the Add button on the Workflow Mappings page brings up another page where you can configure an approval policy.

More Information

How to Configure Policy-Based Workflow for Events (see page 385)
How to Configure an Approval Policy (see page 388)

Task Status in Identity Manager

Administrators may want to track the status of CA Identity Manager tasks once they are submitted for processing. CA Identity Manager provides the following methods for viewing task status:

- **View Submitted Tasks Tab**

  This tab allows you to search for and display CA Identity Manager tasks that have been submitted for processing.

  Administrators can view task details at a high level or view additional levels of detail.

  The View Submitted Tasks tab is included in two default tasks:

  - View My Submitted Tasks

    Allows administrators to search for and display information about tasks that they submitted for processing.

  - View Submitted Tasks

    Allows administrators to search for and display information about tasks that other administrators have submitted for processing.

- **User History Tab**

  This tab, which you can add to user tasks, such as View or Modify User, lets administrators view the following information for a selected user:

  - Tasks performed on the user
  - Tasks performed by the user
  - Workflow approvals by the user

- **Reports**

  CA Identity Manager reports enable you to see the current state of an Identity Manager environment. You can use this information to ensure compliance with internal business policies or external regulations.

  Reporting (see page 277) provides additional information about setting up and using reports.

- **Logs**

  Display information about all of the components in an CA Identity Manager installation, and provide details about all operations in CA Identity Manager.

  See the *Configuration Guide* for more information about CA Identity Manager logs.

How Identity Manager Determines Task Status

A *task* is an administrative function that a user can perform in CA Identity Manager. Tasks include *events*, actions that CA Identity Manager performs to complete the task. A task may include multiple events. For example, the Create User task may include events that create the user's profile, adds the user to a group, and assigns roles.

CA Identity Manager tasks and events can be associated with a workflow process, which determines how CA Identity Manager performs the required actions, and other custom business logic. Tasks may also be associated with other tasks, called nested tasks. In this case, CA Identity Manager processes the nested tasks with the original task.

The status of a task depends on the status of its associated events, workflow processes, nested tasks, and custom business logic.

The View Submitted Tasks Tab

CA Identity Manager includes a View Submitted Tasks tab that provides information about tasks in an Identity Manager environment. You can use this tab to search for and view high-level details about actions that Identity Manager performs. Detail screens provide additional information about each task and event.

Depending on the status of the task, you can use View Submitted Tasks to cancel or resubmit a task.

The View Submitted Tasks tab allows you to track the processing of a task from beginning to end. For example, if a CA Identity Manager task includes provisioning role assignment, and that assignment triggers the creation of accounts in other systems, The View Submitted Tasks tab displays all of the details of the original task and the details of the account creations.

View Submitted Tasks includes details of operations performed on the Provisioning Server. These operations could be the result of a CA Identity Manager event, such as EnableUserEvent. The notifications sent by the Provisioning Server are grouped under this event. View Submitted Tasks displays a message indicating the notifications are In Progress until the End Detail notification is sent. Then, the message changes to Completed.

For the operations that originate in Provisioning Manager, the notifications for operation details are not grouped. They show up along with other tasks in View Submitted Tasks. If the operations cause no change to the endpoint account, the provisioning server sends no notifications to the Identity Manager Server.

By default, CA Identity Manager includes the View Submitted Tasks tab in two tasks:

- View Submitted Tasks
- View My Submitted Tasks

Search for Submitted Tasks

Perform the following steps to search for submitted tasks.

To search for submitted tasks

1. Click System, View Submitted Tasks.

   The View Submitted Tasks page appears.

2. Specify search criteria, enter the number of rows to be displayed, and click Search.

   The tasks that satisfy your search criteria are displayed.

   Note: For more information on specifying attributes in the search criteria, see Search Attributes for Viewing Submitted Tasks (see page 489).

Search Attributes for Viewing Submitted Tasks

To review tasks that have been submitted for processing, you can use the search feature in View Submitted Tasks. You can search for tasks based on the following criteria:

Initiated By

Identifies the name of the user who has initiated a task as the search criteria. Searches are based on the user name. To ensure that you entered a valid user name, use the Validate button.

Approval Tasks Performed By

Identifies the name of the task approver as the search criteria. Searches are based on the user name. To ensure that you entered a valid user name, use the Validate button.

