

CA Service Desk Manager

Implementation Guide

Release 12.9.00



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CA Technologies Product References

This document references the following CA Technologies brands and products:

- CA IT Asset Management (formerly known as CA Asset Portfolio Management (CA APM))
- CA CMDB
- CA Business Intelligence
- CA Business Service Insight (CA BSI)
- CA Configuration Automation (formerly known as CA Cohesion ACM)
- CA Embedded Entitlements Manager (CA EEM)
- CA Enterprise Workload Automation (CA EWA)
- CA Process Automation (formerly known as CA IT PAM)
- CA Management Database (CA MDB)
- CA Management Portal
- CA Network and Systems Management (CA NSM)
- CA Portal
- CA Remote Control Manager (CA RCM)
- CA Service Desk Manager (CA SDM)
- CA Service Management
- CA Siteminder
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- CA Spectrum® Infrastructure Manager (CA Spectrum)
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- Online and telephone contact information for technical assistance and customer services
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Chapter 1: Introduction

This section contains the following topics:

[Overview](#) (see page 15)

[Audience](#) (see page 15)

[CA SDM Default User List](#) (see page 16)

[Server Components](#) (see page 17)

Overview

This guide provides you with the information you need for a successful CA SDM implementation in your enterprise, including information about how to do the following:

- Plan and prepare for both a new installation and an upgrade
- Install and upgrade all of the necessary product components
- Configure the product components
- Integrate with some CA Technologies products

Note: This guide does *not* detail integrations with all CA Technologies products. For detailed information about additional integrations with CA SDM that are not described in this guide, see the *CA Unicenter Service Desk Integrations Green Book* at <http://ca.com/support>.

Note: You can find the most current version of the Release Notes, which contain the system requirements, and optional readme file (if available) at <http://ca.com/support>.

Audience

This guide is intended for anyone who wants to understand how to install, upgrade, and configure CA SDM. The following users may have specific tasks to complete using the information in this guide:

- *System administrators* and *administrators* use the information in this guide, and their operating system knowledge to install the product for the first time, upgrade the product from version to version, and configure the product based on your implementation requirements.

- *Integrators* use the information in this guide, along with their knowledge of CA Technologies products, to integrate CA SDM with some CA Technologies products.

Note: This guide does *not* detail integrations with all CA Technologies products. For detailed information about additional integrations with CA SDM that are not described in this guide, see the *CA Unicenter Service Desk Integrations Green Book* at <http://ca.com/support>.

- *Users*, when necessary, can use the information in this guide to install the product and components.

To use the information in this guide, you should have the following:

- A working knowledge of the Windows and/or UNIX operating systems, depending upon your current production environment.
- The ability to perform basic administrative tasks for your operating system.
- Depending on your working environment, you may also need to be familiar with mainframe, mobile devices, and server installations.

Note: Throughout this guide, you will see references to NX_ROOT. The references pertain to the environmental variable containing the installation path of CA SDM. This NX_ROOT variable is set in the NX.env configuration file that is used to set environmental variables for CA SDM.

Example NX_ROOT Definition

@NX_ROOT=C:\Program Files\CA\Service Desk Manager

CA SDM Default User List

The following lists default user information for typical CA SDM implementations:

OS	Product	Default Username	OS Level?	How it is Created
Windows	CA SDM	ServiceDesk	Yes	Automatically
	CA EEM	EiamAdmin		Default Password: EiamAdmin
	CA MDB SQL Server	ServiceDesk	No	Created in the MDB during configuration
	CA MDB Oracle	mdbadmin	No	Created in the MDB during configuration
UNIX	CA SDM	srvcdesk	Yes	Manually created
	CA MDB Oracle	mdbadmin	No	Created in the MDB during configuration

OS	Product	Default Username	OS Level?	How it is Created
Linux	CA SDM	svcdesk	Yes	Manually created
	CA MDB Oracle	mdbadmin	No	Created in the MDB during configuration

Server Components

CA SDM includes components that work together and run on different servers, depending on the CA SDM configuration. Before you begin your implementation, you should have a basic understanding of the following components:

Daemon Manager (`pdm_d_mgr`)

Starts process sets as defined in the startup file, `pdm_startup`. By default, the daemon manager tries to start a failed component up to 10 times. To check the status of all CA SDM components, use the `pdm_status` utility. The `pdm_d_refresh` utility instructs the daemon manager to start a new cycle of 10 attempts to start any process marked as previously failed.

The daemon manager runs on all CA SDM servers.

Message Dispatcher (`sslump_nxd`)

Acts as a common bus or message passing system. Components that need to communicate with each other first register with the Message Dispatcher. When a component sends a message, the Message Dispatcher delivers it to those components that have registered to receive that type of message. If two components communicate so much that it would be inefficient to pass the messages through the Message Dispatcher, they create a fast channel between them. You can view a list of registered components using the `s/stat` utility.

The message dispatcher runs on the following servers, depending on your CA SDM configuration:

- Conventional: Primary server.
- Advanced availability: All servers.

Database Agent (platform_agent)

Performs SQL queries on the database. Database agents adhere to the logical schema of CA SDM and translate the SQL at this level to the physical database platform SQL.

Note: The database agent detects momentary disconnection and failed queries, and attempts to reconnect and communicate with the database. This is only meant for short outages, such as for a brief network outage and momentary disconnection. It is not meant for long outages such as shutting down a database service for maintenance, and so forth. The agent will only retry the connection for a defined number of times (the default is 3 times), and only for a short time period of a few minutes. If the outage is longer than a few minutes, the agent will stop trying to connect, and CA SDM must be recycled after the database has been made available again.

The database agent runs on the following servers, depending on your CA SDM configuration:

- Conventional: Primary server.
- Advanced availability: All servers.

Agent Provider (platform_prov_nxd)

Starts or stops database agents. By default, a number of agents are running. If more are required to handle the number of database queries, the Agent Provider starts them. If the system no longer requires so many database agents, the Agent Provider terminates the unnecessary ones.

The agent provider runs on the following servers, depending on the CA SDM configuration:

- Conventional: Primary server.
- Advanced availability: All servers.

Virtual Database (bpvirtddb_srvr)

Enables the operation of multiple Object Managers. All Object Managers running on primary or secondary servers connect to the Virtual Database, which arbitrates their access to database agents. For example, when retrieving a new range of ticket reference numbers, the Virtual Database helps ensure that only one Object Manager at a time accesses the table containing the reference numbers. The Virtual Database also performs caching of database information for Object Managers.

The Virtual Database runs on the following servers, depending on CA SDM configuration:

- Conventional: Primary server.
- Advanced availability: All servers

Continuous Archive and Purge (arcpur_srvr)

Runs your archive and purge rules as configured by the CA SDM administrator.

The Continuous Archive and Purge runs on the following servers depending on CA SDM configuration:

- Conventional: Primary server.
- Advanced availability: Background server

Database Monitor (dbmonitor_nxd)

Monitors changes to common tables in the CA MDB, for example *ca_contact*.

The Database Monitor runs on the following servers depending on CA SDM configuration:

- Conventional: Primary server.
- Advanced Availability: Background server

Mail Daemon (pdm_mail_nxd)

Sends outbound email notifications.

The Mail Daemon runs on the following servers, depending on the CA SDM configuration:

- Conventional: Primary server
- Advanced availability: All servers.

Mail Eater (pdm_maileater_nxd)

Accepts inbound email for ticket creation and updates.

The Mail Eater daemon runs on the following servers, depending on the CA SDM configuration:

- Conventional: Primary server
- Advanced availability: Background server

Notification Manager (bpnotify_nxd)

Manages notifications in a Windows environment. The Notification Manager runs on the following servers, depending on the CA SDM configuration:

- Conventional: Primary server.
- Advanced availability: Application, background, and standby servers..

Spell Checker (lexagent_nxd)

Performs spell checking as requested by clients. The Spell Checker runs on all CA SDM servers.

Text API Daemon (pdm_text_nxd)

Creates and updates tickets by external interfaces, such as command line and email. The Text API daemon runs on all CA SDM servers.

Timed Event (animator_nxd)

Runs the delay times of events. In an implementation that has many service types or contracts, there may be many active events that the Timed Event engine needs to track. In this situation, you should dedicate the primary server Object Manager entirely to the Timed Event engine. You can configure other Object Managers on the primary or secondary servers for product access as appropriate.

The Timed Event daemon runs on the following servers, depending on CA SDM configuration:

- Conventional: Primary server
- Advanced Availability: Background server

Time-To-Violation (ttv_nxd)

Calculates projected violation times for service types. The Time-To-Violation daemon runs on the following servers, depending on the CA SDM configuration:

- Conventional: Primary server
- Advanced availability: Background server

Proctor Daemon (pdm_proctor_nxd)

(Windows only) Starts and restarts CA SDM components, as instructed by the Daemon Manager, on primary and secondary servers. When you install a secondary server, the *pdm_proctor_nxd* process is installed as the CA SDM Remote Daemon Proctor service. When the primary server starts, the Daemon Manager instructs the Remote Daemon Proctor to connect to the Message Dispatcher. The Daemon Manager then instructs the Remote Daemon Proctor to start components on the secondary server as defined by Process Sets in the startup file *pdm_startup*. The Proctor daemon runs on all the CA SDM servers in advanced availability configuration.

Object Manager (domsrvr)

Acts as the server process of CA SDM. When you install a primary server, by default, two Object Managers are installed: one for connections to the product, and one dedicated to the Web Screen Painter. This allows you to test your modifications without affecting the production environment. When you install a secondary server, you can configure additional Object Managers.

There must always be a default Object Manager running on the primary server to which clients such as the Timed Event engine can connect.

The Object Manager also caches various records and tables for clients. If you use *pdm_userload* to manipulate these records, you can also use the *pdm_cache_refresh* utility to make the Object Manager retrieve the new data. The Object Manager runs on all the CA SDM servers in advanced availability configuration.

Method Engine (spel_svr)

Runs SPEL code, event, macros, and so forth for an Object Manager. We recommend that every Object Manager be run with its own method engine.

The Method Engine runs on all CA SDM servers.

Login Server (boplogin)

Manages authenticated user sessions.

The Login Server runs on the following servers, depending on the CA SDM configuration:

- Conventional: Primary server
- Advanced availability: All servers

LDAP Virtual Database (ldap_virtddb)

Interfaces with an LDAP directory. The Method Engine runs on the following servers depending on the CA SDM configuration:

- Conventional: Primary or secondary server
- Advanced availability: Background or application server

Knowledge Management Search Daemon (bpebr_nxd)

Performs knowledge base searches. Upon CA SDM startup, the bpebr_nxd daemon caches Knowledge Document data in its memory from the database. With a large document base, you might have memory resource issues. The bpebr_nxd daemon has the following size requirements:

Knowledge Management Search

- 100,000 documents
- Memory size = 332,000 KB

The Knowledge Management daemon runs on the following servers depending on the CA SDM configuration:

- Conventional: Primary or secondary server
- Advanced Availability: Background server

Knowledge Management/Keyword Indexing Daemon (bpeid_nxd)

Indexes the knowledge base.

The Keyword Index daemon runs on the following servers depending on the CA SDM configuration:

- Conventional: Primary or secondary server
- Advanced availability: Background server

Knowledge Management FAQ Ratings Daemon (bu_daemon)

Calculates FAQ ratings for Knowledge Management. It runs on the following servers depending on the CA SDM configuration:

- Conventional: Primary or secondary server
- Advanced availability: Background server

Knowledge Report Card Daemon (krc_daemon)

Performs calculations for the Knowledge Management Knowledge Report Card (KRC) feature. This feature enables analysts and managers to display different matrix views of their knowledge contributions and provide feedback about which documents are most effective. The information provided can be used in a variety of ways to improve the processes of creating knowledge documents and providing the best support to customers.

The Knowledge Report Card daemon runs on the following servers depending on the CA SDM configuration:

- Conventional: Primary or secondary server
- Advanced Availability: Background server

Knowledge Management Daemon (kt_daemon)

Manages knowledge base administration and knowledge management logic. It also manages notifications and the document approval process. The Knowledge Management daemon runs on all CA SDM servers.

Repository Daemon (rep_daemon)

Manages the attachment repositories for CA SDM and the Knowledge Management/Keyword Search Daemon. The Repository Daemon runs on the following servers depending on the CA SDM configuration:

- Conventional: Primary or secondary servers
- Advanced availability: All servers.

Version Control Daemon (pdm_ver_nxd)

Synchronizes the schema files between a primary and secondary server to ensure that they are using the same schema. The Version Control Daemon runs on the following servers depending on the CA SDM configuration:

- Conventional: Primary server
- Advanced availability: Background server

Apache Tomcat Web Server (javaw)

Enables certain features to be implemented, regardless of whether Microsoft Internet Information Server (IIS) is used as the web server for access to CA SDM. These features include CA Workflow, Graph Items, Attachments, and Web Services.

The Apache Tomcat web server can be administered with the apache Tomcat controller (*pdm_tomcat_nxd*). The Apache Tomcat Web Server runs on all CA SDM servers.

Web Engine (webengine)

Connects to web browsers through a *pdmweb cgi* running on a Microsoft IIS or Apache Tomcat web server. There must be at least one web engine for WSP on the following servers, depending on your CA SDM configuration.

Conventional: Primary server

Advanced availability: Application, standby, and background servers

This process ensures that WSP Schema Designer can write schema files. Web engines are the true client of an Object Manager used by web browser to access the product.

Web engines cache .html web forms for connected users. You can manipulate the cache using the *pdm_webcache* utility and see connection statistics using the *pdm_webstat* utility. The Web Engine runs on all CA SDM servers.

RF Broker (pdm_rfbroker_nxd)

(Applicable for advanced availability configuration only). Manage the roles of the servers and controls them across the configuration. This daemon runs on all servers in advanced availability configuration. It is responsible for acquiring information about background and standby servers and updating the information (such as slump ID, node name, server type) in the ServerStatusMonitor class. It receives broadcast messages of server status changes and quiesce requests, and registers for SLUMP_NODE_GONE messages that it forwards to ServerStatusMonitor objects when the failing node is the background server. This daemon is not applicable for conventional configuration.

Login User Authentication (bopauth_nxd)

Performs operating system user account validation and contact record lookups using the System Login field to match a user with an access type.

If your business provides CA SDM to other client businesses, you can place the Login server on a secondary server at a single client location. External authentication can then be enabled in access types. This avoids creating user accounts for your clients on your business systems. It runs on the following servers, depending on your CA SDM configuration:

- Conventional: Primary or secondary (if configured) server
- Advanced availability: Background or application (if configured) server

Interval Logger (pdm_intrvlog_nxd)

Gathers the debugging information for debugging the system. It runs on all CA SDM servers.

QRY KPI Daemon (kpi_qry_daemon)

Executes SQL queries to update key performance indicators in the database. QRY KPI daemon runs on the following servers, depending on the CA SDM configuration:

- Conventional: Primary server
- Advanced Availability: Background server

SYS KPI Daemon (kpi_sys_daemon)

Collects system type key performance indicators and writes to the database. SYS KPI daemon runs on the following servers, depending on your CA SDM configuration:

- Conventional: Primary server
- Advanced availability: All servers.

Confirm Database (confirm_db)

A utility to verify database access. It runs on all CA SDM servers.

Data Dictionary (ddictbuild)

A utility to build the data dictionary. It runs on all CA SDM servers.

Set LogFile (pdm_logfile)

A utility to display or set the log file size limits. It runs on all CA SDM servers.

Report Manager (pcrpt_nxd)

A utility for PC reporting. It runs on all CA SDM servers.

RPC Server (rpc_srvr)

Used for making outbound SOAP web service calls. It runs on all CA SDM servers.

CA SA Tomcat (sa_tomcat)

CA SA Tomcat is used to run support automation. It is configured on any CA SDM server.

CAWF Tomcat (cawf_tomcat)

Tomcat instance used to run CA Workflow. It can be configured on any CA SDM server.

Visualizer Tomcat (viz_tomcat)

Tomcat instance used to run visualizer. It can be configured on the following servers, depending on the CA SDM configuration:

- Conventional: All servers
- Advanced availability: Application server

Event Manager (ehm_nxd)

The Event Manager manages events coming from CA NSM. The Event Manager runs on the following servers, depending on the CA SDM configuration:

- Conventional: Primary server
- Advanced availability: Background server

Knowledge Management Indexing Daemon (bpeid_nxd)

Responsible for indexing the knowledge documents. It runs on the following servers depending on the CA SDM configuration:

- Conventional: Primary server
- Advanced availability: Background server

Registration Server (mdb_registration_nxd)

An agent for handling MDB registration requests. The Registration Server runs on the following servers, depending on your CA SDM configuration:

- Conventional: Primary server
- Advanced availability: All servers

Chapter 2: Upgrading

This section contains the following topics:

- [How to Plan CA SDM Upgrades](#) (see page 27)
- [How the Migration Console Works](#) (see page 41)
- [How to Upgrade CA CMDB from a Previous Release](#) (see page 42)
- [How to Migrate Data to CA SDM r12.9 on a 64-Bit Linux/UNIX](#) (see page 44)
- [How to Migrate Data to CA SDM r12.9 on a 64-Bit Windows](#) (see page 45)
- [Example: Migrate from a Nonsupported Windows Environment](#) (see page 45)
- [Example: Migrate from a Nonsupported Non Windows Environment](#) (see page 46)
- [Support Automation Data Migration](#) (see page 46)
- [How to Migrate a Custom CA Business Intelligence Universe](#) (see page 51)
- [Post Upgrade Configuration](#) (see page 53)

How to Plan CA SDM Upgrades

Verify the following planning consideration for the CA SDM upgrade:

- CA SDM supports upgrade to r12.9 from r11.2, r12.0, r12.1, r12.5, r12.6, and r12.7 for all supported platforms. For Windows, you can upgrade directly to CA SDM r12.9 from r11.2, r12.0, r12.1, r12.5, r12.6, r12.7.
- If you installed CA SDM on Linux or UNIX, the upgrade from versions prior to r12.5 to CA SDM r12.9 requires multiple steps. If your installation is running on an older version of the product, such as r11.2, r12.0 and r12.1 on Linux/UNIX, you must run the automated upgrade script for CA SDM r12.5 and move CA SDM to a supported platform and database before running the automated upgrade script for <uskd> r12.9. If you have customizations, you only have to apply them once - after running the final automated upgrade script to r12.9.
- If you have an earlier version of the product, such as Unicenter Service Desk r6.0 or r11.1, you *must* upgrade to CA SDM r11.2 before upgrading to CA SDM r12.9.
- If you manually added any variables to the NX.env file before migration, add the variables again manually after migration completes.

- CA SDM only supports ITIL. If you are upgrading from a non-ITIL system, the CA SDM r12.9 installation updates you to an ITIL environment.
- If you have a combined CA SDM r11.2 and CA CMDB r11.1 installation, you cannot upgrade directly to CA SDM r12.9. You *must* first upgrade CA CMDB to r11.2, and then run the r12.9 upgrade. This process upgrades CA SDM r11.2 to r12.5, and also upgrades CA CMDB r11.2 to r12.5. CA CMDB r12.0 and r12.1 can also be upgraded directly to CA SDM r12.9.

Note: For more information about upgrading from an earlier version, see the *CA SDM Implementation Guide r11.2*. For upgrade patches and assistance, contact Technical Support at <http://ca.com/support>.

- Before upgrading to the current release of CA SDM, understand the following:
 - [Database Considerations](#) (see page 29)
 - [Retaining Your Customizations](#) (see page 33)
 - [LREL Migration Considerations](#) (see page 37)
 - [Status Transition Considerations](#) (see page 38)
 - [Email Considerations](#) (see page 38)
 - UTF-8 locale must be installed on Linux/UNIX platforms
- On Linux/UNIX, CA SDM no longer uses the smtp_mail script to process outgoing mail notifications. If you are an existing customer using smtp_mail, and you upgrade to the current release, your administrator must configure the appropriate mail options using the Default Mailbox Detail page to enable the mail notification feature of CA SDM.

Database Considerations

Before you upgrade to CA SDM r12.9, consider the following database information:

- Back up your existing database using your typical database backup procedures.
- (Applicable for all non-windows machines) If the previous releases of CA SDM is configured with oracle 10gr2 database, install Oracle 11gr2 client before you upgrade to CA SDM r12.9.

Important! Before upgrading, change the Oracle home path to oracle11g r2 client path in the \$NXROOT/NX.env file.

- After you upgrade, all versions (active and inactive) of webLicenseCt KPIs are no longer available and all the related KPI data becomes invalid. These data still remain in the usp_kpi_data table, but this data is not fetched while reporting. Customers can choose to execute the OOTB KPI Rule, KPI Data (System) (inactive by default), to remove this data.

Important! We recommend you to check the data available in the usp_kpi_data table, as executing this KPI rule will also archive and/or purge other system KPI collected data.

Note: A new KPI, webConcurrentTotalLicenseCt is used in CA SDM r12.9 to calculate the number of unique users logged in to CA SDM during that interval. For more information, see the *Implementation Guide*.

- Archive the installation directory (\$NX_ROOT) using your typical archive procedures. This action lowers the amount of data movement and saves disk space.
- Run the appropriate script from a command prompt to identify any duplicate records on your database:

Note: Run this script on the secondary servers. If you want to run this script using SQL Query Analyzer, edit the SQLCHECK.SQL script and remove the EXIT argument before you run the command.

- (Oracle) Run OracleCheckr12UniqueIndexes.sql, located in the \Migrate directory on the installation media.
- (SQL Server) Open a Command Prompt window and run SQLCHECK.SQL as follows:

```
cd $NX_ROOT\samples\views\SQLServer
```

Enter the command:

```
Sqlcmd -E -e < SQLServer\SQLCHECK.SQL
```

Note: After you upgrade to CA SDM r12.9, you can find these files at \$NX_ROOT/samples/views/SQLServer or \$NX_ROOT/samples/views/Oracle on the server.

Important! These scripts identify your duplicate records. Delete identified duplicate records before you proceed with the migration.

- For Windows, you can upgrade directly from r11.2, r12.0, r12.1, r12.5, r12.6., and r12.7
- If you installed CA SDM on UNIX or Linux, you can upgrade from r12.5, r12.6, and r12.7.
- If your installation contains an earlier version of the product, such as CA SDM r11.2, r12.0, or r12.1 on a non-supported UNIX/Linux operating system and database, you must upgrade to CA SDM r12.5. Then, move CA SDM to a supported operating environment and database before you upgrade.
- Upgrade your CA SDM r11.2 system to a supported database (SQL Server and Oracle).

Note: For more information about supported database, see the *Release Notes*.

- Upgrade from Unicenter Service Desk r11.0 to CA SDM r11.2 before migrating your data to a supported database.
- Special Windows characters, such as a long hyphen, in CA SDM or Knowledge Management on a non-Windows system, are not properly stored in the database.
- **Ingres**—If you are using an Ingres database, convert your data to Oracle or SQL Server before upgrading.

Note: For information about the conversion process, see your database documentation.

- **Oracle**—Oracle does not support case insensitive indexes for Configuration Item registration. Before you start the migration on Oracle, verify SQLPlus and Oracle DB are able to communicate using hostname. If communication fails, verify that Oracle is configured with loopback adaptor.

Note: When you migrate in a double-byte character environment with an Oracle database, increase the maximum open cursor limit to at least 500. For more information, view Oracle documents about ORA-01000 (maximum open cursor exceeded).

- **SQL Server**—For an SQL Server upgrade to the current release of CA SDM, the default database for the configured Database Userid must be CA MDB. If the default database is not CA MDB, the migration console fails and displays the following message:

"The acctyp_v2 table does not exist on the MDB"

- **Tomcat**—(for Unicenter Service Desk r11.0, r11.1 or CA SDM r11.2) If you configured Tomcat for external authentication, manually reconfigure Tomcat for external authentication after upgrading to the current product release.
- **Table Updates**—Consider the following table updates that occur during migration:
 - **Status Tables**—These tables are also updated with the appropriate status records when the same code values do not exist in your database. For example, *Cr_Status* is updated with the code *AEUR* (Awaiting End User Response).

- **Functional Areas**—For each role, migration automatically adds a row for each *usp_functional_access* record. Migration sets the access level to the same level for each CA SDM r12.0 and r12.1 functional area that the *usp_role* table includes. New functional areas are mapped using a reference field.

- **Foreign Keys**—Consider the following information:

- Foreign keys (SRELs) that reference tables, in which the primary key is a UUID, change from integer type to UUID type (or BYTE 16).

Note: For information about setting SREL attributes with foreign key values, see the *CA SDM Technical Reference Guide*.

- If you dropped foreign key constraints in your previous CA SDM system to mass load data, recreate the foreign key constraints before you run the upgrade. The scripts that drop the constraints are found in the following locations:

- Oracle

- `$NX_ROOT/samples/views/Oracle/OracleDropConstraints.sql`

- SQL Server

- `$NX_ROOT/samples/views/SQLServer/SQLDropConstraints.sql`

Note: Reapply the dropped constraints by running the appropriate script *OracleAddConstraints.sql* or *SQLServer/SQLAddConstraints.sql*. These scripts are found in the same directory as the drop constraints and contain instructions within the files mentioned.

- **MDB**—The MDB provides a consistent database schema for various IT management data. During the development of the MDB, data elements from your previous CA SDM environment were incorporated into this schema. The size of the data elements can increase and, consequently, increase the overall database size.

Note: When standard data elements extend beyond the column width defined for the MDB, the update process can truncate data in these elements. Messages alert you to any truncation that occurs during the upgrade.

- **Distributed Setup**—We recommend you upgrade your servers in the following order, depending on your CA SDM configuration:

- **Conventional**

- Primary server
 - (Optional) One or more secondary servers

- **Advanced Availability**

- Background server
 - One or more standby servers
 - One or more application servers

- **Remote Database Setup**—Consider the following information:

We recommend that you upgrade the database server with a new MDB before upgrading the primary server. If your database server is remote, run the CA MDB installation on the database server before running the upgrade.

- If you are using a SQL Server MDB database, sqlcmd must be on the client computer before connecting to the remote MDB.

Knowledge Management Considerations

Before you upgrade to CA SDM r12.9, consider the following Knowledge Management information to help you upgrade:

- For customers upgrading from a previous release of CA SDM that used the FAST ESP search engine, you *must* change to the EBR search engine. The FAST ESP license expires in May 2013. To change to the EBR search engine, click Options Manager, Search Engine and edit ebr_version to specify KT Search Engine.
- How to [upgrade Knowledge Management from CA SDM r11.2](#) (see page 72).
- How to [upgrade Knowledge Management from CA SDM r12.x](#) (see page 75).

DocType Validation

Previous releases of CA SDM used the following DocType for HTML generated from HTML forms in the HtmlDoctype property of web.cfg:

```
HtmlDoctype <!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.01 Transitional//EN">
```

The HtmlDoctype property of web.cfg appears as follows for CA SDM r12.9:

```
HtmlDoctype <!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.01 Frameset//EN"
"http://www.w3.org/TR/html4/frameset.dtd">
```

This line begins on the first list of a page, typically.

Note: After you upgrade to CA SDM r12.9, verify that the HtmlDoctype property value changed in your customized forms. You can open an HTML file from the \$NX_ROOT/bopcfg/www/wwwroot/html directory with text editor and can verify the DocType value.

Retaining Your Customizations

Before you upgrade to CA SDM r12.9, consider the following information for your customized product:

Note: When you close the Migration Console before the upgrade completes, then the process continues to run in the background.

- **Custom Reports**—When you customize the reports that access database tables from previous versions and that have been moved to renamed tables, the column names have been changed in r12.9.

Note: For information about the tables, see the *CA SDM Technical Reference Guide*.

- **Customized Forms**—Upgrading to CA SDM r12.9 retains the customizations of the forms from the previous release of CA SDM. However, you cannot view the CA SDM r12.9 functionality on the customized forms after you upgrade.
- **Customized Admin Tree**—When you customize the Admin tree in Unicenter Service Desk r11.0, then these changes are not upgraded due to modifications in the architecture to support the role-based user interface. These Admin tree customizations include the addition of new nodes, renaming of existing nodes, modifying access types, or other data alterations. To use the customizations, do the following:
 1. Before you upgrade, review your Unicenter Service Desk r11.0 Admin tree and note any customizations that you want to use after upgrading.
 2. After the upgrade completes, identify which roles have Admin tree customizations.
 3. Apply the customizations to the appropriate CA SDM r12.9 role-based Admin trees.
 4. Review and test to verify that the desired functionality has been retained.
- **Customized Form Buttons**—After the upgrade completes, buttons on customized forms in */site/mods/html* that did not have quotes around the msgtxt(n) part of the code result in an error message, instead of the button name.

For example, in the detail_cr.html form, modify msgtxt(441) with quotes as follows to display the correct button name:

```
ImgBtnCreate("btnchg", "msgtext(441)", "detailSave('NEW_CHANGE')",
true, 0, msgtext(440)); // Save and Create Change Order
```

- **Retaining Customizations**—When you need the CA SDM r12.9 functionality and would like to preserve your customizations from a previous release then redo the customizations on a base CA SDM r12.9 form, which has the r12.9 functions.

Note: When you customize the *acctypedtl.rpt* and *acctypesum.rpt* reports, then the return data in CA SDM r12.9 is obsolete.

- **Notification Rules**—When you remove the default activity notifications Contact, Object Contacts, and Contact Types from the previous installation of CA SDM and want to retain this functionality, then note the default contacts removed before migration. After you upgrade to the new version, remove the default Notification contacts again.
- **Role-based Functionality**—Upgrading can cause issues with the role-based functionality. Consider the following information:
 - When you customized any of the following forms, then they are considered read-only by the Web Screen Painter in CA SDM r12.9 and they include an xxx_site.html version where you can use custom code:
 - ahdtop.html
 - menu_frames.html
 - reports.html
 - std_body.html
 - std_footer.html
 - std_head.html
 - styles.html
 - msg_cat.js
 - menu_frames_role.html
- **Customized HTML Files**—Consider the following information:
 - All customized HTML files retain their default menu bar settings after you upgrade. A pop-up window inherits its menu bar from the main page tab, as a result of the role-based user interface. Customized HTML files are not available on the customized forms from the previous release after the upgrade.
 - CA SDM r12.9 does not use some customized HTML files from previous releases. The migration script executes the perl script `$NX_ROOT/bin/migrate_to_r12_9_web_check.pl` that appends the files with the *incompatible_for_r2_9* extension. After migration completes, open `$NX_ROOT/site/web_check_files.txt` with a text editor to see the list of incompatible forms for r12.9.
 - If you customized the `list_dblocks.html` file in a previous release of CA SDM, this form does not work in CA SDM r12.9. If you customized the Admin Tree to display the `list_dblocks.html` in other parts of the tree, the customization does not work after you migrate. Modify the form manually to use the new URL and form. To complete this modification, click Security and Role Management, Menu Tree Resources and open Current Locks. Update the resources with the following CA SDM r12.9 string:

`OP=SEARCH+FACTORY=record_lock+QBE.NN.lock_time=NULL`

- **Foreign Keys**—When the upgrade process detects referential integrity issues while attempting to reset foreign keys then the errors appear in the migration.log file. The associated foreign key sets to a predefined valid reference.
- **Servers and Web Director Configuration**—When your previous installation was configured to use additional servers or web directors, then you must first create the configuration for the specific servers and run the CA SDM server configuration utility (pdm_configure). See the Administration Guide for more information on creating configurations.
- **CA Support Automation Divisions**—When you migrate the divisions to tenants, then convert this data before enabling and configuring Support Automation in CA SDM r12.9.

Rename Customized HTML Forms

If you customized HTML forms in a previous release of CA SDM, you run a script to rename them before you upgrade to CA SDM r12.9. You run this script on all CA SDM servers. The migrate_to_r12_9_web_check.pl script renames all customized web forms, style sheets, Java scripts, images, and macros in the site/mods directory. Renaming these files helps you identify your customized forms.

Follow these steps:

1. From a command prompt, execute pdm_perl
\$NX_ROOT/bin/migrate_to_r12_9_web_check.pl.

The script appends the customized forms with an *incompatible_for_r12_9* extension.
2. Open \$NX_ROOT/bin/migrate_to_r12_9_web_check.pl with a text editor.

A list of incompatible forms for r12.9 appears.

Note: The script does not restore files from backup folders to the legacy or site/mods directories as in previous releases of CA SDM.

More information:

[Retaining Your Customizations](#) (see page 33)

User Interface Migration Considerations

Before you upgrade to CA SDM r12.9, consider the following user interface migration information:

- Migration backs up forms automatically. If you used customized HTML forms in CA SDM r11.2, r12.0, r12.1, or r12.5, you *must* customize them again after upgrading to CA SDM r12.9.
- After you upgrade, modify all customized HTML forms that contained notebook controls to include the new web macros and provide the appropriate tab group names. You modify <PDM_NOTEBOOK> statements to <PDM_MACRO name=startNotebook> and <PDM_TAB> statements to <PDM_MACRO name=TAB> in WSP.

More information:

[Modify Data Grid List on List Form](#) (see page 387)

[Modify Notebooks on Detail Form](#) (see page 388)

copy_inactive Web Option

New CA SDM r12.9 installations do not install the copy_inactive web option in Options Manager so that links to inactive objects are not copied. If you are upgrading from CA SDM r12.5 or r12.6, links to inactive objects are copied because migration installs the option.

Consider the following information when you do not install the copy_inactive option:

- CA SDM does not copy SRELs that point to inactive objects, unless SREL is required.
For example, the Organization org1 has an inactive Location. When you copy org1, the new organization does not have a location. However, if SREL is required, CA SDM ignores this rule and copies the location. For example, CA SDM ignores the rule and you can copy a CI with an inactive class.
- CA SDM does not copy LREL (many-to-many) relationships to inactive objects.
For example, the CI named CITest1 has a relationship to the inactive Organization org2. When you copy CITest1, org2 does not link to the new CI.

Important! These rules also apply when you copy a ticket, even if you create a ticket from a template. Whether you installed copy_inactive, the exception to the rule is for Inactive Areas and Categories, which are not copied from existing tickets or populated from templates.

LREL Migration Considerations

A *List Relationship* (LREL) represents an association between two objects. An LREL has a left-hand side (lhs) and right-hand side (rhs) relationship. Each side of the relationship is an attribute of the majic object that contains the data relationship.

In previous releases of the product, .maj LREL statements and objects described many-to-many DBMS data relationships. Many-to-many relationships no longer use the LREL majic statement. Instead, individual tables store both sides of the relationship. Objects access the relationship with a standard BREL statement. For example, you can see the relationship between change orders and CIs by reviewing the new `usp_lrel_asset_chgnr` table and in the corresponding `lrel_asset_chgnr` object.

The LREL changes eliminate the need to store attribute names in the database. The two sides of the relationship are foreign key single relationships (SREL) that are easy to join and index. If necessary, the relationship can contain additional relational attributes.

During the upgrade, the following activities occur as LREL table data migrates to r12.9:

- The system automatically migrates tables and objects with LREL relationships to r12.9 tables and objects.
- The system names new tables using the `usp_lrel_lhsName_rhsName` format.
For example, the `usp_lrel_asset_chgnr` table has a left-hand relationship to assets and a right-hand relationship to change orders.
- The system names the corresponding objects using the `lrel_lhsName_rhsName`.
For example, the `lrel_asset_chgnr` object corresponds to the `usp_lrel_asset_chgnr` table.
- Because of a database limitation, some names are abbreviated.
- Your data migrates from the old tables to the r12.9 tables, and all CA SDM code is modified to use these tables.
- The system no longer uses the old LREL database tables, such as `bmlrel`. However, for reference purposes, the old tables retain the data.
- A backward relation (BREL) attribute to the new object replaces the original LREL attribute in each related majic object definition.
- If you are using a supported API, such as the `CreateLrelRelationship()` web service method, the code works as expected.
- If you added any custom LREL style relationships, CA SDM migrates them to r12.9 tables.
- Any site-defined code or reports that directly access the old LREL tables operate on old data because the system no longer uses those tables. We recommend that you update the code to use the r12.9 tables so the code and reports run properly.

Important! If your code directly accesses legacy LREL objects or tables, the code fails after migration. We recommend that you upgrade the code before migration. For example, if your code uses majic statements to establish LREL relationships, use the *createLrelRelationships()* method instead of directly populating a table.

Note: We recommend that you verify site-defined code or reports that directly access the database or address the legacy LREL majic objects such as the lrel1 object to verify that they operate properly. You can update your code to use a supported interface, such as Web Services. You also update the necessary table names. For reports, you can also update the queries with the new DBMS table references.

Status Transition Considerations

Consider the following information if you plan to use Status Transitions after upgrading from CA SDM r11.2, r12.1, and r12.1 to CA SDM r12.9:

- Status transitions are inactive when you upgrade to r12.9.

Note: All customized status code descriptions that appear on ticket forms are retained during the upgrade process.

- The *Status_Policy_Violations* option is installed and set to Warn by default after you upgrade. This setting allows undefined transitions to occur, but logs a warning.
- If you set the option to Allow, undefined transactions are not logged.

Note: For more information about the *Status_Policy_Violations* option, see the *Online Help*.

Email Upgrading

CA SDM replaces the Options Manager, Email inbound email options with a Mailbox (*usp_mailbox* table) that supplies corresponding options. The Email outbound email options are still present under the Options Manager. When you upgrade, CA SDM uses your existing email settings to configure a mailbox, instead of the default Mailbox settings that are supplied with CA SDM r12.9. Each email option, except EMAIL_ATTACHMENT_DIR (which is no longer needed), is mapped to an option in the *usp_mailbox* table. Any option that is not set, is set as null in the table.

Note: For information about activating the default mailbox and about using mailbox options, see the *Administration Guide* and the *Online Help*.

The following table lists options that are removed from the Email options, provided in the *usp_mailbox* table, and indicates their labels in the Mailbox Detail page:

Email Option	usp_mailbox Option	Default Mailbox Detail Label
EMAIL_ALLOW_ANONYMOUS	allow_anonymous	Allow Anonymous

Email Option	usp_mailbox Option	Default Mailbox Detail Label
EMAIL_ATTACHMENT_DIR	N/A	N/A Note: Because EMAIL_ATTACHMENT_DIR is deprecated, you must manually select an Attachment Repository if this option was set and EMAIL_ATTACHMENT_REPOSITORY was not.
EMAIL_ATTACHMENT_REPOSITORY	attmnt_repository	Attachment Repository
EMAIL_FORCE_ATTACHMENT_SPLITOUT	split_out_attachment	Force Attachment Splitout
EMAIL_IS_ATTACHMENT	attach_email	Attach Entire Email
EMAIL_SAVE_UNKNOWN_EMAILS	save_unknown_emails	Save Unknown Emails
MAIL_EATER_IMAP_HOST_PORT	host_port	Port Override
MAILEATER_CHECK_MAIL_INTERVAL	check_interval	Check Interval
MAILEATER_HOST	host_name	Hostname
MAILEATER_LOGIN_PASSWORD	password	Password
MAILEATER_LOGIN_USERID	userid	Userid
MAILEATER_POP3_HOST_PORT	host_port	Port Override
MAILEATER_SECURITY_LEVEL	security_lvl	Security Level
MAILEATER_SERVER_TYPE	email_type	Email Type

Important! The Attachment Directory setting is deprecated in r12.9, so you *must* specify an Attachment Repository before you continue polling the mailboxes.

Maileater.cfg Considerations

Information that was previously included in the *maileater.cfg* file maps to the *usp_mailbox_rule* table in r12.9. Consider the following information about the mapping from *maileater.cfg* to *usp_mailbox_rule*:

- The ‘-i’ at the beginning of the line denotes case insensitivity and maps to the *filter_ignore_case* field.
- The search filter “Subject: *...” previously denoted a regular expression on which to filter. The “Subject:” is removed, is replaced with a “^” symbol, and the remaining value maps to the *filter_string* field. The *Filter_type* is set to “Subject Contains” type.
- The “TEXT_API xxx” denotes the object that is processed for the rule. The string “TEXT_API ” is removed, and the remainder maps to the *action_object* field. The *action_operation* field is set to Create/Update Object.

- The reply to the user typically contains “PDM_MAIL ...”. If you have “PDM_MAIL” set, set `reply_method` to 1800 or else leave it set to null.
- If the `-s` parameter is set, remove the subject field from the text and set the `reply_subject` with this value.
- The functionality maintains the order of entries. A sequence number starting at 100 and incremented by 100 is set for each valid row.

The other fields in the `usp_mailbox_rule` are set as follows:

Field	Value
mailbox	Default
action_write_to_log	0
action_log_prefix	null
delete_flag	0
description	Migrated from pdm_maileater.cfg file
reply_failure_html	<leave blank to inherit default action>
reply_failure_text	<leave blank to inherit default action>
reply_success_html	<leave blank to inherit default action>
reply_success_text	<leave blank to inherit default action>
text_api_defaults	null
text_api_ignore_incoming	null
action_subject_handling	null
last_mod_dt	null
last_mod_by	null
inclusion_list	"*"
email_address_per_hour	-1
exclusion_list	null
log_policy_violation	1

How the Migration Console Works

The Migration Console guides you through the migration and upgrade processes for CA SDM. The console automatically detects an existing installation, such as CA SDM r11.2. You can start the upgrade from the installation media or start it [manually](#) (see page 42).

Note: If your customized web forms are not compatible with CA SDM r12.9, the migration console displays a message indicating that these forms moved to the `site/mods/www/html` directory. For more information about these forms, view the `Web_Forms_Changed.txt` file in the `site/mods/` directory.

Important! The CA SDM Migration Console does not convert divisions to tenants. If you want to configure Support Automation in a multi-tenancy environment, you *must* [separately migrate](#) (see page 48) CA Support Automation r6.0 SR1 eFix5 divisions to CA SDM r12.9 tenants before enabling Support Automation in CA SDM.

The console performs the following tasks:

1. Verifies that your product is CA SDM r11.2, r12.0, r12.1, r12.5, r12.6 or r12.7.
2. Converts passwords to a FIPS 140-2 compliant format.
3. Applies MDB updates.
Important! The remote MDB version must be at least CA MDB r1.5, or the migration fails.
4. Migrates LREL data.
5. Converts customized files to UTF-8.
6. Converts access type records to the CA SDM r12.9 role and access type records.
7. Migrates and upgrades user scoreboard queries for role-based operations.
8. Migrates and upgrades existing notifications to use notification rules and notification message templates.

Note: After you select Perform Upgrade and click Install, you cannot roll back the migration and upgrade. If you close the Migration Console before the process finishes, it continues to run in the background.

Migration Log File

If you encounter problems during the migration and upgrade, the migration log provides a record of the entire process. You can access this log in the following location:

```
$NX_ROOT/log/pdm_migrationr12_9.log
```

Start the Migration Manually

You can manually start the upgrade using the following command:

- **Windows**

```
$NX_ROOT\bin\migrate_to_r12_9.vbs
```

- **Linux/UNIX**

```
$NX_ROOT\bin\migrate_to_r12_9.sh
```

Note: If migration fails with a "Schema Validation" error, use the previously mentioned command to run the upgrade again.

How to Upgrade CA CMDB from a Previous Release

You can upgrade CA CMDB to CA SDM r12.9 from a previous release, such as r11.2, r12.0, and r12.1. If you cancel migration, you *must* execute the script to relaunch the migration console. The script is located in the */bin* directory of the product, such as *C:/CMDB/bin*. For example, if you cancel migration on Linux or Unix, execute the *migration_to_r12.9.sh* script.

Note: If you are upgrading from a standalone CA CMDB release, you can continue to use standalone CA CMDB functionality in CA SDM r12.9. If you are upgrading from an environment with CA CMDB and CA SDM, or if you are upgrading from a CA SDM environment without CA CMDB, the full CA SDM r12.9 installs during the upgrade.

You upgrade CA CMDB as follows:

1. Launch the CA SDM installer from the installation media.

The installer detects your version of the product, such as CA CMDB r11.2.

Note: If you are upgrading from a combined CA SDM and CA CMDB installation, the installer displays the detected environment as a CA CMDB release, not CA SDM.

2. Click Next.

The installation warns you not to use CA SDM and Knowledge Management until migration completes.

3. Click Next.

If the installation detects Visualizer, you are prompted to uninstall it manually.

Important! After you uninstall Visualizer, you *must* reboot and relaunch the CA SDM installer.

4. Accept the terms of the License Agreement and click Install.

The installation backs up your data and shuts down services.

Note: The CA CMDB upgrade does *not* back up your database.

After the installation completes, the migration console appears with a warning to review your migration documentation.

5. Click Migrate.

The migration console loads system data, updates your MDB, and recycles services.

Note: You can actively view the migration log during the process.

6. The console verifies tables, processes data, backs up, and upgrades your product to r12.9.

The CA SDM configuration appears.

7. (Optional) Configure CMDB Only.

If you are upgrading from a standalone CA CMDB environment, a *Configure CMDB Only* check box displays on the General Settings form.

Important! During configuration, when you migrate from CA CMDB stand alone version to CA SDM, a *Configure CMDB Only* check box displays. When you clear the *Configure CMDB Only* check box and you click Next, you cannot configure CA CMDB again. Even if you click Back, the *Configure CMDB Only* check box is no longer available. A message warns you of this behavior in the configuration dialog. If you cancel the configuration before it completes and rerun it, the *Configure CMDB Only* check box is available.

The *Configure CMDB Only* check box controls the value of the CA SDM environment variable `NX_CMDB`. The environment variable controls whether the Support Automation feature is configured. If the check box is cleared, Support Automation is configureable, otherwise it is not. The environment variable affects the behavior of some Web forms.

If you are upgrading from a standalone CA CMDB environment, and want to use standalone CA CMDB functionality in CA SDM r12.9, you cannot configure Support Automation.

8. Complete the configuration, as appropriate to your environment.

How to Migrate Data to CA SDM r12.9 on a 64-Bit Linux/UNIX

Note: This information applies to 64-bit Linux/UNIX only.

Follow these steps:

1. Install the Oracle 32-Bit client.
2. Establish the connection with Oracle_Server_SID.
3. Create a Local Net Service Name and test the connection.
4. Export TWO_TASK variable.
5. Edit the ORACLE_HOME and PATH variables to have oracle_client home and remove server home, as shown in the following example:

```
ORACLE_HOME= /opt/app/product/11.2.0/client_1  
PATH= /opt/app/product/11.2.0/client_1/bin
```

Note: Update the ORACLE_HOME variable in the NX.env as shown in the previous example.