Note: If you select Approval Tasks Performed By criteria to filter the tasks, the Show approval tasks criteria is also enabled by default.

Task Name

Identifies the task name as the search criteria. You can refine the search by specifying conditions such as equals, contains, starts with, or ends with the value of the Where Task Name field. For example, you can specify the search criteria "task name equals Create User" by selecting the equals condition, and entering Create User in the text field.

Task Status

Identifies task status as the search criteria. You can select the task status by enabling Where task status equals, and selecting the condition. You can further refine the search based on the following conditions:

- Completed
- In Progress
- Failed
- Rejected
- Partially Completed
- Cancelled
- Scheduled

Note: See Task Status Description (see page 491) for more information.

Task Priority

Identifies task priority as the search criteria. You can select the task priority by enabling Where task priority equals, and selecting the condition. You can further refine the search based on the following conditions:

Low

Specifies that you can search for tasks that have a low priority.

Medium

Specifies that you can search for tasks that have a medium priority.

High

Specifies that you can search for tasks that have a high priority.

Performed On

Identifies tasks that are performed on the selected instance of the object. If you do not select an instance of the object, the tasks that were performed on all the instances of that object will be displayed.

Note: This field appears only when the Configure Performed On field is populated in the Configure Submitted Tasks screen. You use this screen to configure the Submitted Tasks tab. See the online help for that screen for more information.

Date range

Identifies the dates between which you want to search submitted tasks. You must provide the From and To dates.

Show unsubmitted tasks

Identifies the tasks in the Audited state. Identifies the tasks that have initiated other tasks or tasks that have not been submitted. All such tasks will be audited and displayed if you select this tab.

Show approval tasks

Identifies the tasks that have to be approved as part of a workflow.

Search archive of submitted tasks

Identifies the submitted tasks that have been archived.

More Information:

Task Status Description (see page 491)

Task Status Description

A submitted task exists in one of the states described below. Based on the state of the task, you can perform actions such as cancelling or resubmitting a task.

Note: To cancel or resubmit a task, you must configure View Submitted Tasks to display the cancel and resubmit buttons based on the tasks status. For more information on cancelling and resubmitting tasks, see Customize the View Submitted Tasks Tab (see page 494).

In progress

Displayed when any of the following occurs:

- Workflow is initiated but not yet completed
- Tasks, which are initiated before the current tasks, are in progress
- Nested tasks are initiated but not yet completed
- The primary event is initiated but not yet completed
- Secondary events are initiated but not yet completed

You can cancel a task in this state.

Note: Cancelling a task will cancel all the incomplete nested tasks and events for the current task.

Cancelled

Displayed when you cancel any of the tasks or events in progress.

Rejected

Displayed when Identity Manager rejects an event or task that is part of a workflow process. You can resubmit a rejected task.

Note: When you resubmit a task, Identity Manager will resubmit all the failed or rejected nested tasks and events.

Partially Completed

Displayed when you cancel some of the events or nested tasks. You can resubmit a partially completed event or nested task.

Completed

Displayed when a task is completed. A task is completed when the nested tasks and nested events of the current task are completed.

Failed

Displayed when a task, nested task, or event nested in the current task are invalid. This status is displayed when the task fails. You can resubmit a failed task.

Scheduled

Displayed when the task is scheduled to execute at a later date. You can cancel a task in this state.

Audited

Displayed when the current task is audited.

View Task Details

CA Identity Manager provides task details, such as the status of a submitted task, nested tasks, and events associated with a task.

To view details of a submitted task

1. Click the right arrow icon next to the selected task in the View Submitted Tasks tab.

   The task details appear.

   Note: Events and nested tasks (if any) are displayed in the Task Details page. You can view the task details for each of the tasks and events.

2. Click Close.

   The Task Details tab closes and CA Identity Manager displays the View Submitted Tasks tab with the tasks list.

View Event Details

CA Identity Manager provides events details, such as the status of a submitted event, event attributes, and any additional information about the events.

To view details of a submitted event

1. Click the right arrow icon next to an event in the View Task Details page.

   The event details appear.

2. Click Close.

   The Event Details page is closed.

Description of Event Status

Events in CA Identity Manager can be in one of the states described below. Based on the event status, you can cancel or resubmit an event for execution.

Note: To allow administrators to cancel or resubmit an event, you must configure View Submitted Tasks to display the Cancel and Resubmit Events buttons. When you configure the task, you can specify which administrators can cancel and resubmit events. For more information on cancelling and resubmitting events, see Customize the View Submitted Tasks Tab (see page 494).

In progress

Displayed when any of the following occurs:

- Workflow or pre-events are initiated, in progress, or approved
- CA Identity Manager is executing the event
- CA Identity Manager executes post events

You can cancel an event in this state.

Rejected

Displayed when CA Identity Manager rejects an event that is part of the workflow. You can resubmit a rejected event.

Cancelled

Displayed when you cancel any of the events in progress. You can resubmit a cancelled event.

Completed

Displayed when an event is completed.

Failed

Displayed when CA Identity Manager encounters an exception during execution of an event. You can resubmit a cancelled event.

Note: You cannot resubmit a secondary event until the primary event is in the completed state.

Scheduled

Displayed when the event is scheduled to execute at a later date. You can cancel an event in this state.

Audited

Displayed when the current event is audited.

Customize the View Submitted Tasks Tab

You can customize the View Submitted Tasks tab as follows:

- Specify a different task name and tag.
- Change the default display properties. As installed, users see a search screen where they can enter criteria that determine the tasks that appear in the tab. You can configure the tab to automatically display the submitted tasks for a current day, preventing users from having to enter search criteria.
- Determine whether audit events appear in the Task Details page.
- Add an additional column to the task display.
- Specify the criteria for cancelling or resubmitting tasks and events.

Note: Certain task and event details may include data, such as salaries or passwords, that should not be displayed in clear text in the View Submitted Tasks tab. You can hide those attributes by specifying data classification parameters when you define the attributes in the directory.xml file. For more information about the directory.xml file, see the *Configuration Guide*.

You can configure the View Submitted Tasks tab by modifying the corresponding admin task.

To configure the View Submitted Tasks tab

1. Click Roles and Tasks, Admin Tasks, Modify Admin Tasks.

   The Select Admin Task page appears.

2. Select Name or Category in the Search Admin Task where field, enter the string you want to search, and click Search.

   CA Identity Manager displays the admin tasks that satisfy the search criteria.

3. Select View Submitted Tasks, and click Select.

   CA Identity Manager displays the task details for the View Submitted Tasks admin task.

4. Click the Tabs tab.

   The tabs that are used for View Submitted Tasks tab are displayed.

5. Click the right arrow icon to edit the Submitted Tasks tab.

   The tab details appear.

6. Edit the fields to customize the View Submitted Tasks tab as needed. See Configuration Settings for the Submitted Tasks tab (see page 495).

Configuration Settings for the View Submitted Tasks Tab

Use the following fields to change the appearance and functionality of the View Submitted Tasks tab.

Name

Defines the name of the task.

Tag

Defines a unique identifier for the task. It is used in URLs, web services or properties files. It must consist of letters, numbers, or underscores, beginning with a letter or underscore.

Hide Tab

Identifies that the tab is visible to the users, but will not be executed. If you select this option, Identity Manager will display an error to the users.

Show task lists on load

Displays the tasks that have been submitted for the current day.

Note: If you have enabled this option, users clicking on View Submitted Tasks will directly see the tasks that were submitted on the same day.

Show audit events

Specifies if audited events are included in tasks in the View Submitted Tasks page.

Allow custom column

Indicates that you can append a custom column to the tasks table that you can view from the View Submitted Tasks tab and the User History tab. For example, you can append a column "User ID" to the tasks table that is displayed on the User History tab.

Custom column heading

Indicates the display name of the custom column.

Custom column attribute

Indicates the attribute that will be used to populate the custom column in the tasks table. For example, if you are searching for tasks that are performed on employees of an organization, you can append an organization column that displays the organization for each of the employees.

Cancel Tasks and Events

Identifies the criteria for canceling tasks or events. You can set the scope for this field by selecting one of the following options:

Task creator must be current user

Identifies that you can cancel or resubmit tasks or events that you have created.

Task creator must be in scope

Identifies that you can cancel or resubmit tasks that have been initiated by other users who match the user scope rules for the admin role that gives you access to the tab.

For example, you received the User Manager role, which includes View Submitted Tasks, because you met the criteria in a membership rule that includes scope over all users in the Employee organization. You can cancel or resubmit tasks that are submitted by all users in the Employee organization.