6. Set LD_LIBRARY_PATH and LIBPATH to the client-lib which are 32 -bit binaries, as shown in the following example:

```
LD_LIBRARY_PATH=/opt/app/product/11.2.0/client_1/lib
```

7. Execute pdm_configure with ORACLE_HOME set to client_home, as shown in the following example:

```
C:\app\Administrator\product\11.2.0\client_1\
```

8. Install CA SDM r12.9.

How to Migrate Data to CA SDM r12.9 on a 64-Bit Windows

Note: This information applies to 64-bit Windows only.

Complete the following steps to migrate data to CA SDM r12.9:

1. Install the Oracle 32-bit client.
2. Establish the connection with Oracle_Server_SID.
3. Create a Local Net Service Name and test the connection.
4. Edit the PATH variable to have oracle_client home and remove server home from PATH, as shown in the following example:
C:\app\Administrator\product\11.2.0\client_1\bin
5. Execute pdm_configure with ORACLE_HOME set to client_home, as shown in the following example:
C:\app\Administrator\product\11.2.0\client_1\
6. Install CA SDM r12.9.

Example: Migrate from a Nonsupported Windows Environment

In this example, you have CA SDM r11.2 installed on Windows 2003 (32-bit) with SQL Server 2005. You want to migrate your data and upgrade to CA SDM r12.9 on a Windows 2008 64-bit system with SQL Server 2008 successfully.

Follow these steps:

1. Migrate to CA SDM r12.9 on the same computer.
2. Upgrade SQL Server 2005 to 2008.
3. Back up the MDB database.
4. Install CA SDM r12.9 on Windows 2008 (64-bit).
5. Load the MDB backup that you completed in Step 3.
6. Move the \$NX_ROOT\site\mod folder from the older computer to the new computer.
7. Update the NX.env file with the customized variables.
8. Copy the Attachment folder from the older computer to the new computer.
9. Run configuration again on the new computer.
10. Update the computer details in the required places in Options Manager.

Example: Migrate from a Nonsupported Non Windows Environment

In this example, you have CA SDM r11.2 installed on Redhat Enterprise Linux 4 with Oracle 10g. You want to migrate your data and upgrade to CA SDM r12.9 on a Redhat Enterprise Linux 6 system with Oracle 11g R2 successfully.

Follow these steps:

1. Migrate to CA SDM r12.5 on the same computer.
2. Back up the MDB database.
3. Install CA SDM r12.5 on Redhat Enterprise Linux 6 with Oracle 11g R2.
4. Load the MDB backup that you completed in Step 2.
5. Move the \$NX_ROOT\site\mod folder from the older computer to the new computer.
6. Update the NX.env file with the customized variables.
7. Copy the Attachment folder from the older computer to the new computer.
8. Run configuration again on the new computer.
9. Update the computer details in the required places in Options Manager.
10. Migrate from CA SDM r12.5 to r12.9.

Support Automation Data Migration

You can migrate CA Support Automation r6.0 SR1 eFix5 data to CA SDM r12.9 from the following environments:

- Unicenter Service Desk r11.2
- CA SDM r12.0
- CA SDM r12.1
- CA Support Automation r6.0 SR1 eFix5 without CA SDM.

Note: You can only migration data from CA Support Automation r6.0 SR1 eFix5. We recommend that you run a full backup of the CA Support Automation r6.0 SR1 eFix5 database before migrating.

Important! Branding customizations from CA Support Automation r6.0 SR1 eFix5 do not migrate to CA SDM r12.9 automatically. We recommend that you review the customized branding to verify that it corresponds to the CA SDM branding. If necessary, copy and paste the Header, Footer, and CSS URL data of each division to the corresponding tenant (or public) in CA SDM to migrate the branding data.

How to Migrate a Support Automation Database

You can configure the migration tool to migrate data from the Support Automation database to the CA SDM database, including Support Automation names transformation into the CA SDM database conventions. Migrate the data from the Support Automation database to the CA SDM database before the first usage of Support Automation.

The following process outlines how you migrate the data:

1. [Export](#) (see page 48) the CA Support Automation data using the script on the installation media.

The export tool converts the data into *.DAT* format. The tool performs the following major steps when you migrate the data:

- Import the Support Automation database schema into the CA SDM database.

This schema creates the necessary tables that Support Automation uses.

- Migrate the data from the Support Automation database migration XML into the CA SDM database.

The CA SDM migration tool generates necessary UUIDs and creates necessary records which represent relationships between Support Automation ID and CA SDM UUID.

2. Copy the CA Support Automation data export folder to the following directory on the CA SDM server:

NX_ROOT/site/sbmigration/SA60

The data export completes.

3. [Import](#) (see page 50) the data into CA SDM using the CA Support Automation Migration tool.

The data loads into the database and migration completes.

Historical Data Migration

If you do not want to migrate all the historical data from the CA Support Automation r6.0 SR1 eFix5 database, you can purge some of the historical data. You can configure the number of days to leave in the database in the purge script setup.

You can download the purge script from the following location:

ftp://ftp.ca.com/pub/supportbridge/6.0/patch-01/purge_history_6.0_sp1.zip

How to Convert Divisions to Tenants

You can only migrate divisions from CA Support Automation r6.0 SR1 eFix5. You convert these divisions to tenants to use multi-tenancy in a Support Automation environment. You can migrate each division separately as its own tenant. During the initial data import, all rows in tenant-optional tables are made tenanted.

Important! You migrate this data before enabling Support Automation in CA SDM.

You can migrate divisions to tenants as follows:

1. [Export](#) (see page 48) the division data using the script on the installation media.
You can export a single division or all divisions.
2. The export tool converts the data into *.DAT* format.
The tool displays the status of the division export.
3. Copy the CA Support Automation data export folder to the following directory on the CA SDM server:
`NX_ROOT/site/sbmigration/SA60`
The data export completes.
4. [Import](#) (see page 50) the data into CA SDM using the CA Support Automation Migration tool.
The data loads into the database and migration completes.

Note: For more information about configuring Support Automation, see the *Online Help*.

Export CA Support Automation Data

You export CA Support Automation r6.0 SR1 eFix5 data by converting it to the *.DAT* format that CA SDM uses. You can export divisions into separate tenants, and import the data to a public environment. The export tool logs the process and displays the output directory of the log file after the export completes. The export process records the successful output of each table and indicates any unexpected conditions or errors it encounters.

Important! You can only migrate divisions from CA Support Automation r6.0 SR1 eFix5.

To export CA Support Automation data

1. Execute the *SA60Export* script from the installation media in the following directory:
/casd.nt/SAMigration

Note: The file extension depends on your operating system. For example, Windows uses “bat,” UNIX uses “sh” for the bourne shell script, “csh” for the C shell, or “ksh” for the korn shell, and so on.

The CA Support Automation Migration tool appears.

2. Do the following:
 - a. Enter the CA Support Automation r6.0 SR1 eFix5 "WEB-INF" installation parent directory.
 - b. Enter a directory to export your CA Support Automation data.

Note: After the export completes, move this folder to the *NX_ROOT/site/sbmigration/SA60* directory on the CA SDM server.

- c. (Optional) Specify whether passwords can be exported. If you select this option, passwords are exported for users, default credentials, and automated task credentials.
 - d. (Optional) Export a single division or all the divisions. If you select this option, a drop-down list displays all active divisions.

3. Click Run.

The Process Status displays information about the export, such as the database table being migrated, and a count of the records in the table.

A message appears if the tool detects unrecoverable errors.

Note: You can stop the export by selecting Stop from the toolbar or file menu.

The data export completes.

4. Configure and implement Support Automation, as appropriate to your environment.

Note: For more information about configuring Support Automation options, see the *Online Help*.

Import Support Automation Data

You import Support Automation data after converting it to *.DAT* format. You can import the data into CA SDM using the Support Automation migration script. You invoke the utility after installing and configuring CA SDM. You can also execute *sa_migrate.pl* using the *pdm_perl* command.

You can access the script in the *NX_ROOT\bin* directory. The migration script performs tasks such as processing tables to maintain database constraints, creates corresponding CA SDM objects, maps tenant column values, and so on.

The default location for migration-related files in the CA SDM installation is in the *NX_ROOT/site/sbmigration* directory. For example, you can find the import configuration file in the *NX_ROOT/site/sbmigration/config* folder. The *sa_migration_config.dat* file stores the id, prop_name, value, and prop_description columns in the CA SDM data format.

The directory stores CA Support Automation r6.0 SR1 eFix5 export data, migration utility code, and Perl scripts, and so on.

To import Support Automation data

1. Start the CA SDM Service.

The service starts and you can verify that it is running.

2. Enter the following on the command line:

```
pdm_perl <NX_ROOT>\bin\sa_migrate.pl
```

The Support Automation data loads into the database from the export package.

How to Configure Support Automation Role Access After Migration

If you configure Support Automation before migration, the role access configures properly. If you configure Support Automation after migration, set the Support Automation access field for each role to the appropriate value. If the role access is not properly set up, you cannot access the Support Automation Analyst Interface or the End User interface.

The following process outlines how you configure the Support Automation role access after migration:

1. Install the *supportautomation_url* option.
2. Set the Support Automation access field for each role you want to access Support Automation.

Note: For more information about installing the *supportautomation_url* option or creating Support Automation access roles, see the *Online Help*.

How to Migrate a Custom CA Business Intelligence Universe

You can migrate a custom universe as follows:

1. Follow the customization instructions to link a custom universe to the CA SDM universe.
2. Back up the *biar* file of any site-defined universes or reports.
3. Install a universe from the current release.
4. Link the custom universe to the universe from the current release.

How to Back Up a Custom Universe

If you linked a custom universe to the CA SDM universe, do the following before you install the CA SDM r12.9 universe and reports:

1. Use the Import Wizard to create a backup *biar* file of any site-defined universes or reports.
2. Start Universe Designer.
3. Import your custom universe.
4. Save a copy of the universe on your local drive.

The custom universe is backed up.

More information:

[Move from Development to Production](#) (see page 477)

Install a CA Business Intelligence Universe

You install the universe to replace the CA Business Intelligence r12.0 universe and reports.

To install the universe

1. From the CA Service Desk Manager DVD #2, execute setup.exe.
2. Select the Product Installs tab.
3. Scroll down and select CA Business Intelligence Configuration.

The CA Service Desk Manager Component Installer Wizard appears.

4. Click Next and enter your user credentials.

Note: If CA SDM is not installed on this computer, specify the CA SDM hostname.

5. Click Finish.

The CA Business Intelligence r12.0 universe and reports are replaced and the r12.9 reports are created in the subfolders.

Update a Universe Link

Although the universe name remains unchanged in CA SDM r12.9, you *must* update the universe link to the universe. Otherwise, universe connection problems can occur when you run your reports and when you import the universe. The following error message can occur:

Unable to resolve core universe ID

To update the universe link

1. Start Universe Designer on the same computer that you used to back up the custom universe.
2. Select File, Open to open your custom universe.
3. Select File, Parameters.

The Universe Parameters dialog appears.

4. Click the Links tab.
5. Under the Name column, click the CA SDM universe.

The Change Source button becomes enabled.

6. Click the Change Source button.
7. Navigate to and select the location of the CA SDM *.unv* file.

Note: The *.unv* file is typically located in the CA Universes folder.

8. Click Open, and click OK.

The universe link is updated.

9. Export the custom universe.

Post Upgrade Configuration

You configure the product when the upgrade completes. Use the configuration wizard to verify your existing customizations.

Note: If the Configuration dialog closes without completing post-upgrade configuration, run `pdm_configure -s` from the command line.

Inactive Servers Other Than Primary or Secondary

After you upgrade, all the servers that are not entered as primary server in the `usp_servers` table are converted to secondary server. Before upgrading, if you have added any server in the `usp_servers` table, which are not secondary or primary server, inactive them after you upgrade. You can inactive servers from the primary server Web UI. For more information, see the *Online Help*.

Support Existing Customers Using EEM 8.4 Server

CA SDM r12.9 uses EEM 12.5 SDK which is not compatible with the EEM 8.4 server. To support the existing customers who are using EEM 8.4 server, EEM 8.4 SDK patch has to be applied on the CA SDM r12.9 server. Find the patch details from the CA Support Online.

How to Upgrade CA Workflow and CA EEM

You install CA Workflow and CA EEM separately in CA SDM r12.9.

When migrating to r12.9, upgrade to at least CA EEM r8.4 SP4 and CA Workflow r1.1.132.

Note: You can upgrade from CA EEM r8.1 directly to r8.4 SP4.

To upgrade CA EEM and CA Workflow, perform the following tasks:

1. Verify that you upgraded to CA SDM r12.9.
2. Insert the installation media into your drive.
3. Install CA EEM.
4. Install CA Workflow.

After you install CA Workflow and CA EEM, manually set the appropriate options in the Options Manager. Review the upgraded options carefully. The default Tomcat port for CA Workflow is no longer port 8080, and the default Process Manager URL is no longer `pmService`.

Note: The *cawf_pm_url* option has changed to a default of:
http://<wf_hostname>:<wf_tomcat_port>/pm/service/pmService2, so you *must* manually change "pmService" to "pmService2" for CAWF communication to remain functional.

Important! After you upgrade CA EEM, set the *eiam_hostname*, *use_eiam_artifact*, and *use_eiam_authentication* options in Options Manager, Security if you previously used eIAM CA SDM user authentication. For more information about these options, see the *Online Help*.

Retain Server Process Configuration

In the previous releases of CA SDM, the information regarding the server process configuration (created using the *pdm_edit.pl* script) are stored in the *pdm_startup.dat* file located in the *\$NX_ROOT/samples/pdmconf* directory. To retain this server process configuration in CA SDM r12.9, the *pdm_startup.dat* file requires to be processed to generate that configuration which can be then applied using the *pdm_configure* command.

Follow these steps:

1. Log in to the primary server Web UI and add all the secondary servers which were part of the previous CA SDM release (if not already been added). For more information, see the *Online Help*.
2. Go to the *\$NX_ROOT/bin* directory and run the *pdm_edit_migration* command line tool. This tool is applicable only for the CA SDM conventional configuration.

If this tool runs successfully, a new configuration with Active state is created or else a new configuration with Inactive state is created. From the CA SDM Web UI, check Systems, Configuration from the Administration tab for the new configuration. Only active configurations can be applied on a server.

Note: If the tool does not run successfully, correct the problem entries in the *pdm_startup.dat* file and run the tool again.

3. Run *pdm_configure* on the primary server to apply this new configuration. For more information, see the *Server Configuration Help*.

Enable the CA SDM and CA IT PAM Integration

After you upgrade, ensure that integration of CA SDM with CA IT PAM 4.0 or above, by completing the following steps:

1. Go to Options Manager, CA IT PAM Workflow and change the value of the following options:
2. Set the value of `caextwf_processdisplay_url` to
`http://<wf_hostname>:<wf_tomcat_port>/itpam/Web.jsp?page=runtimeeditor&ROID=`
3. Set the value of `caextwf_worklist_url` to
`http://<wf_hostname>:<wf_tomcat_port>/itpam?page=tasklist`

Important! When CA SDM is integrated with CA IT PAM which uses CA EEM 8.4, ensure that you apply the CA EEM 8.4 SDK patch on CA SDM. Find the patch details on [CA Support Online](#).

Clear the Webengine and Browser Cache

After you upgrade to CA SDM r12.9, run the `pdm_webcache` utility to clear the cache for the webengine and browser.

```
pdm_webcache -b -H
```

-b

Warns the user to clear their browser cache.

-H

Clears the webengine cache.

Configure the Web Director and Servers

After you upgrade, we recommend that you configure the servers and Web Director.

To configure the Web Director and servers

If the previous version was configured to use additional servers, or web directors, you can configure the servers and web director and apply the configuration after upgrade.

See the *Administration Guide* for additional information.

LREL Post-Migration

After migration, complete the following verification steps:

1. Query the contents of the new tables to verify that the tables contain the correct data.
2. Update each site-defined report to verify that report data originates from the new LREL tables.
3. Test site-defined reports.

Deprecated Object and Tables

The following objects and tables are deprecated for this release of CA SDM. During migration, the system copies the data to r12.9 LREL tables. The system uses the LREL tables and objects, but for reference purposes, the old tables retain the data that was present at the time of the upgrade.

Note: For more information about LREL tables, see the *Technical Reference Guide*.

DBMS Name	Object Name
Attachment_Lrel	attmnt_lrel
Business_Management_Repository_Lrel	bmlrel
Chgcat_Group	chgcat_grp
Chgcat_Loc	chgcat_loc
Chgcat_Workshift	chgcat_workshift
Group_Loc	grp_loc
Isscat_Group	isscat_grp
Isscat_Loc	isscat_loc
Isscat_Workshift	isscat_workshift
Knowledge_Lrel_Table	kmlrel
Lrel_Table	lrel1
Pcat_Group	pcat_grp
Pcat_Loc	pcat_loc
Pcat_Workshift	pcat_workshift
Wftpl_Group	wftpl_grp

LREL Tables and Objects

The migration automatically creates the following tables and objects to manage many-to-many data relationships:

DBMS Name	Object Name
usp_lrel_asset_chgnr	lrel_asset_chgnr
usp_lrel_asset_issnr	lrel_asset_issnr
usp_lrel_att_cntlist_macro_ntf	lrel_att_cntlist_macro_ntf
usp_lrel_att_ctplist_macro_ntf	lrel_att_ctplist_macro_ntf
usp_lrel_att_ntflist_macro_ntf	lrel_att_ntflist_macro_ntf
usp_lrel_attachments_changes	lrel_attachments_changes
usp_lrel_attachments_issues	lrel_attachments_issues
usp_lrel_attachments_requests	lrel_attachments_requests
usp_lrel_aty_events	lrel_aty_events
usp_lrel_bm_reps_assets	lrel_bm_reps_assets
usp_lrel_bm_reps_bmhiers	lrel_bm_reps_bmhiers
usp_lrel_cenv_cntref	lrel_cenv_cntref
usp_lrel_dist_cntlist_mgs_ntf	lrel_dist_cntlist_mgs_ntf
usp_lrel_dist_ctplist_mgs_ntf	lrel_dist_ctplist_mgs_ntf
usp_lrel_dist_ntflist_mgs_ntf	lrel_dist_ntflist_mgs_ntf
usp_lrel_false_action_act_f	lrel_false_action_act_f
usp_lrel_false_bhv_false	lrel_false_bhv_false
usp_lrel_kwrds_crsolref	lrel_kwrds_crsolref
usp_lrel_notify_list_cntchgntf	lrel_notify_list_cntchgntf
usp_lrel_notify_list_cntissntf	lrel_notify_list_cntissntf
usp_lrel_notify_list_cntntf	lrel_notify_list_cntntf
usp_lrel_ntfr_cntlist_att_ntfrlist	lrel_ntfr_cntlist_att_ntfrlist
usp_lrel_ntfr_ctplist_att_ntfrlist	lrel_ntfr_ctplist_att_ntfrlist
usp_lrel_ntfr_macrolist_att_ntfrlist	lrel_ntfr_macrolist_att_ntfrlist
usp_lrel_ntfr_ntflist_att_ntfrlist	lrel_ntfr_ntflist_att_ntfrlist
usp_lrel_oenv_orgref	lrel_oenv_orgref
usp_lrel_status_codes_tsktypes	lrel_status_codes_tsktypes

usp_lrel_svc_grps_svc_chgcat	lrel_svc_grps_svc_chgcat
usp_lrel_svc_grps_svc_isscat	lrel_svc_grps_svc_isscat
usp_lrel_svc_grps_svc_pcat	lrel_svc_grps_svc_pcat
usp_lrel_svc_grps_svc_wftpl	lrel_svc_grps_svc_wftpl
usp_lrel_svc_locs_svc_chgcat	lrel_svc_locs_svc_chgcat
usp_lrel_svc_locs_svc_groups	lrel_svc_locs_svc_groups
usp_lrel_svc_locs_svc_isscat	lrel_svc_locs_svc_isscat
usp_lrel_svc_locs_svc_pcat	lrel_svc_locs_svc_pcat
usp_lrel_svc_schedules_chgcat_svc	lrel_svc_schedules_chgcat_svc
usp_lrel_svc_schedules_isscat_svc	lrel_svc_schedules_isscat_svc
usp_lrel_svc_schedules_pcat_svc	lrel_svc_schedules_pcat_svc
usp_lrel_true_action_act_t	lrel_true_action_act_t
usp_lrel_true_bhv_true	lrel_true_bhv_true

Verify LREL Conversion

During data migration, the system adds LREL tables to manage many-to-many relationships. You can verify the contents of the new tables and updated site-defined code and reports.

To verify data in the LREL tables

1. Query the contents of the tables to verify that they contain the correct data.
2. Update each site-defined report to verify that report data originates from the new LREL tables.
3. Update the queries with the new DBMS table references.
4. Test site-defined reports and code. Update your code to use the new LREL tables and a supported interface, such as Web Services. If necessary, update the table names in your code.

Verify Database Customizations

You can verify that your database customizations migrated correctly to the current release of the product.

To verify database customizations

1. Review each customized table using either your database management product or WSP.
2. Verify that your customized files appear in the following directory:

\$NX_ROOT/site/mods/

Verify Web Form Customizations

You can verify that your web form customizations work correctly in the current release of the product.

To verify web form customizations

1. Verify that your customized forms appear in the *\$NX_ROOT/site/mods/www/html* directory.
2. Verify that your web form opens correctly within a browser.
3. Verify that your web form opens correctly in Web Screen Painter.

Edit Access Types

When you upgrade from CA SDM r11.2, the upgrade process automatically creates roles for all access types and correctly assigns access and permissions to the roles. If you want to take advantage of the new roles in r12.9, you can create roles for access types.

To create roles for access types

1. Log in to the web interface as a user with the ability to access the Administration tab.
2. Click the Administration tab.
3. In the tree on the left, select Security and Role Management, Access Types.

All available access types display.

4. Click an available access type.

The detail page for the access type displays.

5. Click the Roles tab.
6. Select a new role for the access type and click Update Roles.

The new role is associated with the access type.

Note: You can also create a custom role and assign it to the access type. For information about creating roles, see the *Administration Guide*.

Enable Priority Calculation

Priority calculation is a set of values that automatically set Priority, Urgency, and Impact values on problems and incidents. For new CA SDM installations, the default priority calculation is enabled for problem and incident ticket types by default. However, if you are upgrading from a previous release, the default priority calculation is inactive.

If you create and activate a different priority calculation, the ticket values reflect the settings in the active priority calculation that is associated with an incident or a problem. When no priority calculation is active, users can manually set the Priority and other values on tickets.

Note: The customized forms on the Employee and Customer interface operate in the same manner as the previous versions. The Self-Service users can directly change the Priority regardless of the settings in Priority calculation.

To enable priority calculation after the migration, do the following:

1. On the Administration tab, navigate to Service Desk, Request/Incidents/Problems, Priority Calculation.

The Priority Calculation List appears.

2. Right-click the default priority calculation or another priority calculation and select Edit from the short-cut menu.

The Update Priority Calculation page appears.

3. Set the Status to Active.
4. Select one or more of the following ticket types:

Incidents

Enables this priority calculation to manage incident tickets. Only one active priority calculation can manage incidents.

Problems

Enables this priority calculation to manage problem tickets. Only one active priority calculation can manage problems.

5. Click Save.

The values on the default priority calculation apply to new tickets unless you activated another priority calculation. On new tickets that use a priority calculation, the Priority field is read-only.

Note: For information about defining a priority calculation for tenants and tickets, see the *Administration Guide* and *Online Help*.

How to Add the Incident Priority Field to Incidents

The *incident priority* is the sum of the Urgency and Impact values. The incident priority is only for the incident ticket type. The Incident Priority value appears on the incidents after you install the use_incident_priority option and add it to the incident Detail page form with Web Screen Painter.

To add the Incident Priority field to incident, do the following:

1. Install the use_incident_priority option from the Options Manager, Request Mgr.
2. Use Web Screen Painter to add the Incident Priority field to the Incident Detail pages.

The Incident Priority value appears on saved Incident Detail page when the use_incident_priority option is installed. When the use_incident_priority option is not installed, the Incident Priority value is zero.

Note: The use_incident_priority option only manages the Incident Priority value. This option is not related to priority calculation.

More information:

[Set the Urgency Range for Self-Service Users](#) (see page 62)

Add the Urgency Field to Employee Tickets

By default the Urgency field does not appear on Employee incidents or requests. However, you can add the Urgency field by using the urgency_on_employee option.

Note: When you uninstall the urgency_on_employee option and disable priority calculation, the Priority field appears on the Request and Incident Detail pages for self-service Users.

To add the Urgency field to Employee tickets, install the urgency_on_employee option from the Options Manager, Request Mgr. The Urgency field appears on Employee incidents or requests. Self-service users can override the value on the incident.

How to Set Ticket Values for Self-Service Users

You can control the Urgency and Priority values that appear to Self-Service users. The properties you set in the *web.cfg* file manage choices that appear to users while they create or edit tickets.

To set ticket values for Self-Service users, consider the following:

1. For each override value in the *web.cfg* parameter, specify one or more values.
2. For [Urgency values](#) (see page 63), specify one or more numbers from 0 through 4.
3. For [Priority values](#) (see page 64), specify one or more numbers from 1 through 5 or the word None.
4. Separate each value with a space.
5. Specify the first value that appears in the list as the default value that appears on tickets. If necessary, you can repeat the default value in the list to improve legibility.

More information:

[Set the Urgency Range for Self-Service Users](#) (see page 62)

[Urgency Property Values](#) (see page 63)

[Set the Priority Range for Self-Service Users](#) (see page 63)

[Priority Property Values](#) (see page 64)

Set the Urgency Range for Self-Service Users

For self-service incidents and requests, you can set default Urgency values in the *web.cfg* file. When you set a range of Urgency values, self-service users such as employees, VIP employees, or guests can set Urgency values on tickets. The choices that appear to self-service users are based on the range of values that you set in the *web.cfg*.

To set the default Urgency range for self-service users

1. Open the *web.cfg* file from the appropriate directory:
 - (Windows) %NX_ROOT%\bopcfg\www\
 - (UNIX) \$NX_ROOT/bopcfg/www/
2. For each parameter, specify one or more [urgency property values](#) (see page 63). Separate each value with a space:

ESCEmpUrg

Specifies how VIP employees can override Urgency on tickets.

EmpUrg

Specifies how employees can override Urgency on tickets.

AnonymousUrg

Specifies valid priorities for tickets created by guest users.

3. Save the *web.cfg*.

On new tickets, employees, VIP employees, or guests can set Urgency values based on the range of values in the *web.cfg*.

Example: Show Guests Only Two Urgency Values on a Request

1. Open the *web.cfg*.
2. Set the *AnonymousUrg* parameter as 0 4. For example, *AnonymousUrg 0 4*.
3. Save the *web.cfg*.

The Urgency values that appear to the self-service user are 1-When Possible and 5-Immediate. The default Urgency is 1-When Possible.

Urgency Property Values

The *web.cfg* contains settings to control how self-service users override Urgency on tickets. The following Urgency property values are available:

- **0**—Lets the user set the Urgency to 1-When Possible
- **1**—Lets the user set the Urgency to 2-Soon
- **2**—Lets the user set the Urgency to 3-Quickly
- **3**—Lets the user set the Urgency to 4-Very Quickly
- **4**—Lets the user set the Urgency to 5-Immediate

Set the Priority Range for Self-Service Users

You can set a range of valid priorities to allow self-service users to override Priority values on tickets. When you set the priority range, customers, employees, or guests can set Priority values based on the range of values in the *web.cfg*.

To set the priority range for self-service users

1. On the *web.cfg* file from the appropriate directory:
 - (Windows) %NX_ROOT%\bopcfg\www\
 - (UNIX) \$NX_ROOT/bopcfg/www/
2. For each of the parameters, specify one or more [Priority property values](#) (see page 64).

CstPrio

Specifies how customers can override Priority on tickets.

EmpPrio

Specifies how employees can override Priority on tickets.

AnonymousPrio

Specifies how employees can override Priority on tickets.

3. Save the *web.cfg*.

On new tickets, customers, employees, or guests can set Priority values based on the range of values in the *web.cfg*.

Example: Show Guests Only Two Priority Values

1. Open the *web.cfg*.
2. Set the *AnonymousPrio* parameter to None 4. For example: AnonymousPrio None 4.
3. Save the *web.cfg*.

When a guest works with tickets, the values for Urgency are None or 4. The default value is None.

Priority Property Values

The *web.cfg* contains settings to control how self-service users override ticket Priority. The following Priority property values are available:

- **None**—Lets the user set the Priority to None
- **1**—Lets the user set the Priority to 1 (highest priority)
- **2**—Lets the user set the Priority to 2
- **3**—Lets the user set the Priority to 3
- **4**—Lets the user set the Priority to 4
- **5**—Lets the user set the Priority to 5 (lowest priority)

Activate Status Transitions

After the upgrade, all predefined status transitions are inactive, so status transitions are not in effect. You can activate and modify these status transitions to accommodate the ticket status transition flow you want.

Note: All customized status code descriptions that appear on ticket forms are retained during the upgrade process.

To activate a status transition

1. On the Administration tab, expand the Service Desk node, and select one of the following ticket types:
 - Change Orders
 - Change Order Transitions
 - Issues
 - Issue Transitions
 - Requests/Incidents/Problems:
 - Incident Transitions
 - Problem Transitions
 - Request Transitions

The Transitions List appears.

2. Select Show Filter on the Transitions List page.

The top portion of the page reveals additional search fields.
3. Select Inactive in the Record Status field and click Search.

The Transitions List at the bottom of the page displays all inactive transitions.
4. Open the transition for editing.
5. Select Active in the Record Status drop-down list.
6. Click Save, Close Window.
7. Click Search.

The Transition List displays the active transition.

Note: For more information about status transitions, see the *Administration Guide* and *Online Help*.

Activate Transition Types

By default, all predefined transition types delivered with the product are inactive, so status transition buttons are not in effect. You can activate and modify these transition types to accommodate the status transition flow you want.

To activate a transition type

1. Select Show Filter on the Transition Type List page.
The top portion of the page reveals additional search fields.
2. Select Inactive in the Record Status field and click Search.
The Transition Type List displays all inactive transition types.
3. Right-click the title of the transition type and select Edit from the menu.
4. Select Active in the Record Status drop-down list.
5. Click Save, Close Window.
6. Click Search.

The Transition Type List displays the active transition type.

Customize Functional Access Areas

A *functional access area* is a group of objects that let you restrict user access. Previous versions of CA SDM included eight fixed functional access groups to restrict access to code components.

During migration, the functional access groups migrate to new functional access areas for each role. Migration automatically handles the Majic changes, the default reference data, and role mapping to the new functional access areas.

After migration, consider the following actions:

- Review how the objects map to existing and new functional access areas and role permissions to each area. Use Web Screen Painter to verify the functional access areas.
- Use CA SDM to remap or change permissions. Verify that users have the proper access to features and objects.

Note: For details about default permissions and how objects map to the new functional access areas, see the Product Support website. For information about how to change or add functional access areas, see the *Online Help*.

The following table maps Functional access areas to code components:

Functional access area	Code Component	New
Administration	admin	No
Incident/Problem/Request	call_mgr	No
Change Order	change_mgr	No
Inventory	inventory	No
Issue	issue_mgr	No
Knowledge Document	kd	No
Notification	notify	No
Reference	reference	No
Security	security	No
Announcement	announcement	Yes
Incident/Problem/Request Reference	call_mgr_reference	Yes
Incident/Problem/Request Template	call_mgr_template	Yes
Change Order Template	change_mgr_template	Yes
Change Order Reference	change_reference	Yes
Configuration Item	ci	Yes
Configuration Item Common	ci_common_ro	Yes
Configuration Item Reference	ci_reference	Yes
Contact	contact	Yes
Group	group	Yes
Issue Template	issue_mgr_template	Yes
Issue Reference	issue_reference	Yes
Location	location	Yes
Notification Reference	notification_reference	Yes
Organization	organization	Yes
Prioritization	prioritization	Yes
Service Level	service_level	Yes
Site	site	Yes
Stored Query	stored_queries	Yes
Survey	survey	Yes

Tenant Admin	tenant_admin	Yes
Timezone	timezone	Yes
Workflow Reference	workflow_reference	Yes
Workshift	workshifts	Yes

Post-Migration Access Level Changes

After migration, you can verify functional access levels for every role. Because the objects moved to another functional access areas, the user could have access to some screens in some situations that they were denied previously. They can also be denied access to forms to which they had access previously. Both situations can occur when a new functional access area manages permissions for two of the original functional access areas.

Note: For details about default permissions and how objects map to the new functional access areas, see the Product Support web site. For information about how to change or add access levels, see the *Online Help*.

SITEMODS.JS File

Lines of code added to the sitemods.js file of the previous version, called from an HTML page, must be merged into the current sitemods.js file before the code works.

Adjust Access Types

If you customized access types and data partitions in the previous release of CA SDM, you may have a problem with the Knowledge Management data partitions settings after upgrading. These customizations can cause a problem with the permission groups settings on categories and documents. For example, a user has access to restricted information.

Note: Even if you recreated a data partition or an access type after deleting it, verify your access type and data partition settings after the upgrade.

To adjust access types

1. Click the Administration tab.
The Administration page appears.
2. Click Security and Role Management, Role Management, Role List.
The Role List appears.

3. Complete the following steps for each role:

- a. Right-click the role and select Edit.
- b. Review the Data Partition Name field under the Authorization tab.

If this field is empty, there is no data partition associated with the selected access type, so the user has no restrictions and can access any document or category in the product, even if you set up permission groups.

This action can be appropriate for administrators, but not for all roles. If there is no data partition associated with the role, you can create or modify one.

Adjust Data Partition Settings

You can adjust partition constraints after you configure the roles in your system. You adjust the partition constraints to verify that the appropriate permissions function properly after you upgrade to the current release of the product.

To adjust data partition constraints

1. On the Administration tab, browse to Security and Role Management, Data Partitions, Data Partition Constraints.

The Data Partition Constraints List page appears.

2. Verify the Majic code constraint settings for the following tables:

SKELETONS

Specifies the table used for Knowledge Documents.

O_INDEXES

Specifies the table used for Knowledge Categories.

The table constraint settings are verified.

3. Click Show Filter and enter the Data Partitions you previously used.

Note: You can also use the Table Name field in the Search area to limit your list. For example, enter *SKELETONS* or *O_INDEXES* in the Table Name field and click Search.

Modify Help Sets after Migrating Roles

After you upgrade, CA SDM provides all migrated roles with the complete *Online Help*. You can modify help sets for any role, as appropriate to the needs of your online help system.

To modify help sets for a role

1. On the Administration tab, browse to Security and Role Management, Role List.
The Role List page appears.
2. Open the Role for modification, such as *customer*.
The Role Detail page appears.
3. Click Edit.
4. Select the Web Interface Tab.
Click Help View.
The list of available Help Sets appears for the selected role.
5. Select a Help Set, such as *customer*.
6. Save the Role.
The help View for the role changes to the selected online help set.

You can also view the topics available under an online help set by selecting the help set detail and clicking the View Help button.

Default Constraint Settings

The typical default settings for Constraints are listed as follows:

Constraint Settings for the Customer (like) and Employee (like) Data Partitions

Constraint Settings for Customer (like) and Employee (like) Data Partitions should be the following:

SKELETONS Table

View constraint as:

'SKELETONS READ_PGROU in @root.pgroups or READ_PGROU.[pgrou] contained_roles.role in @root.id) and ACTIVE_STATE = 0'

Pre-update and Delete constraint:

'id = 0' (id=0 indicates no access)

O_INDEXES Table

View constraint as:

READ_PGROU in @root.pgroups or READ_PGROU.[pgroup]

contained_roles.role in @root.id

Pre-update and delete constraint:

WRITE_PGROU in @root.pgroups OR WRITE_PGROU.[pgroup]

contained_roles.role IN @root.role

Constraint Settings for CA SDM Analyst (like), Knowledge Managers (like) and Knowledge Engineers (like)

Constraint Settings for CA SDM Analyst (like), Knowledge Managers (like) and Knowledge Engineers (like) should be the following:

SKELETONS Table

View constraint as:

(ACTIVE_STATE >= 0)and (READ_PGROU in @root.pgroups or
READ_PGROU.[pgroup] contained_roles.role in @root.id) OR (ACTIVE_STATE
> 0 AND ASSIGNEE_ID = @root.id) OR (ACTIVE_STATE = 0 AND OWNER_ID =
@root.id)) Active

Pre-update and delete constraint:

(ACTIVE_STATE >= 0) AND (WRITE_PGROU in @root.pgroups OR
WRITE_PGROU.[pgroup] contained_roles.role IN @root.role) OR
(ACTIVE_STATE > 0 AND ASSIGNEE_ID = @root.id) OR (ACTIVE_STATE = 0 AND
OWNER_ID= @root.id)) Active

O_INDEXES Table

View constraint as:

READ_PGROU in @root.pgroups or READ_PGROU.[pgroup]

contained_roles.role in @root.id

Pre-update and delete constraint:

WRITE_PGROU in @root.pgroups OR WRITE_PGROU.[pgroup]

contained_roles.role IN @root.role

Start the IIS Web Interface (CAisd)

After you upgrade a CA SDM r11.2 Windows installation that had an IIS integration, the CA SDM IIS web interface (CAisd) stops. If you want to continue using the IIS integration, manually start CAisd after you upgrade.

Important! If you want to use IIS 7.0, you *must* install the CGI and Metabase Compatibility components.

Modify Customized HTML Forms

After you upgrade CA SDM, you modify all customized HTML forms that contained notebook controls to include web macros and provide the appropriate tab group names.

For each customized form, use WSP to modify <PDM_NOTEBOOK> statements to <PDM_MACRO name=startNotebook> and <PDM_TAB> statements to <PDM_MACRO name=TAB>.

Note: For more information about using WSP, see the *Web Screen Painter Online Help*.

More information:

[Modify Data Grid List on List Form](#) (see page 387)

[Modify Notebooks on Detail Form](#) (see page 388)

How to Upgrade Knowledge Management From r11.2

Upgrading to CA SDM r12.9 from r11.2 automatically upgrades your Knowledge Management environment. When the upgrade finishes, complete the following steps:

1. Map links created in a resolution of a document to the database to locate broken links.

Note: You use the default *Flag broken links* policy to locate broken links.

2. Select Knowledge, Automated Policies, Scheduling on the Administration tab.
The Automated Policies page opens.

3. Select the Run the Automated Policies calculation check box.
4. Select the time interval to perform the calculation and click Save.
The policies will start processing at the specified date and time.

5. Select Knowledge, Systems, General Settings on the Administration tab.

The System page opens.

6. Complete the following information:

Path for EBR Index Files

Defines the location for storing EBR index files. CA SDM creates EBR index files when you save and publish any knowledge document. Depending on your configuration type, consider the following points while defining the EBR index file path:

- **Conventional:** If you are upgrading from the CA SDM r12.9 from r11.2 or r12.X, you may choose not to use UNC shared path. If you have not created a UNC path, CA SDM uses the default path to store EBR index files. If you are using a UNC shared drive, manually copy the ebr/ebc_ADM folders from the default location (\$NX_ROOT/site/) to the UNC shared path.
- **Advanced availability:** If you are upgrading to the advanced availability configuration from CA SDM r11.2 or r12.X, you must create the UNC shared path and use it to store EBR index files. The UNC credentials are not required for the default path. After you create the UNC path, manually copy the ebr/ebc_ADM folders from the default location (\$NX_ROOT/site/) to the UNC shared path.

Important! EBR Index Files path & KEIT Files path must refer to the same UNC credentials and the path must reside on a same server to support this.

Default: \$NX_ROOT/site/ebc

Path For Knowledge Import/Export Files

Defines the location for storing KEIT import/export packages during an import/export operation. Depending on your configuration type, consider the following points while defining KEIT file path:

- **Conventional:** If you are upgrading to CA SDM r12.9 from r11.2 or r12.X, you may chose not to use UNC shared path. If you have not created a UNC path, CA SDM uses the default path to store the KEIT files. If you are using a UNC shared drive, manually copy the Import/Export package folders from the default location (\$NX_ROOT/site/keit) to the UNC shared path.
- **Advanced availability:** If you are upgrading to the advanced availability configuration from CA SDM r11.2 or r12.X, you must create the UNC shared path and use it to store the KEIT files. The UNC credentials are not required for the default path. After you create the UNC path, manually copy the Import/Export package folders from the default location (\$NX_ROOT/site/keit) to the UNC shared path.

Important! EBR Index Files path & KEIT Files path must refer to the same UNC credentials and the path must reside on a same server to support this.

Default: \$NX_ROOT/site/keit

UNC Credentials

You can use this option to create UNC credentials to access the network shared drive to access EBR indexing files and import/export packages. Use the UNC Credentials link to create the UNC credentials.

Note: UNC paths and UNC credentials are required in case of the advanced availability configuration. Restart the CA SDM service when you change any of the UNC details (UNC paths or UNC credentials). See the *Online Help* for more information on how to create UNC Credentials.

7. Run `pdm_k_reindex` as follows:

`pdm_k_reindex -pm`

Fixes the document links and embedded images inside the resolution field.

Important! After you upgrade, you can get a critical error when running `pdm_k_reindex -pm`. If you get this error, browse to Knowledge, Approval Process Manager, Approval Process Settings, and change the *Permissions for Document Edit after Publish* option to *User with full permissions may edit documents*, and then run `pdm_k_reindex -pm`.

`pdm_k_reindex -ml`

Fixes the document links inside the resolution field and maps them to the database.

`pdm_k_reindex`

Indexes the documents so they are searchable in your knowledge environment.

The Knowledge Management environment is upgraded to r12.9.

Note: After the upgrade, printing Knowledge Documents can result in a large space inserted after the Resolution section of the document. This space is inserted due to an issue with upgrading document templates from a previous release. For more information about resolving this printing issue, see the *Release Notes*.

Important! After you upgrade, Knowledge Management notification data from previous releases of CA SDM uses the r12.9 notification engine. For example, there are default activity notifications and notification rules for object types, such as the Knowledge Report Card.

How to Upgrade Knowledge Management From CA SDM r12.x

Upgrading to CA SDM r12.9 from r12 or r12.1 automatically upgrades your Knowledge Management environment. When the upgrade finishes, complete the following steps:

1. Map links created in a resolution of a document to the database to locate broken links.

Note: You use the default *Flag broken links* policy to locate broken links.

2. On the Administration tab, browse to Knowledge, Automated Policies, Policies, Scheduling.

The Scheduling page appears.

3. Select the Run Calculation check box in the Last Updated field.
4. Enter a date in the Schedule text box or click the Calendar icon to select a date.
5. Select the time interval to perform the calculation and run the policies.
6. Click Save.

The policies are processed at the specified date and time.

7. On the Administration tab, browse to Knowledge, Systems, General Settings.
The General Settings page opens.

8. Complete the following information:

Path for EBR Index Files

Defines the location for storing EBR index files. CA SDM creates EBR index files when you save and publish any knowledge document. Depending on your configuration type, consider the following points while defining the EBR index file path:

- **Conventional:** If you are upgrading from the CA SDM r12.9 from r11.2 or r12.X, you may choose not to use UNC shared path. If you have not created a UNC path, CA SDM uses the default path to store EBR index files. If you are using a UNC shared drive, manually copy the ebr/ebc_ADM folders from the default location (\$NX_ROOT/site/) to the UNC shared path.
- **Advanced availability:** If you are upgrading to the advanced availability configuration from CA SDM r11.2 or r12.X, you must create the UNC shared path and use it to store EBR index files. The UNC credentials are not required for the default path. After you create the UNC path, manually copy the ebr/ebc_ADM folders from the default location (\$NX_ROOT/site/) to the UNC shared path.

Important! EBR Index Files path & KEIT Files path must refer to the same UNC credentials and the path must reside on a same server to support this.

Default: \$NX_ROOT/site/ebc

Path For Knowledge Import/Export Files

Defines the location for storing KEIT import/export packages during an import/export operation. Depending on your configuration type, consider the following points while defining KEIT file path:

- **Conventional:** If you are upgrading to CA SDM r12.9 from r11.2 or r12.X, you may chose not to use UNC shared path. If you have not created a UNC path, CA SDM uses the default path to store the KEIT files. If you are using a UNC shared drive, manually copy the Import/Export package folders from the default location (\$NX_ROOT/site/keit) to the UNC shared path.
- **Advanced availability:** If you are upgrading to the advanced availability configuration from CA SDM r11.2 or r12.X, you must create the UNC shared path and use it to store the KEIT files. The UNC credentials are not required for the default path. After you create the UNC path, manually copy the Import/Export package folders from the default location (\$NX_ROOT/site/keit) to the UNC shared path.

Important! EBR Index Files path & KEIT Files path must refer to the same UNC credentials and the path must reside on a same server to support this.

Default: \$NX_ROOT/site/keit

UNC Credentials

You can use this option to create UNC credentials to access the network shared drive to access EBR indexing files and import/export packages. Use the UNC Credentials link to create the UNC credentials.

Note: UNC paths and UNC credentials are required in case of the advanced availability configuration. Restart the CA SDM service when you change any of the UNC details (UNC paths or UNC credentials). See the *Online Help* for more information on how to create UNC credentials.

9. (For Keyword Search implementations) Enter the following command at the command prompt:

```
pdm_k_reindex factory:all
```

Important! The *all* variable is case sensitive. If you use *factory:ALL*, errors appear in the log files.

The Knowledge Management environment is upgraded to r12.9.

Note: After the upgrade, printing Knowledge Documents can result in a large space inserted after the Resolution section of the document. This space is inserted due to an issue with upgrading document templates from a previous release. For more information about resolving this printing issue, see the *Release Notes*.

Important! After you upgrade, Knowledge Management notification data from previous releases of CA SDM uses the r12.9 notification engine. For example, there are default activity notifications and notification rules for object types, such as the Knowledge Report Card.

Chapter 3: Planning

This section contains the following topics:

- [CA SDM Default and Recommended Port List](#) (see page 79)
- [How to Plan for Advanced Availability](#) (see page 82)
- [Plan the CA MDB Installation](#) (see page 91)
- [Plan the CA SDM Installation](#) (see page 94)
- [CA NSM Installation Planning](#) (see page 106)
- [CA EEM and CA Workflow Installation Planning](#) (see page 107)
- [CA Process Automation Integration Planning](#) (see page 113)
- [CA Business Intelligence Installation Planning](#) (see page 117)
- [Implementation Strategies](#) (see page 122)
- [Enable Windows Authentication in Firefox](#) (see page 123)

CA SDM Default and Recommended Port List

The CA SDM installation requires various ports and port ranges to be opened on your firewall. This port information helps your site and security administrators install and configure CA SDM, as well as integrations with other CA Technologies solutions and third-party products.

The ports you need to open on your firewall depend on settings in the *NX.env* file. By default, CA SDM chooses the appropriate port based on availability. The system reserves ports less than 1024, but can request a port number as high as 65335.

The following *NX.env* variables set the starting port (2100) and the incremental increase (plus 1) the system uses to find an open port for the process starting up:

- `NX_SLUMP_FIXED_SOCKETS=1`
- `NX_SLUMP_SECONDARY_SOCKET=2100`

The following list displays default and recommended ports (and port ranges) for a typical CA SDM installation:

Database

- Oracle: 1521
- SQL Server: 1433

CA SDM

- FTP: 21
- SMTP: 25

- HTTP: 80
- HTTPS: 8080
- HTTPS (secondary): 8081
- POP3: 110
- IMAP: 143
- LDAP: 389
- WebEx: 1270
- mstsc: 1389
- oaserver: 1706
- Slump Socket: 2100
- qserver: 2234
- Proctor Socket: 2300
- Communications: 2365
- Apache Tomcat: 8080
- Apache Tomcat Shutdown:
- SSL on Apache Tomcat: 8443

CA CMDB

- Visualizer: 9080
- Visualizer Apache Tomcat Shutdown: 9085
- CA Cohesion ACM: 9000
- CA Cohesion ACM Tomcat Shutdown: 9005

CA EEM

Administration Port: 5250

CA Workflow

- Apache Tomcat: 8090
- Apache Tomcat Shutdown: 8095

REST

- Apache Tomcat: 8050
- Apache Tomcat Shutdown: 8055

CA Business Intelligence

Note: For information about firewall port handling for BusinessObjects, see the BusinessObjects Enterprise XI r2 Deployment and Configuration Guide.

- Apache Tomcat: 8080
 - Recommended:** 8070
- Apache Tomcat Redirect: 8443
- Apache Tomcat Shutdown: 8075
- Secondary Apache Tomcat Shutdown: 8005
- ODBC Driver: 1706
- BusinessObjects Central Management Server (CMS): 8080
- BusinessObjects Application Server: 6400
- ODBC DSN (OpenAccess Database): 1706
- BEA WebLogic: 7001

EBR Search

- Base Port: 13000

Portal Server

- Apache Tomcat: 8080
- Apache Tomcat Shutdown: 8085
- SSL Functionality: 8443
- Portal_Safe_List: 8444

Support Automation

- Main Server (Socket Server) Internal: 7005
- Main Server (Socket Server) External: 10443
- Socket Proxy Server (Socket Configuration Main Server) Internal: 7005
- Socket Proxy Server (Socket Configuration Main Server) External: 10444
- Message Routing Server (Socket Configuration) External: 10444
- Apache Tomcat: 8070
- Apache Tomcat Shutdown: 8075

Visualizer

- Apache Tomcat: 9080
- Apache Tomcat Shutdown: 9085

How to Plan for Advanced Availability

The advanced availability configuration offers more resilience to server outages, higher application availability, and supports rolling maintenance with minimal end-user disruption. This configuration requires one background server, one or more standby servers, and one or more application servers. The previous configuration with primary and secondary servers is now known as the conventional configuration.

You can configure CA SDM to use either conventional or advanced availability configuration. You can also convert from one configuration to another.

The advanced availability configuration improves the overall availability of CA SDM in the following ways:

- Minimizes the CA SDM application down time resulting from the application failure, hardware failure, or maintenance by reducing single point of the failure.
- Minimizes the CA SDM downtime by supporting rolling maintenance of the servers. This means, the users keep working on the application while one of the servers is under the maintenance.

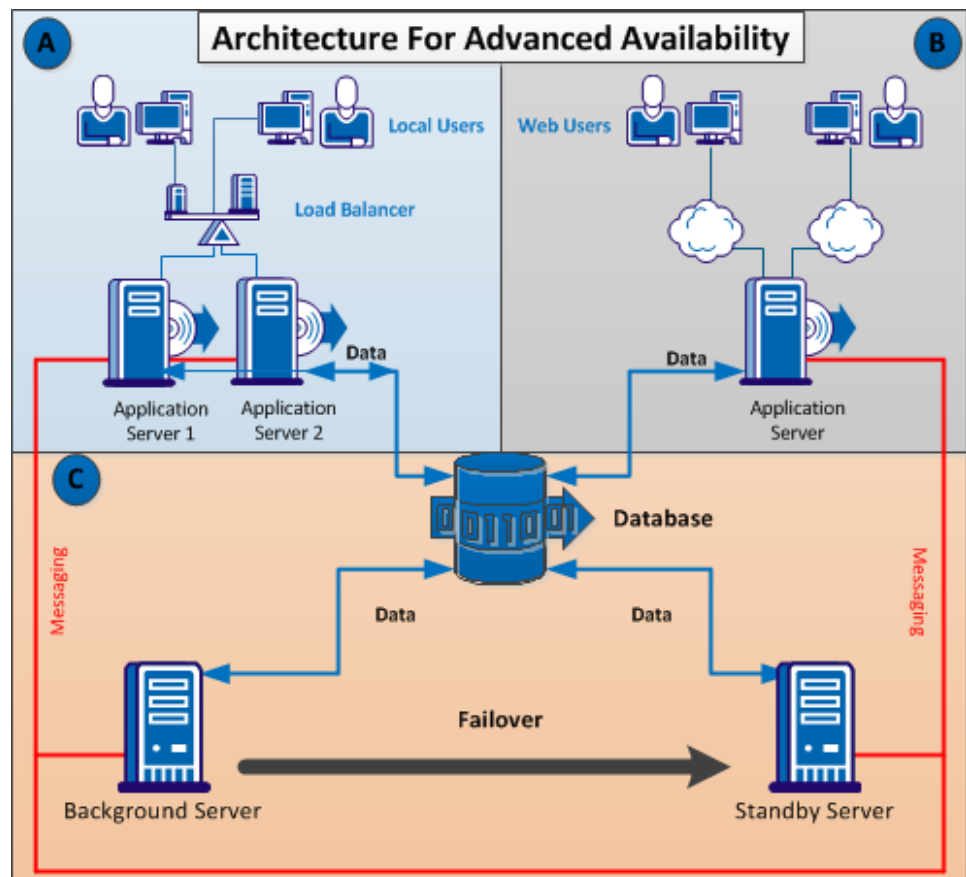
For more information about planning and configuring advanced availability, see the *Implementation Guide* or view the advanced availability scenarios directly from the bookshelf.

Ensure that you verify the following planning considerations before you set up the Advanced availability configuration:

- [CA SDM Architecture for Advanced Availability](#) (see page 83)
- [When to Opt for Advanced Availability Configuration](#) (see page 85)
- [Considerations for Advanced Availability Configuration](#) (see page 85)

CA SDM Architecture for Advanced Availability

The advanced availability configuration includes a background server, one or more standby servers, and one or more application servers. To reduce the single point of failure, each of these servers has a direct connection with the database. All the components of the architecture communicate using an internal CA protocol. The following diagram provides an example of CA SDM implementation:



The architecture is spread across three different locations A, B, and C. Location A has two application servers, serving users through a load balancer. The location B has an application server directly serving the users and the location C has the background server, the standby server, and the database. Each of the servers has direct connection to the database. The blue lines mark the flow to and from the database. The red lines identify the internal communication between the components.

Background Server

The background server is the core of the advanced availability architecture. This server provides ancillary services to other servers and runs all singleton processes of CA SDM. A process can be designated as singleton when only single copy of it can be active in any SDM installation. Only the users with the Administrator Access Type have access to the background server. To increase the availability, the standby server shadows the background server. You can switch the standby server as the background server in case of any failure or when performing rolling maintenance.

Standby Server

The primary function of the standby server is to act as a warm standby for the background server. The standby server has the same hardware and OS platform as the background server. The standby server can run all processes that run on the background server. The standby server stays idle during normal working of the system, but keeps updating the critical caches by listening to the internal CA SDM system messages for database changes. If the background server fails or requires rolling maintenance, you can promote the standby server to background server with the minimal disruption to the application servers as well as to the end users. You can invoke a utility to perform this switchover.

The standby server is only running a small subset of the processes that normally run on the background server. You cannot log on to the web interface on the standby server.

Application Server

The application server has all the CA SDM components necessary to serve the end users through various interfaces like web, SOAP, and RESTful web services. The application servers are independent of each other and resilient to the background server outages for short periods of time. Users access the application servers. You can individually remove the application servers and return to service by using the new Quiesce facility. The quiesce facility allows current users to complete their work and then sign in to an alternate application server.

When to Opt for Advanced Availability Configuration

The advanced availability configuration provides higher availability, reduces down times, and supports rolling maintenance. Consider the advanced availability configuration when any of the following factors is true:

- You require a high degree of CA SDM availability.
- You require the CA SDM servers to be more independent and more resilient to failures.
- You require an ability to remove and return the CA SDM servers to service, without bringing down the entire CA SDM installation.
- You require near zero downtime during rolling maintenance.

Considerations for Advanced Availability Configuration

We recommend you to consider the following points before you decide to implement the advanced availability configuration:

General Considerations

All the planning considerations of the conventional configuration are valid for the advanced availability configuration. For more information about the conventional configuration planning, see the *Implementation Guide*.

- Additional hardware costs are expected as you require one background, at least one standby, and one or more application servers. The configuration of standby and background server must be identical.
- You require a remote database server and a server to share knowledge tools index files, knowledge tools import/export files, archive purge output files, and attachment repositories. To allow the background and the standby server to access these files, a shared location is required. Linux and Unix installations can use NFS mounts. UNC support has been added for Windows installations.
- The CA SDM performance is expected to remain the same even with the additional servers for background and standby operations. If you deploy more application servers, the performance can possibly improve.
- Each of the servers is directly connected to the database, leading to an increased resource contention at the DBMS level. We recommend increasing the hardware configuration of the DBMS server. For more information, check the system information.
- Converting a conventional configuration to an advanced availability configuration is a manual effort. The larger implementations are usually more complex and you may have to engage CA Services for the assistance.

- To migrate to the advanced availability configuration, upgrade to CA SDM r12.9 in the conventional configuration and then convert to the advanced availability configuration.
- Install the background and the standby server on the same network subnet to make ping times and latencies from different application servers similar.
- Consider locating the background and the standby servers in a central location with a good network connectivity to all your users. The application servers can be located either centrally or they can be distributed across the globe.
- An advanced availability configuration must always have one background server and at least one standby server.
 - (Recommended) Ensure that both background server and all other standby servers have similar configuration. This process ensures that during a failover when a standby server becomes the new background server, it can function exactly like the old background server.
 - Any number of standby servers can be configured. To increase the CA SDM availability, consider placing one standby server in your backup data center or the disaster recover site.
 - The minimum advanced availability implementation requires one application server. We recommend you to have two application servers to increase the availability and a load balancer to direct web traffic.
 - Except for CA SDM administrators, no other users are allowed to log in to the background server. Also, no users are allowed to log in to the standby servers.
- We can send email notifications from all CA SDM servers. There is currently no way to limit or configure this option. Every server in the advanced availability configuration must have a connection to the mail server.
 - An email notification resulting from an end user interaction is sent from the application server to which the user is connected.
 - An email notification resulting from any background processes (such as Animator processing an Attached Event) are sent by the pdm_mail_nxd utility running on the background server.
 - During a background server failure, the queued emails are sent when the background server comes up as a standby server.

Failover Considerations

During a failover of the background server to the standby server, consider the following:

- The new users cannot log in.
- For the already connected users, the following actions do not work during the failover and must be attempted again by the user after the failover:
 - Creating the tickets with attachments.
 - Downloading the attachments.

- Searching Knowledge documents.
- Indexing the new knowledge documents.
- Inbound email.
- The SLA events that are not triggered until the failover has completed.
- **Important!** If you have configured your third party tool to enable the auto-failover of the CA SDM servers, you must disable it before starting the rolling maintenance.

Database Considerations

- A direct connection exists from each of the servers to the other as well as to the database. If the CA SDM server is within DMZ, you are required to open the firewall ports or implement a tunneling proxy technology for this connectivity. Also consider licensing arrangements with your DBMS vendor.
- Ensure that you install the database client on all the CA SDM servers.
- In advanced availability configuration, all the servers still connect to a single database. As the database can be a single point of failure, consider taking the advantages of database clustering to increase the availability of DBMS.
- Microsoft SQL Server is only natively supported on the Windows platform. For example, if your implementation consists of servers with heterogeneous operating systems like Windows and Linux, select Oracle as the DBMS as Microsoft SQL Server is not supported on Linux.
- The `pdm_isql` utility works only on the application server.

System Configuration, Administration, and Operation

- SOAP Web Services and RESTful Web Services are only supported on the application servers. Web directors can be configured on all CA SDM servers.
- As the application servers are independent of each other, web directors can only service web engines running on the same application server. Web directors cannot service web engines across application servers.
- Since the servers in the advanced availability configuration have a higher degree of independence, most command-line utilities function only on the local server. For example, `pdm_status` only shows you the CA SDM processes running on the server on which you are executing the command. The `pdm_webcache` utility only refreshes the form caches on the server on which it was issued.

- Unlike conventional configuration, where you start and stop CA SDM processes by `pdm_d_mgr` running on the primary server, in advanced availability, processes on each server are controlled independently.
- We recommend you to use the new `pdm_server_control` instead of `pdm_halt` command to shutdown application servers. Before the shutdown, you can ask the active users to move to another application server. This can be done by notifying the users using the quiesce option.
- The `pdm_edit` utility has been replaced with a new graphical user interface, eliminating many manual configuration file changes required earlier.
- Unlike conventional, in the advanced availability configuration, you can use the `bopauth_host` option from the Options Manager of the background server Web UI to specify the authentication server details. You no longer make this configuration change in `pdm_edit` for the advanced availability configuration. Users cannot log in when the authentication server is unavailable.

Note: In the conventional configuration, you can use a secondary server to integrate CA SDM with an authentication system running on a different system or even on a different hardware platform.

- To prevent rogue servers from joining the advanced availability configuration, all servers must be defined from the background server Web UI, before they can be configured.
- The role and other information for a server in the advanced availability configuration can be changed from the Administration tab. Stop the CA SDM services before attempting to change a server definition. The server reconfiguration is required for the changes to take effect.
- You can change a server between the conventional configuration and the advanced availability configuration by running the configuration utility. Be sure to change all servers in the implementation. Your data remains unaffected, but the manual updates are required to change the settings.
- Use the latest `pdm_startup` files while migrating to CA SDM r12.9. Do not use the files from previous versions of CA SDM. For example, files that are generated by the `pdm_edit` utility.
- New environment variables have been added to `NX.env` to support the advanced availability and the system automatically maintains the variable values.

Important! Do not change `NX.env` manually unless instructed to do so.

- A new facility generates ticket numbers and numeric record keys. To avoid possible database corruption, never try to load or manually alter the Key_Control table.
- You cannot move the Knowledge Tools daemons to another server in the advanced availability configuration. The kt_daemon now runs on all servers. All other Knowledge Tools daemons run as singletons on the background server.
- Knowledge Tools now support UNC file paths on Windows for the location of the EBR index files and input/output files that are used by the Knowledge Export Import facility. This feature is available for both the advanced availability and the conventional configurations.

Important! EBR Index Files path & KEIT Files path must refer to the same UNC credentials and the path must reside on a same server to support this.

- Version control distributes the files (for example, html, .maj, .mod, and .sch) that are configured in the server_secondary_custom.ver file from the background server. Upon startup, the standby or the application server runs the version control client to pull updated files from the background server.
- Archive/Purge runs on the background server and supports UNC file paths on Windows for output files. This feature is available in the advanced availability and the conventional configurations.
- Attachments on incoming emails are now stored by pdm_maileater when the repository is on a remote server.
- Ensure that you allow the daemon manager to modify the procsets and do not run the pdm_dmnmode command for this action.

General Web User Interface Considerations

- A web server is required on all the servers of the advanced availability configuration.
- When the background server is not available due to failover, a Delayed Server Response form is presented to the web users. Users are allowed to resume their work when the standby server is promoted to the background server.
- The value of the web_cgi_url option must point to:
 - The load balancer if you have more than one application servers.
 - The application server, if you have only one application server.

Attachment Considerations

- You can increase the availability of attachments by configuring multiple document repository processes to access a shared file repository.

Web Screen Painter Considerations

- You can use the Web Screen Painter (WSP) only on the background server.
- Follow the recommended procedure to publish WSP form changes so that the updated forms are distributed to all the servers in the installation. For more information, see the *How to Customize Schema Using Web Screen Painter* and *How to Customize Web Interface using Web Screen Painter* scenarios.
- The virtual database layer daemons run on all servers. Install the CA SDM database customizations and object definitions on all the servers.

Reporting Considerations

- CA Business Intelligence can automatically retrieve data from alternate application servers. You can configure this feature to increase the availability of CA SDM reporting.
- BOXI is not integrated with the background server. For this reason, you cannot view reports from the background server web UI. An error message is displayed if you select the Reports tab from the background server web UI.

Options Manager Considerations

- You can install or uninstall options through Options Manager only from the background server web UI. Use the rolling maintenance procedure to propagate the changes to all servers in the configuration. For more details on performing the rolling maintenance, see the *Performing Rolling Maintenance on the CA SDM Server* scenario.

Web Services Considerations

- You can configure web services only on the application servers.
- The webservices_domsrvr option no longer exists in the Options Manager. You can configure NX_WEBSERVICES_DOMSRVR variable independently on each application server by modifying NX.env.

General Integration Considerations

- The URL to the CA SDM web user interface must point to a properly configured application server. The ca_application_registration contains a URL to your CA SDM installation that is used by other CA products. This URL points to the CA SDM server that is configured first, which is most commonly the background server. Only the CA SDM administrators can change the value through the administration facility. If you are using a load balancer, point this URL to the load balancer instead of a single application server. For more information, see the *Online Help*.

- Most end-users interaction and integrations with other software products are done at the application server level. There is no failover for the application servers. If the application server is unavailable, the web services for the application server are also unavailable. To increase the application server availability, you can deploy a load balancer to route requests among different application servers.
- You can integrate NSM only to a single application server as the IP addresses are involved. The NSM integration is unavailable when that server is down.
- CA Workflow must be installed on any of the application servers. If that application server goes down, the CA Workflow integration becomes unavailable.

Conversion Considerations

- You can convert the background server to a primary server only.
- You can convert the primary server to a background server only.
- You can convert the secondary server to a standby server or application server only.
- You can convert the standby or an application server to the secondary server only.

Federated Search Considerations

- To enable and use the federated search feature, select the federated search option while configuring the application servers.

Plan the CA MDB Installation

For a successful CA MDB installation and configuration, use the following information to research and gather information.

- **Research**—Read the *CA Management Database Overview* to become familiar with the CA MDB, determine your deployment strategy, and read about any SQL Server or Oracle issues you may need to be aware of to use the CA MDB with CA SDM.
- **SQL Server**—To help ensure that you can configure the product and components on SQL Server, complete the following steps:
 - Enable TCP/IP on the computer on which you want to perform the installation and configuration.
 - Have the following information available:
 - The named instance of the server that is running SQL Server.
 - The SQL Server database user name and password.
 - The SQL Server database port number.
- **Oracle**—Have the following information available:
 - Whether the Oracle database is local or remote.
 - Whether you need to create tablespaces.

- The Net service name.
- The DBA user name and password.
- The data and index tablespace name.
- The complete path for the tablespace.
- JDBC connection information, including the system identifier (SID) and listener port.

Note: If you are not sure what to enter for your database, see the *Server Configuration Online Help*.

More information:

[How to Install CA MDB](#) (see page 143)

CA MDB Considerations

Before you install the CA MDB, consider the following information to ensure a successful implementation:

- **AIX**—On some AIX computers, the maximum allowable space of the ARG/ENV list is too small to install the CA MDB. In this situation, issue the `lsattr -lsys0 -ancargs -Fvalue` command to find the current setting for the maximum size of the ARG/ENV list. If the value returned is less than 50, increase the size with the following command: `chdev -l sys0 -a ncargs=50`
- **Oracle**—Consider the following information:
 - Perform an Oracle backup before an CA MDB patch is applied. The backup can be taken by a DBA or by the patch script. The patch script uses the Oracle Recovery Manager (RMAN) to back up the database using OS authentication. Your RMAN configuration may require that archive logging (ARCHIVELOG mode) be enabled in the database. Alternatively, if the DBA has taken a backup, you can suppress the backup using the patch script by specifying “no” for the -ORA_BACKUP parameter.

Note: Patching uses the RMAN command with operating system authentication.

 - The Oracle user that runs the CA MDB installation must have the following database administrator privileges assigned:
 - The dba role (connect sys as sysdba; grant dba to installation_user;).
 - The sysdba role (connect sys as sysdba; grant sysdba to installation_user;).

- The ability to grant privileges to the mdbadmin user to various system tables and views (connect sys as sysdba; grant all privileges on "sys"."TABLE_NAME" to installation_user with grant option;). The values to be assumed by TABLE_NAME are: COL\$, DBA_CONSTRAINTS, DBA_CONS_COLUMNS, DBA_INDEXES, DBA_IND_COLUMNS, DBA_OBJECTS, DBA_OBJECT_TABLES, DBA_REGISTRY, DBA_TABLES, DBA_TABLESPACES, DBA_TAB_COLUMNS, DBA_TAB_PRIVS, DBA_VIEWS, DBMS_REGISTRY, EXPDEPACT\$, EXPDEPOBJ\$, EXPPKGACT\$, EXPPKGOBJ\$, KOPM\$, OBJ\$, TS\$, USER\$
- **Remote Clients (UNIX and Linux)**—When the CA MDB is created from a remote client, the CA MDB creation process ends with a return code 95 and an error message *Failed to create the table space* in the installation log unless the directory specified in the tablespace path exists on both the client computer and the Oracle server.
- **CA MDB Component Installation (SQL)**—The CA MDB component installer interface displays a Database Server Name field. This field identifies the local server name or cluster node name, if clustered. Use the network name that is used to connect to SQL Server.
- **Special Characters (UNIX, Linux, and Windows)**—Consider the following information:
 - (UNIX and Linux) The userid name of the database administrator used to create the CA MDB cannot include special characters. In addition, the following restrictions apply:
 - The DBA User and tablespace names support the # and _ special characters. All other special characters are not supported.
 - The DBA Password and MDBADMIN password support the ~, #, %, ^, -, +, _, {, }, [,], :, ., and ? special characters. All other special characters are not supported.
 - The Oracle Tablespace path, MDB Target Directory, MDB Source Directory, and MDB Patch Directory DIR support the ~, %, ^, _, -, +, [,], {, }, :, (including <space> if the path is double-quoted; however, consecutive spaces are not supported) special characters.
 - (Windows) The userid name of the database administrator used to create the CA MDB *cannot* include special characters. In addition, the following restrictions apply:
 - The DBA User and tablespace names support the #, \$, and _ characters. All other special characters are not supported.
 - The DBA Password and MDBADMIN password support the ~, !, #, \$, *, (), _ +, ` , -, {}, [], \, ;, ', ?, ., /, and @ special characters. All other special characters are not supported.
 - The Oracle Tablespace path, MDB Target Directory, MDB Source Directory, and MDB Patch Directory support the ~, !, #, \$, (), _ +, ` , -, {}, and [] (including <space> if the path is double quoted) special characters.

- **Tablespaces**—Consider the following information:
 - The CA MDB uses the system temp tablespace to store temporary tables. At least 50 MB of space should be available for this purpose. If you decide to use existing tablespaces for the CA MDB, then the tablespaces require a minimum of 200 MB of available disk space. If this amount of space is not available, the creation of the CA MDB fails.
 - If the CA MDB creation process is used to create data or index tablespace and the size parameter is non-numeric, a return code of 350 occurs and the CA MDB installation log includes an error (rc=189) that the creation process failed to create the tablespace.
- **Users and Administrative Privileges**—If the CA MDB creation process occurs with a user that has no administrative privileges, the creation process does not work. The CA MDB installation log shows the error *ORA-00942: table or view does not exist*.

More information:

[How to Install CA MDB](#) (see page 143)

Plan the CA SDM Installation

For a successful CA SDM installation and configuration, use the following information to research and gather information.

- **Login Permissions**—Complete the following steps:
 - (Windows) Log in as an Administrator and have full Administrative permissions.
 - (UNIX) Log in as the root user and have the correct permissions to the root account.
- **Research**—Complete the following steps:
 - Read *both* the Release Notes and optional readme file (if available). Do not start your installation until you have read and understand that information.

Note: You can find the most current version of the Release Notes, which contain the system requirements, and optional readme file (if available) at <http://ca.com/support>.

- Verify that you have your installation media.

Note: If your computer does not have an appropriate drive for the installation media, copy the media content to the computer on which you want to install CA SDM. Then, start the installation. For a remote installation over the network, you can also have to share a drive or folder on the network and then connect over the network to start the installation.

Important! Do not mount the CA SDM install DVDs on a Windows XP operating system as some of the installation files are not found, and the install fails.

- Review the certification matrix for a list of third-party software products that have been certified for use with CA SDM.

Note: You can find the most current version of the certification matrix at <http://ca.com/support>.

- Read about, and have a basic understanding of, the product components.
- Become familiar with the different types of implementation strategies that the product supports. Consider network availability, usable bandwidth, and responsiveness when deciding which implementation strategy is best for your organization.
- Review the implementation considerations for each component you install.

■ **Installation Home Directory**—Complete the following steps:

- Determine the home directory in which you want to install the product. The default home directory for the product is C:\Program Files\CA\Service Desk Manager.
- Determine the home directory in which you want to install the shared components that the product uses (for example, the Java Runtime Environment (JRE) and Apache Tomcat). The default home directory for the shared components is C:\Program Files\CA\SC.

■ **Database**—Decide which database (either SQL Server or Oracle) to use with CA SDM and install the database. Then, complete the following steps:

- **SQL Server.** Enable TCP/IP on the computer on which you want to perform the installation and configuration.

■ **Primary, Secondary Server, and User Configuration**—Complete the following steps:

- To help ensure that you can configure both the primary and optional secondary servers at the end of the product installation, have the following information available:
 - The domain name system (DNS) of the primary and secondary servers.
 - The name or alias of the server.
 - The name or aliases of the object manager to which you want to establish a connection.
 - The name or IP address of the secondary server.

- The slump socket port to be used for communication by all of CA SDM.
- The proctor socket port to be used by the secondary server to listen for messages from the primary server.
- To help ensure that you can configure account information for product administration at the end of the product installation, have a privileged and restricted user name and password ready.
- (UNIX and Linux) Manually create your privileged user. On Windows, this user is automatically created during the product configuration, but on UNIX and Linux, you must manually create this user.

Note: See the scenario How to Configure Servers for Advanced Availability for advanced availability server configuration.

- **Web Interface Configuration**—Complete the following steps:
 - To ensure that you can configure the web interface at the end of the product installation, have the following information available:
 - The web host name and web server.
 - (Windows NT only) The web site to be used by the CA SDM server.
 - The Tomcat port number and socket port number for shutdown requests.
- **Browsers and Antivirus Software**—Complete the following steps:
 - (Firefox) Optionally enable Windows authentication (enterprise single sign-on).
 - Temporarily disable any antivirus software, as this slows down the installation. After the installation, make sure you enable your antivirus software again.
- **Web Screen Painter**—Web Screen Painter automatically installs on the primary server when you install CA SDM. You can install Web Screen Painter on separate computers using the installation media.
- **File Name Creation**—CA SDM requires 8.3 File Name Creation. See your operating system's Help and Support documentation for more information about 8.3 File Name Creation and the disable8dot3 registry entry.

More information:

[How to Install CA SDM](#) (see page 150)

[Server Components](#) (see page 17)

[Implementation Strategies](#) (see page 122)

[Enable Windows Authentication in Firefox](#) (see page 123)

CA SDM Considerations

Before you install CA SDM, consider the following information to ensure a successful implementation:

- **Apache Server (UNIX and Linux)**—If you are using the Apache Server on UNIX or Linux, some installations of the Apache Server disable the `OPTION FollowSymLinks` from the root directory. This option disables the default Apache integration for CA SDM, because the configuration file uses the `/opt/CAisd` symbolic link created during the CA SDM installation. To allow CA SDM to work with Apache, you can either allow the `FollowSymLinks` from the root directory (this must be done in the `httpd.conf` file) or modify the `$NX_ROOT/bopcfg/www/CAisd_apache.conf` file to replace the symbolic link with the actual path. In the `CAisd_apache.conf` file, change all occurrences of `/opt/CAisd` to the actual location of CA SDM (for example, `/opt/CA/ServiceDeskManager`). After making and saving this change, stop and start the Apache Server to apply the change.
- **Browsers**—Consider the following information:
 - (Firefox) Consider the following information:
 - You may receive an *Unprivileged Script* error when you use cut, copy, and paste functionality on the HTML editor page in Knowledge Categories. Click OK to view a technical note at mozilla.org, which shows you how to allow a script to access the clipboard.
 - When viewing the content of a file attachment in which the file name contains Latin-1 extended characters, a save as popup appears. You can either save to disk or click open and select an application to open the attachment.
 - (Internet Explorer 8 on Windows 2008) If the internet security level is set to high, the CA SDM URL and *about:blank* must be added as Trusted Sites for the web pages to be displayed properly.
 - (Google Toolbar) The CA SDM web interface may have a problem displaying the title bar text at the top of the window.
 - (Internet Explorer 8.0) You may experience periodic increased memory use when accessing the CA SDM web interface. This is a known issue with the current release of Internet Explorer. To release the memory, periodically minimize your main CA SDM web page.

■ **CA Workflow**—Consider the following information:

- If the privileged user credentials are incorrect during configuration, CA SDM may run but CA Workflow fails. If these credentials are incorrect, you may experience the following:
 - CA Workflow does not install. A bad username/password error is cited in `/site/Workflow/wekinstall.log`.
 - Tomcat takes excessive CPU, and/or the logfile `/log/pdm_tomcat_CAWF.log` is filled with security manager exceptions and *AbandonedObjectPool is used* messages.

To correct this situation, verify the privileged username and password by logging in to the operating system with those credentials. Then, run the CA SDM configuration and specify the correct privileged username/password. If the privileged user password is changed, configuration must be run to set the new password.

- If the privileged user credentials change after the CA Workflow installation completes, the CA Workflow process can fail. Complete the following steps:
 - a. Log in to the CA Workflow IDE to modify the default CA SDM Web Service Actor.
 - b. Select the Actors tab, expand the JavaScript tree, and click USDInitializer.
 - c. Double-click Get Global Attributes.
 - d. Enter the CA SDM privileged user name and password in the following fields under the script section:

```
USD_Username = ""
USD_Password = ""
```
 - e. Modify these values in the `$NX_ROOT\data\workflow\actors\r12_Service_Desk_Actors_en_US.xml` file.

■ **Databases (All Supported)**—Consider the following information:

- If CA SDM has been configured with one database, and then the configuration is run a second time and a different database type is selected, configuration does not work. For example, if you initially configure for SQL Server and then configure again to an Oracle database. The workaround is to restart the computer before the second configuration is run.
- Database connection information, if different, is not accepted in subsequent configurations. If an additional configuration is needed as a result of a change in the database connection information, delete the `$NX_ROOT\NX.env` file before proceeding.

- If you have upgraded from Argis 8.0 to CA Asset Portfolio Management r11.2 and you are sharing the CA MDB (database) with CA SDM, you may encounter problems attempting to add or update assets in asset families using CA SDM. To avoid errors, you must define the asset extension tables to CA SDM using one of the following methods:
 - Use WSP to define the tables and the forms to view and edit the table entries.
 - Manually edit the tables and forms using the following guidelines:
 - a. The file `$NX_ROOT\bopcfg\majic\assetx.maj` contains a template that can be used to create a majic file to identify the columns in the asset extension table to CA SDM. Copy this file and edit as appropriate, following the instructions located in the file.
 - b. Create a .sch file in `$NX_ROOT\site\mods` directory to define the database columns. The files `$NX_ROOT\site\assetx_schema.sch` and `$NX_ROOT\site\assetx_index.sch` can be used as templates which can be copied and edited as appropriate for your asset extension tables.
- Note:** Creating the form to display the asset extension data is accomplished using WSP.
- **SQL Server**—Consider the following information:
 - Newer version of SQL Server has stricter user password credentials than in previous versions of SQL Server. Make sure that the CA SDM database password adheres to the password policies as defined in SQL Server. If the CA SDM database password does not meet the SQL Server 2005 password policy, the CA SDM configuration does not work.
 - (Microsoft clustered environment on SQL Server 2005) Within the cluster, you must create an alias for the SQL Virtual node name so when the cluster fails over, CA SDM can still connect to the same server name, regardless of which clustered node is active.

- **Oracle**—Consider the following information:
 - If you install CA SDM on a UNIX-based system with an Oracle database, the privileged user must belong to the group specified during the Oracle installation. The Oracle installation group can be found in file named *oraInst.loc*.
 - When configuring to a 64-bit Oracle database on a 64-bit computer, the system library path (LD_LIBRARY_PATH on Oracle Solaris and Linux, LIBPATH on AIX) must point to the 32-bit Oracle libraries. The 32-bit Oracle libraries are found in \$ORACLE_HOME/lib32. This is for both configure and runtime.
 - For configuring a 64-bit Oracle 11g database on a 64-bit computer, you *must* also install the Oracle 32-Bit Client on the server. When configuring the database, the system library path (LD_LIBRARY_PATH on Oracle Solaris and Linux, LIBPATH on AIX), it *must* point to the 32-bit Oracle libraries. This step is required for both configuration and runtime. Also, create a net service name on the Oracle client to point to the Oracle database server instance.
 - If you are using an Oracle database and you want to use existing tablespaces, you must create a Data tablespace that is at least 400 MB, and an Index tablespace that is at least 100 MB before configuring CA SDM.
- **Externally Mounted Drives**—When installing CA SDM on Linux with 20 or more externally mounted drives, you may experience a delay during the installation after the installation wizard pages and before the installation progress page appears. This is normal behavior, and the installation should resume after the delay.
- **Install Shield and InstallAnywhere**—Consider the following information:
 - If you receive an Install Shield error when trying to install CA SDM, wait until *msiexec.exe* stops running. Then try installing the product.
 - If you start, and then stop, the CA SDM installation on UNIX or Linux, you may see a directory at the root of the installation named *install.dir.#####*. This is a feature of InstallAnywhere. These files are not needed and you can safely delete them.
- **Installation Home Directory**—When installing CA SDM, do not install the CA Shared Components in the same directory as the CA SDM installation directory (NX_ROOT).
- **International**—Consider the following information:
 - You cannot use multi-byte characters for either the user you are logged in as or for the CA SDM privileged username when installing on multi-byte operating systems such as Simplified Chinese and Japanese. Doing so causes the installation to fail.
 - Do not specify multi-byte characters in file path names during installation and configuration. Doing so causes one or both to fail.

- CA SDM must run on UTF-8 locale on Linux and UNIX platforms.
- The Timespan Symbol names that are provided with the default CA SDM installation (Administration tab, Service Desk, Application Data, Codes, Timespans) are in English. For example, TODAY, YESTERDAY, THIS MONTH, and so on. For localized versions of the product, administrators may want to define new localized Timespans as required. You should not delete or modify the default Timespans.
- Date formats in CA SDM do not support international specifiers such as, localized date-picture specifiers (for example, "jj/MM/AAAA" for French). The syntax is limited to generic specifiers such as "DD/MM/YYYY". However, many international short date-time patterns can be constructed from these generic specifiers (for example, "YYYY.MM.DD" would supply a common Japanese short date format).
- For outbound plain-text email notifications, the NX_SMTP_HEADER_CHARSET and NX_SMTP_BODY_CHARSET options may need to be adjusted (directly in the NX.env file) to correctly tag the email message with the character encoding used by the international operating environment, so that it can be properly interpreted and displayed by recipient email systems. The default values for these options are set to UTF-8 on all platforms.
- For non-English Oracle installations running on UNIX or Linux, you must set the NLS_LANG environmental variable before running pdm_init. The Oracle DBA should check the Oracle documentation for the value assignment needed for NLS_LANG.

Important! If you do not set NLS_LANG, the Oracle client defaults to *American_America.US7ASCII*. For example, to test multi-byte Japanese in your environment, set NLS_LANG to *JAPANESE_JAPAN.UTF8*.

Note: The NLS_LANG variable must be set in the same shell before running pdm_init. For example, *setenv NLS_LANG GERMAN_GERMANY.WE8ISO8859P1*

- International users may want to adjust the DateFormat property in web.cfg to use the date and date-time formats best suited for their region.
- International users may want to change from the default spell check lexicon (LEX_LANG option in the Options Manager) to a lexicon matching the language used in their region.
- The English release of the CA SDM server is certified to operate in nine non-English language operating environments. For Windows, these environments must be fully localized regional releases of the supported Windows Server operating systems. In particular, Windows operating environments which utilize a Language Interface Pack or MUI running on an English core are not supported.

Further, localized releases of CA SDM are supported only on the matching localized Windows server operating environment. In all cases, the system's "Language for non-Unicode programs" (default system Windows ANSI code page) must be accurately configured in the Control Panel's Regional and Language Options window to support the target certified language.

Note: For more information about the localized releases of Windows Server operating systems, see the Localized Microsoft Operating Systems listing on Microsoft's Global Development and Computing Portal.

- For knowledge searches containing multi-byte Japanese characters for International users of CA SDM and Knowledge Management to work properly with SQL Server only when SQL Server is installed with Windows collation. Make sure to specify the Collation option for your data during the SQL Server installation.

- **IPv4**—When installing on Linux, the `/etc/hosts` file must contain an IPv4 entry with the IP address, computer name, and the fully-qualified computer name. An example entry may look similar to the following:

```
127.0.0.1 localhost.localdomain localhost
141.202.211.11 usbep11.ca.com usbep11
```

- **Short File Names**—If you have disabled short file names on your Windows operating system, enable them before attempting to install CA SDM. In addition to enabling short files names, you must also set both the TEMP and TMP environment variables to a short file name, for example, `c:\temp`, after enabling short file names before starting the installation process.

Note: For information, see the Microsoft Knowledge Base Article 121007 on the Microsoft Help and Support web site.

- **Special Characters and Spaces (Directory, Media Path, and Folder Name)**—Consider the following information:

- (UNIX and Linux) If you copy the installation media to a local hard drive, make sure the location does not contain spaces or special characters (for example #) in the directory path. If the location contains spaces or special characters, the installation does not work.
- (UNIX, Linux, and Windows) Do *not* specify spaces in the installation media path and folder name. If you do, the installation does not work.

- **Tomcat**—Consider the following information:

- Tomcat is set as the default CA SDM web server during the product installation. If you want to use IIS (on Windows) or Apache (on UNIX or Linux) as the default web server, run the configuration and select IIS or Apache when prompted, or re-run the configuration and select IIS or Apache.
- If Tomcat is configured with external authentication on the primary server, you must set up a secondary server with a webengine and repository daemon to allow users who are not authenticated to use attachments. The Tomcat installation on the secondary server cannot use external authentication.

- The CA SDM installation sets the Tomcat port to 8080. Other CA products, such as CA Asset Portfolio Management or the Service Delivery Suite of products, also default the Tomcat port to 8080. If you are installing multiple CA products on the same server, make sure you select a port number other than 8080 for subsequent CA Technologies product installations so they function properly together. To change the Tomcat port number to something other than 8080 for CA SDM, install the product or if it has already been installed, re-run the product configuration and specify an available port number for Tomcat when prompted.
- After a restart, the CA SDM Tomcat process may not start properly. If this happens, stop and restart Tomcat using the following commands:

```
pdm_tomcat_nxd -c stop  
pdm_tomcat_nxd -c start
```

■ **Users and Authentication**—Consider the following information:

- User authentication does not work if the system is using shadow files and there is an x in the password field of the /etc/passwd file.
- On HP, if you have configured security so that system passwords are stored in /etc/shadow (for example, an x is stored in /etc/passwd in place of passwords), CA SDM user authentication fails, and users are not able to log in to CA SDM.
- The password specified for the privileged user must conform to the password policy constraints imposed by the network domain. If it does not meet the constraints imposed by the domain, CA SDM configuration does not work.

■ **Web Interface and Internet Information Services (IIS)**—To configure the web interface with IIS 7.0 on Windows 2008, you must install the CGI and Metabase Compatibility components of IIS 7.0. You can add these components using the Roles section of the Server Manager, by installing the IIS Management Compatibility modules.

■ **Web Screen Painter**—Consider the following information:

- When you install WSP as part of the CA SDM installation, it must be configured for it to work properly.
- In a Web Screen Painter preview session in test mode, search filters are ignored on new tables that are not published.

More information:

[How to Install CA SDM](#) (see page 150)

CA CMDB Components

CA CMDB provides the following standard components:

CA CMDB Web Interface Pages

- Defines and tracks CI properties and relationships.
- Supports change impact and root cause analysis.

CMDB Visualizer

- Graphically displays CI relationships.
- Supports the planning function.

Versioning

- Displays CI change history and relationships.
- Compares snapshots and named milestones.

Common Asset Viewer

- Provides a common view of asset attributes across multiple products.
- Provides the launch point into supporting products.

CI Reconciliation

- Associates imported CI data with existing CIs in the CMDB.
- Uses existing Asset Registry API.

Repository

- Provides a data store for CIs, relationships, families, and so on.
- Exists in the MDB.

Integration

- Provides standard, predefined integration with CA Service Desk, CA NSM, CA Asset Portfolio Management, CA EEM, and others.

Reporting

Provides the following reports for CIs:

- Summary
- Detail
- Changed CIs
- CI Family
- CI Relationship
- Relationship Tree

Support Automation Planning Considerations

You can use the following information to research and gather information to help you plan for a successful Support Automation configuration.

- Read the Release Notes to understand the requirements for Support Automation.
 - **Server and Network**—Consider the following supported Support Automation server modes:
 - **Main Server**—Support Automation uses main application server. The server provides socket-based and HTTP-based communications.
 - **Socket Proxy Server**—Support Automation uses a socket proxy on the same tier as the web server which off-loads encryption/decryption processing from the main server for direct socket connections to support scalability.
 - **Message Routing Server (MRS)**—Support Automation separates high bandwidth and unpredictable traffic from the main application server to support server scalability and provide a network routing shortcut for geographical scalability using remote control connections.
 - **Server Sizing**—Consider the following server variables:
 - **Network characteristics of end-user and analyst connections**—The server load is directly proportional to the data of the message routing component. Low bandwidth, high latency, and high packet loss contribute significantly to lowering the load on the server. When network conditions are optimal (high bandwidth, low latency, low packet loss), the speed on the server is much higher. The total number of concurrent analyst users and end-user logins per minute, including self-service user, can place a heavy load on the server.
 - **Connection type**—The number of socket connections as opposed to the number of HTTP connections affects the servers as follows:
 - When you connect predominantly through socket connections, the load on the servers is so light that, assuming powerful hardware, the application is network bound rather than CPU bound. The hardware does not limit the number of concurrent connections but rather the network can limit the connections.
 - When you connect through HTTP, the load on the web and application servers is higher and the application is CPU bound unless scaled significantly.
 - **Remote Control usage**—Remote Control uses significant network bandwidth in a sustained way whenever it is running. All traffic routed between end users and analysts flows through the server. The number of concurrent Remote Control connections has a significant role in any sizing assessments.
- Note:** Remote Control is the only high-bandwidth tool in the Live Assistance toolset. Chat and Automation are low bandwidth. Screenshot and File Transfer can use high bandwidth for short periods while files are transferred.

Support Automation Network and Bandwidth Considerations

The amount of bandwidth you consume on the end-user computer depends on the tools you use as follows:

- For the Chat and Automation features, the amount of bandwidth required is small. A dial-up modem of 56 kbps or less is adequate to support these functions.
- For the Remote Control feature, the amount of bandwidth required increases. However, Live Assistance Remote Control automatically adapts to low-bandwidth environments by reducing the image quality and refresh rate of the remote control session.

The amount of bandwidth also depends on the connection model you employ. Two connection models are available:

- HTTP connectivity—Use in cases where the end user is behind a restrictive firewall that lets only HTTP connections to the server.
- SSL direct socket—Use in cases where the end user connects to the server using a connection on the SSL port 443.

The following chart illustrates the necessary bandwidth depending on the tools you use.

Tools/Bandwidth	Chat/Automation	Remote Control
< 3 KBps (28.8 kbps dial-up)	Very fast and responsive	Slow
< 5 KBps (< 56 kbps dial-up)	Very fast and responsive	Adequate with image degradation
< 50 KBps (Cable/ADSL)	Very fast and responsive	Very fast and responsive
< 100 KBps (LAN)	Very fast and responsive	Very fast and responsive

CA NSM Installation Planning

To help you plan for a successful CA NSM installation and configuration, read your CA NSM documentation, including both the *Release Notes* and optional readme file (if available).

CA EEM and CA Workflow Installation Planning

To help you plan for a successful CA EEM and CA Workflow installation and configuration, use the following information to research and gather information.