No restrictions

Identifies that any user can cancel or resubmit a task or event.

Not allowed

Specifies that a task or event cannot be cancelled or resubmitted.

Resubmit Tasks and Events

Identifies the criteria for resubmitting a task or event. You can set the scope of this field by selecting one of the following options:

Task creator must be current user

Identifies that you can cancel or resubmit tasks or events that you have created.

Task creator must be in scope

Identifies that you can cancel or resubmit tasks that have been initiated by other users who match the user scope rules for the admin role that gives you access to the tab.

For example, you received the User Manager role, which includes View Submitted Tasks, because you met the criteria in a membership rule that includes scope over all users in the Employee organization. You can cancel or resubmit tasks that are submitted by all users in the Employee organization.

No restrictions

Identifies that any user can cancel or resubmit a task or event.

Not allowed

Specifies that a task or event cannot be cancelled or resubmitted.

User History Tab

The User History tab allows you to view tasks that are related to a user. The task details that are displayed in this tab can also be viewed in the View Submitted Tasks tab.

Note: You cannot add this tab to create tasks, such as Create User.

You can use this tab to view a history of the following tasks:

- **Tasks performed on the user**

  Displays all the tasks that are performed on the selected user.

- **Tasks performed by the user**

  Displays all the tasks that are performed by the selected user.

- **Workflow approvals by the user**

  Displays all the tasks that the user has approved as part of a workflow.

Note: The type of tasks that you can view in this tab depend on the tab's configuration. Customize the User History Tab (see page 498) provides more information.

Search Attributes for Viewing User History

To review tasks that have been submitted for processing, you can use the search feature in View Submitted Tasks. You can search for tasks based on the following criteria:

Task Name

Identifies the task name as the search criteria. You can refine the search by specifying conditions such as equals, contains, starts with, or ends with the value of the Where Task Name field. For example, you can specify the search criteria, task name equals Create User by selecting the equals condition, and entering Create User in the text field.

Task Status

Identifies task status as the search criteria. You can select the task status by enabling Where task status equals, and selecting the condition. You can further refine the search based on the following conditions:

- Completed
- In Progress
- Failed
- Rejected
- Partially Completed
- Cancelled
- Scheduled

Note: See Task Status Description (see page 491) for more information.

Task Priority

Identifies task priority as the search criteria. You can select the task priority by enabling Where task priority equals, and selecting the condition. You can further refine the search based on the following conditions:

Low

Specifies that you can search for tasks that have a low priority.

Medium

Specifies that you can search for tasks that have a medium priority.

High

Specifies that you can search for tasks that have a high priority.

Date range

Identifies the dates between which you want to search submitted tasks. You must provide the From and To dates.

Customize the User History Tab

Administrators can customize the User History tab as follows:

- Specify a different task name and tag.
- Change the default display properties. As installed, users see a search screen where they can enter criteria that determines the tasks that appear in the tab. Administrators can configure the tab to automatically display the tasks for a current day, preventing users from having to enter search criteria.

- Determine whether audit events appear in the Task Details page.
- Add an additional column to the task display.
- Specify the criteria for cancelling or resubmitting tasks and events.

To configure the User History tab

1. Click Roles and Tasks, Admin Tasks, Modify Admin Tasks.

   The Select Admin Task page appears.

2. Select Name or Category in the Search Admin Task where field, enter the string you want to search, and click Search.

   Identity Manager displays the admin tasks that satisfy the search criteria.

3. Select the task that includes the User History tab, and click Select.

   CA Identity Manager displays the task details for the admin task.

4. Click the Tabs tab.

5. Click the Edit icon (✎) next to the User History tab.

   The tab details appear.

6. Edit the fields to customize the User History tab.

   See

Configuration Settings for the User History Tab

Use the following fields to change the appearance and functionality of the User History tab.

Name

Defines the name of the task.

Tag

Defines a unique identifier for the task. It is used in URLs, web services or properties files. It must consist of letters, numbers, or underscores, beginning with a letter or underscore.

Hide Tab

Identifies that the tab is visible to the users, but will not be executed. If you select this option, Identity Manager will display an error to the users.

Show task lists on load

Displays the tasks that have been submitted for the current day.

Note: If you have enabled this option, users clicking on View Submitted Tasks will directly see the tasks that were submitted on the same day.

Show audit events

Specifies if audited events are included in tasks in the View Submitted Tasks page.

Allow custom column

Indicates that you can append a custom column to the tasks table that you can view from the View Submitted Tasks tab and the User History tab. For example, you can append a column "User ID" to the tasks table that is displayed on the User History tab.

Custom column heading

Indicates the display name of the custom column.

Custom column attribute

Indicates the attribute that will be used to populate the custom column in the tasks table. For example, if you are searching for tasks that are performed on employees of an organization, you can append an organization column that displays the organization for each of the employees.

Cancel Tasks and Events

Identifies the criteria for canceling tasks or events. You can set the scope for this field by selecting one of the following options:

Task creator must be current user

Identifies that you can cancel or resubmit tasks or events that you have created.

Task creator must be in scope

Identifies that you can cancel or resubmit tasks that have been initiated by other users who match the user scope rules for the admin role that gives you access to the tab.

For example, you received the User Manager role, which includes View Submitted Tasks, because you met the criteria in a membership rule that includes scope over all users in the Employee organization. You can cancel or resubmit tasks that are submitted by all users in the Employee organization.

No restrictions

Identifies that any user can cancel or resubmit a task or event.

Not allowed

Specifies that a task or event cannot be cancelled or resubmitted.

Resubmit Tasks and Events

Identifies the criteria for resubmitting a task or event. You can set the scope of this field by selecting one of the following options:

Task creator must be current user

Identifies that you can cancel or resubmit tasks or events that you have created.

Task creator must be in scope

Identifies that you can cancel or resubmit tasks that have been initiated by other users who match the user scope rules for the admin role that gives you access to the tab.

For example, you received the User Manager role, which includes View Submitted Tasks, because you met the criteria in a membership rule that includes scope over all users in the Employee organization. You can cancel or resubmit tasks that are submitted by all users in the Employee organization.

No restrictions

Identifies that any user can cancel or resubmit a task or event.

Not allowed

Specifies that a task or event cannot be cancelled or resubmitted.

Show Tasks

Determines the tasks that appear in the User History tab.

Tasks performed on the user

Displays all the tasks that are performed on the selected user.

Tasks performed by the user

Displays all the tasks that are performed by the selected user.

Workflow approvals by the user

Displays all the tasks that the user has approved as part of a workflow.

The View User Activity Task

User activity is a history of tasks that involve a specific user. Administrators can use the View User Activity task to track the following user information:

- Tasks performed on the user
- Tasks performed by the user
- Workflow approvals performed by the user

To view user activity

1. Click Users, Manage Users, View User Activity.

   The Select User screen appears.

2. Search for a user and click Select.

   The View User Activity screen appears.

Note: For more information on the user activity displayed, see the User Console Online Help.

Cleanup Submitted Tasks

With each task submitted, the runtime performance of tasks and events slows as the task persistence database grows. The garbage collecting of stored procedures mitigates the potential for performance problems or system outages due to the task persistence database running out of storage space. The ability to archive the tasks, gives the administrator the ability to view both current task and event information, as well as tasks and events that have been deleted.

In the User Console, CA Identity Manager administrators can schedule jobs to automatically perform garbage collection and archive on a recurring basis.

Recurrence Tab

Use this tab to schedule your job. The fields in this tab are as follows:

Execute now

Runs the job immediately.

Schedule new job

Schedules a new job.

Modify existing job

Specifies that you want to modify a job that already exists.

Note: This field appears only if a job has already been scheduled for this task.

Job Name

Specifies the name of the job you want to create or modify.

Time Zone

Specifies the server time zone.

Note: If your time zone is different from the server's time zone, a drop-down box is displayed so you can select either your time zone or the server's time zone when scheduling a new job. You cannot change the time zone when modifying an existing job.

Daily schedule

Specifies that the job runs every certain number of days.

Every (number of days)

Defines how many days between job runs.

Weekly schedule

Specifies that the job runs on a specific day or days and time during a week.

Day of Week

Specifies the day or days of the week the job runs.

Monthly schedule

Specifies a day of week or day of month that the job runs on a monthly basis.

Yearly schedule

Specifies a day of week or day of month that the job runs on a yearly basis.

Advanced schedule

Specifies additional scheduling information.

Cron Expression

For information about filling out this field, see the following:

http://www.opensymphony.com/quartz/api/org/quartz/CronExpression.html

Execution Time

Specifies the time of day, in 24-hour format, that the job is run. For example, 14:15.