- **Research**—Complete the following steps:
 - Read your CA EEM and CA Workflow documentation, including both the Release Notes and optional readme file (if available).
Note: CA EEM is not a configuration option in CA SDM. CA EEM requires a separate installation.
 - Find out if you have an existing CA EEM installation that you can use with CA Workflow. In this situation, do *not* install CA EEM again. Instead, install CA Workflow and reference your existing CA EEM installation.
 - Note your CA EEM administration password; you need the password during the installation.
- **CA Workflow Installation**—Complete the following steps:
 - Before you try to install CA Workflow, verify that you have installed CA EEM. You cannot install CA Workflow until this product is installed.
 - If you want to use CA Workflow with CA SDM r12.9, download the CA SDM r12.7 ISO from CA Support Online and then install CA Workflow.
 - The Tomcat port number for CA SDM defaults to 8080, and 8090 for CA Workflow. If these port numbers are already in use by another product, change the port numbers for CA SDM and CA Workflow so you do not have a conflict.
- **CA EEM and AIX**—If you are installing CA EEM on AIX, and you have configured AIX for Network Information Service (NIS), add a user named *dsa* before you install CA EEM and CA SDM. In this situation, complete the following steps:
 1. Create a user with the user ID *dsa*.
 2. Set the *dsa* home directory to `/opt/CA/eTrustDirectory/dxserver`. If the directories do not exist, manually create them.
Note: This step is only required for CA EEM Release 8.3 and earlier. The home directory for CA EEM 8.4 has changed to `/opt/CA/Directory/dxserver` and is automatically created during installation.
 3. Make *dsa* the owner of `/opt/CA/eTrustDirectory` and all subdirectories. To make *dsa* the owner, you can use a command similar to the following:
chown -R dsa /opt/CA/eTrustDirectory
 4. Verify that the user exists, the home directory, and ownership of `/opt/CA/eTrustDirectory`.

More information:

[How to Install CA EEM](#) (see page 208)

[CA Workflow Considerations](#) (see page 109)

[How to Install CA Workflow](#) (see page 211)

[Install Standalone CA Workflow IDE](#) (see page 214)

CA EEM Considerations

Before you install CA EEM, consider the following information to help ensure a successful implementation:

- **Migration**—When you migrate to CA SDM r12.9, upgrade to CA EEM r8.4 SP4 CR05 or later after you install CA SDM.
- **External LDAP Data Store**—If CA EEM is configured to use an external LDAP data store, the privileged user must be created in the LDAP Directory.

Note: For more information about external LDAP server configuration, see the *Administration Guide*.

More information:

[How to Install CA EEM](#) (see page 208)

CA Workflow Considerations

Before you install CA Workflow, consider the following information to help ensure a successful implementation:

- CA Workflow is installed on the following CA SDM servers, depending on your CA SDM configuration:
 - Conventional: Primary or secondary server
 - Advanced availability: Any one of the application servers
- **CA MDB Database User or Password**—Consider the following information:
 - If you change either the CA MDB database user or password after the initial CA SDM installation, rerun the CA Workflow installation so CA Workflow applies the changes and can communicate with CA SDM. When you rerun the CA Workflow installation, CA SDM automatically sets the new user name or password for CA Workflow and you are *not* able to change the values manually during the CA Workflow installation.

Note: Oracle environmental variables must be set before installing CA Workflow on UNIX and Linux. If the ORACLE_HOME variable is not set, you receive an error message when clicking the install link.
 - If you are migrating to a new database, run the [Workflow Migration Utility](#) (see page 111).
- **IPv6**—If your Linux server is configured for IPv6 support, you might be unable to log in to the CA Workflow IDE. To correct this situation, modify the ide.sh script file located in \$NX_ROOT\site\Workflow\Client by changing the second line which reads: "VMARGS=" to read: "VMARGS=-Djava.net.preferIPv4Stack=true". Then, save the script file and start the CA Workflow IDE again.
- **Tomcat**—Consider the following information:
 - If you have any difficulties with Tomcat being started, and as a result, the CA Workflow and web interface are not available, increase the Tomcat memory.

Note: For information about how to address this situation, search for the Knowledge Base Article TEC418959 on <http://ca.com/support>.
 - During the installation of CA Workflow, CA SDM and CA EEM share a separate port number for Tomcat. If you have any difficulties with Tomcat when installing or using CA Workflow, [stop and restart](#) (see page 260) the service.
 - The CA Workflow host name that you specify in options manager *must* match the NX_LOCAL_HOST variable in the NX.env file of the server where you installed CA Workflow. The host name *must* also match the correct case sensitivity.
 - If you have installed and changed the installation defaults for the Tomcat port (8080) or the default privileged userid/password (ServiceDesk/ServiceDesk), make the following changes to the default CA Workflow definitions/actors so they work properly.

- Log on to Workflow IDE.
Complete the following steps to modify the default Service Desk Web Service Actor:
 - a. Click the Actors tab.
 - b. Expand the Web Service tree.
 - c. Right-click the Unicenter_Service_Desk_Web_Service actor and select Properties.
 - d. Select and copy the content of the WSDL URL entry.
 - e. Modify the name of the actor and click OK.
 - f. Right-click the Web Service Tree and select Add Actor.
 - g. In the Name field, enter **Unicenter_Service_Desk_Web_Service**.
 - h. In the WSDL URL entry, paste the previously copied content.
 - i. Modify the port number in the URL to match the port number selected during the Tomcat configuration.
 - j. Click OK.
- After you install CA Workflow on the CA SDM server, complete the following steps so that the integration between CA SDM and CA Workflow works successfully:
 - Log in to the CA Workflow IDE to modify the default CA SDM Web Service Actor.
 - Select the Actors tab, expand the JavaScript tree, and click USDInitializer.
 - Double-click Get Global Attributes.
 - Enter the CA SDM privileged user name and password in the following fields under the script section:
`USD_Username = ""`
`USD_Password = ""`
 - Modify these values in the
\$NX_ROOT/data/workflow/actors/r12_Service_Desk_Actors_en_US.xml
file.

More information:

[How to Install CA Workflow](#) (see page 211)

Workflow Migration Utility

The Workflow Data Migration Tool moves data from one CA Workflow database to another. This utility can move data from any of the supported databases to any of the other supported databases, and can move data to the latest CA Workflow schema.

The Workflow Data Migration Tool is provided as both a GUI and as a bean.

- **GUI**—migration.jar
- **Bean**—datamover.jar

Note: To run these Java commands, two JAR files (datamover.jar and migration.jar) must be manually unzipped and extracted into the Java path. The Migration.zip file can be found on the installation media in the \winsrvr.cd1\CA_tps.nt\CAFLOW\Resources directory.

Run the Migration Utility from the Command Line

The migration tool is provided as a bean in datamover.jar. You can run the migration tool from the command line.

Run the migration utility

```
java -cp <driver jar file(s)> com.ca.workflow.util.DataMover <source db driver name>
<source db url> <source db username> <source db password> <target db driver name>
<target db url> <target db username> <target db password> <number of entries in one
transaction> [product keys (comma separated)] --fetchsize=15 [options]
```

Example

```
java -cp ijjdbc.jar;datamover.jar com.ca.workflow.util.DataMover
ca.ingres.jdbc.IngresDriver
jdbc:ingres://155.35.26.105:EI7/mdb;cursor=readonly;auto=multi;group=workflow_adm
in_group root iloveca ca.ingres.jdbc.IngresDriver
jdbc:ingres://tadra01-w2k3-v:EI7/mdb;cursor=readonly;auto=multi;group=workflow_ad
min_group tadra01 ca#33333 50 wekProductKey1 --clean-target --fetchsize=15
```

driver jar file(s)

Identifies the source and target driver file(s). Separate multiple driver files using semicolons (;).

source db driver name

Identifies the source database driver.

source db URL

Identifies the source database URL.

source db username

Identifies the source database user.

source db password

Identifies the source database password.

target db driver name

Identifies the target database driver.

target db URL

Identifies the target database URL.

target db username

Identifies the target database user.

target db password

Identifies the target database password.

number of entries in one transaction

Specifies the number of entries to move in one transaction. If this number is too large, then there is a chance to overrun the Ingres transaction log. 50 is the recommended default.

clean-target

Removes all data related to the specified product key(s) from target database before proceeding to transfer data. If no product key is specified, it removes all data from the target database before proceeding to transfer data. This option can be used to clean up a target database if a migration has previously failed midway through running.

fetchsize

If the -fetchsize command line option is present, it specifies the number of rows to be fetched at a time in a scrollable result set. If it is not specified, the utility uses the default fetchsize of the source database. Ingres does not have any default value for the number of rows to be fetched at a time in a scrollable result set; in that case, the default of 10 rows is used if it is not specified as a command line option.

product keys

Specifies product keys for which to migrate data. This is an optional parameter. If specified, it can be either a single product key or a comma separated list of multiple product keys. If the product keys parameter is present, then the migration utility only migrates data from the source database that is constrained by the specified product keys. If this parameter is omitted, all workflow data is migrated regardless of the product key.

Log File

A log file is created when you transfer data from a command line.

Driver File

All driver files should be placed in the migration tool directory, or you must specify the location of the database driver JAR file.

Run the Migration Utility from the GUI

To run the migration from GUI

1. At the command line, enter the following command:

```
java -cp datamover.jar;migration.jar -Dwflog="c:\wf.log" -Dtxlimit="0"  
com.ca.workflow.util.WFMigration
```

The Workflow Data Migration Tool dialog appears.

2. For both the Source and Target Database sections, select the database type from the Database Type drop-down menu.

The driver names and URLs update automatically. You can modify these default values, if necessary.

- For Ingres, use -ijdbc.jar
- For Oracle 10g, use ojdbc14.jar
- For Oracle 11g, use ojdbc5.jar
- For MS SQL 2000, use msutil.jar, msbase.jar, mssqlserver.jar
- For MS SQL 2005, use sqljdbc.jar
- For Sybase Adaptive Server Enterprise 12.5.4, use jconn3.jar
- For Sybase Adaptive Server Enterprise 15.0, use jconn3.jar

Important! For a list of supported databases for CA SDM, see the *Release Notes*.

3. Complete the appropriate fields.
4. Click Start.

The data migration starts. During the migration, the status updates at the bottom of the dialog.

CA Process Automation Integration Planning

CA Process Automation is a stand-alone CA product with features for automating and tracking hardware and software administration tasks in enterprise IT environments. CA Process Automation automates tasks and manages user interactions, such as approvals and notifications for compliance and accuracy within production environments.

To plan for CA Process Automation integration, consider the following:

- Allow extra time to install and configure the CA Process Automation product.
- Assess whether CA Process Automation and CA SDM can coexist on a single server when the server architecture supports both products. When CA Process Automation or CA SDM components cannot coexist on the same server, consider installing each product on separate servers.
- Allow for time to verify that both products are installed and working independently.
- When CA SDM is integrated with CA Process Automation which uses CA EEM 8.4, ensure that you apply the CA EEM 8.4 SDK patch on CA SDM. Find the patch details on CA Support Online

Note: For information about CA SDM and CA Process Automation product requirements, see the *CA SDM Release Notes*. For information about the CA Process Automation supported platforms, required steps, and options for installation, see the CA Process Automation installation and configuration documentation.

Security Considerations

In addition to the stated minimum requirements from the Release Notes, consider the following recommendations for the CA Process Automation installation:

- Configure CA Process Automation to use CA EEM as an authentication server. CA EEM eliminates plain text user names and passwords from being passed for authentication purposes.
- If you are using multi-tenancy for CA Process Automation, CA EEM installation is required.

Note: For information about implementing multi-tenancy with CA Process Automation, see the CA Process Automation installation and configuration documentation.

- If you are using multi-tenancy for CA SDM, CA EEM installation is required.

Note: If you are not using multi-tenancy, CA EEM configuration for CA SDM is optional.

- Configure CA Process Automation to communicate using secure communications over HTTPS. HTTPS URLs use SSL/TLS to eliminate plain text exchanges, protecting proprietary and other sensitive data from accidental or malicious disclosure.

Note: For information about configuring CA Process Automation to use HTTPS, see the CA Process Automation installation and configuration documentation.

How to Set Up SSL Communications with CA Process Automation

For security reasons, CA Process Automation implementers may have chosen to install or reconfigure CA Process Automation to require SSL communications. If CA Process Automation is configured to require SSL communications, integrated applications such as CA SDM require a certificate from the CA Process Automation keystore for communication.

To set up SSL communications with CA Process Automation, do the following:

1. Configure CA SDM options to use the CA Process Automation HTTPS address.
2. Export the CA Process Automation keystore certificate to a file and copy the file to CA SDM.
3. Load the certificate file into CA SDM using the CA SDM `pdm_keystore_mgr` utility.
4. If applicable to your CA SDM architecture, update the version control files to deliver the CA SDM keystore to all secondary servers.
5. Restart CA SDM.

How to Enable Communications When CA Process Automation is SSL Enabled

When CA Process Automation communicates with SSL, you must configure the CA SDM servers to communicate with CA Process Automation.

To enable communications when CA Process Automation is SSL enabled, do the following:

1. Verify that you can use CA Process Automation in a browser, without launching CA SDM. Record the CA Process Automation URL and use it for reference when you configure the CA Process Automation Workflow options in Options Manager.
2. Log in to CA SDM and install or modify the CA Process Automation Workflow options in Options Manager. For each of the following options, use the syntax `https://server:8443` instead of `http://server:8080` for reaching the SSL enabled CA Process Automation application. However, if the CA Process Automation installation uses another port instead of the 8443 SSL port, specify the appropriate port number.

- `caextwf_endpoint`
- `caextwf_processdisplay_url`
- `caextwf_worklist_url`

Note: If the values do not match the actual CA Process Automation installation values, CA SDM cannot communicate with CA Process Automation and a runtime error occurs. Verify that the values match the actual CA Process Automation installation values because the CA Process Automation installer might have selected a different port instead of port 8443.

3. On the CA Process Automation server, locate the KEYSTOREID and itpam.web.keystorealias entries in the following file:

C:\Progra~1\ITPAM\server\c2o\.config\0asisConfig.properties

4. Copy the KEYSTOREID. Be prepared to paste the KEYSTOREID value as the password after you issue the keytool command.
5. On the CA Process Automation server, issue the following keytool command as one line on the command line:

```
C:\Progra~1\ca\sc\jre\1.6.0_00\bin\keytool.exe -keystore  
C:\Progra~1\ITPAM\server\c2o\.config\c2okeystore -export -alias  
<keystorealias> -file itpam.cer
```

The keytool utility prompts you for a password.

6. Paste or type the KEYSTOREID value as the password.

The keytool utility uses the final parameter (-file itpam.cer) to create a file named *itpam.cer*. The *itpam.cer* file contains the necessary certificate information for communications with CA SDM.

7. Move the *itpam.cer* file to one of the following locations on the CA SDM server:

- (Windows) %NX_ROOT%\bin
- (UNIX) \$NX_ROOT/bin

8. Import the CA Process Automation certificate information into CA SDM by entering the following command:

```
(Windows) pdm_perl %NX_ROOT%\bin\pdm_keystore_mgr.pl -import  
%NX_ROOT%\bin\itpam.cer
```

```
(UNIX) pdm_perl $NX_ROOT/bin/pdm_keystore_mgr.pl -import $NX_ROOT/bin itpam.cer
```

The *pdm_keystore_mgr.pl* script generates the keystore file in the following locations:

- (Windows) %NX_ROOT%\pdmconf\nx.keystore
- (UNIX) \$NX_ROOT/pdmconf/nx.keystore

9. The *nx.keystore* must be delivered to the following CA SDM servers, depending on the CA SDM configuration:

- Conventional:Secondary server.
- Advanced Availability: Application and standby server.

Open the *server_secondary.ver* file from one of the following locations:

- (Windows) %NX_ROOT%\site\server_secondary.ver
- (UNIX) \$NX_ROOT/site/server_secondary.ver

10. Modify the *server_secondary.ver* for version control by adding the following information:

```
[SSL_Keystore]
filename = "nx.keystore"
directory = "$NX_ROOT/pdmconf"
component_type = "file"
O_mode = "RW"
g_mode = "RW"
w_mode = "RW"
file_ctl
```

Note: For information about managing version control, see the *Administration Guide*.

11. Restart CA SDM.

The CA SDM server can communicate with the SSL enabled CA Process Automation application.

Note: For information about configuring CA Process Automation Workflow options, see the *Online Help*.

CA Business Intelligence Installation Planning

To help you plan for a successful CA Business Intelligence installation and configuration, use the following information to research and gather information.

- **Research**—Complete the following steps:
 - Read the Release Notes to understand the requirements for CA Business Intelligence.
 - Read your CA Business Intelligence documentation, including both the Release Notes and optional readme file (if available).

Note: For a detailed list of supported environments and hardware requirements, see the various Supported Platforms documents on the CA Business Intelligence DVD. These documents include specific version and patch-level requirements for web application servers, web browsers, and operating systems.

- **Installation Home Directory**—Determine the home directory in which you want to install CA Business Intelligence. The default locations are:
 - For windows 32bit computers: C:\Program Files\CA\SC\CommonReporting3
 - For x64 computers: C:\Program Files X(86)\CA\SC\CommonReporting3
 If this directory does not exist, create it before starting the installation.
- **Antivirus Software**—Temporarily disable any antivirus software scanning on the computer on which you install CA Business Intelligence.
- **Application Server Support**—The CA SDM integration with CA Business Intelligence only supports Apache Tomcat as the CA Business Intelligence application server.
- **Web Browser Support**— CA Business Intelligence 3.2 SP5 supports the following web browsers:

Browser OS	Browser	JVM
Apple Mac OS X	Safari 5	Apple 1.6.0_xx
Microsoft Windows	Firefox 3.6	Sun 1.5.0_xx Sun 1.6.0_xx
	Firefox 8 Note: New Firefox releases will be supported with minimal testing about two weeks after the release by Mozilla.	Sun 1.6.0_xx
	IE 6.0 SP3	Sun 1.5.0_xx Sun 1.6.0_02+
	IE 7.0	Sun 1.5.0_xx Sun 1.6.0_02+
	IE 8.0 Note: Only compatible mode supported.	Sun 1.6.0_xx
	IE 9.0 Note: Only compatible mode supported.	Sun 1.6.0_xx

Important CA Business Intelligence installation is limited to Windows platforms only for CA SDM r12.9. You can, however, integrate CA Business Intelligence with CA SDM on all supported operating systems.

More information:

[Reporting Considerations](#) (see page 119)

[Integrate CA Business Intelligence with CA SDM](#) (see page 241)

Reporting Considerations

Before you install CA Business Intelligence, consider the following information to help ensure a successful implementation.

- An installation of CA Business Intelligence r3.2 (BusinessObjects Enterprise Release 3.1) is required to view the CA SDM r12.9 reports included in this release.
- CA Business Intelligence r2.1 (BusinessObjects Enterprise Release 2) is not supported.
- You can install CA Business Intelligence r3.0 during the upgrade process from r12.1 to r12.5.
- The installation differs based on the installation type that you select (custom opposed to new).
- The credentials for the BusinessObjects Administrator Account must be defined before running the installer for both new and custom installations.
- The Configuration Management Server (CMS) must be installed on port 6400 (default); otherwise the CA Business Intelligence configuration fails during setup.
- CA SDM users must be added to the Administrator's list in CMS before using the reports.
- Some additional configuration steps must be completed if you want to install Apache Tomcat 5.5.20 for use as the application server for Business Objects.
- SAP Business Objects users with an existing installation of Business Objects can install and configure CA Business Intelligence (recommended) or they can use their existing Business Objects installation.
- If you plan to access InfoView with Firefox, then Firefox version supported by CA Business Intelligence 3.2 must be used.
- It may be necessary to modify the version of the JRE provided with Business Objects to a version that better fits your specific environment.
- Crystal Reports Explorer and Desktop Intelligence are *not* supported even though they can be invoked after the CA Business Intelligence installation.

New Opposed to Custom Installation (Windows)

Several differences exist between a new installation and custom installation. The installation flow differs based on the installation type that you select.

New

Installs all components on one computer. Select this installation type to quickly set up a complete deployment, with all server and client components on a single computer. A new installation provides:

- MySQL as the database to store CMS information.
- Apache Tomcat as the application server.

Note: BusinessObjects Enterprise requires a database to store information about users and groups, security levels, BusinessObjects Enterprise content, and servers. The primary database, which the CMS maintains, is known as the CMS database. During the installation of CA Business Intelligence, you specify the CMS you want to use and enter the required parameters for authentication. For more information about CMS database requirements and preparation, see the *CA Business Intelligence Implementation Guide*.

Custom

Installs the components that you select on the computer. Select this installation type to specify which components to install when performing a distributed deployment, or when adding servers to an existing deployment.

Important! Perform a custom installation if you are installing the BusinessObjects CMS on a Microsoft SQL or Oracle database.

A custom installation provides the options to do the following:

Install MySQL or use a pre-existing CMS, including:

- Oracle
- Microsoft SQL
- Apache Tomcat—You can control the installation of the Apache Tomcat instance.

BusinessObjects Administrator Credentials

The BusinessObjects administrator password must be identified before running the installer for both new and custom installations.

This password must be mixed-case, at least six characters long, and cannot contain the word administrator in any form. It should also contain at least two of the following character types:

- Uppercase
- Lowercase
- Numeric
- Punctuation

BusinessObjects Enterprise XI Application Server

BusinessObjects Enterprise requires an application server to process the server-side scripts that make up web applications.

During the installation of CA Business Intelligence, you specify the application server to use and enter the required configuration parameters. CA Business Intelligence provides the option to install Apache Tomcat 5.5.20, or you can use your existing application server.

If you want to install Apache Tomcat 5.5.20 for use as the application server for BusinessObjects, do the following:

- Install the Java 2 Standard Edition JDK 1.5.
- Set the environment variable \$JAVA_HOME to the JDK 1.5 home directory.
- Install Apache Tomcat 5.5.20 and set the Java Virtual Machine path to the directory in which the Java 2 Standard Edition JRE 1.6 is installed on your system.
- Complete a Custom CA Business Intelligence Install.
- On the Web Server Configuration screen, select "No" when prompted to Install a new copy of Tomcat for BusinessObjects XI.
- Select Tomcat from the list of application servers.
- Enter the location of the Apache Tomcat 5.5.20 web server in the Install Directory field and complete the install.
- After completing the CA Business Intelligence Install, run the CA Business Intelligence Configuration.

Note: If you have already installed CA Business Intelligence with JDK 1.5 (using an external nondefault application server) and you want to employ JRE 1.6 on a client environment accessing the InfoView Web Intelligence tool, do not install the 1.4.2 JRE when prompted. Instead, install JRE 1.6 on the client environment. If applicable, restart your browser after installing JRE 1.6. You can download JRE 1.6 from the Oracle website.

Existing Installation of BusinessObjects (SAP)

For SAP BusinessObjects users, if you have an existing installation of BusinessObjects, which was not installed through CA Business Intelligence, we recommend for the greatest level of compatibility and supportability that you install and configure CA Business Intelligence. If you prefer to use your existing BusinessObjects installation, however, you can skip the CA Business Intelligence installation steps and proceed to this section: How to Configure CA Business Intelligence.

Note: You must be using BusinessObjects Enterprise Release 3 and have deployed Tomcat as an application server. You also must be licensed for Web Intelligence. Regarding Crystal Reports, you must have a runtime license or greater.

Access InfoView with Firefox

If you plan to access BusinessObjects InfoView with Firefox, you must use Firefox 2 with Java Virtual Machine (Java Runtime) 1.5.0_xx and 1.6.0_02+.

Note: For more information about supported platforms and release levels, see the *BusinessObjects Enterprise XI for Windows Guide*.

Reporting Best Practices

Use the following best practices when installing, maintaining, and using CA Business Intelligence:

- Install and maintain one universe for each CA product. If required, you can build linked universes.
- Before applying service packs, patches, and other updates to your customized universe, back up all your customizations.
- Do not modify the default universe. Instead, copy it and modify the copy. Otherwise, your customizations may be erased when you apply service packs, patches, and other updates.
- Build your own folders.
- If reports stop running, verify that the Central Management Server (CMS) is running.
- Do not overwrite pre-defined reports.
- Always use a pre-defined report as a base to build a custom report. Doing so helps ensure consistent formatting in all reports.

Note: For details about completing these tasks, see your BusinessObjects Enterprise documentation.

Implementation Strategies

When planning your CA Service Desk implementation strategy, consider the following information, in addition to network availability, usable bandwidth, and responsiveness.

- **Centralized**—Installs and configures all product components on one primary server. This is the default installation. You can implement multiple Object Managers and web engines for load balancing and failover, but your business may outgrow this implementation.
- **Distributed**—Installs and configures product components on servers that are closer to the clients receiving the service. For example, a branch location of a business that has a number of subnets may have many analysts using the Web Client. Placing a secondary server at this branch location reduces the network traffic and response times. Network traffic between the branch location and the primary server location is also reduced because the secondary server performs caching. This type of implementation supports the implementation of multiple Object Managers and web engines for load balancing and failover.

- **Global**—Consists of two or more centralized or distributed implementations known as regions. The primary server of a region replicates minimal information to and from a master region. This allows a single region to have all necessary information about all other regions. This enables an analyst to be aware of tickets from all regions, but only connect to a region when required. This type of implementation is useful when network bandwidth is too limited for a distributed implementation. For example, you may have business locations in different countries with a slow link between them.

Note: For more information, see the [CA Service Desk Architecture for Advanced Availability](#) (see page 83).

Enable Windows Authentication in Firefox

NT LAN Manager (NTLM) authentication allows the login credentials of a Windows user, who is logged in to a Windows domain, to be automatically passed to an IIS web server in the same domain. By default, Windows authentication is not enabled in Firefox. To prepare for your implementation, you should enable Windows authentication in Firefox.

To enable Windows authentication in Firefox

1. Start Firefox.
2. Navigate to the following URL:
about:config
3. Confirm that you want to change the advanced settings.
The Preference Name list appears.
4. Locate and double-click the *network.automatic-ntlm-auth.trusted-uris* preference name:
The Enter string value dialog appears.
5. Specify the list of trusted sites by entering the full URL (for example, <http://web.example.com>) or the server name (for example, web.example.com)
Note: Do not enter a trailing slash. If you want to specify multiple servers, separate them with a comma. You can match all the servers in a particular domain, but typical wildcards do not work. For example, you must specify *.example.com* rather than **.example.com*.
6. Click OK.
7. Restart Firefox.

Chapter 4: Installing

This section contains the following topics:

[How to Implement the Software](#) (see page 125)

[How to Configure CA SDM Servers](#) (see page 126)

[How to Convert from Conventional to Advanced Availability Configuration](#) (see page 134)

[How to Convert from Advanced Availability to Conventional Configuration](#) (see page 139)

[How to Install CA MDB](#) (see page 143)

[How to Install CA SDM](#) (see page 150)

[How to Install Web Screen Painter](#) (see page 164)

[How to Install and Configure the CA SDM and CA NSM Integration](#) (see page 165)

[How to Install CA EEM](#) (see page 208)

[How to Install CA Workflow](#) (see page 211)

[How to Install CA Business Intelligence for CA SDM](#) (see page 215)

[Verify the Installation](#) (see page 219)

[The Install Log](#) (see page 219)

How to Implement the Software

You implement CA SDM based on a number of factors, such as whether you are upgrading from a previous release, you are installing the product for the first-time, your operating system, your database, the products you want to integrate, and so on. In general, follow these steps to implement the software:

1. Read the implementation considerations that are documented in the *Release Notes*.
2. If you are *upgrading* from a previous version, follow the steps to upgrade the database, console, and CA Workflow.
3. Install the CA MDB.

If your database (SQL Server or Oracle) is installed on a server other than the CA SDM primary server, install the CA MDB on the remote database server (that is, the computer on which SQL Server or Oracle is installed). If the CA MDB and primary server are on the same computer, CA MDB automatically installs.

4. Install CA SDM on either the primary server or optional secondary server.

You can customize web forms and the schema after installation because Web Screen Painter automatically installs on the server.

5. (Optional) Enable CA CMDB Visualizer during the CA SDM configuration.
6. (Optional) Enable Support Automation during the CA SDM configuration.

Important! If you want to migrate CA Support Automation r6.0 SR1 eFix5 divisions to tenants, convert this data before enabling and configuring Support Automation in CA SDM r12.9.

7. (Optional) Enable the REST API during the CA SDM configuration.
8. (Optional) Install CA EEM for authentication.
9. (Optional) Install CA Workflow to manage your business processes.
10. (Optional) Install CA Business Intelligence for managing reports with BusinessObjects technology.
11. (Optional) Install the CA NSM integration.

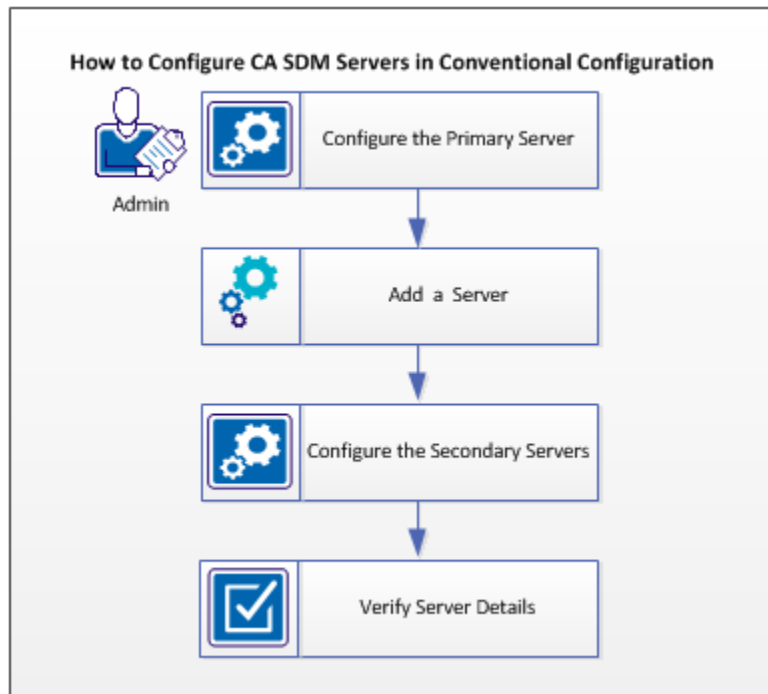
How to Configure CA SDM Servers

As a system administrator, you configure the CA SDM servers under the following circumstances:

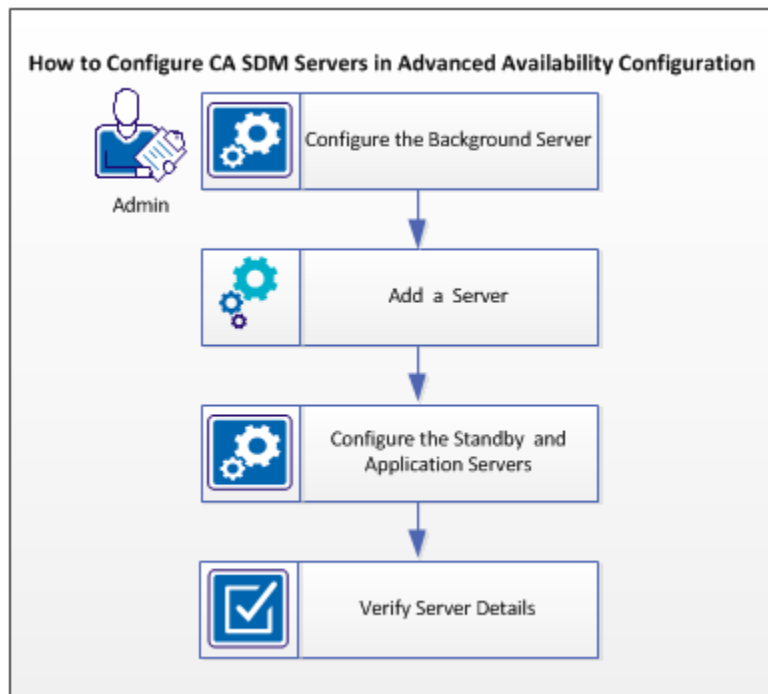
- You completed a new installation of CA SDM and want to implement the advanced availability or conventional configuration.
- You upgraded to the latest version of CA SDM and want to implement the advanced availability or conventional configuration.

Note: If you installed or upgraded CA SDM with a specific configuration (for example, conventional) and want to implement the other configuration (for example, advanced availability), see the conversion scenarios or the *Implementation Guide*.

The following diagram shows how to configure the CA SDM servers in conventional configuration:



The following diagram shows how to configure the CA SDM servers in advanced availability configuration:



Follow these steps:

1. Depending on your CA SDM configuration,
 - [Configure the Primary Server](#) (see page 128).
 - [Configure the Background Server](#) (see page 130)
2. [Add a Server](#) (see page 128), if you not have any existing server.
3. Depending on your CA SDM configuration,
 - [Configure the Secondary Servers](#) (see page 130).
 - [Configure the Standby and Application Servers](#) (see page 131)
4. [Verify Server Details](#) (see page 132).

Configure the Primary Server

Primary server must be configured before you configure any secondary servers.

Follow these steps:

1. Log in to the server that you want to configure as the primary server.
2. Use the `pdm_configure` command to start the configuration.
The Select Server Configuration screen opens.
3. Select Conventional as the configuration type and follow the prompts to complete the configuration. For more information about the configuration, see the *Server Configuration Help*.
The primary server is now configured.

Add a Server

If you do not have any existing servers, add server records for all the servers that you want to install in your CA SDM deployment.

Follow these steps:

1. Log in to the following server, depending on your CA SDM configuration:
 - Conventional: Primary server
 - Advanced availability: Background server

2. Select System, Servers from the Administration tab.

The Server List page opens.

3. Click Create New to add a server record for the following server, depending on CA SDM configuration:
 - Conventional: Secondary server
 - Advanced availability: Application or standby server

The Create New Server page opens.

4. Complete the server fields, as appropriate for the server.
5. Click Save.

You added the server detail.

Create Server Fields

The following fields appear when you create a server:

Host Name

Specifies the local host name of the server. The local host name is stored in the usp_servers table in local_host column.

Important! Ensure that host name is entered as case-sensitive in the usp_servers table.

Time Zone

Specifies the time zone where the server is located. The time zone is used for triggering events in the system if the Use End User Time Zone option is not selected, or if no time zone is specified for the service type.

Record Status

Indicates the state of the server. Active status indicates that the server is a part of the CA SDM deployment.

Important! If you have inactivated any server, it is recommended not to start CA SDM services on that server. This action may result in unexpected behaviour.

Server Type

Specifies the type of server that you want to configure. Following server types can be selected, depending on your CA SDM configuration:

- Advanced Availability: Application or standby server
- Conventional: Secondary server

Configured

Available only for advanced availability configuration. Indicates the state of the configured server. The default value of this field is No. The value is updated to Yes after you successfully run `pdm_configure` on that server. If you edit any of the automatically entered field values of a server record, the Configured field turns to No.

Configure the Secondary Servers

You configure each secondary server after configuring the primary server. This configuration is required to establish communication with the primary server.

Follow these steps:

1. Log in to the server that you want to configure as the secondary server.
2. Use the `pdm_configure` command to start the configuration.
The Select Server Configuration screen opens.
3. Select Conventional as the configuration type and follow the prompts to complete the configuration. For more information, see the *Server Configuration Help*.
The secondary server is now configured.
4. Repeat steps 1-3 on each of servers that you want to configure as the secondary server.

Configure the Background Server

Configure the background server before configuring the application or standby servers.

Follow these steps:

1. Log in to the server that you want to configure as the background server.

2. Use the `pdm_configure` command to start the configuration.

The Select Server Configuration screen opens.

3. Select Advanced Availability as the configuration type and follow the prompts to complete the configuration. For more information, see the *Server Configuration Help*.

The background server is configured.

Configure the Standby or Application Server

You configure each standby and application server after configuring the background server. This configuration is required to establish communication with the background server.

Important! (Recommended) Ensure that both background server and all other standby servers have similar configuration. This process ensures that during a failover when a standby server becomes the new background server, it can function exactly like the old background server.

Follow these steps:

1. Log in to the in to the server that you want to configure as the standby or application server.

2. Use the `pdm_configure` command to start the configuration.

The Select Server Configuration screen opens.

3. Select Advanced Availability as the configuration type and follow the prompts to complete the configuration. For more information, see the *Server Configuration Help*.

4. Repeat steps 1-3 on each of the servers that you want to configure as the standby and application server.

You have configured the standby and application servers.

5. If you have one or more application servers and you want to use a load balancer to track the requests to and from the different application servers, [configure the load balancer](#) (see page 132).

Note: To use a load balancer URL or an application server URL for the links in the CA SDM notifications, complete the following steps:

- a. Log in to the background server.
- b. Select Options Manager, Notifications on the Administration tab.
- c. Change the value of the `web_cgi_url` option to point to:
 - The load balancer if you have more than one application servers.
 - The application server, if you have only one application server.

Configure the Load Balancer

If you have one or more application servers, configure the load balancer to monitor the application servers.

Follow these steps:

1. Log in to an application server.
2. Copy the HealthServlet.war file from the \$NX_ROOT/samples/HealthServlet directory to \$NX_ROOT/bopcfg/www/CATALINA_BASE/webapps directory.
3. Restart CA SDM services or restart CA SDM Tomcat.
4. Repeat steps 1-3 for all the other application servers.
5. Configure the load balancer to monitor the following healthservlet URL on each application server:

`http://<Machine_name>:<Port_number>/HealthServlet/GetHealth`

- If a quiescing response is received from the healthservlet URL of an application server, the load balancer must redirect all requests from that server to the other application servers. For example, the following response is received when the application server is quiesced for 58677 seconds.

`Quiesce time remaining :58677 seconds`

- If an application server is healthy and no quiescing is required, then the following response is received from the healthservlet of the server:

`Currently no Quiesce time set. Return code : -1`

6. Configure the session persistence on each load balancer. This process ensures that a request coming from one application server is routed back to the same application server.

Verify Server Details

After you have configured all the servers, ensure that each one is properly configured and available.

(For advanced availability configuration) Follow these steps:

1. Make sure that all background, standby, and application servers are running.
2. Log in to the background server Web UI.
3. Select System, Servers on the Administration tab.

The Server List page opens.

4. Verify that the Configured field displays Yes for the standby and application server records.
5. If Record Status is set to inactive, edit the server and set to Active. If you change the record status of any server, reconfigure it.

You have successfully configured servers for the advanced availability configuration.

Note: You can click any of the Local Host entries on the Server Details page to view the details of the server.

(For conventional configuration) Follow these steps:

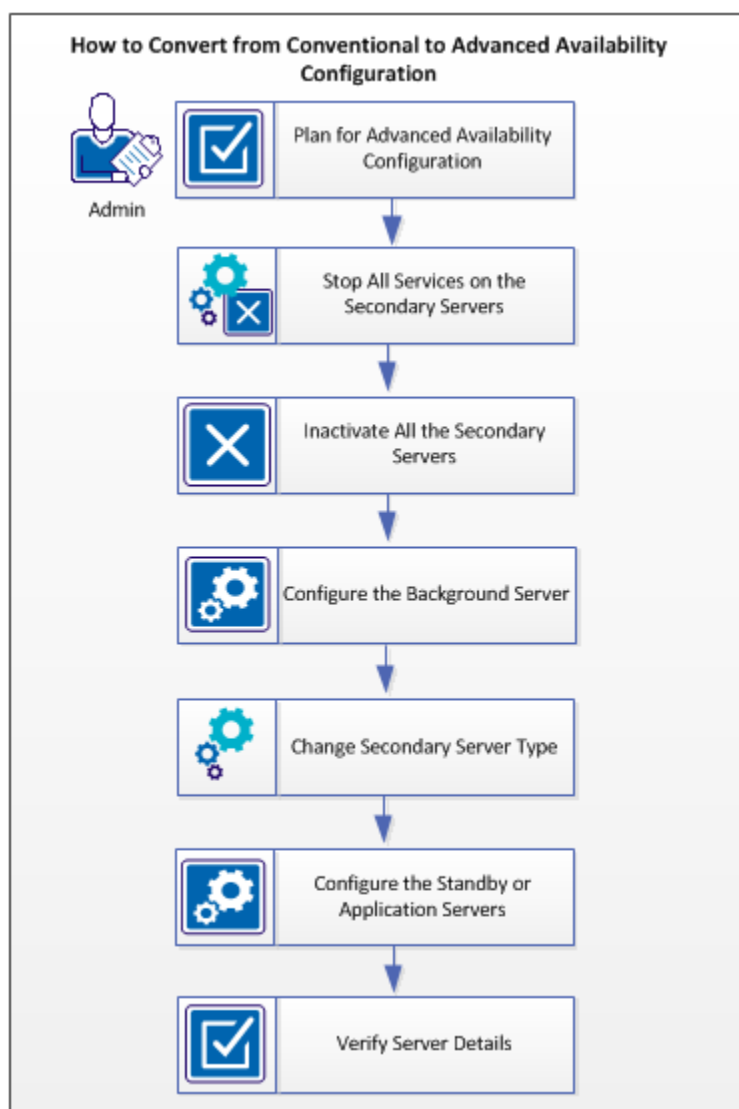
1. Make sure that primary and all secondary servers are running.
2. Log in to the primary server Web UI.
3. Select System, Servers on the Administration tab.
The Server List page opens.
4. If Record Status is set to inactive, edit the server and set to Active. If you change the record status, ensure that you reconfigure that server again.

You have successfully configured the servers.

How to Convert from Conventional to Advanced Availability Configuration

Before you convert from the conventional to the advanced availability configuration, ensure that you have upgraded to or already have installed CA SDM r12.9 on all the servers.

The following diagram shows how to convert from conventional to advanced availability configuration:



Follow these steps:

1. Plan for the Advanced Availability Configuration. For more information, see the planning scenario or the *Implementation Guide*.
2. Stop all services on the secondary servers.
3. [Inactivate All the Secondary Servers](#) (see page 135).
4. [Configure the Background Server](#) (see page 135).
5. [Change Secondary Server Type](#) (see page 136).
6. Configure the Standby or Application Server.
7. [Verify Server Details](#) (see page 138).

Inactivate All the Secondary Servers

Before you configure the servers for the advanced availability configuration, ensure that you inactivate all the secondary servers.

Follow these steps:

1. Log in to the web UI of the primary server.
2. Select System, Servers on the Administration tab.
The Server List page opens.
3. Click the host name of the secondary server.
The Server Detail page opens.
4. Click Edit.
5. Change the Record status to Inactive.
Important! If you have inactivated any server, it is recommended not to start CA SDM services on that server. This action may result in unexpected behaviour.
6. Click Save.
The secondary server is set to inactive.
7. Perform steps 3-6 for all the other secondary servers.
All secondary servers are set to inactive.

Configure the Background Server

Configure the background server before configuring the application or standby servers.

Follow these steps:

1. Log in to the primary server.

2. Use the `pdm_configure` command to start the configuration.

The Select Server Configuration screen opens.

3. Select Advanced Availability as the configuration type and follow the prompts to complete the configuration. For more information, see the *Server Configuration Help*.

The background server is configured.

Change Secondary Server Type

After you configure the background server, change the server type for all the secondary servers to application and standby servers and activate them.

Follow these steps:

1. Make sure that the background server is running.
2. Log in to the web UI of the background server.
3. Select System, Servers on the Administration tab.

The Server List page opens.

4. Set the Record Status for all secondary servers as Active.
5. Change the server type of all the secondary servers to application or standby servers, as required.

The server type of all the secondary servers is changed.

Configure the Standby and Application Servers

You configure each standby and application server after configuring the background server. This configuration is required to establish communication with the background server.

Important! (Recommended) Ensure that both background server and all other standby servers have similar configuration. This process ensures that during a failover when a standby server becomes the new background server, it can function exactly like the old background server.

Follow these steps:

1. Log in to a secondary server.

2. Use the `pdm_configure` command to start the configuration.

The Select Server Configuration screen opens.

3. Select Advanced Availability as the configuration type and follow the prompts to complete the configuration. For more information, see the *Server Configuration Help*.
4. Repeat steps 1-3 on each of the servers that you want to configure as the standby and application server.

You have configured the standby and application servers.

5. If you have one or more application servers and you want to use a load balancer to track the requests to and from the different application servers, [configure the load balancer](#) (see page 132).

Note: To use a load balancer URL or an application server URL for the links in the CA SDM notifications, complete the following steps:

- a. Log in to the background server.
 - b. Select Options Manager, Notifications on the Administration tab.
 - c. Change the value of the `web_cgi_url` option to point to:
 - The load balancer if you have more than one application servers.
 - The application server, if you have only one application server.
6. [Verify the Server Details](#) (see page 138).

Configure the Load Balancer

If you have one of more application servers, configure the load balancer to monitor the application servers.

Follow these steps:

1. Log in to an application server.
2. Copy the `HealthServlet.war` file from the `$NX_ROOT/samples/HealthServlet` directory to `$NX_ROOT/bopcfg/www/CATALINA_BASE/webapps` directory.
3. Restart CA SDM services or restart CA SDM Tomcat.
4. Repeat steps 1-3 for all the other application servers.

5. Configure the load balancer to monitor the following healthservlet URL on each application server:

`http://<Machine_name>:<Port_number>/HealthServlet/GetHealth`

- If a quiescing response is received from the healthservlet URL of an application server, the load balancer must redirect all requests from that server to the other application servers. For example, the following response is received when the application server is quiesced for 58677 seconds.

`Quiesce time remaining :58677 seconds`

- If an application server is healthy and no quiescing is required, then the following response is received from the healthservlet of the server:

`Currently no Quiesce time set. Return code : -1`

6. Configure the session persistence on each load balancer. This process ensures that a request coming from one application server is routed back to the same application server.

Verify Server Details

After you have configured all the servers, ensure that each one is properly configured and available.

Follow these steps:

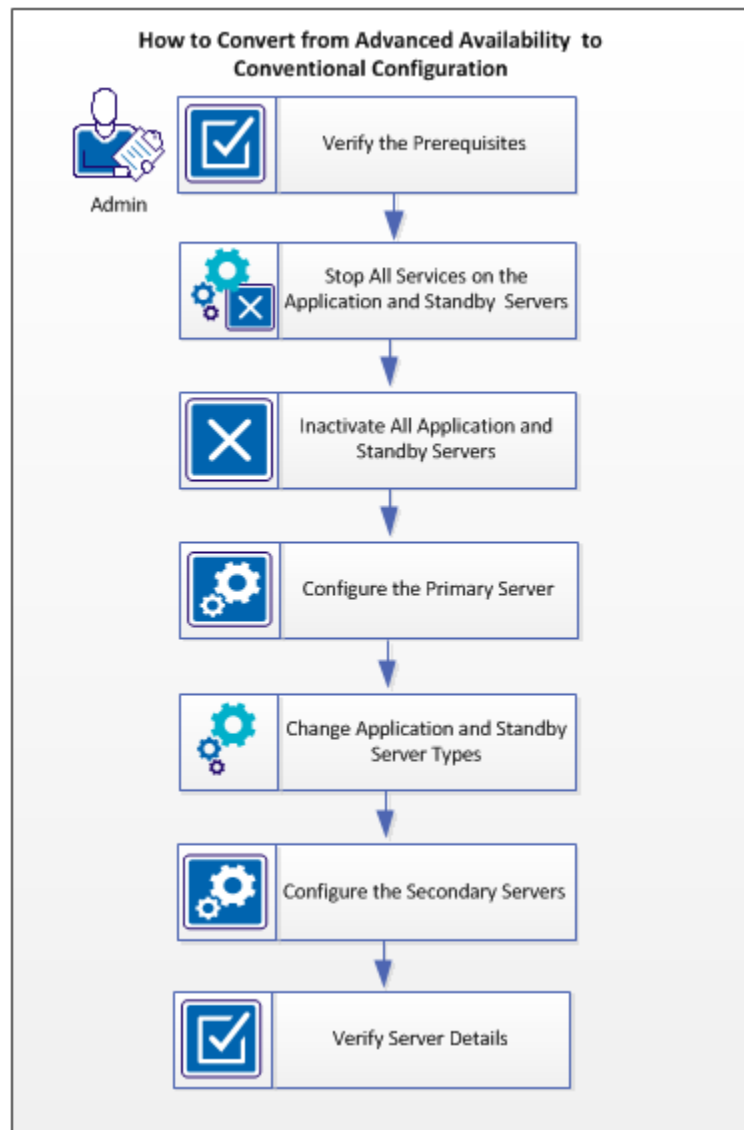
1. Make sure that all background, standby, and application servers are running.
2. Log in to the background server Web UI.
3. Select System, Servers on the Administration tab.
The Server List page opens.
4. Verify that the Configured field displays Yes for the standby and application server records.
5. If Record Status is set to inactive, edit the server and set to Active. If you change the record status of any server, reconfigure it.

You have successfully configured servers for the advanced availability configuration.

Note: You can click any of the Local Host entries on the Server Details page to view the details of the server.

How to Convert from Advanced Availability to Conventional Configuration

You can revert to conventional configuration from the advanced availability configuration. The following diagram shows how to convert from the advanced availability to the conventional configuration:



Follow these steps:

1. [Verify the Prerequisites](#) (see page 140)
2. Stop all services on the application and standby servers.
3. [Inactivate all Application and Standby Servers](#) (see page 140).
4. [Configure the Primary Server](#) (see page 128).
5. [Change the Application and Standby Server Types](#) (see page 141).
6. [Configure the Secondary Servers](#) (see page 130).
7. [Verify Server Details](#) (see page 142)

Verify the Prerequisites

Verify the following prerequisites before converting to the conventional configuration:

1. You have planned for the conventional configuration. For more information, see the planning section in the *Implementation Guide*.
2. You can configure only the background server as the primary server.
3. You can configure only the standby and application servers as the secondary servers.

Inactivate All Application and Standby Servers

Before you configure the servers for the conventional configuration, ensure that you inactivate all the application and standby servers.

Follow these steps:

1. Log in to the web UI of the background server.
2. Select System, Servers on the Administration tab.
The Server List page opens.
3. Click the host name of the application server.
The Server Detail page opens.
4. Click Edit.
5. Change the Record status to Inactive.

Important! If you have inactivated any server, it is recommended not to start CA SDM services on that server. This action may result in unexpected behaviour.

6. Click Save.
The application server is set to inactive.
7. Perform steps 3-6 for all the other application and standby servers.
All application and standby servers are set to inactive.

Configure the Primary Server

Primary server must be configured before you configure any secondary servers.

Follow these steps:

1. Log in to the background server Web UI.
2. Inactivate the background server using the background server Web UI.
3. Use the `pdm_configure` command to start the configuration.
The Select Server Configuration screen opens.
4. Select Conventional as the configuration type and follow the prompts to complete the configuration. For more information about the configuration, see the *Server Configuration Help*.
The primary server is now configured.

Verify the Server Details

After you configure the primary server, change the server type for all the application and standby servers to secondary servers and then activate them

Follow these steps:

1. Make sure that the primary server is running.
2. Log in to the primary server web UI.
3. Select System, Servers on the Administration tab.
The Server List page opens.

4. Set the Record Status for all application and standby servers as Active.
5. Change the server type of all the application and standby servers to secondary servers.

The server type for all application and standby servers are changed.

Configure the Secondary Servers

You configure each secondary server after configuring the primary server. This configuration is required to establish communication with the primary server.

Follow these steps:

1. Log in in to the application or standby server that you want to configure as the new secondary server.
2. Use the `pdm_configure` command to start the configuration.

The Select Server Configuration screen opens.

3. Select Conventional as the configuration type and follow the prompts to complete the configuration. For more information, see the *Server Configuration Help*.

The secondary server is now configured.

4. Repeat steps 1-3 on each of servers that you want to configure as the secondary server.

Verify Server Details

After you have configured all the servers, ensure that each one is properly configured and available.

Follow these steps:

1. Make sure that primary and all secondary servers are running.
2. Log in to the primary server Web UI.
3. Select System, Servers on the Administration tab.

The Server List page opens.

4. If Record Status is set to inactive, edit the server and set to Active. If you change the record status, ensure that you reconfigure that server again.

You have successfully configured the servers.

How to Install CA MDB

Note: Before you install this component, ensure that you [plan the CA MDB installation](#) (see page 91).

Important! Mapping the DVD image using a UNC path is not supported for the CA MDB installer.

If the database (either SQL Server or Oracle) you want to use with CA SDM is installed on a server other than the CA SDM primary server, manually install the CA MDB on the remote database server (that is, the computer on which SQL Server or Oracle is installed). If the CA MDB and primary server are on the same computer, you do not have to install the CA MDB manually. CA SDM automatically installs the CA MDB during the CA SDM installation.

Note: If you want to install the Management Database on the primary server, you *must* start and run the CA MDB installation on the remote computer hosting the database server.

More information:

[Plan the CA MDB Installation](#) (see page 91)

[Install on SQL Server \(Windows\)](#) (see page 145)

[Install on Oracle \(Windows\)](#) (see page 146)

[Install on Oracle \(Linux\UNIX\)](#) (see page 148)

MDB Installations

For MDB installations, the following requirements apply:

- When you perform an MDB Installation to install the SQL database on a different server, the SQL Native Client, Client and Management Tools must be installed on the CA CMDB client.
- For any Oracle database setup, the Oracle Client software also must be installed. You can download Oracle Client Software from the Oracle website.

Find Product Integration and Compatibility Information

You can use information that CA Support Online provides to understand CA MDB compatibility with CA SDM and other products.

- *CA Service Accounting and CA Service Catalog Integration Guide*—Describes CA MDB versions and how to determine if you must install a CA MDB compatibility patch so that other products can integrate with CA MDB.
- *CA Management Database Mixed Version Installation*—Describes CA MDB compatibility.

To find integration with CA MDB information

1. Open a browser and go to <http://support.ca.com>.
The CA Support Online page appears.
2. Log in to CA Support Online.
3. Click the Documentation link in the left pane.
The Documentation page appears.
4. Select CA Service Catalog, r12, and US English from the drop-down lists. Click Go.
The CA Service Catalog documentation list appears.
5. Click the PDF link for the Integration Guide J02775-1E.
The *CA Service Accounting and CA Service Catalog Integration Guide* appears.
6. Click the Enabling Integration with CA Products that Use an Earlier Version of the MDB bookmark.
You can use the information to help you integrate products with CA MDB.

To find compatibility information

1. Open a browser and go to <http://support.ca.com>.
The CA Support Online page appears.
2. Log in to CA Support Online.
3. Click Knowledge Base Search in the Support pane.
The Knowledge Base Search page appears.
4. Enter **MDB104 Compatibility** in the search field. Click Search.
Knowledge Base Search Results appear.
5. Click the CA Management Database Mixed Version Installation link.
The *CA Management Database Mixed Version Installation* document appears.

Install on SQL Server (Windows)

If you are using advanced availability configuration and the CA MDB you are using is installed on a different computer than the CA SDM server, you must install the CA MDB on the remote database server (that is, the computer on which SQL Server is installed).

Follow these steps:

1. Insert the installation media into your drive.

Important! If your computer does not have an appropriate drive for the installation media, copy the media content to the computer on which you want to install CA SDM. Then, start the installation. For a remote installation over the network, you can share a drive or folder on the network, and then connect over the network to start the installation.

2. Select your language from the list, click Select Language.

The Installation Menu appears.

Note: If the Installation Menu does not automatically appear, start the installation by double-clicking the setup.exe file, located at the root of the installation media.

3. Click the Product Installs tab.
4. Click CA MDB.
5. To continue with the installation, follow the on-screen instructions.
6. When prompted, select SQL Server as the database type and enter the appropriate information for SQL Server.

Note: If you are not sure what to enter for SQL Server, see the *Server Configuration Online Help*.

7. Continue following the on-screen instructions to complete the CA MDB installation.
The CA MDB is installed on SQL Server.

More information:

[The Install Log](#) (see page 219)

Install on Oracle (Windows)

If you are using advanced availability configuration and the CA MDB you are using is installed on a different computer than the CA SDM server, you must install the CA MDB on the remote database server (that is, the computer on which SQL Server is installed).

Follow these steps:

1. Insert the installation media into your drive.

Important! If your computer does not have an appropriate drive for the installation media, copy the media content to the computer on which you want to install CA SDM. Then, start the installation. For a remote installation over the network, you can share a drive or folder on the network, and then connect over the network to start the installation.

The Installation Menu appears.

Note: If the Installation Menu does not automatically appear, start the installation by double-clicking the setup.exe file, located at the root of the installation media.

2. Click the Product Installs tab.
3. Click CA MDB.
4. To continue with the installation, follow the on-screen instructions.
5. When prompted, select Oracle as the database type and enter the appropriate information for Oracle.

Note: If you are not sure what to enter for Oracle, see the *Server Configuration Online Help*.

6. Enter and select the information to configure the Oracle Database.

CA SDM requires a Net Service Name specifying the Oracle database where the MDB resides. CA SDM also requires a system identifier (SID) for the database. These names may be different, although they specify the same MDB database. Two name values are required for CA SDM because it accesses the database with both Oracle client technology and JDBC technology.

Note: For information about Service Names and SIDs, see your Oracle documentation.

Load default data

Specifies whether to load the default CA SDM data into the Oracle database.

If this check box is selected, the system loads the CA SDM default system data into the Oracle database. If you modified any system default values, this option replaces the values. Select this check box for first-time installations. This option replaces existing data when it is not a first-time installation. If this check box is not selected, no default data loads.

Remote Database

Indicates an Oracle database is installed on a server other than the CA SDM primary server. You manually install the CA MDB on the remote database server (that is, the computer on which Oracle is installed) before you run the CA SDM Install.

If the Oracle server is local (not selected), CA SDM creates the MDB if it is not already created.

Create Tablespaces

Specifies whether to create tablespaces for the MDB database or use tablespaces already created.

- Clear this check box if you already created tablespaces manually. You provide the names of existing tablespaces. The tablespace path field in the product is disabled and the Data Tablespace Name and Index Tablespace Name fields are enabled.
- Select this check box to create tablespaces with the default names MDB_DATA and MDB_INDEX. Provide a tablespace path. The Data and Index tablespace name fields are disabled.

Note: If you are using Oracle Automated Storage Manager (ASM), manually create an Oracle tablespace before you run the CA SDM Install. When Oracle is installed and configured for ASM, we are unable to create an Oracle tablespace during our MDB install. ASM uses virtual storage, and we are looking for a physical directory, so we cannot successfully create the tablespace with this configuration.

Net Service Name

Identifies the Net Service Name of the Oracle database where the MDB resides. If the database is remote, use the Net Service Name defined within the Oracle client on the local computer. CA SDM accesses the database using a local installation of the Oracle client, which may specify a Net Service Name that is different than the service name on the Oracle server.

mdbadmin User Password

Specifies the mdbadmin user password. Provide the existing password, or specify a new password if CA SDM creates the user.

DBA User Name

Specifies the name of an Oracle user with DBA access (usually SYS). This field is only used if the Oracle server is on the local computer.

DBA Password

Identifies the password for the DBA user. This field is only used if the Oracle server is on the local computer.

Data Tablespace Name

Creates the data tablespace name specified when the Create Tablespace check box is selected. This field is only used if the Oracle server is on the local computer.

Index Tablespace Name

Creates the index tablespace name specified when the Create Tablespace check box is selected. This field is only used if the Oracle server is on the local computer.

Tablespace Path

Specifies the directory path to the physical tablespace location created if the tablespaces previously mentioned do not exist. This field is only used if the Oracle server is on the local computer.

Oracle Home Path

Specifies the directory path to the Oracle home path.

JDBC Connectivity

Specifies whether to use JDBC Connectivity. Several components of CA SDM use JDBC technology to access the database and require specific information about the Oracle server.

Identify the Database Host Name, SID, and Listener Port that you configured previously.

The CA MDB is installed on Oracle.

More information:

[The Install Log](#) (see page 219)

Install on Oracle (Linux\UNIX)

If you are using advanced availability configuration and the CA MDB you are using is installed on a different computer than the CA SDM server, you must install the CA MDB on the remote database server (that is, the computer on which SQL Server is installed).

Note: Verify that your Oracle environment is correctly set up and accessible.

Follow these steps:

1. Mount the installation media on your drive.

Important! If your computer does not have an appropriate drive for the installation media, copy the media content to the computer on which you want to install CA SDM. Then, start the installation. For a remote installation over the network, you can share a drive or folder on the network, and then connect over the network to start the installation.

2. Navigate to the root directory of the installation media and start the installation by running the following command:

```
sh ./setup.sh
```

3. Select your language from the list, click Select Language.

The Installation Menu appears.

4. Click the Product Installs tab.

5. Click CA MDB.

6. To continue with the installation, follow the on-screen instructions.

7. When prompted, select Oracle as the database type and enter the appropriate information for Oracle.

Note: If you are not sure what to enter for Oracle, see the *Server Configuration Online Help*.

8. Continue following the on-screen instructions to complete the CA MDB installation.

The CA MDB is installed on Oracle.

More information:

[The Install Log](#) (see page 219)

Install a Remote MDB on HP-UX

You can install a remote MDB on HP-UX.

Follow these steps:

1. Download the CA MDB installer for HP-UX from the CA Support portal or contact CA Technical Support to obtain the same.
2. Unzip the media to a location of your choice.
3. Verify that the CA MDB folder has full permissions for all users.

For example, `chmod -R 777 mdb`.

4. Navigate to the Oracle folder and execute the following command:

```
./setupmdb.sh -DBVENDOR=oracle -DBHOST=<DBHOST_NAME> -DBNAME=<ORACLE_SID>  
-DBUSER=<DB_User_SYS_name> -DBPASSWORD=<DB_User_SYS_password>  
-MDB_ADMIN_PSWD=<MDB_ADMIN_PASSWORD>  
-ORA_TBSLSPACE_PATH=<Oracle_Table_Space_path> -MANIFEST=Service_Desk  
-WORKSPACE=Service_Desk -JRE_DIR=<JRE_PATH> -MDB_COMMON_DIR=<mdb_Common_DIR>
```

5. For example, you execute the following command:

```
./setupmdb.sh -DBVENDOR=oracle -DBHOST=hostname -DBNAME=mdb -DBUSER=SYS  
-DBPASSWORD=mdbpassword -MDB_ADMIN_PSWD=mdbpassword  
-ORA_TBSLSPACE_PATH=/sdhome/oracle/oracle/product/10.2.0/db_1/oradata/mdb  
-MANIFEST=Service_Desk -WORKSPACE=Service_Desk  
-JRE_DIR=/sdhome/opt/Sharedcomponents/JRE/1.6.0_00  
-MDB_COMMON_DIR=/sdhome/opt/Sharedcomponents/Mdb
```

The CA MDB installation completes and a message appears about the successful installation.

How to Install CA SDM

Note: Before you install this component, ensure that you [plan the CA SDM installation](#) (see page 94). In addition, when you install on Linux and UNIX, some pop-up messages cannot view clearly if your color properties are white on white.

When you start and install CA SDM on a server, the following files, components, and features are installed to use the product:

- Server functionality, based on how you configure the product after installation.
- The SQL Server or Oracle Interface
- The ODBC Interface

Important! Installation of the ODBC interface is intended solely for use to access the ODBC driver for Business Objects reporting in CA SDM with CA Business Intelligence. Use of the ODBC driver by other applications is not directly supported, certified, or warranted by CA Technologies and you use it at your own risk.

- The Web Interface
- CA CMDB

Important! During configuration, when you migrate from CA CMDB stand alone version to CA SDM, a Configure CMDB Only check box displays. When you clear the Configure CMDB Only check box and you click Next, you cannot configure CA CMDB again. Even if you click Back, the Configure CMDB Only check box is no longer available. A message warns you of this behavior in the configuration dialog. If you cancel the configuration before it completes and rerun it, the Configure CMDB Only check box is available.

The Configure CMDB Only check box controls the value of the CA SDM environment variable `NX_CMDB`. The environment variable controls whether the Support Automation feature is configured. If the check box is cleared, Support Automation is configureable, otherwise it is not. The environment variable affects the behavior of some Web forms.

- Visualizer
- Support Automation

You install the *supportautomation_url* option after configuring Support Automation during CA SDM configuration. For more information about this option, see the *Online Help*.

Important! When you uninstall CA SDM, CA Workflow is also uninstalled.

More information:

[Plan the CA SDM Installation](#) (see page 94)
[Install on SQL Server \(Windows\)](#) (see page 152)
[Install on Oracle \(Windows\)](#) (see page 153)
[Install on Oracle \(Linux\UNIX\)](#) (see page 157)

Oracle Environment Variables

Set the Oracle environment variables before you install or migrate CA SDM, as follows:

- Verify that the `ORACLE_HOME` variable is set correctly.

Important! You must export `TWO_TASK` variable when Oracle 32 bit client variables are exported on non-windows.

- Include the 32-bit Oracle libraries (commonly `$ORACLE_HOME/lib32` for 64-bit Oracle) in the library path variable `LD_LIBRARY_PATH` (`LIBPATH` on AIX).

Install on SQL Server (Windows)

When you start and install CA SDM on a server, the following components and features are installed:

- Server functionality, based on how you configure the product after installation.
- The SQL Server Interface
- The Web Interface
- The ODBC Interface

Important! Installation of the ODBC interface is intended solely for use to access the ODBC driver for Business Objects reporting in CA SDM with CA Business Intelligence. Use of the ODBC driver by other applications is not directly supported, certified, or warranted by CA Technologies and you use it at your own risk.

Follow these steps:

1. Insert the installation media into your drive.

Important! If your computer does not have an appropriate drive for the installation media, copy the media content to the computer on which you want to install CA SDM. Then, start the installation. For a remote installation over the network, you can share a drive or folder on the network, and then connect over the network to start the installation.

2. Select your language from the list, click Select Language.

The Installation Menu appears.

Note: If the Installation Menu does not automatically appear, start the installation by double-clicking the setup.exe file, located at the root of the installation media.

3. Click the Product Installs tab.
4. Click CA SDM.
5. To continue the installation, follow the on-screen instructions.

The Configuration Wizard appears.

Note: If Internet Protocol Version 4 (IPv4) and Internet Protocol Version 6 (IPv6) hosts coexist on the network, verify the appropriate transition strategies, tools, and mechanisms to support these technologies are in place before you start the product configuration. For information about configuring servers, see the *Administration Guide*.

6. Enter and select the information to configure the product.

Note: For information about the fields that appear in the wizard, see the *Online Help*.

7. Continue following the on-screen instructions to complete the installation.
CA SDM is installed on SQL Server.
8. After you configure the installation, the wizard provides instructions about downloading and executing `pslist.exe`. Complete these steps and click Next.
9. After you install CA SDM (or migration to CA SDM from a CA CMDB standalone system), run the `cmdb_update_ambiguity` utility. Use the `-h` command to view the mandatory options. For more information about calculating the ambiguity index, see the *Administration Guide*.

Note: If configuration fails during the Validate Extension Tables step, database connectivity can be an issue. Run the configuration again, and verify that you provided the correct database connectivity information.

More information:

[The Install Log](#) (see page 219)

[Verify the Installation](#) (see page 219)

[Start the Web Interface](#) (see page 229)

Install on Oracle (Windows)

When you start and install CA SDM on a server, the following components and features are installed:

- Server functionality, based on how you configure the product after installation.
- The Oracle Interface
- The Web Interface
- The ODBC Interface

You must be the administrator to install CA MDB or CA SDM.

Important! Installation of the ODBC interface is intended solely for use to access the ODBC driver for Business Objects reporting in CA SDM with CA Business Intelligence. Use of the ODBC driver by other applications is not directly supported, certified, or warranted by CA Technologies and you use it at your own risk.

Follow these steps:

1. Insert the installation media into your drive.

Important! If your computer does not have an appropriate drive for the installation media, copy the media content to the computer on which you want to install CA SDM. Then, start the installation. For a remote installation over the network, you can share a drive or folder on the network, and then connect over the network to start the installation.

2. Select your language from the list, click Select Language.

The Installation Menu appears.

Note: If the Installation Menu does not automatically appear, start the installation by double-clicking the setup.exe file, located at the root of the installation media.

3. Click the Product Installs tab.
4. Click CA SDM.
5. To continue the installation, follow the on-screen instructions.

The Configuration Wizard appears.

Note: If Internet Protocol Version 4 (IPv4) and Internet Protocol Version 6 (IPv6) hosts coexist on the network, verify the appropriate transition strategies, tools, and mechanisms to support these technologies are in place before you start the product configuration. For information about configuring servers, see the *Administration Guide*.

6. Enter and select the information to configure the Oracle Database.

CA SDM requires a Net Service Name specifying the Oracle database where the MDB resides. CA SDM also requires a system identifier (SID) for the database. These names may be different, although they specify the same MDB database. Two name values are required for CA SDM because it accesses the database with both Oracle client technology and JDBC technology.

Note: For information about Service Names and SIDs, see your Oracle documentation.

Load default data

Specifies whether to load the default CA SDM data into the Oracle database.

If this check box is selected, the system loads the CA SDM default system data into the Oracle database. If you modified any system default values, this option replaces the values. Select this check box for first-time installations. This option replaces existing data when it is not a first-time installation. If this check box is not selected, no default data loads.

Remote Database

Indicates an Oracle database is installed on a remote server. You manually install the CA MDB on the remote database server (that is, the computer on which Oracle is installed) before you run the CA SDM Install.

If the Oracle server is local (not selected), CA SDM creates the MDB if it is not already created.

Create Tablespaces

Specifies whether to create tablespaces for the MDB database or use tablespaces already created.

- Clear this check box if you already created tablespaces manually. You provide the names of existing tablespaces. The tablespace path field in the product is disabled and the Data Tablespace Name and Index Tablespace Name fields are enabled.
- Select this check box to create tablespaces with the default names MDB_DATA and MDB_INDEX. Provide a tablespace path. The Data and Index tablespace name fields are disabled.

Note: If you are using Oracle Automated Storage Manager (ASM), manually create an Oracle tablespace before you run the CA SDM Install. When Oracle is installed and configured for ASM, we are unable to create an Oracle tablespace during our MDB install. ASM uses virtual storage, and we are looking for a physical directory, so we cannot successfully create the tablespace with this configuration.

Net Service Name

Identifies the Net Service Name of the Oracle database where the MDB resides. If the database is remote, use the Net Service Name defined within the Oracle client on the local computer. CA SDM accesses the database using a local installation of the Oracle client, which may specify a Net Service Name that is different than the service name on the Oracle server.

mdbadmin User Password

Specifies the mdbadmin user password. Provide the existing password, or specify a new password if CA SDM creates the user.

DBA User Name

Specifies the name of an Oracle user with DBA access (usually SYS). This field is only used if the Oracle server is on the local computer.

DBA Password

Identifies the password for the DBA user. This field is only used if the Oracle server is on the local computer.

Data Tablespace Name

Creates the data tablespace name specified when the Create Tablespace check box is selected. This field is only used if the Oracle server is on the local computer.

Index Tablespace Name

Creates the index tablespace name specified when the Create Tablespace check box is selected. This field is only used if the Oracle server is on the local computer.

Tablespace Path

Specifies the directory path to the physical tablespace location created if the tablespaces previously mentioned do not exist. This field is only used if the Oracle server is on the local computer.

Oracle Home Path

Specifies the directory path to the Oracle home path.

JDBC Connectivity

Specifies whether to use JDBC Connectivity. Several components of CA SDM use JDBC technology to access the database and require specific information about the Oracle server.

Identify the Database Host Name, SID, and Listener Port that you configured previously.

7. Continue following the on-screen instructions to complete the installation.
CA SDM is installed on Oracle.
8. After you configure the installation, the wizard provides instructions about downloading and executing `pslist.exe`. Complete these steps and click Next.
9. After you install CA SDM (or migration to CA SDM from a CA CMDB standalone system), run the `cmdb_update_ambiguity` utility. Use the `-h` command to view the mandatory options. For more information about calculating the ambiguity index, see the *Administration Guide*.

More information:

[The Install Log](#) (see page 219)

[Verify the Installation](#) (see page 219)

[Start the Web Interface](#) (see page 229)

Install on Oracle (Linux\UNIX)

When you start and install CA SDM on a server, the following components and features are installed:

- Server functionality, based on how you configure the product after installation.
- The Oracle Interface
- The Web Interface
- The ODBC Interface

Important! Installation of the ODBC interface is intended solely for use to access the ODBC driver for Business Objects reporting in CA SDM with CA Business Intelligence. Use of the ODBC driver by other applications is not directly supported, certified, or warranted by CA Technologies and you use it at your own risk.

Note: Verify that your Oracle environment is correctly set up and accessible.

Follow these steps:

1. Mount the installation media on your drive.

Important! If your computer does not have an appropriate drive for the installation media, copy the media content to the computer on which you want to install CA SDM. Then, start the installation. For a remote installation over the network, you can share a drive or folder on the network, and then connect over the network to start the installation.

2. Navigate to the root directory of the installation media and start the installation by running the following command:

```
sh ./setup.sh
```

3. Select your language from the list, click Select Language.

The Installation Menu appears.

Note: When installing on Linux and UNIX, you may not be able to view some pop-up messages clearly, if your color properties are white on white.

4. Click the Product Installs tab.
5. Click CA SDM.
6. To continue the installation, follow the on-screen instructions.

The Configuration Wizard appears.

Note: If Internet Protocol Version 4 (IPv4) and Internet Protocol Version 6 (IPv6) hosts coexist on the network, verify the appropriate transition strategies, tools, and mechanisms to support these technologies are in place before you start the product configuration. For information about configuring servers, see the Administration Guide.

7. Enter and select the information to configure the product.

Note: For information about the fields that appear in the wizard, see the *Online Help*.

8. Continue following the on-screen instructions to complete the installation.

CA SDM is installed on Oracle.

9. After you install CA SDM (or migration to CA SDM from a CA CMDB standalone system), run the cmdb_update_ambiguity utility. Use the -h command to view the mandatory options. The -d option is not required in a Linux/Unix environment as it defaults to Oracle.

Note: For more information about calculating the ambiguity index, see the *Administration Guide*.

More information:

[The Install Log](#) (see page 219)

[Verify the Installation](#) (see page 219)

[Start the Web Interface](#) (see page 229)

Visualizer Configuration

You can configure Visualizer during the CA SDM installation. When you select the Configure Visualizer check box, the panels for Visualizer configuration display.

When you select the wizard Next button, you validate the configuration information. After a successful validation, the Visualizer configuration task uses the validated Visualizer configuration information.

How to Configure Visualizer on a Secondary Server

You can configure Visualizer on a secondary CA SDM server to use Web Services. You start and configure Visualizer on a secondary server during CA SDM configuration and by using the *pdm_edit* utility.

Note: When configuring to use secondary web services on a secondary installation of CA CMDB Visualizer, select the server name from the drop-down menu. The default selection is the primary.

Follow these steps:

1. Select Configure Visualizer in the Configuration Wizard Visualizer page.
2. Select secondary CA SDM server as the web host and complete the web host port.
If the configuration is running on a secondary CA SDM server, you can use the drop-down menu to select available web service hosts `general.primary_server_node` and the `general.local_host` property values.
3. Enter the CA SDM port number for the secondary Visualizer server.

4. Continue following the on-screen instructions to complete the installation.
Visualizer is installed and configured on a secondary CA SDM server.
5. Open a command prompt and Navigate to \$NX_ROOT\samples\pdmconf folder.
Execute the following command:
`pdm_perl pdm_edit.pl`
A menu appears.
6. Select Z to edit the Visualizer Tomcat Servers. Enter A to add a new Visualizer Tomcat Server.
You are prompted to enter a host name.
7. Complete the secondary host name.
The secondary host name is saved and a list of templates appear.
8. Follow the instructions provided by the `pdm_edit.pl` utility.
The secondary visualizer tomcat configuration is complete.

Support Automation Component Configuration

CA SDM installs and configures the following Support Automation components:

- End User Client
- Support Automation Analyst Interface
- Server

You install and configure the following components separately:

- End User Agent
- Automated Tasks Editor IDE

Important! You *must* install the *supportautomation_url* option after installing CA SDM, in addition to configuring Support Automation during CA SDM configuration. For more information about the *supportautomation_url* option, see the *Online Help*.

Configure Support Automation Server Modes

You can configure the following Support Automation server modes during the installation:

- **Main Server**—If you select the Main Server Configuration Type, the Host Name or IP field defaults to the local Host Name. All parameters must be provided for the Main Server except the Internal Port section and the Bind to IP in Socket Server section, which are optional.

Note: Configure the main server on the following CA SDM server according to the CA SDM configuration type:

- Conventional: Primary server or secondary server.
- Advanced availability: Background server.

Important! When you set the `supportautomation_url` option, this URL must use the URL of the Support Automation main server. It should not reference the proxy server or load balancer server. This is applicable only for conventional model. In the advanced availability configuration the URL can point to load balancer, main server, or proxy server.

Note: If you select the Main Server option, and are also planning to configure one or more socket proxy servers, you *must* set the Socket Server host name and external port to the socket proxy host and external port. For multiple socket proxies, you set the Socket Server to the host and external port of the load balancer server.

- **Socket Proxy Server**—You can select the Socket Proxy Server Configuration type on the following servers, based on the CA SDM configuration:
 - Conventional: Secondary server
 - Advanced availability: Application server.

The default values for fields are displayed. All parameters must be provided for Socket Proxy Server except the Bind to IP field in the Socket Configuration section, which is optional.

- **Message Routing Server**—You can select the Message Routing Server Configuration type on the following servers, based on the CA SDM configuration:
 - Conventional: Secondary server
 - Advanced availability: Application server.

The default values for fields are displayed. All parameters must be provided for Message Routing Server except the Bind to IP field in the Socket Configuration section, which is optional.

Configure Support Automation on a Secondary Server

You can configure Support Automation on a secondary CA SDM server.

Follow these steps:

1. Select Support Automation in the Configuration Wizard.
2. Enter the appropriate information for your configuration types on secondary server, such as the host name and port on a Socket Server.

Important! After you define the Support Automation server, its role as primary or secondary server cannot be changed.

3. Continue following the on-screen instructions to complete the installation.
Support Automation is installed and configured on a secondary CA SDM server.
4. On the primary server, open a command prompt and navigate to \$NX_ROOT\samples\pdmconf folder.
5. Execute the following command:
`pdm_perl pdm_edit.pl`
A menu appears.
6. Enter M to edit the Support Automation Tomcat Servers. Enter A to add a Support Automation Tomcat Server.
You are prompted to enter a host name and server type.
7. Complete the secondary host name and server type.
The secondary host name is saved and a list of templates appear.
8. Follow the instructions provided by the pdm_edit.pl utility.
The secondary Support Automation Tomcat configuration is complete.

Configure Support Automation on the Background Server

You can configure Support Automation on the background server when you have selected advanced availability configuration. For advance availability configuration, configure main server on the background server.

Follow these steps:

1. Select Support Automation in the Configuration Wizard.
2. In the Select Config page, select Advanced Availability from the Server Configuration drop down. For more details, refer to online help.
3. In the General Settings page, select Background server/ Standby Server from the Configuration Type drop down.
4. In the Support Automation page, select the Main Server option.
5. Enter the Socket Configuration and Tomcat Configuration details.
6. Follow the instructions to complete the wizard.
You have configured Support Automation on the background server.

Configure Support Automation on the Application Server

You can configure Support Automation on the application server when you have selected advanced availability configuration. The Socket Proxy or Message Routing Server are the valid Support Automation server modes on the application server.

Follow these steps:

1. Select Support Automation in the Configuration Wizard.
2. In the Select Config page, select Advanced Availability from the Server Configuration drop down. For more details, refer to online help.
3. In the General Settings page, select Application Server from the Configuration Type drop down.
4. In the Support Automation page, select the Message Routing Server or Socket Proxy Server option.
5. Enter the Socket Configuration and Tomcat Configuration details.
6. Follow the instructions to complete the wizard.

You have configured Support Automation on the application server.

How to Configure Automated Tasks

You install and configure the Automated Tasks Editor to manage automated tasks that Support Automation analysts use to provide support for end users. The end user can launch an automated task from a knowledge document and the self-service interface, or an analyst executes an automated task during an assistance session. Automated tasks provide analysts with detailed information about an end-user computer. You create self-service automated tasks that interact with the end user and process their input. These tasks can change the file system, registry, download install software, and so on. You configure automated tasks as follows:

1. Install the Automated Tasks Editor.

You launch the installer from the following location on the installation media:

`casd.nt\SAScriptWriter`

Note: You can also copy the installer and deploy it to the appropriate users in your support environment.

The Automated Task Editor is installed.

2. Open the Automated Tasks Editor.

The Automated Tasks Editor installation creates a shortcut on your desktop.

3. Set the following connection parameters:
 - a. Click Tools, Server.
The Server Configuration dialog appears.
 - b. Enter your hostname and port.
Default Port: 8070
 - c. Enter the user name and password of a user with read/write access to the Automated Task Editor, such as a Support Automation Analyst.
 - d. Click Test.
 - e. Click OK.

4. Create automated tasks and upload them to your server.

You can upload public tasks or assign them to specific tenants and subtenants.

Important! Only roles from the Service Provider tenant with the Update Public flag enabled can upload tasks and libraries to the server. All task library content and static content are stored as public data.

How to Install Web Screen Painter

Install Web Screen Painter to customize schema and web interface.

Follow these steps:

1. Log in to the following server where you want to install Web Screen Painter, depending on your CA SDM configuration:
 - Conventional: Primary or secondary server or any remote computer
 - Advanced availability: Background server

Important! WSP can only run on the background server. The WSP installer does not stop you from installing it on any other server, but it prevents from running standalone, or on the standby server and application server. For example, you installed WSP on a server other than background server. The WSP shortcuts appears on the Start menu. If you click on the shortcut, an error message is displayed.

2. Insert the installation media into your drive.

Important! If your computer does not have an appropriate drive for the installation media, copy the media content to the computer on which you want to install CA SDM. Then, start the installation. For a remote installation over the network, you can share a drive or folder on the network, and then connect over the network to start the installation.

3. Select your language from the list, click Select Language.

The Installation Menu is displayed.

Note: If the Installation Menu does not automatically appear, start the installation by double-clicking the setup.exe file, located at the root of the installation media.

4. Click the Product Installs tab.
5. Click Web Screen Painter.
6. Select your language, click OK.
7. Continue following the on-screen instructions to complete the Web Screen Painter installation.

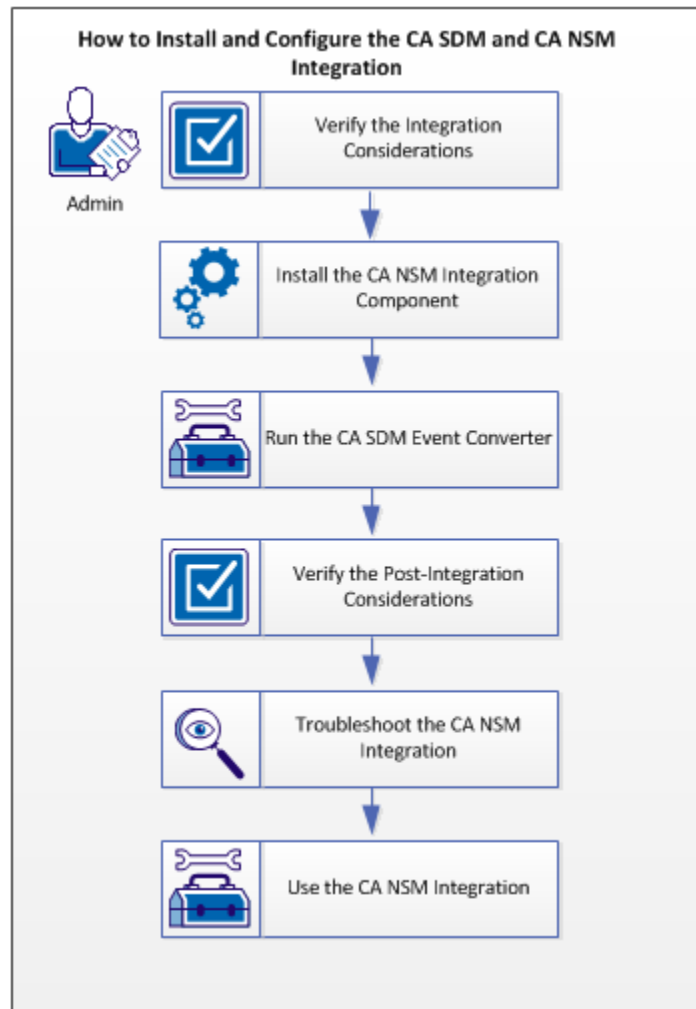
Web Screen Painter is installed.

How to Install and Configure the CA SDM and CA NSM Integration

The CA NSM integration lets you do the following:

- Automatically control network management issues detected by CA NSM Event and Alert Management.
- Automatically coordinate critical management events detected by CA NSM with incident management.
- Determine impacts from your network administrators and service desk staff.
- Avoid requests or incident storms.
- Automatically update requests or incidents.
- Implement business rules as a best practice for network and service support management.
- Auto-dispatch new request or incident occurrences.
- Automate the interaction with CA SDM to reduce the workload of the customer support staff by eliminating some manual tasks.
- Reduce the number of requests and incidents opened by users when a problem in the enterprise occurs because the request or incident has been created automatically as soon as it occurs.

The following diagram shows how to install and configure the CA SDM and CA NSM integration:



Follow these steps:

1. [Verify the Integration Considerations](#) (see page 167).
2. [Install the CA NSM Integration Component](#) (see page 168).
3. [Run the CA SDM Event Converter](#) (see page 170).
4. [Verify the Post-Integration Considerations](#) (see page 171).
5. [Troubleshoot the CA NSM Integration](#) (see page 172), when necessary.
6. [Use the CA NSM Integration](#) (see page 201).

More information:

[Create Owned Assets](#) (see page 172)

[Monitor Event Console Messages](#) (see page 173)

[Filter Rule Considerations](#) (see page 174)

[Troubleshoot the CA NSM Integration](#) (see page 196)

Verify the Integration Considerations

Verify the following considerations before you start the integration:

- Verify that you have installed and configured CA SDM and CA NSM r11.2 SP2 cum1 with the WSDL fix.
- Changing the default settings when you integrate CA SDM with CA NSM can cause unexpected results. To avoid an instantaneous creation of thousands of CA SDM requests during the integration, verify that the following parameters in the NX.env file located in \$NX_ROOT (UNIX) or installation-directory (Windows) is set to NO:

@NX_TNG_OBJECT_UPDATED_SUBSCRIBE=NO

@NX_TNG_OBJECT_ADDED_SUBSCRIBE=NO

@NX_TNG_OBJECT_DELETED_SUBSCRIBE=NO

@NX_TNG_OBJECT_STATUS_UPDATED_SUBSCRIBE=NO

- You can install the CA NSM integration on the following servers, depending on your CA SDM configuration:

- Conventional: Primary or secondary or any other standalone server.
- Advanced availability: Any of the application servers or any other standalone server.

Important! To install the CA NSM integration on a standalone server, [install the CA NSM integration component](#) (see page 168) on the standalone server. For the advanced availability configuration, point the component to one of the application servers.

- If you plan to have CA SDM and CA NSM installed on the same computer, you do not need to install the CA NSM integration. This integration is enabled automatically.
- (Windows) If you plan to have CA SDM and CA NSM installed on different computers, complete one of the following actions, depending on your CA SDM configuration:
 - Conventional: Install and configure the secondary server on the CA NSM server or [install the CA NSM integration component](#) (see page 168) on the CA NSM server.
 - Advanced availability: Install and configure one of the application servers on the CA NSM server or [install the CA NSM integration component](#) (see page 168) on the CA NSM server, pointing to one of the application servers.

- (UNIX) If you plan to have CA SDM and CA NSM are installed on different computers, complete one of the following actions, depending on your CA SDM configuration:
 - Conventional: Install the secondary server on the CA NSM server.
 - Advanced availability: Install the application server on the CA NSM server.

Install the CA NSM Integration Component

You need to install the CA NSM integration component (or Event Converter) if CA SDM and CA NSM are not installed on the same computer or if you want to install the CA NSM integration on a standalone server. This component runs only on a Windows computer.

Follow these steps:

1. Log in to the CA NSM server or on the standalone server.
2. Insert the installation media into your drive.

Important! If your computer does not have an appropriate drive for the installation media, copy the media content to the computer on which you want to install CA SDM. Then, start the installation. For a remote installation over the network, you can share a drive or folder on the network, and then connect over the network to start the installation.

3. Select your language from the list, click Select Language.

The Installation Menu opens.

Note: If the Installation Menu does not automatically appear, start the installation by double-clicking the setup.exe file, located at the root of the installation media.

4. Click the Product Installs tab.
5. Click CA NSM Integration.
6. Follow the on-screen instructions, and when prompted, complete the following information:

- Slump Host Name
- Slump Host IP Address
- Slump Port ID
- NSM Repository

The installer creates the NX.env file and a Windows service for starting and stopping the Event Converter.

7. Log in to the following server, depending on your CA SDM configuration:
 - Conventional: Primary or secondary server
 - Advanced availability: One of the application servers.

8. Go to the following directory and open the topology.cfg file:

`$NX_ROOT/site/eh`

9. Ensure that the file contains the following information:

```
# <remote_node>:uniconv uniconvert IP_ADDR_tngfilter:tngfilter uni
IP_ADDR_tngcnv:tngcnv tngcnv <IP_ADDR_tngfilter>:tngfilter tng
IP_ADDR_tngfilter:tngfilter filter_nxd <IP_ADDR_tngwriter>:tngwriter -
IP_ADDR_tngwriter:tngwriter ehwriter - -
```

IP_ADDR_tngcnv

Specifies the IP Address of the server that is running the CA NSM Event Converter process.

IP_ADDR_tngfilter

Specifies the IP Address of the server that is running CA SDM.

IP_ADDR_tngwriter

Specifies the IP Address of the server that is running CA SDM.

10. Save the file.

The CA NSM integration component is installed.

11. [\(Unix only\) Configure the Event Converter](#) (see page 169).

The Event converter is configured.

(UNIX only) Configure the Event Converter

After integrating CA SDM and CA NSM, you must also configure the converter.

Follow these steps:

1. Log in to the web UI from the following servers, depending on your CA SDM configuration:
 - Conventional: Primary or secondary servers
 - Advanced availability: Application or background servers
2. Select System, Configurations on the Administration tab.

The Configuration List page opens.
3. Select the configuration for the server on which the Event Converter is installed.

The Configuration Detail page opens.

4. Click Additional Processes.
The Additional Process list is displayed.
5. Click Add Process.
The Create New Process window opens.
6. Select UNI Converter as the Process.
7. Enter the IP Address of the server on which the Event Converter is installed.
8. Click Save.
9. Run `pdm_configure` on the following server depending on your CA SDM configuration:
 - Conventional: Primary server.
 - Advanced availability: Application server.
10. This puts your new configuration settings into effect the next time you start the server.
Important! Do not reinitialize your database when you reconfigure.
11. As the privileged user, run `pdm_proctor_init` on the CA NSM server to start the CA SDM proctor.
12. As the privileged user, restart the CA SDM services to start the CA SDM daemons.
Run `pdm_status` to display the status of the daemons.
The Event Converter is configured.

CA SDM Event Converter

This information only applies to the CA NSM integration in a Windows operating environment. The CA SDM Event Converter installs in two different ways when you run CA SDM configuration on a Windows server:

- Installs as a Windows Service
- Installs as a part of the CA SDM Daemon Server from where you can start and stop the converter

While you can use either method to start the Converter on the CA SDM servers installation, depending on your CA SDM configuration, it can only be started as a Windows Service on a Client.

Note: If CA SDM is shutdown for any reason, you may want to leave the Event Converter running so, it can continue to receive messages from NSM. Any messages that are received from NSM when CA SDM is down, those messages are queued and processed after CA SDM is restarted.

Event Converter Removal (Windows Service)

If you want to use the Daemon Manager to start and stop the Event Converter, use the following command to remove the Event Converter from the Windows Service:

```
tngcnv -u
```

You can reinstall the Event Converter as a Windows Service by using the following command:

```
tngcnv -i
```

Event Converter Removal (Daemon Manager)

The Daemon Manager not only starts and stops the Converter, but also restarts the Converter if it inadvertently stops. You can use *pdm_status* to see whether the Converter is running or not and to determine whether it is running on the local or on a remote (Secondary) server.

If you want to use the Windows Service Manager to start and stop the Event Converter, remove the Event Converter from the startup configuration of the Daemon Manager.