Execute a Job Now

To execute a job immediately, use the Cleanup Submitted Tasks wizard.

From the System tab

1. Select Cleanup Submitted Tasks from the left pane.

   The Recurrence step of the wizard appears.

2. Select Execute Now and Next.

   The Cleanup Submitted Tasks step of the wizard appears.

3. Enter the minimum age, archive, audit timeout, time limit, and task limit information and click Finish.

   The job is submitted immediately.

Schedule a New Job

To schedule a new job, use the Cleanup Submitted Tasks wizard.

From the System tab

1. Select Cleanup Submitted Tasks from the left pane.

   The Recurrence step appears.

2. Select Schedule a new job, enter the job name and scheduling information for the job and click Next.

   The Cleanup Submitted Tasks step appears.

3. Enter the minimum age, archive, audit timeout, time limit, and task limit information and click Finish.

   The new job is scheduled.

Modify an Existing Job

To modify an existing job, use the Cleanup Submitted Tasks wizard.

From the System tab

1. Select Cleanup Submitted Tasks from the left pane.

   The Recurrence step appears.

2. Select Modify an existing job and choose an existing job, modify the scheduling information, and click Next.

   The Cleanup Submitted Tasks step appears.

3. Modify the minimum age, archive, audit timeout, time limit, and task limit information and click Finish.

   The existing job is modified.

Delete a Recurring Task

To delete a recurring task, follow this procedure.

From View Submitted Tasks

1. Select Delete Recurring Task
2. Select the task you want to delete.
3. Click Submit.

Cleanup Submitted Tasks Tab

Use this tab to specify the minimum age, archive, audit timeout, time limit, and task limit of the task. Click Finish once you have completed all required fields. The fields in this tab are as follows:

Minimum Age

Specifies the minimum age of tasks that are in a final state (Completed, Failed, Rejected, Cancelled, or Aborted) to be cleaned up. For example, if 1 month is specified, any tasks that have reached a final state in the last month are retained. Any tasks that have reached a final state more than a month ago are subject to cleanup and archiving.

This is a required field.

Archive

Backs up tasks to the archive database before deleting them from the runtime database.

Once the job is run, if archive is selected, the data is committed to the archive database and removed from the runtime task persistence database. Data is not removed until a successful commit to the archive database happens.

Audit Timeout

Specifies the length of time before tasks in the audit state are subject to cleanup. Tasks in the audit state are not considered to be in a final state until this length of time has elapsed. Tasks in the audit state have not been submitted

Time Limit

Limits cleanup to a specific amount of time.

Task Limit

Limits cleanup to a specific number of tasks.

Delete Recurring Tasks

When a task no longer needs to be run on a recurring basis, the CA Identity Manager administrator has the ability to delete the task. Once the task has been deleted, garbage collection and archiving is not performed for that task.

All tasks scheduled using the Cleanup Submitted Tasks:Recurrence wizard are listed on this page and the CA Identity Manager administrator can choose which tasks to delete.

Note: The tasks are still present in the database, only the scheduling recurrence is deleted.

Configure Enterprise Log Manager Connection

Use this screen to manage newly added CA Enterprise Log Manager connection tasks.

The fields on this screen are listed below:

Connection Name

Specifies the unique name used for the single CA ELM connection managed object.

This is a read-only field.

Description

Describes the CA ELM connection.

Host Name

Specifies the CA Enterprise Log Manager server hostname or IP address.

This is a required field.

Port #

Specifies the CA Enterprise Log Manager server connection port.

Default: 52520

This is a required field.

Certificate Authority Signed SSL Certificate

When checked, specifies a strict SSL certificate check when connecting to a CA Enterprise Log Manager server.

If you have a self-signed SSL certificate, for example one installed with CA Enterprise Log Manager by default, this check box must not be selected since the trusted path to the root certificate authority does not exist.

Certificate Name

Specifies the name of the CA Enterprise Log Manager certificate to use for authentication.

This is a required field.

Certificate Password

Specifies the CA Enterprise Log Manager password.

This is a required field.

Attribute

Not supported. Version is retrieved on an attempt to save connection information as a test.

Delete Enterprise Log Manager Connection

Select a connection from the list and click Delete. The CA Enterprise Log Manager connection task is deleted.

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