To enable or disable the *tngcnv* line, log in to the following servers, depending on your CA SDM configuration and navigate to System, Configurations from the CA SDM Web UI:

- Conventional: Primary or secondary servers.
- Advanced Availability: Application server.

Important! This change reverts if you run the CA SDM configuration again. If you want to retain the change after running configuration, modify *pdm_startup.tpl*.

Verify the Post-Integration Considerations

Consider the following information as you make selections during the integration process:

- Before the process of “receiving a CA NSM event and creating a Request in CA SDM” can work, you must install and configure all components, and ensure that they are active.
- An event would only become lost if the event converter service has been stopped. The event converter service queues CA NSM events when the CA SDM system is down (meaning it has been paused instead of stopped from the Microsoft Windows Services Panel). When CA SDM is restarted, it processes the queued events.

- The CA NSM event converter service queues events up to a maximum specified by the NX_TNGCNV_QUEUE_SIZE environment variable.
- When the CA NSM repository is rebuilt after integration with CA SDM, the CA SDM menu entries are lost. To restore them, you must re-run the integration on the CA NSM Windows computer. To do this, run integAHD.exe located in *installation-directory\bin*.
- If the CA NSM event converter starts during the CA NSM events generation, events that occur before the event converter is fully initialized are lost.

Verify the CA NSM Integration

Complete the following actions to verify the CA NSM integration:

- [Create Owned Assets](#) (see page 172)
- [Monitor Event Console Messages](#) (see page 173)
- [Filter Rule Considerations](#) (see page 174)

Create Owned Assets

Many CA Technologies products create assets in the CA MDB; however the assets are not automatically available to CA SDM. Usually a CA SDM organization only wants to track assets that the organization owns and that were acquired through a formal process. Some devices that are detected on the network by other CA Technologies products should most likely not become available to CA SDM automatically. For example, the laptop computer of a visiting consultant is probably of no interest to the CA SDM organization.

To make a discovered asset in the CA MDB available to CA SDM, use the Discovered Asset selection dialog that is available from the Asset Search or Create New Asset forms in the Analyst Web Interface.

Note: The Discovered Asset selection dialog is available on the Web Client.

If the WorldView integration is being used, discovered Assets can be made available to CA SDM from the pdm_nsmimp command-line utility. The CA NSM 2D/3D map and Unicenter Explorer let you access and create requests by right-clicking a managed object to display two menu options: Create Request and Request List. These menu options are added to CA NSM when you integrate with CA SDM.

How to Register Discovered Assets

The `pdm_discimp` utility is used for batch registration of non-CA SDM Discovered Assets. You can use this utility to search the CA MDB for assets that other software products registered, and register them as CA SDM assets, so they can be used in CA SDM. This utility is an interactive batch process.

The logic is similar to the Discovered Assets dialog that can be launched from Asset Search/List web form. This program queries the `ca_logical_asset`, `ca_asset`, and `ca_logical_asset_property` tables, using various parameters, and attempts to register new CA SDM Assets from the discovered values.

Note: If the processing results in a blank Asset Label, the value found for the Host Name or DNS Name is used as the Asset Label. Assets must have at least a Label and Asset Class to be registered for use in CA SDM.

The following queries are performed to select the appropriate records to process, because of the structure of the CA MDB and CA SDM architecture.

1. A query retrieves the rows from a join between the `ca_logical_asset` and `ca_asset` tables that match label, serial number, tag, and hostname.
2. For each resulting row, a query is performed against `ca_logical_asset_property` to match `dns_name` and `mac_address`.

The asset from the first query is selected for registration when the second query results in rows being returned.

Note: This process can affect performance.

Monitor Event Console Messages

The basic CA SDM installation automatically monitors status changes of monitored objects and the addition of new managed objects. You can set up your environment to use `AHD.DLL` to monitor console messages on Windows and send event messages to the CA SDM server.

We recommend using `AHD.DLL` to send events to CA SDM. However, other methods are available when the event console is running on a UNIX system.

Event Management in CA NSM lets you identify events to which you want to respond and specify one or more actions to initiate automatically. After you define a message and an associated action, the action is performed automatically whenever the event is encountered.

After integration with CA SDM, when the event message occurs, you can send generic event data to CA SDM to do the following:

- Create requests or update existing requests
- Create and post announcements on the CA SDM scoreboard

Note: For more information about creating requests and announcements, see the *Online Help*.

To begin the integration, do the following:

1. Use AHD.DLL to create a CA NSM msg_action record.
2. Use the cawto command to pass that message record to the event console.

Note: Use the default filter and writer rules provided with CA SDM until you are sure that your system is integrated. Do not modify or remove the default rules until you have witnessed CA NSM events creating requests. Avoid using a space, colon, colon, space (::) character combination when you create character strings for CA NSM messages. Otherwise, a parsing error can occur when the product consumes the message.

Send Generic Event Data (UNIX Only)

To send generic event data to filter daemons in CA SDM, use the uniconv daemon in a message action in CA NSM Event Management.

Generic event data can then be used to generate requests automatically in the same manner as AHD.DLL is used on Windows. This method is the preferred method on UNIX.

Post Announcements Automatically

When you integrate CA SDM with CA NSM, you can create and post announcements on the CA SDM scoreboard from CA NSM.

Filter Rule Considerations

After you set up integration correctly and events are creating or updating requests as defined, you can modify filter rules to filter out unwanted events.

The following list provides some tips for coding filter rules:

- Anytime you change a filter rule, restart CA SDM.
- Use the default writer rules while testing your filter rules.

- When coding the *node_ID*, *user_ID*, or *event_ID* parameters in the filter rule, match the case of the incoming event. To help ensure that you have the case specified correctly, create an event in CA NSM on the parameter you are testing. This action creates a request with the information you need. Match the case on the request with the case in your filter rule. This rule includes the case of incoming console messages.
- Avoid using a space, colon, colon, space (::) character combination when you create character strings for CA NSM messages. Otherwise, a parsing error can occur when the product consumes the message.
- When you are coding a filter rule for a specific event, the incoming text on the event may have the following format: "Object_Status_Updated minor." Code your filter rule to look for the following text:

```
tng::*:*:*::Object_Status_Updated.*minor.*:::(0,1)
```
- Blanks in the event may actually be unprintable characters. Code the filter to include one or more characters with a period and asterisk (.*), instead of the blank space (' '). Also include a period and asterisk (.*) at the end of the event for any unprintable characters that may be at the end of the event text.
- When you combine more than one parameter in a filter, such as a *node_ID*, *user_ID*, and *event_ID*, code one filter and verify that it works. Then, add the next parameter, verify that it works with the first parameter, and so on, until finished.
- For ease in debugging, order your filter rules in a file from the most specific at the beginning, to the most general at the end.

Event writer rules follow the same set of debugging practices as filter rules. If you are using the CR_CREATE action and you have included a template, verify that the template exists.

How to Filter Events Automatically

You can configure CA SDM to create requests automatically for error and event messages generated by network devices and other event sources. Defining how events are filtered lets you automatically detect when an event occurs and initiate the actions specified for handling that event. This method can improve overall operating efficiency and reduce the potential for error.

You can configure CA SDM to do the following:

- Filter events based on host, content, type, and other information from CA NSM
- Create requests automatically for error and event messages generated by network devices
- Execute commands automatically in response to an event

To filter events automatically, do the following:

- Define filter rules that identify the events that require special handling
- Define event writer rules that identify the actions to perform automatically when these events are encountered

Filter and event writer rules use a generic event data structure to receive and send data. They are defined using a text editor and stored and edited on the CA SDM server only.

Any event is eligible for processing by filter and event writer rules. Some examples of events you may want filter and event writer rules to process are the following:

- Hardware failures
- Failures of scheduled batch processes
- Excessive CPU usage
- High paging rates
- Unusual file activity
- Unusual security conditions

You can configure any number of filter daemons, event writer daemons, and event sources on different computers. The locations and relationships of these elements are stored in the topology file on the CA SDM server.

Note: When integrated with CA NSM, you can use the `uniconv` daemon to automatically generate requests (this is the preferred method for UNIX). `uniconv` is used in a message action in CA NSM Event Management.

Generic Event Data

Information about events is communicated using a *generic event* data structure. The generic event data structure consists of the following data elements:

Source Type

Identifies the format for the rest of the event.

Node ID

Identifies the device name or ID.

User ID

Identifies the user name or ID (when applicable).

Major Source

Identifies the source application ID.

Minor Source

Identifies the agent of event or further delineation.

Date/Time

Identifies the event date and time.

Event ID

Identifies the source event string that triggered the event.

Event Data

Identifies the associated event data.

Severity

Identifies the measure of the event's importance.

Handle

Identifies the daemon-supplied string resulting from rules.

Handle Source

Identifies the daemon identifier that assigned the handle.

Handle Status

Identifies the status as create, update, or terminate.

Status Count

Identifies the number of updates.

Filter Rule Setup

Filters receive information from event sources that can then be passed to event writers. Because network devices generate hundreds of event messages, you can use filter rules to isolate those that can be used to create requests. Filter rules let you do the following:

- Determine which network events or traps to report and how.
- Control what happens when each type of event or trap is reported. Valid actions include ignoring, reporting on, and marking.

When integrated with CA NSM, filtering lets you manage events from all systems managed by CA NSM, including SNA and TCP/IP networks.

By filtering events, you can retrieve specific information about a particular node, user, or workstation, and then pass that information to event writers. You can define event filter rules to screen for your particular needs, helping you identify suspicious events and correct them before they cause problems.

Note: It is helpful to be familiar with UNIX regular expressions when writing filter rules. You can also use UNIX regular expressions on Windows.

Filter Rule Definitions

Filter rules use UNIX regular expression matching to determine if an event has a matching filter rule and blocks events that do not filter. A special filter (ID=5) passes the incoming generic event unchanged to the writer. The filter passes only filtered events and assigns a handle source of *filter* and handle status of *create*, *update*, or *terminate*.

CA SDM uses the major source, event ID, node ID, and user ID fields from the generic event data structure to find a matching filter rule.

Important! Filter rules pass information from events to another daemon that uses event writer rules, which can automatically create requests.

The default filter rule file, `tngfilter_rule.dat`, is located in `$NX_ROOT/site/eh/IP` (UNIX) or `installation-directory\site\eh\IP` (Windows) on the CA SDM server. `$NX_ROOT` or `installation-directory` is the directory where you installed CA SDM and `IP` is the IP address of the computer on which the filter resides. Typically, this computer is the CA SDM server.

This file also contains many comment lines that show you how to set up various filter rules. Comment lines begin with the pound sign (#).

Use a text editor to view, update, and save the filter rule file. However, do not use an editor that leaves extra formatting characters in the file. We recommend WordPad for Windows users and vi for UNIX users.

Syntax (Filter Rules)

The filter rule syntax is:

```
source_type:::node_ID:::user_ID:::event_ID:::filter
```

where:

Fields in the rule are separated by three colons (:::). You can use an asterisk (*) as a wildcard character, which means the value of the parameter is ignored when determining whether an incoming event matches the filter rule pattern.

Note: The first four parameters in the filter rule describe a pattern to compare against incoming events. This pattern is used to determine if the filter specified in the last parameter of the rule should process an incoming event.

Parameters (Filter Rules)

source_type

Specifies the type of source directing events to the filter. The major source field of the incoming event is compared to the value in this parameter. The type of converter that is sending events to the filter generally determines the value of this parameter. Valid values are:

uni

Identifies the UNIX CA NSM converter.

tng

Identifies the Windows CA NSM converter.

If an incoming event matches several rules when source types and event IDs are compared, then node IDs are compared.

node_ID

Specifies the node ID where the event originated. This parameter must exactly match the node ID of the incoming event, or this filter rule is not used. An asterisk (*) indicates that the node ID is ignored when determining if an incoming event matches this filter rule pattern.

Rules that match the node ID of the incoming event take precedence over rules that have asterisk (*) specified for node ID.

If an incoming event matches several rules when source types, event IDs, and node IDs are compared, user IDs are compared.

user_ID

Identifies a user associated with the event. Use this parameter to execute a particular action for events from a specific user. Many events will not have specific users associated with them. This parameter cannot contain a UNIX regular expression. You must supply an exact user ID or an asterisk. An asterisk (*) is the default and indicates that the user is ignored in selecting the rule.

Rules that match the user ID associated with the event take precedence over rules that have asterisk (*) specified for user ID.

event_ID

Specifies the event identifier. You can use a UNIX regular expression. A period and an asterisk (.*) matches any event name. For example, you can specify [Aa].* to match any event that starts with uppercase or lowercase "a."

If the *event_ID* parameter is simple text (not a regular expression), it must exactly match the generic event's event ID. Partial matching does not count. If the *event_ID* is a regular expression, the length of the regular expression match is used to determine how well the event filter rule's *event_ID* matches the generic event's event ID.

If an incoming event matches several rules when source types and event IDs are compared, node IDs are compared.

filter

Specifies which filter to use to process the incoming event and the parameters that the filter uses. The format is:

(*filter_id*, *filter_parameter1*, *filter_parameter2*, ...)

Valid values for *filter_id* are:

Value=0

Report all events

Value=2

Ignore events that occur infrequently

Value=3

Ignore outages shorter than the length specified in *filter_parameter1*

Value=4

Ignore bursts shorter than the length specified in *filter_parameter1*

Value=5

Pass all events to destination without modification

The number of filter parameters varies for each *filter_id*, as the following table shows:

filter_ID	filter_parameter1	filter_parameter2	filter_parameter3
0	0=no, 1=yes Indicates whether events should always be reported as separate problems.	None	None

filter_ID	filter_parameter1	filter_parameter2	filter_parameter3
2	Number of occurrences Specifies the number of times an event must occur during an interval to be important.	Interval Specifies the elapsed time, in seconds, during which an event must occur to be important.	0=no, 1=yes Indicates whether events should always be reported as separate problems.
3	Interval Specifies the elapsed time, in seconds, during which an event must occur to be important.	0=no, 1=yes Indicates whether events should always be reported as separate problems.	None
4	Interval Specifies the elapsed time, in seconds, during which an event must occur to be important.	0=no, 1=yes Indicates whether events should always be reported as separate problems.	None
5	None	None	None

Note: The first four parameters in the filter rule describe a pattern to compare against incoming events. This pattern is used to determine if the filter specified in the last parameter of the rule should process an incoming event.

Event Writers

Event writers specify what CA SDM should do when it detects an important event from the network. The event writer uses converted events (events using the generic event data structure) from an event source and events that have passed through a filter to create requests.

Using event writers, you can do the following:

- Identify the type of event received from an event source
- Specify the action to perform when the event writer receives events of this type. Valid actions include:
 - Creating requests
 - Updating existing requests
 - Executing a command
- Indicate whether logging occurs

Event Writer Rule Definitions

When CA SDM is installed, a default configuration is supplied that runs on the CA SDM server. This default configuration sets up a single event source, filter, and writer, and has a filter rule that passes all events to the writer. The default writer rule creates requests for all events that it receives.

The default writer rule file, `tngwriter_rule.dat`, is located in `$NX_ROOT/site/eh/IP` (UNIX) or `installation-directory\site\eh\IP` (Windows) on the CA SDM server. `$NX_ROOT` or `installation-directory` is the directory where you installed CA SDM and `IP` is the IP address of the CA SDM server.

You can view the contents of this file to see the default writer rule definitions and comments describing the format of the writer rules. The comments are at the beginning of the file, and the writer rules are at the end. Comment lines begin with the pound sign (#).

Use a text editor to view, update, and save the writer rule file. However, do not use an editor that leaves extra formatting characters in the file. We recommend WordPad for Windows users and vi for UNIX users.

Syntax (Event Writer Rules)

The event writer rule syntax is:

```
event_ID:::device:::user_ID:::majorSrc:::minorSrc:::action:::template:::  
command:::logging:::event_token:::user_parms
```

where:

Fields in the rule are separated by three colons (:::). You can use an asterisk (*) as a wildcard character, which means the value of the parameter is ignored when determining matches for the event writer rule.

Parameters (Event Writer Rules)

event_ID

Specifies the event identifier to which the event writer rule applies. You can use a UNIX regular expression. A period and an asterisk (.*) matches any event name. For example, you can specify `[Aa].*` to match any event that starts with uppercase or lowercase "a."

If the `event_ID` parameter is simple text (not a regular expression), it must exactly match the generic event's event ID. Partial matching does not count. If the `event_ID` is a regular expression, the length of the regular expression match is used to determine how well the event writer rule's `event_ID` matches the generic event's event ID.

device

Specifies the name of the object, which is typically a device or host associated with the event. A period and an asterisk (*) is the default and indicates that the source object is ignored in selecting the rule.

If an incoming event matches several rules when source types and event IDs are evaluated, devices are compared. Rules that match the device of the incoming event take precedence over rules that have asterisk (*) specified for *device*.

If you have defined rules for assigning device names, this parameter can be useful. For example, if you name devices located in the United States USxx, you can specify US.* in this parameter to execute a particular writer action for events from devices in the United States.

user_ID

Identifies a user associated with the event. Use this parameter to execute a particular action for events from a specific user. Many events do not have specific users associated with them. This parameter cannot contain a UNIX regular expression. You must supply an exact user ID or an asterisk. An asterisk (*) is the default and indicates that the user is ignored in selecting the rule.

If an incoming event matches several rules when source types, event IDs, and devices are evaluated, user IDs are compared. Those rules that match the user ID associated with the event take precedence over rules that have asterisk (*) specified for *user_ID*.

majorSrc

Automatically displays the major type of source directing events to the event writer. This parameter is required. Its value is determined by the event source. For events from CA NSM on Windows, the value must be "tng." For events from CA NSM on UNIX, the value must be "uni."

minorSrc

Automatically displays the minor type of source directing events to the event writer. For events from CA NSM, this parameter contains the event type. Use an asterisk (*) to accept all events.

action

Specifies the action that occurs when the event writer receives this type of event using one of the following values:

CR_CREATE

Write a new request for each event.

CR_UPDATE

Update an existing request or requests (if they exist), or create a request if no requests are found. By default, records are located by matching on the *log_agent* and *affected_resource* attributes. The user can override the defaults by specifying a list of any request attributes.

CR_UPDATE_ONLY

Like CR_UPDATE, except a request is never created when no matching requests are found.

COMMAND

Execute the command specified in the *command* parameter.

Note: If CA SDM cannot access a request or change order, it attempts the update again after a fixed interval.

template

Specifies the name of a request template to use to create a request. This parameter is not required and is ignored if the action is not CR_CREATE.

Note: The request template must be created before the rule is defined.

command

Specifies the command to execute if the *action* parameter value is COMMAND. Substitution arguments, as the following table shows, can be incorporated into the command. The arguments are replaced by their real-time values when the command is executed:

&node

The device name or node identifier

&user

The user name or ID

&date

The event date

&time

The event time

&event-id

The source event string that triggered the event

&data

The associated event data

&sev

A measure of importance for the event

&major-src

The source application ID

&minor-src

The agent name or further delineation of the event

&handle

The daemon-supplied string resulting from rules

&src-handle

The daemon identifier that assigned the handle

&status-handle

The status of the handle (valid values are create, update, or terminate)

logging

Specifies whether logging occurs, using one of the following values:

NONE

No logging, other than normal error logging, occurs. NONE is the default value.

PDM

Logging occurs in the CA SDM log (stdlog.0) in its internal generic event format.

SYS

Logging occurs in the UNIX syslog, which can be forwarded to the Unicenter Console. The event is assigned a message ID (CAPD 13) to allow event processing from the Unicenter Console.

BOTH

Logging occurs in the CA SDM log (stdlog.0) and the UNIX syslog.

event_token

A 30-character user-defined tag that identifies a specific request associated with an *event_id* (tng event message) or all messages like an *event_id* (for example, a wildcarded *event_id*). *event_token* is a request attribute and is stored in every request generated by the CA NSM interface. If no *event_token* is specified in the writer rule, the string "tng_generated" is used. This lets the user update all requests that match the *event_token* attribute. For example, two different messages for the same asset can update unique requests.

Each CR_UPDATE writer rule specifies the unique message parts and a unique *event_token*. The *event_token* is used to find and update the matching request. By default, an activity log containing the message is added to the matching request. In another example, the user can update the status attribute (for example, set status=CL (closed)) in an existing request by specifying the same *event_token* in the CR_UPDATE writer rule that was used when the request was created using a CR_CREATE writer rule.

For example, the first writer rule below causes the writer process (tngwriter) to create a call request with an event_token equal to 'SystemCritical' whenever it receives a NSM event identified by the string 'Event1'. The second writer rule causes the writer process to update the status value to 'CL' for all call requests with an event_token equal to 'SystemCritical' whenever it receives a NSM event identified by the string 'Event2'.

```
Event1:::.*:::*:::tng::.*:::CR_CREATE::::::::::NONE:::SystemCritical:::
Event2:::.*:::*:::tng::.*:::CR_UPDATE::::::::::NONE:::SystemCritical:::%SEARCH
=EVENT_TOKEN;%STATUS=CL
```

user_parms

Contains the following types of information:

Request attribute values

Request attribute values are specified using the following syntax:
%ATTRIBUTE=value, where **ATTRIBUTE** is an attribute name identified in text_api.cfg that maps to a CA SDM Majic call request attribute. This file is located in \$NX_ROOT/site (UNIX) or *installation-directory*\site (Windows).

Note: If you use multiple keyword/value pairs, separate each one with a semicolon (";").

For example, the writer rule below causes the writer process (tngwriter) to create a call request with assignee equal to 'mccda04' and customer equal to 'nsm' whenever it receives a CA NSM event identified by the string 'Event4'.

```
Event4:::.*:::*:::tng::.*:::CR_CREATE::::::::::NONE::::::::::%ASSIGNEE=mccda04
;CUSTOMER=nsm
```

A list of request attributes to match when updating existing request records

The syntax for the list of attributes to match is specified as follows:

%SEARCH=attribute1[, attribute2...], where **SEARCH** is a fixed keyword and attribute1, attribute2, and so on are **ATTRIBUTE** names specified in the text_api.cfg.

The default search list of attributes is "asset_name" (DEVICE or UUID) and LOG_AGENT. The **SEARCH** keyword adds attributes (to match on) to the default search list. The **SEARCH_EXPLICIT** keyword completely overrides the default search list. Only the list of attributes following the **SEARCH_EXPLICIT** keyword are used to search for a call request.

For example, the writer rule below causes the writer process (tngwriter) to update the status value to 'CL' for all call requests with assignee equal to 'mccda04' whenever it receives a CA NSM event identified by the string 'Event2'.

```
Event2:::.*:::*:::tng::.*:::CR_UPDATE::::::::::NONE:::SystemCritical:::%SE
ARCH=ASSIGNEE;%STATUS=CL;%ASSIGNEE=mccda04
```

An attribute in the list of attribute values is used to search on if the attribute is in the SEARCH or SEARCH_EXPLICIT list. If it is not in the search list it is used to set or update the attribute's value in the call request. It cannot be used for both in the same writer rule.

Note: For more information about text_api.cfg and how CA SDM uses it, see the *Administration Guide*.

Special parameter names that are replaced with their corresponding value from the CA NSM event structure

You can use the following special parameter names anywhere in the *user_parms* string:

&message

Message text associated with this CA NSM message.

&parm

AHD.DLL Parm field on CA NSM Message Action Screen.

&uuid

CA NSM universally unique identifier.

&device

Device (for example, host name) that generated the CA NSM message.

&majorsrc

The major type of source directing events to the event writer. For events from CA NSM on Windows, the value is "tng." For events from CA NSM on UNIX, the value is "uni."

&minorsrc

The minor type of source directing events to the event writer.

&node

Device (for example, host name) that generated the CA NSM message.

&addr

The IP address of the host that generated the CA NSM message.

&username

The user name on the host that generated the CA NSM message.

&date

An integer representing how long since 1970 the CA NSM message was generated.

&time

The Date and Time of the CA NSM message (for example, Tue Jul 4 10:23:37 2000).

&severity

The severity of the CA NSM message.

&tag

Tag data associated with the CA NSM message.

For example, the writer rule below causes the writer process (tngwriter) to create a call request with customer equal to the username value (&username) of the event message whenever the writer receives a NSM event identified by the string 'Event2'.

```
Event2::.*::.*::tng::.*::CR_CREATE:::::NONE:::::%CUSTOMER=&username
```

Using *event_token* and *user_parms*, you can set initial values or update values of all attributes of the request and specify which fields to match when locating records to update. The only restriction is that the description attribute is never updated in an existing call request record. If a record update and the description field are specified, an activity log containing the text of the description is added to the existing record.

CA NSM Message Action Record: ahd.dll AHD_Call <parms...>

You can also specify data (<parms...>) to the AHD_Call on the CA NSM message action record that can be used to replace the &Parm parameter specified in your user_parms parameter in your writer rule. In order for the data specified on the AHD_Call to be processed in this way the data (<parms...>) must be preceded with a '%' character and the &Parm 'special parameter' must be included somewhere in the user_parms field of the writer rule.

The following is an CA NSM message action and a writer rule that work together to cause the writer process to create requests with assignee set to 'mccda04' whenever it receives a NSM event identified by the string 'Event3'.

```
Ahd.dll AHD_Call %ASSIGNEE=mccda04
```

```
Event3::.*::.*::tng::.*::CR_CREATE:::::NONE:::::&Parm
```

CA SDM customers upgrading from AHD4.5 and earlier may already be using the <parms...> field. For example, you may be using this data to match on Writer rules. You can continue this practice without change. If you want to use both 'old' and 'new' parameters then you must concatenate a '%' character to your 'old' <parms..> data and then follow with 'new' data.

Example:

ahd.dll AHD_Call old data

ahd.dll AHD_Call %new user_parms

ahd.dll AHD_Call old data%new user_parms

Data before the first '%' character is concatenated to the CA NSM event message which is placed into the Call Request description field. This is how CA SDM has worked in the past. Data after the first '%' character is used to replace the &Parm parameter wherever it is specified in your user_parms parameter in your writer rule.

CA SDM Log (stdlog.0) Syntax

The syntax for entries in the stdlog.0 file is:

```
genDate genTime genNode genProc PID level codefile linenum msgID
:::msgDomain\msgNode::: ::: ::msgGenDomain\msgGenUser:::domainID
:::msgDate msgTime:::eventID arg tag::: ::IPAddr:filter:filterNum
:::majorSrc::: ::msgSrc:::msgType:::msgSrcNum::: ::platform
```

where:

Fields in the rule are separated by three colons (:::).

genDate

Specifies the month and day (from the system clock) on which the log incident was generated.

genTime

Specifies the time (from the system clock) at which the log incident was generated.

genNode

Specifies the node name that generated the log incident. The value is typically the first eight characters of the generating node's DNS name. This value is always the same, because stdlog.0 only contains entries from processes running on the same node.

genProc

Specifies the name of the process (for example, ehwriter) that generated the log incident. The process name is operating environment-dependent, but should correspond to the name that appears in the Task Manager processes list (Windows) or in output from a ps command (UNIX).

PID

Specifies the numeric process identifier from the Task Manager processes list (Windows) or in output from a ps command (UNIX). The PID is critical when multiple processes are running with the same process name. For example, multiple database agents typically run concurrently with the same process name.

level

Specifies the programmer's estimation of the significance of the message. Possible values include FATAL, EXIT, RESTART, SIGNIFICANT, SEVERE, ERROR, MINIMUM, WARNING, INFORMATION, MILESTONE, TRACE, and VERBOSE.

codefile

Specifies the name of the code source file from which the message was generated.

linenum

Specifies the number of the line in the code source file at which the message was generated.

msgID

Specifies the ID assigned to a TNG event.

msgDomain

Specifies the name of the domain from which the message originated.

msgNode

Specifies the name of the node from which the message originated.

msgGenDomain

Specifies the domain from which the user identified by the msgGenUser value generated the TNG message.

msgGenUser

Specifies the user ID of the user that generated the TNG message.

domainID

Specifies the ID of the domain from which the TNG message was generated.

msgDate

Specifies the month and day (from the system clock) on which the TNG message was generated.

msgTime

Specifies the time (from the system clock) at which the TNG message was generated.

eventID

Specifies the source event string or sed-style regular expression that triggered the event.

arg

Specifies a variable entered in the text string of a message action. For example, if the text field on a message action is entered as "ahd.dll AHD_Call help me," the argument in stdlog.0 appears as "args=help me."

tag

Specifies tag data associated with the TNG message.

IPAddr

Specifies the IP address of the host that generated the TNG message.

filter

Specifies the process name for the filter rule file.

filterNum

Specifies the number of the filter rule file.

majorSrc

Specifies the major source (or converter type). This is a string that identifies the source application ID. That is, whether events come from Unicenter TNG for Windows (in which case the value is tng), from Unicenter for UNIX (in which case the value is uni), or from an internal daemon (in which case the value is -).

msgSrc

Specifies the message source. Possible values are CNV (converter), FLT (filter), NOS (no source), and WRT (writer).

msgType

Specifies the message type. Possible values are CRT (create), DSC (discovery), TRM (terminate), and UPD (update).

msgSrcNum

Specifies the message source number.

platform

Specifies the operating environment from which the message originated. Possible values are AIX, AS400, DECOSF1, DGUX, DYNIX, HPUX, IRIX, MISERVER, MPRAS, MVS, NETWARE, SINIX, SOLARIS, SVR4MP, TANDEM, UNIXWARE, WNT (Windows), or any value defined by the UNIX agents.

Load Event Writer Rules

When you modify or define writer rules, you can load these new or modified rules without restarting the CA SDM server or any of the support processes, such as the CA NSM converter or the filter and writer daemons. You can also use this utility to write existing writer rules to a file.

To do load event writer rules, use the wrtrule utility.

Syntax (Loading Event Writer Rules)

The syntax for loading event writer rules is:

```
wrtrule [-v] -c addr [-r rule_file] [-d dump_file]
```

Parameters (Loading Event Writer Rules)

-v

Specifies verbose mode, so feedback displays as the utility executes.

-c addr

The name of the event writer as shown by slstat.

-r rule_file

The name of the text file containing the events to load.

-d dump_file

The name of the file where you want the current event writer rules written. The following types of information are written to the file:

- Pending event messages
- Network resource information in the process of being retrieved
- Event writer rules

Note: Although both *-r rule_file* and *-d dump_file* are optional, you must specify one or the other. You can specify both, in which case new rules load first.

Note: If the event writer is handling one or more CA NSM event messages when it receives a request to load new writer rules, the load is delayed until the writer completes the current messages. For example, the writer may be processing an event because it is waiting for network resource (asset) information. In this case, the load message is delayed until this information has been retrieved and the request for a CA SDM call request has been generated.

A request to write the current event rules to a file, however, is performed with no delay.

Maintain Filtered Events

The relationships between filter and event writer daemons and event sources on different computers are maintained in the topology file, *topology.cfg*, in the *\$NX_ROOT/site/eh* directory (UNIX) or *installation-directory\site\eh* directory (Windows) on the CA SDM server. The topology file lets you determine and maintain the entire event handling system from one location. Instead of going to multiple clients, you can edit files in a single location and determine the topology of the entire event handling system.

Note: The *\$NX_ROOT/site/eh* directory (UNIX) or *installation-directory\site\eh* directory (Windows) on the CA SDM server also includes filter and event writer rules.

Use a text editor to view, update, and save the `topology.cfg` file. We recommend WordPad for Windows users and `vi` for UNIX users. Do not use a text editor that leaves formatting characters in a file.

The format of the topology file is:

```
name cmd [dest-name] [converter-type]
```

where:

name

Specifies the host and the unique name of the event-handling daemon in the format *hostname:daemon-name* (for example, *ws2:uconv*). The *daemon-name* appears in *sstat*.

cmd

Specifies the name of the executable in the `$NX_ROOT/bin` directory (UNIX) or *installation-directory\bin* (Windows), such as `tngcnv`, `uniconvert`, `filter_nxd`, or `ehwriter`.

dest-name

Specifies the daemon that receives the generic events from this daemon (for example, *ws2:filter1* and *ws3:wrtr*). Event writer daemons do not have destination daemons. All daemons should also have a record in the topology file.

converter-type

Specifies whether events come from CA NSM for Windows (`tng`), CA NSM for UNIX (`uni`), or from an internal daemon (`-`).

A sample topology file is as follows:

```
# maple:uniconv    uniconvert  maple:tngfilter  uni
maple:tngcnv      tngcnv      maple:tngfilter  tng
maple:tngfilter   filter_nxd  maple:tngwriter  -
maple:tngwriter   ehwriter    -               -
```

Example

Following is an example of how one organization implemented filtered events in an integrated installation of CA SDM and CA NSM.

To automatically create requests when a critical status appears on the CA NSM WorldView map, the CA SDM administrator (Ken) must create an event filter rule to identify the events to which he wants to respond. He must also create an event writer rule to specify the action to perform when events of this type are received.

Ken decides that he will use one simple filter rule at first. Then, as he becomes more familiar with the system, he will use a more complex set of rules. He decides to capture each critical event from U.S. servers. His system uses the convention that names all servers located in the contiguous United States as usaxxx, so this is very simple.

Ken first edits the `tngfilter_rule.dat` filter rule file in the `$NX_ROOT/site/eh/IP` directory on the CA SDM server, where IP is the IP address of the CA SDM server. He uses the UNIX vi editor, although he could use any text editor that does not add extraneous control characters (we recommend that Windows users use WordPad to edit files).

In the `tngfilter_rule.dat` file, the pound sign (#) is the comment character. Any characters after the pound sign are ignored when the rules are read. Most of the lines in Ken's `tngfilter_rule.dat` file are commented out, but he notices the following lines:

```
# Report All Events (separately)
uni::*:*:*:*:*:*::(0,1)
tng::*:*:*:*:*:*::(0,1)
```

These lines constitute an open filter; that is, a filter that will pass all events to the event writer.

Ken changes these lines to:

```
# Report All Events (separately)
# uni::*:*:*:*:*:*::(0,1)
tng::*:*:*:*:*:*::Object_Status_Updated.*Critical.*::(0,1)
```

Ken comments out the uni line because he is currently interested only in Windows CA NSM events. He enters `Object_Status_Updated.*Critical.*` in the event_ID field in the tng line because he wants the filter to pass only `Object_Status_Updated.*Critical.*` events. CA NSM generates `Object_Status_Updated.*Critical.*` events when the state of an object becomes critical.

After saving the filter rule file, Ken edits the `tngwriter_rule.dat` writer rule file found in `$NX_ROOT/site/eh/IP` on the CA SDM server, where IP is the IP address of the CA SDM server.

As with the filter rules, most of the lines in the file are comments. The last two lines in the file show the default writer rule definitions. Ken wants to pay attention to events from Windows CA NSM only, so he comments out the first of these two lines.

Ken formats the second line following these steps:

1. He has already set his filter to pass only critical events, so he leaves the event ID open with `.*`.
2. He wants to accept events from U.S. servers only, so he enters `usa.*` in the device field.
3. He wants to accept events from any user, so the user field remains asterisk (`*`).

4. He wants to write a new request for each critical event, so he leaves CR_CREATE in the action field.
5. He has already entered a suitable request template in the system, so he enters its name, CriticalTemplate, in the template field.
6. He does not want any other logging done, so the logging field remains NONE.

Here are the results of Ken's edit:

```
# .*::.*::.*::.*::uni::.*::CR_CREATE:::::NONE
.*::usa.*::.*::.*::tng::.*::CR_CREATE::CriticalTemplate:::::NONE
```

Ken saves the writer rule file, and then recycles the CA SDM server. He is ready to receive events and write requests automatically.

Troubleshoot the CA NSM Integration

Errors can occur when integrating, configuring, and using CA NSM with CA SDM. You troubleshoot these errors. using the following information:

- [2D/3D Map Error Messages \(Windows Only\)](#) (see page 196)
- [Review Server Configuration](#) (see page 197)
- [Filter Error Messages](#) (see page 198)
- [Check the Slump Connection](#) (see page 200)
- [Turn On Logging](#) (see page 200)

2D/3D Map Error Messages (Windows Only)

The integration portion of the 2D/3D map and Unicenter Explorer can produce CA NSM errors.

TNGWV object create failure= x

Reason:

This error typically occurs when the integration script is executed multiple times without first running de-integration (x represents a number).

Action:

To de-integrate, then integrate, CA SDM with the CA NSM 2D/3D map and Unicenter Explorer, complete the following steps:

1. At the command line, enter:
installation-directory\bin\deintahd.exe
2. Open the CA NSM Object Browser. Locate and click Method to display a list of methods.

3. If any AHD Methods are listed in the name column, select Delete from the Object menu to remove them.
4. Click Popup_Menu to display a list of menus.
5. If any AHDMangedObject exists under the name column, select Delete from the Object menu to remove it.
6. With Popup_Menu still open, scroll down until ManagedObjects displays under the name column.
7. Search for any ManagedObject that has a method name containing AHD. If any exist, select Delete from the Object menu to remove them.
8. Click Jasmine_Menu_Action to display a list of Unicenter Explorer methods. If any USPSD menu actions are listed in the name column, select Delete from the Object menu to remove them.
9. Click Jasmine_Menu_Object to display a list of Unicenter Explorer menus. If any USPSD menu objects are listed in the name column, select Delete from the Object menu to remove them.
10. Exit Object Browser.
11. At the command line, enter:

```
installation-directory\bin\integAHD.exe
```

Your integration into the 2D/3D maps and Unicenter Explorer should now be successful. Right-click a managed object from the 2D/3D map or Unicenter Explorer, and verify that all of the CA SDM menu options are displayed.

CAE0232E-Repository error code 22

Reason:

This message indicates that the path to the executable in the method is incorrect.

Action:

Add installation-directory\bin to your path or modify the exe_name field in the Method list to include the full path to the executable.

Review Server Configuration

When the CA SDM server is on a UNIX or Windows computer and CA NSM is on a different Windows computer, the CA SDM server must be up and running. Start the NSM Event Converter service on the CA NSM computer. To ensure the converter is up and running, check the processes using Task Manager. If tngcnv does not appear as a running process after the event converter service was started, check the most recent tngcnv.n or stdlog.n files (located in *installation-directory\log*). These files provide you with information about why the event converter is not running.

When the CA SDM server and CA NSM server are on the same Windows computer, the CA SDM Service must be up and running. Start the CA NSM Event Converter Service on the computer. To ensure the converter is up and running, check the processes using Task Manager. If `tngcnv` does not appear as a running process after the CA SDM service was started, check the following:

1. Using WordPad, edit the `pdm_startup` file located in *installation-directory*\pdmconf. In this file, you will see text similar to the following:

```
[ procset MAIN_PROCSET]
pdm_info
sw_ver_ctl
bnotify_nxd
PDMBASE
PDMBOP
FILTERING
```

If a semicolon (;) is used to comment out `FILTERING`, remove the semicolon.

2. Moving backwards toward the top of the file, you should see the following text:

```
[ procset FILTERING ]
tngfilter
tngwriter
ehc
; UNICNV_REPLACE
; tngcnv:NT_ONLY
```

If a semicolon (;) is used to comment out any of the above options, remove the semicolon.

3. If you made any changes to this file, save them, then recycle CA SDM server.

If the event converter still does not show up as a running process, check the most recent *tngcnv.n* file (located in *installation-directory*\log). This file provides you with information about why the event converter is not running.

Filter Error Messages

If your event converter (`tngcnv`) does not start or your converter is running but no requests are being created, your log files may contain an error indicating why it could not start or report events. You may see one or more of the following error messages:

Can't resolve host name to an IP address

Reason:

This message indicates that you are missing host entries on your CA SDM computer, your CA NSM computer, or both.

This error might also indicate that DNS is not working or is not returning the correct IP address.

Action:

Check the %SystemRoot%/system32/drivers/etc/hosts file. Your host file must contain an entry for the CA SDM computer and the CA NSM computer. After adding the host name, restart the converter (or the CA SDM service). An example entry resembles the following:

```
127.0.0.1      localhost      # Local host loop back
141.202.211.11 usbegp11        # This is the NSM client box
141.202.211.12 usbegp12 ahdhost # This is the Service Desk host
                                     # (showing multiple entries)
```

Cannot find repository file

Reason:

This message indicates that the @NX_REPOSITORY parameter is not set in NX.env (located in *installation-directory*) on the client.

Action:

Edit NX.env, add your repository name, making sure that you match the name exactly, save the file, and then restart the event converter.

The dependency doesn't exist or has been marked for deletion

Reason:

This message occurs when there is a dependency (probably MSSQL) on the converter that should be removed.

Action:

Execute regedt32 and open the HKEY_LOCAL_MACHINE -> System -> Current Control Set -> Services -> AHD_Event_Converter tree. Remove the MSSQL dependency (or other as applicable) and restart your Windows server.

Destination unknown, Queuing events or No topology.cfg file entry for node; queuing event

Reason:

This message indicates that the topology.cfg file on the CA SDM server must be corrected.

Action:

Correct the [topology.cfg file](#) (see page 193) as necessary, then recycle CA SDM and the CA NSM converter. An example topology.cfg file for CA SDM on a Windows computer named AHD1 and a CA NSM computer named TNG1 follows:

```
TNG1:tngcnv      tngcnv      AHD1:tngfilter   tng
AHD1:tngfilter   filter_nxd  AHD1:tngwriter   -
AHD1:tngwriter   ehwriter    -                -
```

How to Check the Slump Connection

If the CA NSM converter is running and you still do not see any events being created, verify the slump connection to CA SDM.

To verify the connection, do the following:

1. Use the `s/stat` command from the command line on the CA SDM computer.
2. Look for a slump connection to tngcnv.
If you do not find one, the converter is not communicating with CA SDM.
3. Restart the CA NSM converter, and then verify the connection again.
4. (If the connection still cannot be found) Check the `tngcnv.n` files (located in *installation-directory\log*) for errors regarding tngcnv and slump logon.

Turn On Logging

If the slump logon was successful and you still do not see new events, turn on logging and check the files for an indication that an event has come through CA NSM. You can create an event simply by changing the status on a managed object on the 2D/3D map.

To turn on logging, modify the file `NX.env` file located in `$NX_ROOT` (UNIX) or *installation-directory* (Windows) to include the following line:

```
@NX_LOG_LEVEL_BSTRAP=VERBOSE
```


You can then monitor the `tngcnv.n` files (located in *installation-directory*\log) to determine if events are being passed to CA SDM. You should see something similar to the following:

```
09/17 16:35:58:01 tngcnv      477 MILESTONE      convrtr.c      399
Sending 1:::dogwood:::9994011e-2f7e-11d1-a435-00c04fd478c9:::09/17/1997
:::16:35:41:::Object_Status_Updated minor:::BV:141.202.211.0:Segment.1
IP:141.202.211.14 MAC: CNT: LOC: DSC:::3:::tngcnv:1:::tng:::WindowsNT:
:::CNV:::CRT:::1:::
```

In this example, the message indicates that the status on a managed object has been updated to Minor.

If you find that events are being passed to CA SDM and they appear in the log, double check to make sure that you are using the default filter and writer rules. If not, restore the original default filter and writer files, recycle the server, and create an event.

If you find that events are not being passed to CA SDM, make sure that two CA NSM processes responsible for passing event information (`canotify.exe` and `caoprdrmn.exe`) are executing. If they are not running, start them as described in the CA NSM documentation. If they are running, contact CA NSM Support.

Use the CA NSM Integration

The following examples show you how to use the integration between CA NSM and CA SDM:

1. [Create Message Records and Message Actions](#) (see page 202) with limited content.
2. [Create or update a Request using the `cawto` utility](#) (see page 203).
3. [Use the sample files](#) (see page 203) to complete the previous tasks.

Note: The examples offer a sample approach for configuring this default functionality and are not intended to suggest that they are the only way to accomplish this task.

Sample Message Records/Actions with Limited Content

Two Message Records, CFNEW and CFUPDATE, written with a single message action each, are the cornerstone in this example for integrating NSM to CA SDM (sample files are also included). For a clean, compact, robust and easy-to-maintain integration, you can leverage the strength of the following:

- tngwriter_rule.dat
- CR_UPDATE and CR_UPDATE_ONLY functions
- text_api keyword list

Note: The example shows how to create Message Records and Message Actions with little content. The content has been moved into the cawto commands that are illustrated in the examples that follow. You could alternately place the desired parameters and content directly into the “text” field of the message action, or even use a combination of the two approaches.

Sample Event Management Message Record

When you use this integration, you can use the Message Record - Detail page to display a sample Event Management Message Record that will react to an event containing “CFNEW” at the start of the event alert.

Sample Message Action List

When you use this integration, you can use the Message Action list that is associated with the “CFNEW*” Message Record. By double-clicking this item, you can see the detailed information stored as part of the Message Action. When you continue to use the integration, you can see a detailed view where you can see the “action” field set to “EXTERNAL” and the “text” field with the standard integration text value of “AHD.dll AHD_Call”.

Sample Message Record (configured to scan for events beginning with CFUPDATE)

When you use this integration, you can see the detail that results from a second Message Record, configured to scan for events that began with “CFUPDATE”. This Message Record also has an identical Message Action created for it (as illustrated by the previous “CFNEW*” Message Record).

Sample cawto Commands that Generate/Update Requests

To use the Message Records previously created, send a message through CA NSM Event Management by using the “cawto” utility/command provided with CA NSM. The “cawto” utility/command allows you to create or update a Request using the command formats shown in the two examples that follow.

Note: By using this approach, you can capture and reformat (for translation into an expected format for inclusion into CA SDM) any alerts of interest coming into the Event Management console.

Issue the “opreload” command on the NSM Event management Console to refresh the NSM Event Message Records and Actions that are stored in memory after creating the previous NSM Message and Action rules.

Example 1: “cawto” formats for Generating and Updating a New Request

Use the following cawto format for generating a New Request:

```
CAWTO -n <NSM-server-name>  
CFNEW;%STRING1=KEYWORD1;%CUSTOMER=ServiceDesk;%SUMMARY=Photos  
required;%CATEGORY=Applications;%DESCRIPTION=Description: Photos required  
Justification: required by regulations for entry
```

Use the following cawto format for updating a Request:

```
CAWTO -n <NSM-server-name>  
CFUPDATE;%STRING1=KEYWORD1;%STATUS=Closed;%SUMMARY=Cancelled by ServiceDesk
```

Example 2: Alternative “Cawto” formats for Generating and Updating a New Request

Use the following alternative cawto format for generating a New Request:

```
CAWTO -n <NSM-server-name> CFNEW2;%EVENT_TOKEN=KEYWORD2;%SUMMARY=Server  
Installation Approved;%STATUS=Work in  
Progress;%CATEGORY=Hardware;%DESCRIPTION=Install new server and level V drops to  
existing server location within the data center. Also, install wiring on patch  
panel in router cabinet
```

Use the following alternative cawto format for updating a Request:

```
CAWTO -n <NSM-server-name>  
CFUPDATE2;%EVENT_TOKEN=KEYWORD2;%STATUS=Closed;%SUMMARY=Closed by Server Team
```

Sample Files to Use with the Integration

The following sample files are available for your use when integrating CA NSM and CA SDM:

- [topology.cfg](#) (see page 204)
- [tngifilter_rule.dat](#) (see page 204)
- [tngwriter_rule.dat](#) (see page 204)

topology.cfg

```
# <remote_node>:uniconv uniconvert <IP_ADDR_tngfilter>:tngfilter uni
<IP_ADDR_tngcnv>:tngcnv tngcnv <IP_ADDR_tngfilter>:tngfilter tng
<IP_ADDR_tngfilter>:tngfilter filter_nxd <IP_ADDR_tngwriter>:tngwriter -
<IP_ADDR_tngwriter>:tngwriter ehwriter - -
```

where:

<IP_ADDR_tngcnv>

The IP Address of the server that is running the CA NSM Event Converter process.

<IP_ADDR_tngfilter>

The IP Address of the server that is running CA SDM.

<IP_ADDR_tngwriter>

The IP Address of the server that is running CA SDM.

tngfilter_rule.dat

Use the default version of this file, with no changes.

tngwriter_rule.dat

The tngwriter_rule.dat displays as follows:

```
# evt
id:::dev:::user:::majorSrc:::minorSrc:::action:::template:::cmd:::log:::event_tok
en:::user_parms
```

where:

event id

The string or sed-style regular expression.

device

The string, sed-style regular expression, or '*' or empty.

user

The string, '*', or empty.

majorSrc

The string "uni" from uniconverter, or "tng" from tng converter.

minorSrc

The string or '*'.

action

The action options. The following options are available:

CR_CREATE

Write a new request for each event

CR_UPDATE

Updates an existing request or requests (if any exists) or creates a new request if no requests are found. By default, requests are located by matching on the log_agent and affected_resource (asset) fields. The user can override the defaults by specifying a list of any call request attributes.

CR_UPDATE_ONLY

This is like CR_UPDATE except that a new request is never created when no matching requests are found.

COMMAND

Executes <cmd>, identified in the cmd description in this table.

template

Specifies the name of a request template to use to create a request. This parameter is not required and is ignored if the action is not CR_CREATE.

Note: The request template must be created before the rule is defined.

cmd

The command passed to the shell—ignored on all but COMMAND action.

logging

The logging options, as shown by the following:

NONE

No logging (other than error logging).

SYS

Log incidents to the UNIX syslog (Unicenter message console).

PDM

Log incidents to application log (\$NX_ROOT/log).

BOTH

Log incidents to application log and syslog.

event_token

(Optional). This is a 30-character user defined tag that is used to identify a specific request associated with an event_id (tng event message) or all messages like an event_id (for example, a wildcarded event_id).

event_token is a request attribute that is stored in every request generated by the TNG interface. If no event_token is specified in the writer rule, the string "tng_generated" is used. This allows the user to update all requests that match the event_token attribute. For example, two different messages for the same asset can now update unique requests. Each CR_UPDATE writer rule specifies the unique message parts and a unique event_token. The event_token is used to find and update the matching request. By default, an activity log containing the message is added to the matching request.

In another example, the user can update the status attribute (such as, set status=CL (closed)) in an existing request by specifying the same event_token in the CR_UPDATE writer rule that was used when the request was created using a CR_CREATE writer rule.

user_parms

(Optional) This contains the following three types of information:

- Request attribute values
- List of request attributes to match on when updating existing request records
- Special parameter names that are replaced with their corresponding value from the TNG event structure

The request values and the list of attributes are specified using a %<KEYWORD>=<value> syntax. If you use multiple keywords/value pairs, you must separate each by a semicolon (";").

Request attribute values are specified using the syntax %<ATTRIBUTE>=<value>, where ATTRIBUTE is an attribute name identified in the text_api.cfg (located in \$NX_ROOT/site directory), which maps to an AHD majic request attribute.

The syntax for the list of attributes to match is specified as %SEARCH=<attribute1>[,<attribute2>...], where SEARCH is a fixed keyword and attribute1 (and so on), are ATTRIBUTE names specified in the text_api.cfg.

The following special parameter names can be used anywhere in the user_parms string:

&Message

The message text associated with this CA NSM message.

&Parm

The AHD.DLL Parm field on the CA NSM Message Action dialog.

&Uuid

The TNG universally unique identifier.

&Device

The device (for example, hostname) that generated the CA NSM message.

&Majorsrc

The major type of source directing events to the event writer. For events from CA NSM on Windows, the value is "tng". For events from CA NSM on UNIX, the value is "uni".

&Minorsrc

The minor type of source directing events to the event writer.

&Node

The device (for example, hostname) that generated the CA NSM message.

&Addr

The IP address of the host that generated the CA NSM message.

&Username

The user name on the host where the CA NSM message was generated.

&Date

The integer number representing the time since 1970 when the CA NSM message was generated.

&Time

The date and time of the CA NSM message. For example, Tue Jul 4 10:23:37 2000.

&Severity

The severity of the CA NSM message.

&Tag

The tag data associated with the CA NSM message.

As an example, using the examples outlined in Sample 2: Alternative “Cawto” formats for Generating and Updating a New Request the default Event Writer Rules file should be changed from:

```
*:::.*:::.*:::.uni:::.*:::.CR_CREATE::::::::::NONE
```

To the following:

```
CFNEW.*:::.*:::.*:::.tng:::.*:::.CR_UPDATE::::::::::NONE::::::::::&Parm;%SEARCH_EXPLICIT=STRING1
CFNEW2.*:::.*:::.*:::.tng:::.*:::.CR_UPDATE::::::::::NONE::::::::::&Parm;%SEARCH=Event_Token
CFUPDATE.*:::.*:::.*:::.tng:::.*:::.CR_UPDATE_ONLY::::::::::NONE::::::::::&Parm;%SEARCH_EXPLICIT=STRING1
CFUPDATE2.*:::.*:::.*:::.tng:::.*:::.CR_UPDATE::::::::::NONE::::::::::&Parm;%SEARCH=EVENT_TOKEN;%STATUS=CL
```

Note: The %SEARCH_EXPLICIT parameter is used to ensure that when an update is performed, the search looks for a matching Request by comparing the contents of the STRING1 field before proceeding with the update. For more information about text_api.cfg and how CA SDM uses the Text API to create requests from CA NSM, see the *Administration Guide*.

More information:

[Event Writer Rule Definitions](#) (see page 182)

How to Install CA EEM

Note: Before you install this component, verify and read the information about how to plan for a successful installation.

CA SDM r12.9 provides CA EEM r12 CR2 on the installation media. CA EEM authenticates and authorizes users of CA Technologies products such as CA Workflow and CA Service Management. Authentication means that a user ID and password, or other information, verify that the user is a valid product user. Authorization means validating that the logged-in user can access particular functionality in the product.

Each time a user tries to log in, CA EEM must authenticate their information; when authenticated, access is either granted or denied. For example, a user must have a CA EEM user record to access the CA Workflow IDE or Worklist application. If you use CA Workflow in CA SDM to manage your business processes, first start and run the CA EEM installation on a supported operating environment. Then, immediately install CA Workflow.

Important! If you have an existing CA EEM installation that you can use to authenticate CA Technologies products, do not install CA EEM again. Instead, install the CA Technologies products and reference your existing CA EEM installation. However, you need a minimum of CA EEM r8.4 SP4 CR05 before integrating with CA SDM r12.9.

More information:

[CA EEM and CA Workflow Installation Planning](#) (see page 107)

[Install CA EEM \(Windows\)](#) (see page 209)

[Install CA EEM \(UNIX\)](#) (see page 211)

Install CA EEM (Windows)

You can start and run the CA EEM installation on a supported operating environment.

Important! If you have an existing CA EEM installation that you can use to authenticate CA Technologies products, do not install CA EEM again. Instead, install the CA Technologies products and reference your existing CA EEM installation. However, you need a minimum of CA EEM r8.4 SP4 CR05 before integrating with CA SDM r12.9.

To install CA EEM

1. (Optional) Verify that you have installed the Java Runtime Environment (JRE) 1.5 and have set the JAVA_HOME variable.

Note: You can skip this step in CA EEM 8.4 or later, but a warning appears saying that you cannot integrate CA SiteMinder and SAML.

2. Insert the installation media into your drive.

Important! If your computer does not have an appropriate drive for the installation media, copy the media content to the computer on which you want to install CA SDM. Then, start the installation. For a remote installation over the network, you can share a drive or folder on the network, and then connect over the network to start the installation.

3. Click Select Language.

The Installation Menu appears.

Note: If the Installation Menu does not automatically appear, start the installation by double-clicking the setup.exe file, located at the root of the installation media.

4. Click the Product Installs tab.
5. Click CA Embedded Entitlements Manager.
6. Continue following the on-screen instructions to complete the CA EEM installation.

CA EEM is installed and you can install other CA Technologies products.

Note: From CA SDM r12.9, both CA EEM 32-bit and 64-bit installers are shipped. On a 32-bit windows computer, CA EEM runs as a 32-bit application and on a 64-bit computer, CA EEM runs as a 64-bit application.

But if CA iTechnology iGateway is running as a 32-bit application on a 64-bit Windows computer, then CA EEM also runs as a 32-bit application.

More information:

[CA EEM and CA Workflow Installation Planning](#) (see page 107)

Configure CA EEM SDK in FIPS Compliance Mode

When you configure the CA EEM server in Federal Information Processing Standard (FIPS) compliance mode, we recommend you to configure the CA EEM SDK in FIPS compliance mode.

Follow these steps:

1. Navigate to the NX_ROOT/pdmconf/eiam.config file.
2. Change the FIPS setting of the CA EEM Java SDK to ON.
3. Save the eiam.config file.

Note: The FIPS setting of CA EEM C++ SDK sets to ON by default. For more information about how to configure CA EEM SDK in FIPS compliance mode, see the CA EEM documentation.

Install CA EEM (UNIX)

CA EEM for Linux and UNIX uses a self-extracting shell script that guides you through the installation process. During the installation process, the script displays the license information and prompts for installation parameters. After the installation parameters are entered, the installation begins.

Important! If you have an existing CA EEM installation that you can use to authenticate CA Technologies products, do not install CA EEM again. Instead, install the CA Technologies products and reference your existing CA EEM installation. However, you need a minimum of CA EEM r8.4 SP4 CR05 before integrating with CA SDM r12.9.

To install CA EEM

1. Execute the appropriate installation script on the target computer:

- (Linux) /lnxsvr.cd1/ca_tps.lnx/EEM/EEMServer.bin -i console
- (AIX) /aixsvr.cd1/ca_tps.aix/EEM/EEMServer.bin -i console
- (Oracle) /solsvr.cd1/ca_tps.sol/EEM/EEMServer.bin -i console

The file decompresses and the installation begins.

2. Enter Y to accept the Terms and Conditions of the license agreement (or N to decline and abort the installation).

The script prompts for the installation parameters.

3. Enter the installation path for the CA EEM (or accept the default).

A confirmation screen appears with the installation parameter values you entered.

4. If the information about the confirmation screen is correct, enter Y to continue the installation. If you Enter N, the installer exits.

5. Enter the EiamAdmin password.

Note: The default administrator username is EiamAdmin.

The installation procedure depends on the command-line parameters and the type of CA EEM package being installed.

The installer script completes the installation of CA EEM on your computer.

How to Install CA Workflow

Note: Before you install this component, verify and read the information about how to plan for a successful installation.

Important! CA Workflow is not bundled with CA SDM r12.9 installation media. If you want to use CA Workflow, download the CA SDM r12.7 ISO from from CA Support Online and then install CA Workflow.

Each time a user tries to log in to CA Workflow, CA EEM authenticates their information, and when authenticated, access is either granted or denied. A user must have a CA EEM user record to access the CA Workflow IDE or Worklist.

After you have installed CA EEM, start and run the CA Workflow installation on the CA SDM server to manage your business processes.

Important! If you install CA Workflow, and then uninstall CA SDM, CA Workflow is also uninstalled.

CA Workflow logs (*pdm_install_wf.log* and *pdm_tomcat_CAWF.log*) are located in *\$NX_ROOT/log*. If the CA Workflow install is successful, *\$NX_ROOT/site/Workflow/log* contains *wf_admin.log*, *wf_process.log*, *wf_security.log*, and *wl_debug.log*.

More information:

[CA EEM and CA Workflow Installation Planning](#) (see page 107)

[Install CA Workflow \(Windows\)](#) (see page 212)

[Start and Stop CA Workflow](#) (see page 259)

[Install CA Workflow \(UNIX\)](#) (see page 213)

Install CA Workflow (Windows)

Use CA Workflow to manage your business processes in CA SDM.

Follow these steps:

1. Log in to the following CA SDM server, depending on your CA SDM configuration:
 - Conventional: Primary or secondary server
 - Advanced availability: Any of the application servers
2. Download and extract the r12.7 ISO from CA Support Online.
3. Select your language from the list, click Select Language.

The Installation Menu is displayed.

Note: If the Installation Menu does not automatically appear, start the installation by double-clicking the setup.exe file, located at the root of the installation media.

4. Click the Product Installs tab and click CA Workflow.
5. Continue following the on-screen instructions to complete the CA Workflow installation.

CA Workflow is installed and you can configure it for use with CA SDM.

More information:

[How to Configure the Problem Management Sample Workflow](#) (see page 266)
[CA Workflow Integration](#) (see page 573)

Install CA Workflow (UNIX)

Use CA Workflow to manage your business processes in CA SDM.

Follow these steps:

1. Log in to the following CA SDM server, depending on your CA SDM configuration:
 - Conventional: Primary or secondary server
 - Advanced availability: Any application server

2. Download and extract the r12.7 ISO from CA Support Online.

3. Navigate to the root directory of the extracted ISO and start the installation by running the following command:

```
sh ./setup.sh
```

4. Select your language from the list, click Select Language.

The Installation Menu is displayed.

5. Click the Product Installs tab and click CA Workflow.

6. Continue following the on-screen instructions to complete the CA Workflow installation.

CA Workflow is installed and you can configure it for use with CA SDM.

More information:

[How to Configure the Problem Management Sample Workflow](#) (see page 266)
[CA Workflow Integration](#) (see page 573)

Install Standalone CA Workflow IDE

You can install the CA Workflow IDE standalone client from the CA SDM installation media on Windows or Linux. For UNIX installations, this client allows connection to the UNIX CA Workflow server. You can point to any CA Workflow server install regardless of operating environment by changing the URL in its login GUI.

CA SDM is not required to install CA Workflow IDE. The location of the installation log is different on systems with and without CA SDM.

- If CA SDM is installed on Windows or Linux, the log is located in the following location:
`$NX_ROOT/Logs`
- If CA SDM is not installed, the log is located in the following temporary folders:

Windows

`%temp%`

Linux

`/tmp`

Follow these steps:

1. Open the CA SDM r12.7 installation media and select CA Workflow IDE.
The CA SDM Component Installer Wizard is displayed.
2. Specify the Workflow Client Install Location and click Next.
The installation is complete.

Verify the CA Workflow IDE Installation

You *must* verify that the CA Workflow IDE installation completed successfully.

To verify the CA Workflow IDE installation

1. Navigate to the directory specified in the Workflow Client Install Location field in the CA SDM Component Installer Wizard.
2. Verify that the directory contains the following:
 - Folders named "Client" and "uninstall"
 - Files named *version.txt* and *wekinstall.log*

Note: If there are errors in the installation or if the folders and files are in the incorrect locations, view `pdm_install_wf_client.log`.

On Windows, you can launch CA Workflow IDE from the Start Menu by selecting Programs, CA, Service Desk Manager, CA Workflow IDE.

Uninstall the CA Workflow IDE Client (Windows and Linux)

Follow these steps:

1. Run the following command:

```
<install_location>/jre/bin/java" -cp  
"<install_location>/uninstall/uninstall.jar" run -silent
```

install_location

Specifies the root folder where the CA Workflow IDE client was installed.

■ Windows Example

If "c:\test" was the root folder where the CA Workflow IDE client was installed:

```
"c:\test\jre\bin\java" -cp "c:\test\uninstall\uninstall.jar" run -silent
```

■ Linux Example

If "/test" was the root folder where the CA Workflow IDE client was installed:

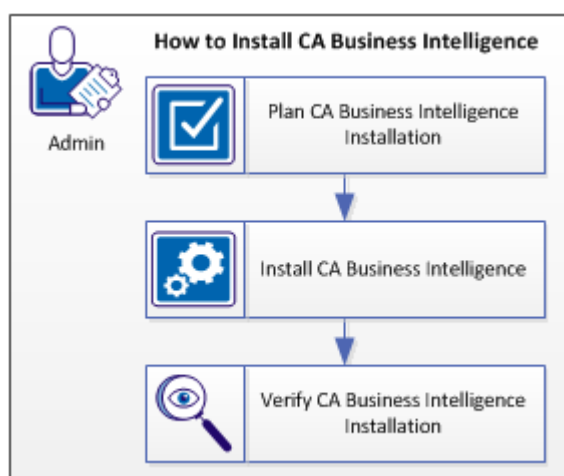
```
"/test/jre/bin/java" -cp "/test/uninstall/uninstall.jar" run -silent
```

2. Delete the root folder where CA Workflow IDE client was installed.
3. (Windows) Delete the associated start menu shortcut.

How to Install CA Business Intelligence for CA SDM

CA Business Intelligence (CABI) provides a consistent installation of SAP Business Objects Enterprise edition. Multiple CA products can share a license of CABI. You can install CABI as a part of CA SDM installation.

The following diagram shows how to install CABI:



Follow these steps:

1. [Plan CA Business Intelligence Installation.](#) (see page 216)
2. [Install CA Business Intelligence.](#) (see page 217)
3. [Verify CA Business Intelligence Installation.](#) (see page 218)

Plan CA Business Intelligence Installation

Review the following considerations before you plan to implement CABI for CA SDM:

- Understand the requirements and installation considerations for CABI. For more information, see the *CA Business Intelligence Release Notes* and *CA Business Intelligence Implementation Guide*.
- Temporarily disable any antivirus software on the computer where you are installing CABI.
- The CA SDM integration with CABI only supports Apache Tomcat as the CABI application server.
- Determine the location of the components that you want to install. These components include the specific subnet, computer, database, security, or cluster systems that are required to run your system.
- Verify the following prerequisites for the installation:
 - The database server details and the authentication details are available.
 - You have the permission to install a new SQL Anywhere database or to use an existing SQL Anywhere database.
 - You have the name for Server Intelligence Agent (SIA).
 - The web application server has been installed and configured.
 - The installation checklist for the selected operating system

Note: CABI installation is limited to Windows platforms. You can, however, integrate CABI with CA SDM on all supported operating systems.

Install CA Business Intelligence

You can install the CA Business Intelligence r3.3 on a standalone server using express or custom mode.

Note: For the advanced availability configuration, CA Business Intelligence must be installed on a separate server.

Express Installation

Use the express installation to install CA Business Intelligence with all of the required and optional components.

Follow these steps:

1. Insert the installation media DVD 2 into your drive.
The Installation Menu opens.
2. Select your language from the Select Language list.
The Installation Menu opens.
3. Click the Product Installs tab.
4. Click CA Business Intelligence Installation.
5. Continue following the on-screen instructions to complete CA Business Intelligence installation.

Note: For more information, see the *CA Business Intelligence Implementation Guide*.

6. Restart your computer when you are prompted.
7. CA Business Intelligence supports the entire range of performance management, reporting, querying, and analysis applications. You must install the CA Business Intelligence R3.3 SP1 (CABI 3.3 SP1 is a patch release which is equal to SAP BOXI 3.1 SP6 patch release) patch to complete the CA Business Intelligence installation. To download and install the patch, open the following link:

`ftp://ftp.ca.com/pub/CABI/CABI-3.x/boeXIR3_SP6/Windows/`

Note: For more information about installing the patch, see the *CABI 3.3 SP1 Release Notes*.

8. Upgrade CA Business Intelligence R3.3 SP1 patch to support JDK7. For more information, see the *Upgrading CABI 3.3 SP1 JDK to 7.pdf* document from the `cabi-windows-boeXIR3_SP6\Docs` folder.
9. Apply the `cabi33sp1hotfix` patch from the following location:

`ftp://ftp.ca.com/pub/CABI/CABI-3.x/boeXIR3_SP6/Windows/`

Note: Use the `readme.txt` for instructions on how to apply the patch.

You have installed CA Business Intelligence.

Custom Installation

You can use the Custom Install option to install the selected components of CA Business Intelligence. We recommend this option only when you are familiar with the specified SAP BusinessObjects Enterprise components and the roles. The custom installation varies with the choice of operating system and databases. For more information, see the *CA Business Intelligence Implementation Guide*.

Verify CA Business Intelligence Installation

Verify CABI installation on the CABI server to ensure that the product has been installed properly.

Follow these steps:

1. Select Start, Programs, BusinessObjects, BusinessObjects Enterprise, BusinessObjects Enterprise Java Infoview.
2. Log in to the Infoview by providing the Administrator password. A successful login indicates the successful installation of CABI.

Verify the Installation

After you install CA SDM, use the following information to verify that the installation was successful.

1. Verify that a system environment variable for the path is set for the product to the installation directory you specified. The default home directory is C:\Program Files\CA\Service Desk Manager.
2. Verify the following:
 - a. In the Control Panel (Add or Remove Programs), verify that an entry appears for the product.
 - b. From the Start menu, verify that the following options appear:
 - View the documentation.
 - Start the Configuration Wizard.
 - Start the Web Interface.
 - Contact Technical Support.
 - Start the Web Screen Painter.
 - Uninstall CA SDM.
3. Verify that you can start the Web Interface.

Important! If you cannot verify this information, the product has not been installed correctly. In this case, start the CA SDM installation again to modify the installation.

More information:

[Start the Web Interface](#) (see page 229)

The Install Log

When you install CA SDM, an installation log file is created to document and list the actions, events, and system changes that occurred during the installation. If the product does not install correctly, you can view the errors in the log file to help fix problems so the product installs correctly.

You can find the *ServiceDesk_r12_7_Install.log* file in the \log folder of the installation directory. For Remote Components installations, the log is located in the %TEMP% directory. Open the file with a text editor such as Notepad or the vi editor.

Note: If you cancel the installation before it is finished, the installation log is created on your desktop (Windows) or on the root directory (UNIX and Linux).

Chapter 5: Configuring

This section contains the following topics:

[Product Configuration](#) (see page 221)
[Configure the CA SDM Components](#) (see page 222)
[How to Configure the Web Interface](#) (see page 225)
[How to Implement CA Business Intelligence for CA SDM](#) (see page 230)
[How to Configure Integrated Windows Authentication for CA SDM](#) (see page 249)
[Run the Automated Policies](#) (see page 253)
[Run the Knowledge Report Card](#) (see page 254)
[Knowledge Management Sample Data Import](#) (see page 255)
[Search Engine Configuration](#) (see page 255)
[How to Configure CA Workflow](#) (see page 258)
[How to Configure CA Process Automation Workflow Integration](#) (see page 272)
[Set Up Automatic Login \(CA MDB Authentication\)](#) (see page 278)
[Configure Single Point of Entry](#) (see page 279)
[How to Implement Multi-Tenancy](#) (see page 280)
[How to Enable Auto-Failover](#) (see page 315)

Product Configuration

After you install CA SDM and any additional products you select, there are configuration steps that you must complete so that the products work together correctly. To configure the product, complete the following steps:

- Configure the CA SDM components (servers, the database, the web interface).
- Configure the web interface when the web server and primary server are on different computers.
- Configure Support Automation.
- Implement Knowledge Document Life Cycle Reports for Automated Policies.
- Configure CA Business Intelligence.
- Configure CA Workflow.
- Implement multi-tenancy

Note: For configuring servers for advanced availability configuration, see the scenario [How to Configure Servers for Advanced Availability](#).

Configure the CA SDM Components

If you do not configure CA SDM during the installation, or if you manually configure the product after installation, you can use the product to configure the primary and secondary servers, the database, the web interface, and additional configuration options.

To verify that you can successfully configure the product and components on SQL Server, enable TCP/IP on the computer on which you want to perform the installation and configuration.

Important! CA SDM r12.9 does *not* provide tools.jar and javac for AIX. You *must* install tools.jar on AIX before you run the product configuration. Configuring REST Web Services and Support Automation requires the tools.jar file. To use the REST sample files, you must install javac on AIX. You can download the Java SDK for AIX from the IBM website in the IBM Developer kits section for Linux. Download the 32-bit binaries of Java SE and install JDK 1.6 SR10 on the AIX computer at any location. Copy tools.jar from the installed JDK location to <Shared Component>\JRE\1.6.0_10\lib and copy javac to \JRE\1.6.0_10\bin. You can also find the JRE location in the NX_JRE_INSTALL_DIR variable.

Note: If Internet Protocol Version 4 (IPv4) and Internet Protocol Version 6 (IPv6) hosts coexist on the network, verify the appropriate transition strategies, tools, and mechanisms to support these technologies are in place before you start the server configuration. For information about configuring servers, see the *Administration Guide*.

To configure the product components

1. Select Start, Programs, CA, Service Desk, Configuration.

The Configuration Wizard appears.

2. Enter and select the information to configure the product.

Note: For information about the fields that appear in the wizard, see the *Server Configuration Online Help*.

3. Continue following the on-screen prompts to complete the product configuration.

A default value that works for the TCP service number on most installations is displayed the first-time you run the configuration. To determine the TCP service number at your installation, open a telnet session from your Windows workstation to the server:

- If your network is using NIS, enter the following:

```
yycat services | grep slump.
```

The output includes a line similar to the following:

```
slump nnnn/tcp #This is required for slump to work!
```

- If your network is not using NIS, enter the following:
`grep slump /etc/services.`

The output includes a line similar to the following:

```
#slump nnnn/tcp
```

Enter the number *nnnn* in the TCP Service Number field.

Note: If configuration fails during the Validate Extension Tables step, database connectivity can be an issue. Run the configuration again, and verify that you provided the correct database connectivity information. For configuring servers for advanced availability configuration, see the scenario [How to Configure Servers for Advanced Availability](#).

Set Up the CA CMDB Audit Log

The object and trigger definitions, attributes, and html forms that CA CMDB uses for the audit log have changed in the product.

To set up the CA CMDB r12.9 audit log

1. Remove the `cmdb_write_audit_log_site` trigger if you have created `site/mods/extension.mod` (*extension* specifies the extension name).

In this release of the product, auditing is automatically created and enabled.
2. Add 'UI_INFO("AUDIT_LOG")' to each attribute that you want to log.
3. Use the new templates provided by the product to migrate your existing HTML forms.

Note: For more information about attributes and HTML forms, see the *Administration Guide*.

How to Integrate CA Cohesion ACM With CA CMDB

You can integrate CA Cohesion ACM with CA CMDB using a patch. Contact CA Support to obtain the patch specific for your release of CA CMDB and CA Cohesion ACM.

CA CMDB Visualizer Configuration on AIX

Valid on IBM AIX

CA SDM installs CMDB Visualizer by default on all operating environments. You can configure CA CMDB Visualizer if necessary. IBM AIX requires additional security policy files.

To configure CMDB Visualizer on IBM AIX

1. Verify that CMDB Visualizer is configured.
2. Download unrestricted policy files (version 1.4.2 or later) from the Unrestricted JCE policy files page at the IBM website

Note: Register on the IBM website to download the policy files.

3. Replace the local_policy.jar and US_export_policy.jar files in your Shared Components JRE directory (default location: /opt/CA/SC/JRE/1.6.0_10/lib/security) with the policy files that you downloaded from the IBM website.
4. Stop and start Visualizer using the following commands:

```
pdm_tomcat_nxd -c STOP -t VIZ  
pdm_tomcat_nxd -c START -t VIZ
```

CMDB Visualizer is configured on IBM AIX.

Modify Third-Party Scripts for CA CMDB Compatibility

For scripts in the current product release, the ext_asset attribute is renamed to ID. For CA CMDB compatibility with other CA Technologies products that use the ID attribute, you can modify third-party scripts that use CA SDM web services to update CA CMDB extension tables.

To modify third-party scripts for CA CMDB

1. Open the third-party script that you want to modify.
2. Replace all SQL references of ext_asset with ID.

The script is compatible with the current product release.

How to Switch the Target Server for CA CMDB Reports

Typically, a single CA Cohesion ACM system exports CI data to a single CA CMDB server to create CA CMDB reports. You can switch the target CA CMDB server for the export of CI data by doing the following:

1. Use a CA CMDB server as the target for exporting CI data, and run CA CMDB Reports.
2. Restart the CA Cohesion ACM Server service.
3. Switch to a different target CA CMDB server for exporting CI data, and run CA CMDB Reports.
4. (Optional) Repeat Steps 2 and 3.

How to Configure the Web Interface

When you install CA SDM, the *web interface* (commonly referred to as the *browser interface*) is automatically installed and you can configure the web interface as part of the installation.

Select the web server depending on the CA SDM configuration. Consider the following use cases:

- **Conventional:** No additional action is required when the web server and the primary server are on the same computer. But when you are using a web server and primary server is installed on a different computer, install and configure both primary and secondary server.
- **Advanced availability:** No additional action is required when the web server and the background server are on the same computer. But when you are using a web server and Background server is installed on a different computer, install and configure both background and application server. The web interface for end users is never hosted from the background server. The web interface must be hosted only on the application servers.

Select the computer on which the web server resides and where you plan to install and configure the web interface from the following CA SDM servers, depending on your CA SDM configuration:

- **Conventional:** Secondary server. Install this server after you install the primary server.
- **Advanced availability:** Application server. Install this server after you install the background server.

Important! By default, Tomcat is the default web server. If you want to use IIS as your web server, manually configure the product and select IIS. For information, see the *Server Configuration Online Help*.

To configure the web interface, complete the following steps:

1. (Required) Enable the web engine on the secondary server on Windows or UNIX.
2. (Required) [Configure the web interface](#) (see page 229).

You can then [start the web interface](#) (see page 229).

More information:

[Start the Web Interface](#) (see page 229)

[Configure the Web Interface](#) (see page 229)

Add Web Engines or Web Directors

Web engines connect to an object manager for processing all requests to CA SDM objects. Web directors are optional, and are used when two or more web engines are installed on a single server. You can configure web directors on any server. Depending on the CA SDM configuration, CA SDM installs a default web engine on the following servers:

- Conventional: Primary server.
- Advanced Availability: All servers.

Follow these steps:

1. Select Systems, Configurations on the Administration tab.

The Configurations List page opens.

2. Select the configuration to which you want to add the web engine or web director.

The Configuration Detail page opens.

Note: If you are changing the configuration for the first time, then create a configuration first. When you want to make a configuration change, always create or copy an existing one. This process allows you to revert to the previous configuration, if needed.

3. Select the Web Engines/Web Directors tab.

The Web Engine/Web Directors List page opens displays the web engines and web directors that are configured for the server.

- Conventional: A web engine exists by default on the primary server. You can add web directors to any server.
- Advanced availability: A web engine exists by default on all servers. You can add more web directors on any CA SDM server.

4. Click Add Web Engine/Web Director.

The Create New Web Engine/Web Director page opens.

5. Complete the following fields:

Important! Enter only English characters for all the input fields for any localized language.

Host Name

Specifies the host name for the web engine or web director. You can click Search to look up for the servers.

For an advanced availability configuration type, the host name is read-only and is automatically populated based on the host name you specified while creating the configuration.

Type

Specifies if you are configuring a web engine or web director. Based on the option that is selected, the relevant fields are automatically populated.

- Select Web Engine if you want to configure a web engine.
- Select Web Director if you want to configure a web director.

Note: Ensure that you have selected the appropriate option. You cannot edit the process type after you have saved the configuration.

Web Director

Specifies the web director that is assigned to the web engine. You can click Search to look up for the web directors added to the server.

Note: When implementing any web engine load-balancing scheme, SSL-Login, or both, at least two web engines must be assigned to the same web director.

CGI Name

Specifies the unique CGI name for the web engine. It is the name of an actual CGI executable when IIS or Apache is used as the HTTP server; it is a servlet parameter when Tomcat is used as the HTTP server.

Examples: (web engines) pdmweb1, pdmweb2, (web directors) pdmweb_d1, and pdmweb_d2.

Default: pdmweb.exe (The CGI name must be unique).

CGI Port Number

Specifies the port on which CA SDM web clients can connect. The CGI port number is the same port on which the tomcat server is running.

Default: 8080

Protocol

Specifies the protocol for accessing the web engine.

- Select HTTPS if the web engine is configured to handle all CA SDM web-client user authentication requests.
- Select HTTP if the web engine is configured to handle all web client non-user authentication requests (after user is authenticated through the secure login web engine).

Record Status

Specifies whether the web engine or web director is active or inactive.

Note: Before setting the record status of a web director to inactive, remove the link between the web director and the associated web engines.

Object Manager

Specifies the object manager that you want to assign to the web engine.

Default

Specifies that the default object manager is assigned to the web engine.

ANY

Specifies that the web engine can connect to any available object manager with more willingness value. Willingness value is the availability of the server to accept new clients. A willingness value of zero means that the web engine does not accept any sessions.

Choose

Allows you to specify an object manager for the web engine. Selecting this option provides you the option to add multiple object managers or aliases to the configuration.

6. Click Save.

The web engine or web director that you added appears in the Web Engines/Web Directors List.

Configure the Web Interface

If the default configuration specified for the web interface during the CA SDM installation does not meet your requirements, modify the *web.cfg* file, located in the *installation-directory\bopcfg\www* directory. Edit the file using a text editor that does not add formatting or control characters, such as Notepad or WordPad.

Each entry in the file consists of a single line containing a property name, optionally followed by a value. Lines beginning with a pound sign (#) are treated as comments and are ignored.

Note: For information about the entries in the *web.cfg* file, see the *Administration Guide*.

Start the Web Interface

Before you can start the web interface and use CA SDM, you must ensure that the Daemon Server services and the database server are started. If you have configured a secondary server (for example, if you have the web interface installed on a web server that resides on a different computer than the primary server), the Remote Daemon Proctor service must be running before you start the primary server service.

- (Windows) To start the services, start the Control Panel (Administrative Tools, Services). Then, right-click CA SDM Remote Daemon Proctor and select Start.
- (Linux) To start the services, open a command prompt and execute the *pdm_client* command.

After starting the services, you can start the web interface. How you start the web interface depends on whether the computer from which you start the web interface is a primary or secondary server, and whether you are using IIS. You can also start the web interface from an internal web site.

- To start the web interface, select Start, All Programs, CA, Service Desk Manager, Service Desk Manager Web Client.
- To start the web interface from a computer that is not the primary server or a secondary server, open a web browser and enter the following URL:

`http://servername:8080/CAisd/pdmweb.exe`

In this URL, *servername* is the name of the computer that is hosting the CA SDM web server.

- To start the web interface from a computer that is not the primary server or a secondary server, and you are using IIS as your web server, open a web browser and enter the following URL:

`http://servername/CAisd/pdmweb.exe`

- To start the web interface from an internal website, add `/pdmweb.exe` to the URL for your web pages. Use the following sample HTML code as a guide:

A `HREF=http://<server-name>:<port-no>/CAisd/pdmweb.exe`

In this URL, *server-name* identifies your computer and *port-no* is the port on which your web server is listening.

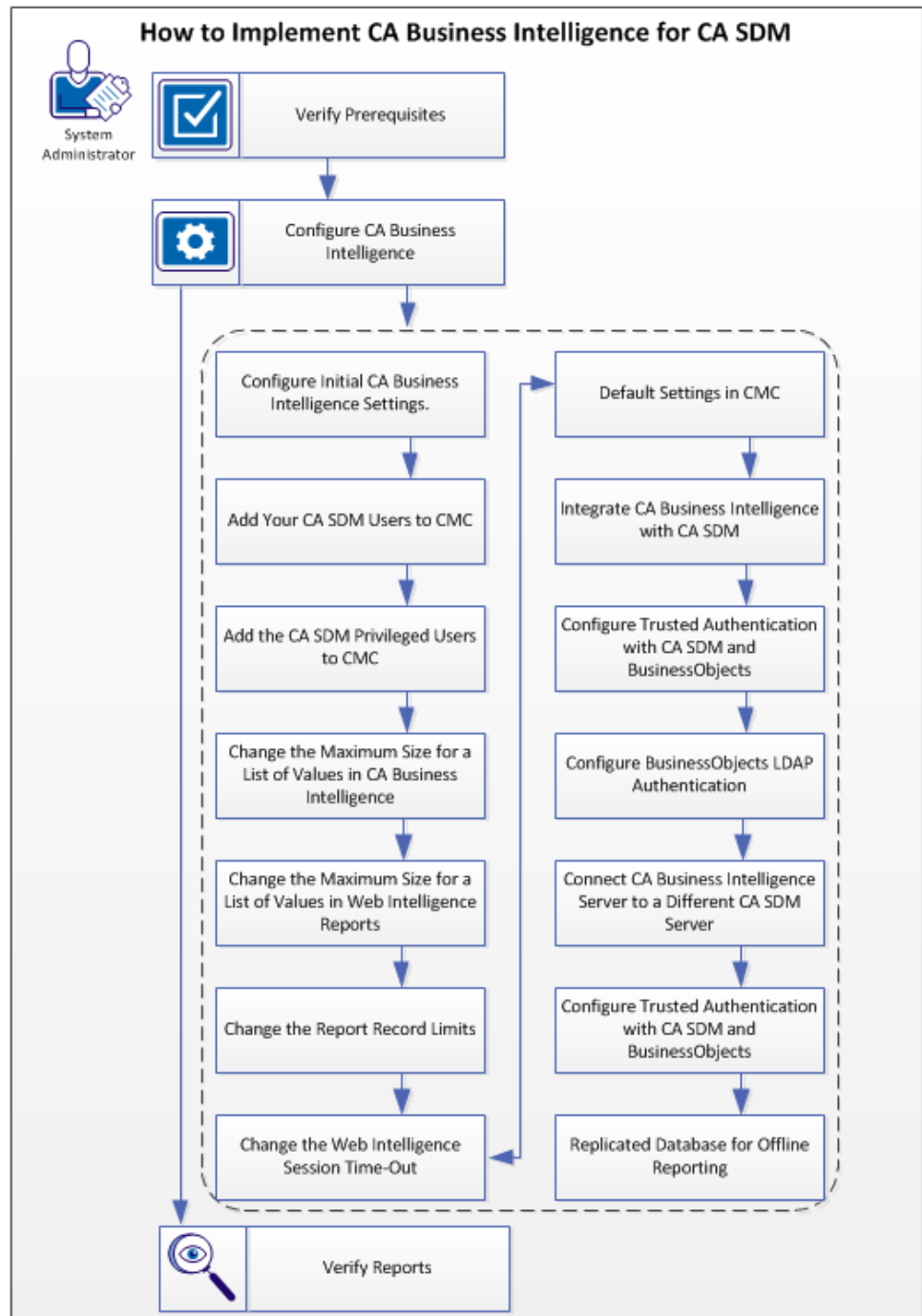
Note: If your Internet Explorer browser security is set to high, a content warning message appears when you start the web interface. To avoid this message, add the website to your trusted sites, or lower your security settings.

In advance availability, the default web interface is readily available with the default installation and configuration.

How to Implement CA Business Intelligence for CA SDM

CA Business Intelligence is a set of reporting and analytic software that CA SDM uses to present information and support business decisions. CA SDM uses CA Business Intelligence to integrate, analyze, and then present the information through various reporting options. To generate reports from CA SDM, you as an administrator must install, configure, and integrate CA Business Intelligence with CA SDM.

The following diagram shows how you can implement CA Business Intelligence for CA SDM:



Follow these steps:

1. [Review the Reporting Considerations.](#) (see page 232)
2. [Configure CA Business Intelligence.](#) (see page 232)
3. [Verify Reports.](#) (see page 248)

Verify Prerequisites

Review the following considerations before you plan to implement CA Business Intelligence for CA SDM:

- CA SDM r12.9 uses CA Business Intelligence version 3.3.
- The installation of CA Business Intelligence requires Central Management Server (CMS) installed on port 6400.
- The CA SDM users requiring access to reports must be added to the CMS Administrator list before using the reports.
- We recommend the SAP BusinessObjects users having an existing installation of BusinessObjects, to install and configure the CA Business Intelligence.
- If you are using Firefox to view the reports, see the *CA SDM Release Notes* to verify the recommended version.
- See the CA SDM Release Notes for the supported version of JRE.
- Crystal Reports Explorer and Desktop Intelligence are not supported with CA SDM.
- You have a separate server to install CA Business Intelligence if you are using advanced availability configuration.

Configure CA Business Intelligence

You can configure CA Business Intelligence after a successful installation. You perform mandatory settings to be able to generate reports from CA SDM. You require some mandatory configurations like Adding users and setting security parameters before integrating CA Business Intelligence with CA SDM.

Follow these steps:

1. Configure CA Business Intelligence Settings.
2. Configure Data Range Values and Join Parameters.
3. Add CA SDM Users and Groups.
4. Add the Default CA SDM Privileged User Account.

5. Modify Default Security and Web Intelligence Settings.
6. Integrate CA Business Intelligence with CA SDM.
7. Configure Trusted Authentication for BusinessObjects and CA SDM.
8. (Optional) Configure BusinessObjects LDAP Authentication.
9. (Applicable for the conventional configuration only) Connect the CA Business Intelligence Server to a different CA SDM Server
10. Change the maximum size for a list of values.
11. Change the Web Intelligence Session Time-Out Value.

Configure Initial CA Business Intelligence Settings

This step loads the CA SDM universe and reports, creates groups, and optionally creates one user for each group and establishes group authorizations.

Follow these steps:

1. Insert the installation media DVD 2 into your drive on the CA Business Intelligence server. If the Installation Menu does not automatically appear, start the installation by double-clicking the setup.exe file, located at the root of the installation media.

Note: If your computer does not have an appropriate drive for the installation media, copy the media content to the computer on which you want to install CA Business Intelligence. Then, start the configuration. For a remote configuration over the network, you can share a drive or folder on the network and then connect over the network to start the configuration.

2. Select your language from the list, click Select Language.

The Installation Menu appears.

3. Click the Product Installs tab.
4. Click CA Business Intelligence Configuration.
5. Complete the following fields on the CA Business Intelligence configuration:

BI Admin User Name

Specifies the user name of a CA Business Intelligence user who belongs to the Administrators group. The user name is Administrator for a newly installed CA Business Intelligence installation.

BI Admin Password

Specifies the password for the CA Business Intelligence administrative user.

Service Desk Admin User Name

Specifies the user name for the CA SDM Administrator.

Service Desk Admin Password

Specifies the password for the CA SDM Privileged user.

Create Default Users

Creates default groups and corresponding users in CA Business Intelligence.

If you installed CA Business Intelligence on a different computer than CA SDM, the following fields appear on the CA Business Intelligence configuration:

Service Desk Primary Host

Provide the host name of the CA SDM server depending on your configuration:

- For conventional: primary server.
- For advanced availability: application server.

ODBC Port

Specifies the port number of the CA SDM ODBC driver.

Recommended: 19987.

ODBC Install Location

Specifies the custom location for the ODBC installation when it is different from the default location.

6. Verify the CA Business Intelligence configuration.

Configure Failover Settings

This process is only applicable for advanced availability configuration. You can configure failover settings if multiple application servers are configured. You configure failover to redirect active user sessions to the other application server. You can also configure load balancing between multiple application servers.

Follow these steps:

1. Invoke the command prompt as an administrator.
2. Execute odbcad32.exe from the location C:\Windows\SysWOW64, on the CA Business Intelligence server.

The DataDirect OpenAccess SDK ODBC Driver Setup dialog opens.

Note: The specified path is valid for Windows 64-bit installation.

3. Enter the application server details in the General tab.
4. Enter the alternate application server details in the Failover tab with the following syntax:
(Host=AppServer1:Port=19987,Host=AppServer2:Port=19987,...)
5. Select Load Balancing to distribute the load among the server. The load is balanced between servers whose details are provided in the General tab and the servers whose details are provided in the Failover tab. The servers are picked randomly.
Note: Select Force SQL_DRIVER_NOPROMPT for failover or load balancing configuration.
6. Click Apply and OK.
You have configured the post configuration settings for the advanced availability configuration.

How to Configure Date Range Values and Join Parameters

After you install CA Business Intelligence, complete the following tasks:

- Configure the date range values so that the date range filters in CA Business Intelligence work correctly.
- Configure the join parameters so that universe outer joins are supported.

Follow these steps:

1. On the computer on which CA Business Intelligence has been installed, navigate to the following location:
C:\Program Files\CA\SC\CommonReporting3\BusinessObjects Enterprise 12.0\win32_x86\dataAccess\connectionServer\odbc\
2. Using a text editor, open the odbc.prm file, navigate to the <Configuration> section, and locate the following line to configure date range values:
<Parameter Name="USER_INPUT_DATE_FORMAT">{\d 'yyyy-mm-dd'}</Parameter>
3. Modify the line to include "hh:mm:ss am/pm" as shown in the following:
<Parameter Name="USER_INPUT_DATE_FORMAT">{\d 'yyyy-mm-dd hh:mm:ss am/pm'}</Parameter>
4. Locate the following line to configure join parameters:
<Parameter Name="EXT_JOIN">NO </Parameter>
5. Modify the line to replace NO with YES as shown in the following:
<Parameter Name="EXT_JOIN">YES</Parameter>

6. Locate the following line:

```
<Parameter Name="OUTERJOINS_GENERATION">NO</Parameter>
```

7. Modify the line to replace NO with FULL_ODBC as shown in the following:

```
<Parameter Name="OUTERJOINS_GENERATION">FULL_ODBC</Parameter>
```

8. Add the following three lines after the OUTERJOINS_GENERATION parameter:

```
<Parameter Name="LEFT_OUTER"></Parameter> <Parameter  
Name="RIGHT_OUTER"></Parameter> <Parameter  
Name="OUTERJOINS_COMPLEX">Y</Parameter>
```

9. Save the odbcc.prm file.
10. Restart the Business Objects Enterprise services.

Date range values and join parameters are configured. Date range filters work with CA Business Intelligence and universe outer joins are supported.

Add Your CA SDM Users to CMC

The CMC is an administrative utility that lets you control users' access to InfoView and other BusinessObjects applications. With CMC, you can assign security and user access permissions to folders and documents.

Note: During the configuration phase, an optional check box indicates whether sample users are added to the CMC. If you selected this option, your CMC contains several sample users. You can use these samples as models when defining user permissions and authentication options for your reporting environment. For more information about sample users, see the *Administration Guide*.

Follow these steps:

1. From the Start menu on the CA Business Intelligence server, select BusinessObjects XI Release 3.1, BusinessObjects Enterprise, BusinessObjects Enterprise Central Management Console.

The CMC Management Console page opens.

2. Type the privileged user name and password.
3. Select Enterprise in the Authentication Type list.
4. Click Log On.

The CMC Home page opens.

5. Click Users and Groups in the Organize section of the CMC home page.
6. Click Manage, New, New User.

The New User dialog opens.

7. Select Enterprise from the Authentication Type list.
8. Under Account Name, specify the CA SDM User ID.

9. On the Properties tab, specify your password information and settings as follows:

Password

Enter the password and confirm. This password should match the CA SDM user's password. The maximum password length is 64 characters.

This password must be mixed-case, at least six characters long, and cannot contain the word administrator in any form. It should also contain at least two of the following character types:

- Uppercase
- Lowercase
- Numeric
- Punctuation

Password never expires

Select the check box.

User must change password at next logon

This check box is selected by default. If you do not want to force users to change the password the first time they log on, clear the check box.

10. To restrict data access for the reports with data partition or tenancy constraints, select the Enable Database Credentials for Business Objects Universes check box. In the fields that display, specify the user's CA SDM account name and password, and then confirm the password.
11. Click the Actions, Members Of to specify the groups the user should belong to.
12. Click the Join Group to view the available groups. By default the user is a member of the Everyone group.
13. In the Available groups area, select one or more additional groups.
14. Click the > arrow to add the group(s).
15. Click OK.

The Members Of dialog appears and lists the groups in which the user is a member.

Note: For more information about adding users and groups and configuring data partitions security, see the *Administration Guide*.

Add the CA SDM Privileged User to CMC

The CA SDM Universe connection is configured by default to use the CA SDM User and Password when accessing data. This user account is added to the CMC as a new CA Business Intelligence user. You need this user if you plan to set up data partition security for reporting and to test reports from the Reports tab. The Reports tab requires a user who is defined to both CA SDM and CA Business Intelligence.

Follow these steps:

1. Click Users and Groups management area of the CMC.
2. Under Account Name, select the CA SDM Privileged User account.
3. On the Properties tab, specify your password information.
4. Select the Enable Database Credentials for Business Objects Universes check box. In the fields that display, specify the privileged user's account name and password, and then confirm the password.
5. Click the Members Of tab to specify the group the privileged user belongs to.
6. Click the Join Group button to view the available groups.
7. In the Available groups area, select Administrators and CA Universe Developer.
8. Click the > arrow to add these groups.
9. Click OK.

The Member Of tab appears and lists the groups in which the user is a member.

Change the Maximum Size for a List of Values in CA Business Intelligence

When you install CA Business Intelligence, the maximum number of values that can be returned in a batch for a list of values in the Crystal reports is automatically set to 5,000 records from the database. For performance reasons, you can change the size so that the list of values returned to the user is in several batches of this size or less.

Note: For information about improving the performance of the Web Intelligence Report Server, see your BusinessObjects documentation.

Follow these steps:

1. Create the following registry key:

```
HKEY_CURRENT_USER\SOFTWARE\Business Objects\Suite  
12.0\CrystalReports\DatabaseOptions\LOV
```

Note: The created registry key overrides the settings of the HKEY_LOCAL_MACHINE\SOFTWARE\Business Objects\Suite 12.0\CrystalReports\DatabaseOptions\LOV registry key.

2. Add a string value as MaxRowsetRecords.

3. Set the value of MaxRowsetRecords to the maximum number of values that you want for the report. For example, a value of 2000 returns up to 2000 values in the lowest level of a cascading parameter.

Note: The value zero (Unlimited) does not work with BusinessObjects Enterprise or Crystal Reports Server. Whenever Crystal Report is accessed from InfoView it takes more time to populate the values if it is set to zero, i.e. maximum list of values..

4. Restart the affected service or application, as required.

Note: These registry keys do not affect the List of Values returned when a report is based on a Universe.

Change the Maximum Size for a List of Values in Web Intelligence Reports

When you install CA Business Intelligence, the maximum number of values that can be returned in a batch for a list of values in the Web Intelligence reports is automatically set to 5,000 records from the database. For performance reasons, you can change the size so that the list of values returned to the user is in several batches of this size or less.

Note: For information about improving the performance of the Web Intelligence Report Server, see your BusinessObjects documentation.

Follow these steps:

1. Log in to Central Management Console.
2. Click Servers.
3. Right click Web Intelligence Processing Server and select Properties.
4. Increase the value of Maximum List Of Values Size (entries).
5. Save and restart the Web Intelligence Processing Server.

Note: Setting large number for Maximum List Of Values Size (entries) may affect the performance of Web Intelligence. It is recommended to set the appropriate number according to the system performance.

Change the Report Record Limits

When you install CA Business Intelligence, the number of records that the server retrieves from the database when a user runs a query or report in Crystal reports is automatically set to 20,000 records. You can change the setting so users running reports receive the record sets they expect.

Note: For complete details about administrative tasks you can complete for the Crystal Reports Page Server, see your BusinessObjects documentation.

Follow these steps:

1. Using BusinessObjects Enterprise, log in to the Central Management Console.
2. Navigate to the page displaying the servers.
3. Click Crystal Reports Page Server.
4. On the Properties tab, change the setting for the Database Records To Read When Previewing or Refreshing a Report field to either unlimited records, or specify a specific record limit.
5. Click Apply.
6. Restart the Crystal Report Page Server.

The report record limit changes and is used when running reports.

Change the Web Intelligence Session Time-Out

Users have Full Control access to the Web Intelligence application by default.

The Web Intelligence application has a session time-out of 20 minutes by default. Unsaved reports are lost when the session times out and the user must log on again to use the application.

Administrators can modify the connection session time-out value using the Central Management Console (CMC).

Follow these steps:

1. Select Servers from the CMC Home page.
The Servers window opens.
2. Select Web_IntelligenceReportServer in the Server Name column.
3. Type the appropriate time-out value (number of minutes) in the Connection Time Out field.
4. Click Apply.

Your changes take effect after the server is restarted.

5. Click OK

The session time-out value is set.

Default Settings in CMC

Most of the reporting configuration is performed silently during the CA Business Intelligence installation. Reporting configuration involves the following actions:

- Setting up security
- Deploying reports
- Deploying universes
- Deploying program objects
- Configuring Web Intelligence settings

The administrator can log on to the BusinessObjects CMC and modify the default settings at any time. Users are authorized access based on the CA SDM group to which they belong.

Note: For more information about the BusinessObjects CMC, see the *CA Business Intelligence Implementation Guide*.

Integrate CA Business Intelligence with CA SDM

After you install CA Business Intelligence, update the Web Reporting options so CA SDM is properly integrated with CA Business Intelligence.

Follow these steps:

1. On the Administration tab, select Options Manager, Web Report.

The Option List appears.

2. Set the correct values for the following Web Report options:

bo_server_auth

Specifies which type of authentication you want to use for reporting. You can specify the following types of authentication:

- **secEnterprise**—(Default) Specify Enterprise Authentication as your authentication type when you prefer to create distinct accounts and groups in BusinessObjects for use with CA Business Intelligence, or when a user hierarchy has not been set up in a Windows NT user database, an LDAP server, or a Windows AD server.

Note: Before you use the secEnterprise option, [add your CA SDM report users](#) (see page 236) to the BusinessObjects Central Management Console (CMC). In the CMC, enter the same user names and passwords configured in CA SDM.

- secLDAP—Specify LDAP Authentication as your authentication type if you have already set up an LDAP directory server and want to use your LDAP user accounts and groups in BusinessObjects for use with CA Business Intelligence.

When you map LDAP accounts to BusinessObjects, users can access CA Business Intelligence with their LDAP user name and password. This setup eliminates the need to recreate individual user and group accounts within BusinessObjects.

- secWinAD—Specify Windows AD Authentication as your authentication type if you are working in a Windows 2000 environment and want to use your existing Active Directory user accounts and groups in BusinessObjects for use with CA Business Intelligence.
- secExternal—Specify External Authentication as your authentication type when you integrate the BusinessObjects authentication solution with a third-party authentication solution (for example, using JCIFS with Tomcat). This authentication type requires setting up Trusted Authentication in BusinessObjects to allow users to log on without providing their passwords.

Note: For information about alternative security options, see the *CA Business Intelligence Implementation Guide*.

bo_server_cms

Specifies the name of the Central Management Server (CMS) that is responsible for maintaining a database of information about your BusinessObjects that you use with CA Business Intelligence.

For the bo_hostname, use the hostname of the computer where CA Business Intelligence is installed. The default bo_cms_port is 6400.

Note: For detailed information about advanced server configuration options, see the *CA Business Intelligence Installation Guide*.

bo_server_location

Specifies the hostname of the computer where CA Business Intelligence is installed. Specify bo_hostname. CA SDM uses this URL for report URLs for requesting reports from the BusinessObjects server. The CMS location is specified by hostname and port.

Note: For detailed information about each option, see the *CA Business Intelligence Implementation Guide*.

3. Click Save, Refresh.

The Options Detail page is updated with your selection.

4. Click Close Window.
5. Stop and start the service named CA SDM Server.

The Web Reporting settings are correctly configured to work with CA SDM. You can now set up web-based reports.

Note: For information about setting up web-based reports, see the *Administration Guide*.

How to Configure Trusted Authentication with CA SDM and BusinessObjects

Trusted Authentication lets you use a simple form of Single Sign On when integrating CA SDM and CA Business Intelligence. With Single Sign On, users can log on to the system without providing a password more than once in a session.

Follow these steps:

1. Install and configure CA SDM.
2. Install and configure CA Business Intelligence.
3. Login to the CMC as Administrator.
4. Access the Central Management Console (CMC) to set up Trusted Authentication.
5. Create CA SDM contacts and BusinessObject users.
6. Install the CA SDM web report options and set the `bo_server_auth` option to Enterprise.

Note: For more information about `bo_server_auth`, see the *Online Help*.

7. Cycle the BusinessObjects Apache Tomcat.
8. Cycle the CA SDM server in Windows Services.

Configure Trusted Authentication in CA Business Intelligence

You configure trusted authentication for CA Business Intelligence by first editing the `web.xml` file.

Follow these steps:

1. Log in to CMC as Administrator and go to the Authentication management area.
The Enterprise page appears.
2. At the bottom of the page, select the Trusted Authentication is enabled option, and specify a text string in the Shared secret field.

Note: The shared secret is used to create a trusted authentication password.

3. Enter a time-out value for your trusted authentication requests.

Note: The time-out value determines how long the CMS waits for the `EnterpriseSession.logon()` call from the client application.

4. Click Update.

Trusted authentication is configured.

Configure Trusted Authentication in CA SDM

Configuring Trusted Authentication in CA SDM requires editing the `TrustedPrincipal.conf` file.

Follow these steps:

1. Open the `TrustedPrincipal.conf` file located in the following directory:
`NX_ROOT\bopcfg\www\CATALINA_BASE\webapps\CAisd`
2. Edit this line
`SharedSecret=<Shared Secret as entered in CMC>`
to reflect the following:
`SharedSecret=xxxx`
(where `xxxx` is the shared secret entered into the CMC in step 3)
3. Click Save.
4. Repeat the steps 1-3 for all configured application servers.
5. Recycle the CA Business Intelligence Tomcat server.

Trusted authentication in CA SDM is configured.

Note: You must configure trusted authentication in the CA SDM background server to launch reports from the background server URL.

Configure BusinessObjects LDAP Authentication

When configuring LDAP authentication, the LDAP Server Administration Credentials “cn” value must be the fully qualified name (First Name, Last Name). Configuring LDAP authentication allows you to map LDAP attributes to use the end-user logon name.

Important! The user Account Name for BusinessObjects must match the CA SDM contact User ID when configuring LDAP authentication.

Follow these steps:

1. Access the Authentication management area of the Central Management Console (CMC).
2. Double-click LDAP.

3. Enter the name and port number of your LDAP hosts in the Add LDAP host (hostname:port) field. For example, "myserver:123".
4. Click Add and then OK.
5. Select Custom for the server type from the LDAP Server Type list.
6. Follow the prompts in the CMS configuration wizard and complete the configuration.

BusinessObjects LDAP authentication is configured.

Note: For more information about configuring LDAP Authentication, see the *CMS Online Help* and the *BusinessObjects Enterprise Administrator's Guide*.

Connect CA Business Intelligence Server to a Different CA SDM Server

This is required to generate reports from another instance of CA SDM installed on a different server.

Follow these steps:

1. [Create an ODBC DSN for the CA SDM server](#) (see page 245).
2. [Connect the CA SDM universe to this CA SDM server](#) (see page 246).

Create an ODBC DSN for the CA SDM Server

Use the ODBC Data Source Administrator to create an ODBC DSN.

Follow these steps:

1. Start the Windows ODBC Data Source Administrator (Data Sources (ODBC)).
2. On the ODBC Data Source Administrator form, select the System DSN tab, and select Add.
3. On the Create New Data Source form, select the DataDirect OpenAccess driver, and select Finish.
4. On the DataDirect OpenAccess ODBC 32 Setup form, assign an ODBC Name and select Advanced.

The naming convention to use is casd_hostname. For example, if the hostname of the CA SDM server is MyServer, you would use casd_MyServer.

5. On the OpenAccess Database Configuration form, select Add.
6. On the OpenAccess Database Setup form, enter the following information:
 - Name—Specify casd_hostname.
 - IP Address—Specify the IP address of the CA SDM server.
 - Port—Specify 19987.
 - Type—Select SQL.

7. Click OK.
8. On the Open Access Database Configuration form, select OK.
9. On the DataDirect OpenAccess ODBC 32 Setup form, select casd_hostname from the Database drop-down list, and select OK.

The ODBC DSN is created.

Connect the CA SDM Universe to the Server

Use the Designer in BusinessObjects Enterprise to establish a connection.

Follow these steps:

1. From the Start menu, browse to BusinessObjects XI Release 3.1, BusinessObjects Enterprise, Designer.
2. Log in to the Designer with the following credentials.
 - System—Specify the hostname of the server where CA Business Intelligence was installed.
 - User name—Specify the name of the CA Business Intelligence administrative user (typically Administrator).
 - Password—Specify the password of the CA Business Intelligence administrative user.
 - Authentication—Select Enterprise.

The Designer window appears.

3. Click File, Import.

The Import Universe dialog appears.
4. Select the CA Universes folder from the drop-down list and then select the CA SDM universe and click OK.

Note: If this is the first time you are using Designer, you may first need to select Browse to select the CA Universes folder.

5. Click OK to the Universe successfully imported message.

The Universe window appears.
6. Select File, Parameters.

The Universe Parameters dialog appears.
7. On the Definition tab, click Edit.

The Login Parameters dialog appears.
8. Select Edit.

9. Select the ODBC DSN you created (casd_hostname) from the Data source name drop-down list and specify the CA SDM Privileged User and Password for User name and Password.
10. Click Next, Test Connection, and step through the Universe Connection dialogs that appear.
11. Click OK to finish.
12. Select File, Export
13. Select CA Universes from the Domain drop-down list.
14. Select Everyone from the Groups list.
15. Click OK.

The universe is exported and the connection to the server is established.

Replicated Database for Offline Reporting

To manage potential performance issues that may affect the reporting components installed with CA SDM, you can create a replicated database for offline reporting purposes.

Note: For more information about creating a replicated database for offline reporting, see the sample documentation and scripts delivered in the NX_ROOT\samples\reporting directory.

Verify Reports

To ensure that the reports are generated without any problem, verify the CA Business Intelligence configuration.

Follow these steps:

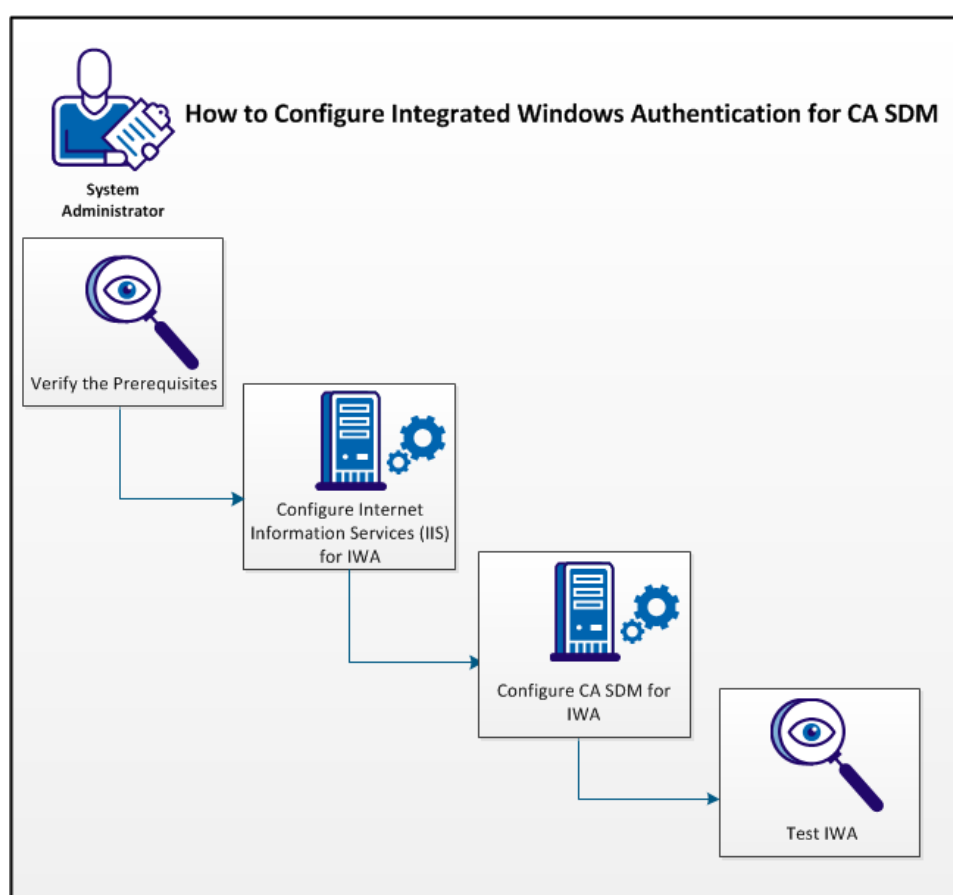
1. Click the Reports tab.
The Web Report page opens.
2. Click InfoView.
The Business Objects InfoView window opens.
3. Click the Document List link.
4. Expand Public Folders, CA Reports, CA Service Desk.
5. Select the Asset folder in the left pane.
6. Double-click the Asset List report.

The report returns with zero or more Results Found. CA Business Intelligence is now configured for CA SDM.

How to Configure Integrated Windows Authentication for CA SDM

As a system administrator, you can authenticate the CA SDM users through an existing external authentication method. This scenario describes the process to use Integrated Windows Authentication (IWA) to authenticate CA SDM users through Microsoft Active Directory (AD). When you configure CA SDM access types like administrators to use IWA, the users of the selected access types are directly authenticated through AD.

The following diagram illustrates how you can configure IWA for CA SDM:



To configure the IWA for CA SDM, complete the following tasks:

1. [Verify the Prerequisites](#) (see page 250)
2. [Configure Internet Information Services \(IIS\) for IWA](#). (see page 251)
3. [Configure CA SDM for IWA](#). (see page 252)
4. [Test IWA](#) (see page 252)

Verify the Prerequisites

Verify the following requirements before you configure the external authentication for CA SDM:

- You have configured servers for CA SDM.
- You have installed IIS 7.0 on the following server depending on your configuration:
 - Conventional configuration: primary server.
 - Advanced availability: application server.
- You have configured CA SDM to use IIS 7.0.
- You have the list of access types for which the external authentication is required. For example, CMDB Administrator, Employee, and CMDB User.

Configure IIS for IWA

You configure the IIS server to enable IWA. The configuration changes the authentication mode of IIS from Anonymous to Windows Authentication. After the configuration, the server starts redirecting authentication requests to the external source.

Follow these steps:

1. Log in as administrator to the following server depending on your configuration:
 - Conventional: Primary or secondary server.
 - Advanced availability: Background server.
2. Open the Administrative Tools, Internet Information Services Manager.
3. Expand the Server Name node, where Server Name is the name of the CA SDM server.
4. Expand Sites, Default Web Site, CAisd node.
The CAisd Home page opens.
5. Double-click the Authentication icon.
The Authentication Settings page opens.
6. Disable the Anonymous Authentication by clicking the existing Status value.
7. Enable the Windows Authentication by clicking the existing Status value.
8. Restart IIS to apply the changes.

You have configured IIS for IWA.

Configure CA SDM for IWA

You configure the IWA for each of the selected access types. After an access type is configured for the external authentication, CA SDM externally authenticates the contacts of that access type.

Follow these steps:

1. Log in to CA SDM as a system administrator.
2. Select the Administration tab, Security and Role Management, Access Types.
The Access Type List page opens.
3. Click the access type for which the external authentication is required.
The Update Access Type form opens.
4. Select the Web Authentication tab and select the Allow External Authentication check box.
5. Select an appropriate value from the Validation Type drop-down list. The following values require description:

No Access

Specifies that the selected access type is not allowed to access.

Open

Specifies that the access is open to all.

OS

Specifies that the CA SDM server operating system credentials are required to access CA SDM. If you have configured EEM, the login request would be redirected to the EEM server.

PIN

Specifies that the value of selected CA SDM contact record field is required for the authentication. For example, if you select Pin as Validation Type and select Contact_Number from the PIN Field drop-down, the contact number of the user will be required for the authentication.

Note: The Validation Type is not used for the IWA validation, but it is used when the user logs in through the CA SDM login form. The CA SDM Login page appears only when the user clicks the Logout link or when the credentials do not match with IIS credentials.

6. Click Save.
To configure the external authentication for other access types, repeat steps 1 through 6.

Test IWA

You test the IWA with a user id having the corresponding contact record in CA SDM. A successful login indicates that you have configured the IWA successfully.

Follow these steps:

1. Log in to the following server depending on your configuration, with a user id having the corresponding contact record in CA SDM:

- Conventional: Primary or secondary server.
- Advanced availability: Application server.

Note: If the LDAP options have been installed in the Options Manager, you can also create new contact in CA SDM from any Active Directory contact.

2. Launch the browser and enter the CA SDM URL.

The Service Desk Home page opens.

You have successfully configured the IWA.

Run the Automated Policies

In Knowledge Management, the Automated Policies feature provides a set of default automated policies that allow you to manage knowledge for your organization more efficiently and effectively. An automated policy describes the condition by which documents are flagged for correction and promoted to publication or retirement throughout the various stages of the document lifecycle process. For example, you can specify the "fix broken links" default policy that matches documents found in the knowledge base with broken links. The task of fixing the problem can be assigned to an analyst.

The Automated Policies List page contains the details of the policies you can manage. To display this page, select the Administration tab, Knowledge, Automated Policies.

Each policy contains a stored query that executes when documents are matched during processing. After processing completes, a Lifecycle Policy report appears on the CA SDM Scoreboard. To view a report, select Knowledge Documents, Automated Policies. From the scoreboard, the analyst can manage their own documents, and by default, the administrator can manage all documents for each role.

To implement the reports, you must run a batch process with the Automated Policies Scheduler. The scheduler runs on the following CA SDM server, depending upon the configuration and displays the data required to view the reports.

- Conventional:Primary or secondary
- Advanced availability: Background

When you are finished, run the [Knowledge Report Card](#) (see page 254).

To run the Automated Policies Scheduler

1. Select the Administration tab, browse to Knowledge, Automated Policies, Scheduling.

The Automated Policies Scheduler appears.

2. Complete the following fields:
 - **Last Updated**—Select the Run Calculation check box.
 - **Schedule**—Specify a date and time from which CA SDM performs the calculation and runs the policies.
3. Click Save.

Run the Knowledge Report Card

The Knowledge Report Card displays information about the knowledge contribution from each end user and provides feedback about which knowledge documents are most effective. You can use the information to improve the processes of creating knowledge documents and providing the best support to end users in your environment.

To run the Knowledge Report Card

1. Click the Administration tab.
2. Browse to Knowledge, Knowledge Report Card.

The Knowledge Report Card appears.

3. Complete the following fields and click Save.
 - **Last Updated**—Select the Run Calculation check box.
 - **Schedule**—Specify a date and time from which CA SDM performs the calculation and runs the Report Card.

Note: For information about using Automated Policies and the Knowledge Report Card, see the *Administration Guide*.

Knowledge Management Sample Data Import

Sample Knowledge data from Knowledge Broker and Knowledge Accelerators is provided for your use. If you decide you want to use the sample Knowledge data you must import the data into the Knowledge Management database.

Note: The sample files are not localized. Importing sample data does not work on localized environments.

For advanced availability, run ImportSampleData.bat or ImportSampleData.sh from the background server.

Windows installation

1. Go to \$NX_ROOT\samples\data and unzip SampleData.zip into the same directory.
2. From the command window, go to \$NX_ROOT/bin and run ImportSampleData.bat.

UNIX installation

1. Run the command `tar -xvf SampleData.tar` from \$NX_ROOT/samples/data.
2. From the command window, go to \$NX_ROOT/bin and run ImportSampleData.sh.

Search Engine Configuration

The EBR Search Engine installs with CA SDM by default.

Note: For more information about the search engine options, see the *Online Help*.

pdm_k_reindex—Knowledge Re-Index Utility

The Knowledge reindex utility, `pdm_k_reindex.exe`, is located under the Knowledge Management installation directory.

Note: Reindexing the documents in the knowledge base can be a time-consuming operation, depending upon the size of your database. We recommend that you run the Knowledge Reindex utility after all the changes have been added. For advanced availability configuration, you cannot execute the knowledge re-index utility during failover.

Important! On UNIX, the `LIBPATH` must be set before running several CA SDM utilities. Use `pdm_task` to set the `LIBPATH` before running a utility. For example, input "`pdm_task pdm_clean_attachments ...`".

Follow these steps:

1. Open the command prompt.
2. Enter the following command at the command prompt to run the knowledge reindex:

For example:

```
pdm_k_reindex
```

The following options are available with this command.

-D

Defines the debug mode, such as printing to the command window.

-v

Defines the verbose mode, such as printing to the stdlog file.

-i

Does not create table indexes in the reindex table after reindexing.

Note: Parameters with a dash as a prefix, such as "-D", must precede other parameters that do not have this prefix.

The other option is as follow:

File:reindex.txt

Documents are reindexed to the specified file.

+i

Creates the indexes of the reindexed table only, which is the search table after reindexing. The old indexes are dropped before reindexing.

+t

Switches the names of search and reindex tables only.

Note: A “+” prefix denotes only this parameter applies.

sdtout

Defines the frequency of statistic appearing in the command window. By default the knowledge reindex utility provides statistics into the command window for every 1000 documents processed. However, sometimes statistics are required to be provided more often. Use the following parameter:

```
pdm_k_reindex -i sdtout:10
```

In this case, statistics display in the command window for every ten documents.

The documents are reindexed in the knowledge base.

New Tags to Configure a Domserver for the Crawler Surface

If CA SDM has huge data for indexing, then you must have a dedicated server for the Crawler Surface depending on your CA SDM configuration to minimize the impact on the overall CA SDM environment:

- Conventional: Primary or secondary server
- Advanced Availability: Application server

For more information on how to configure CA SDM server, see the *Server Configuration Online Help*

The following two new tags are introduced in the `crawler_surface_config.xml` file to take care of the indexing:

- A new tag has been introduced in `crawler_surface_config.xml` file `root\general_configuration\sdm_domsvr_name` to let the customer mention the name of a dedicated domserver instance for the Crawler Surface.

Default: domsvr

This value is a default domserver (object manager) instance name.

- Another new tag has been introduced in the `crawler_surface_config.xml` file `sharepoint_properties_file` at the `root\general_configuration\` to let the customer edit and make it empty, if the crawler surface is not for SharePoint to index CA SDM data.

Default: sharepoint

This value is the name of `sharepoint.properties` file available by default at `NX_ROOT\CATALINA_BASE_FS\lib`.

How to Configure CA Workflow

To configure CA Workflow for use with your CA SDM installation, perform the tasks described in this section.

More information:

[Start and Stop CA Workflow](#) (see page 259)

[Set Up Automatic Login \(External Authentication\)](#) (see page 262)

[Configure Worklist and Workflow Manager for Automatic Login](#) (see page 263)

[Configure Workflow Design Environment for Automatic Login](#) (see page 264)

[CA Workflow Options](#) (see page 265)

[How to Configure the Problem Management Sample Workflow](#) (see page 266)

[How to Configure the Order PC Sample Workflow](#) (see page 268)

[Change Management Process Definition Example](#) (see page 269)

Start and Stop CA Workflow

You must first install and configure CA SDM servers before installing CA Workflow. The default CA SDM Tomcat is automatically configured, started and stopped by the CA SDM daemon manager. The `pdm_tomcat_nxd` command line utility can be used to start and stop the Tomcat instance as well.

Follow these steps:

1. (Applicable only for conventional configuration) Configure specific processes to be started on the secondary server.
 - a. Run `pdm_edit` (on the primary server).
 - b. Recycle the CA SDM services.

This will version control specific environment variables to a secondary server that are required to install and run CA Workflow

2. Install and configure CA Workflow on the following server, depending on your CA SDM configuration:

- Conventional: Primary or secondary servers
- Advanced availability: Any one of the application servers

3. Run `pdm_tomcat_nxd -d start -t CAWF`

This manually starts CA Workflow.

Note: Run `pdm_tomcat_nxd -d stop -t CAWF` to stop CA Workflow.

4. Install CAWF options on the following server, depending on your CA SDM configuration:

- Conventional: Primary server
- Advanced availability: Background server

This allows CA Workflow to start and stop automatically, and allows communications between CA SDM and CA Workflow.

More information:

[pdm_tomcat_nxd—Start or Stop a Tomcat Instance](#) (see page 260)

pdm_tomcat_nxd—Start or Stop a Tomcat Instance

The *pdm_tomcat_nxd* utility runs as a daemon process and as a command line utility. The utility can do the following:

- Handles requests from the command line utility to START and STOP a specific Tomcat instance
- Returns the Tomcat STATUS.
- EXIT the daemon and stops the Tomcat instance.

The daemon also handles requests from a Tomcat "listener" servlet to update the STATUS of the Tomcat instance when it is stopped or started.

The *pdm_tomcat_nxd* command line utility directs START, STOP, STATUS and EXIT requests to a Tomcat daemon or can START or STOP a specific Tomcat instance directly without using a Tomcat daemon.

Pdm_tomcat_nxd provides multiple daemons that are started on a single CA SDM server with each daemon maintaining a specific Tomcat instance. Each daemon is initialized with a specific Tomcat and Server name which are used to compose the daemon's slump address, its "listener's" slump address and the Catalina Base directory where the Tomcat instance is defined. This change is supported by a new Tomcat name parameter.

Use the following command to start a *pdm_tomcat_nxd* daemon. When the daemon starts, it automatically starts a Tomcat instance with a specified Tomcat name.

Note: In the following examples, the default Tomcat name is empty (implies "ServiceDesk").

```
pdm_tomcat_nxd -s [ -t tomcat ]
```

Example: Send a request to a specific Tomcat daemon on a specific Server

If the request is STATUS, a message is sent first to the Tomcat "listener". If there is no response, the request is then sent to the Tomcat daemon. The default Server name is `NX_LOCAL_HOST`. The default Tomcat name is empty; (which implies "ServiceDesk").

```
pdm_tomcat_nxd -c <request> [ -t <tomcat_name> ] [ -S <server_name> ]
```

request

STOP | SHUTDOWN | START | STATUS | EXIT

Example: Start or stop a specific Tomcat on this Server (without using the Tomcat daemon)

```
pdm_tomcat_nxd -d <request> [ -t <tomcat_name> ]
```

request

STOP | START

Example: Display the Tomcat command that will be used to start and stop a Tomcat instance

```
pdm_tomcat_nxd -T [ -t <tomcat_name> ]
```

When the daemon process begins, it logs in to the Slump server using a process name comprised of the server_name and the tomcat name (if it is non-empty). The command line utility uses this address to send messages to the daemon. To send STATUS requests to the Tomcat "listener" the command line utility uses the listener process name also comprised of the server_name and the tomcat_name (if it is non-empty). The daemon also opens a log file for the Tomcat instance using a log filename comprised of the tomcat name (if it is non-empty). The following example displays the daemon_name, listener_name, and log filename variables:

daemon_name

```
"pdm_tomcat -" +  
server_name  
[ + "-" + tomcat_name ] if tomcat_name is non empty
```

```
listener_name = server_name + "-" +  
"container-pdmContextListener"  
[ + "-" + tomcat_name ] if tomcat_name is non empty
```

```
tomcat_log = pdm_tomcat +  
"-" + tomcat_name + ] if tomcat_name is non empty  
".log"
```

When the command line utility or the daemon process starts or stops a Tomcat instance, a command (catalina_cmd) is generated using various NX environment variables. All of the following environment variables are required except for NX_JAVA_OPTIONS and NX_TOMCAT_HOTSPOT ,which is only used on an HP system.

The environment variables (for the default ServiceDesk Tomcat instance) do not incorporate a Tomcat name in their name. Whereas the environment variables for all other Tomcat instances may optionally use a Tomcat name as part of their variable name except for NX_XXX_CATALINA_BASE where the tomcat name (XXX) must be specified. If a Tomcat specific environment variable does not exist then the default environment variable name is used.

```
CATALINA_BASE | NX_XXX_CATALINA_BASE
NX_TOMCAT_INSTALL_DIR + [ _XXX ]
NX_TOMCAT_INSTALL_DIR + [ _XXX ]
NX_JRE_INSTALL_DIR + [ _XXX ]
NX_JDBC_DRIVER + [ _XXX ]
NX_JAVA_OPTIONS + [ _XXX ]
NX_JDBC_DRIVER_CLASSPATH + [ _XXX ]
NX_TOMCAT_HOTSPOT + [ _XXX ]
```

Set Up Automatic Login (External Authentication)

To automate the login process for CA Workflow Worklist tasks when working with change orders, requests, incidents, problems, and issues, you can set up automatic login. When you use automatic login, you will not have to enter a userID and password when you click a Worklist link. Automatic login uses your Windows operating system domain credentials to log in to the Worklist.

Note: For automatic login to work correctly, the user does *not* have to be included in the Workflow Administrators, Workflow Process Initiators, or Workflow SuperUser groups in CA EEM. These groups provide different access levels to users logged in to the Workflow Design Environment.

To set up automatic login for Worklist tasks (Windows only)

1. [Install and configure CA Workflow](#) (see page 211).
2. [Configure Worklist and Workflow Manager for automatic login](#) (see page 263).
3. Configure CA EEM to reference an external directory (for example, Microsoft Active Directory) to authenticate users. For information, see your CA EEM documentation.

Note: A user must have a CA EEM user record, as well as a matching valid CA SDM contact record for the same user account, to access the Worklist and for Automatic Login to work correctly. For an item to appear in the Worklist, and to take advantage of the Workflow Administrators, Workflow Process Initiators, and Workflow SuperUser groups in CA EEM, a valid CA EEM user record is needed.

4. Log in to CA SDM.
5. Click the Administration tab.
6. In the tree on the left, click Options Manager, CA Workflow.

The Options List appears.

7. Verify that the user name in `cawf_username` and password in `cawf_password` is a valid user on the domain set up in CA EEM. If not, use CA EEM to add the user to the domain.

Important! In the Options Manager, the values in `cawf_username` and `cawf_password` are set based on the values specified for the privileged user name and privileged user password when configuring CA SDM after the installation. If the privileged user specified during the CA SDM configuration is not available when CA EEM is configured to reference the external directory, automatic login will *not* work. In this situation, use CA EEM to add the user to the domain, or change the information in `cawf_username` and `cawf_password` to include a valid domain user set up in CA EEM.

8. Log in to CA SDM and create a change order, request, incident, problem, or issue with the appropriate category.

Note: Make sure the category is configured to use CA Workflow and has a CA Workflow definition attached to it before creating the change order, request, incident, problem, or issue.

You will now be able to click a link in the Worklist and log in without being asked for a userID and password.

More information:

[Configure Workflow Design Environment for Automatic Login](#) (see page 264)

Configure Worklist and Workflow Manager for Automatic Login

You can enable automatic login for Worklist and Workflow Manager by changing the value for variable *automaticLoginEnabled* to true in the Worklist and Workflow Manager web.xml files (wl.xml and pm.xml). The entries are the same in both web.xml files.

```
<env-entry>
  <env-entry-name>automaticLoginEnabled</env-entry-name>
  <env-entry-value>true</env-entry-value>
  <env-entry-type>java.lang.Boolean</env-entry-type>
</env-entry>
```

The initial value for Worklist and Workflow Manager is defined during the installation based on the setting in the response file.

Enable or disable Automatic Login (also known as Single Sign On or SSO)

```
-P serverAction.automaticLoginEnabled="true"
```

To configure Worklist and Workflow Manager for automatic login

1. Navigate to the pm.xml and wl.xml files in the following directory:
`$NX_ROOT\bopcfg\www\CATALINA_BASE_WF\conf\Catalina\localhost`
2. Edit pm.xml and wl.xml and change the value of the following line:
 - (Before editing) `<Environment name="automaticLoginEnabled" override="true" type="java.lang.Boolean" value="false"/>`
 - (After editing) `<Environment name="automaticLoginEnabled" override="true" type="java.lang.Boolean" value="true"/>`
3. Stop the Tomcat server using the following command:
`pdm_tomcat_nxd -d STOP -t CAWF`
4. Start the Tomcat server to re-create these two folders using the following command:
`pdm_tomcat_nxd -d START -t CAWF`
5. Access a ticket with a Workflow task and select one of the tasks.
6. The Worklist appears and the automatic login is successful.

Note: If you reconfigure CA Workflow and reference a different CA EEM server, you must shut down the CAWF Tomcat, delete both the *pm* and *wl* folders found under `$NX_ROOT\bopcfg\www\CATALINA_BASE_WF\webapps`, and then restart the CAWF Tomcat to have these folders re-created with the new CA EEM server information.

Configure Workflow Design Environment for Automatic Login

Automatic login for the Workflow Design Environment is enabled using the command-line parameter *-auto*.

CA Workflow Options

The following options control the CA Workflow functionality.

Important! After installing CA Workflow and CA EEM, you must manually set options in the Options Manager, such as the port number. For example, a separate Tomcat web application is used for CA Workflow, so it can no longer use the default port 8080. To avoid port conflict, the default value 8090 is used. For more information, see the *Implementation Guide*.

cawf_hostname

Specifies the host name of the server where CA Workflow is installed. Set this variable only if CA Workflow is installed from the CA SDM media; otherwise, do not install this option.

cawf_password

Specifies the password for the CA Workflow IDE user. During CA Workflow installation, the CA SDM Component Installer Wizard uses the Workflow User Password value to set the cawf_password.

cawf_pm_location

Specifies the location of the CA Workflow Process Manager application. The URL must take the following format:
http://<wf_hostname>:8090/pm

cawf_pm_url

Specifies the CA Workflow Process Manager Web Service URL. The URL must take the following format:
http://<wf_hostname>:8090/pm/services/pmService2

cawf_username

Specifies the CA Workflow username for the CA Workflow IDE user. During CA Workflow installation, the CA SDM Component Installer Wizard uses the Workflow User Name value to set the cawf_username.

cawf_wl_location

Specifies the location of the CA Workflow Worklist Manager application. The URL must take the following format:
http://<wf_hostname>:8090/wl

cawf_wl_url

Specifies the CA Workflow Worklist Web Service URL. The URL must take the following format:
http://<wf_hostname>:8090/wl/services/wlService

Important! Installing or uninstalling an option requires you to restart the CA SDM servers. For advanced availability configuration, not all options require you to restart all the servers. Ensure that you read the Server Restart List before restarting any server.

How to Configure the Problem Management Sample Workflow

The Problem Management sample workflow guides the process of deciding whether to create a change order for a particular problem ticket. After a problem assignee has researched a problem, they complete a problem survey to develop a recommendation. The survey gives the approver an idea of the impact of the problem and indicates whether it is necessary to resolve it through change management. The underlying concept of this workflow (problem pain/value analysis) is derived from ITIL v3.

Note: For details about performing the CA SDM tasks in the following process, see the *Online Help*.

To configure the Problem Management sample workflow:

1. Create a CA SDM contact for an analyst (for example, Jane Analyst) using the following values:

Contact Type

Select Analyst.

Data Partition

Select Service Desk Analyst.

Access Type

Select Service Desk Staff.

Email Address

Enter an e-mail address.

Note: For testing purposes, you may want to enter your own e-mail address.

Notifications Method

Select Email for Low, Normal, High, and Emergency notifications.

2. Create a CA SDM contact for a supervisor (for example, Joe Supervisor) using the following values:

Contact Type

Select Manager.

Data Partition

Select Service Desk Administrator.

Access Type

Select Service Desk Management.

Email Address

Enter an e-mail address.

Note: For testing purposes, you may want to enter your own e-mail address.

Notifications Method

Select Notification for Low, Normal, High, and Emergency notifications.

3. Create an associated EEM user record for the Jane Analyst and Joe Supervisor CA SDM contacts.

Note: The userids of the EEM records must match those of the contact records. For information about creating EEM user records, see the *EEM Online Help*.

4. Assign Joe Supervisor as the Supervisor on Jane Analyst's contact record.
5. Create a CI (for example, Exchange Server).
6. Create a Root Cause code (for example, RAM Upgrade Required).
7. Create a Problem Area (for example, ProblemMgmt.SampleWF).
8. Associate the ProblemMgmt.SampleWF Problem Area with the Problem Management sample workflow.
9. Create a problem ticket with the following attributes:

Problem Area

Select ProblemMgmt.SampleWF.

Configuration Item

Select Exchange Server.

Assignee

Select Analyst, Jane.

10. Log in to CA SDM as Jane Analyst and test the workflow configuration.

Note: You must complete the problem research before you complete the first form in the workflow. For information about performing the workflow tasks, see the *CA Workflow Online Help*.

More information:

[Set Up Automatic Login \(CA MDB Authentication\)](#) (see page 278)

[Set Up Automatic Login \(External Authentication\)](#) (see page 262)

[Start and Stop CA Workflow](#) (see page 259)

How to Configure the Order PC Sample Workflow

The Order PC sample workflow guides the change management process of ordering a new PC.

Note: For details about performing each of the CA SDM tasks in the following process, see the *Online Help*.

To set up and test the Order PC sample workflow:

1. Create a CA SDM contact for an employee (for example, William Employee) using the following values:

Contact Type

Select Employee.

Data Partition

Select Employee.

Access Type

Select Employee.

Email Address

Enter an e-mail address.

Note: For testing purposes, you may want to enter your own e-mail address.

Notifications Method

Select Email for Low, Normal, High, and Emergency notifications.

2. Create a CA SDM contact for an analyst (for example, Jane Analyst) using the following values:

Contact Type

Select Analyst.

Data Partition

Select Service Desk Analyst.

Access Type

Select Service Desk Staff.

Email Address

Enter an e-mail address.

Note: For testing purposes, you may want to enter your own e-mail address.

Notifications Method

Select Email for Low, Normal, High, and Emergency notifications.

3. Create an associated EEM user record for the William Employee and Jane Analyst CA SDM contacts.

Note: The userids of the EEM records must match those of the contact records. For information about creating EEM user records, see the *EEM Online Help*.

4. Create a Change Category (for example, PC.Order).
5. Assign Jane Analyst as the assignee of the Change Category.
6. Create a change order ticket with the following attributes:

Change Category

Select PC.Order.

Assignee

Select Analyst, Jane.

7. Log in to CA SDM as Jane Analyst and test the workflow configuration.

Note: For information about performing the workflow tasks, see the *CA Workflow Online Help*.

Change Management Process Definition Example

This example demonstrates how the Change Management Process Definition manages change orders using the following ITIL v3 guidelines:

- Risk assessment
- Conflict and impact analysis
- Approvals by both the Change Manager and the CAB
- Implementation assessment and review

Note: This example assumes that CA SDM is using CA Workflow and that the Change Management Process Definition is set up. For information about setting up the Change Management Process Definition, see the *Administration Guide*.

How to Prepare a Change Order for Approval Example

This example configures a change category and prepares a change order for approval. As an administrator, you configure the change category to use the Change Management Process Definition and set up groups and contacts. As a requester, you complete a Risk Assessment Survey, perform conflict and impact analysis, and perform change analysis.

Note: For information about configuring the change category and working with the Change Management Process Definition, see the *Online Help* and the *Administration Guide*.

To prepare a change order for approval, do the following:

1. Log in as administrator and create or edit a change category with the following options and click Use CA Workflow:
 - **CAB**—Select the CAB group.
 - **Group**—Specify the Implementation group.
 - **Risk Survey**—Select General.
 - **CA Workflow Definition Name**—Select Change Mgmt - Service Desk r12.1 (from the Workflow tab).
2. Create the following CA SDM user IDs and contacts and assign them to the respective groups in CA SDM and CA EEM:
 - **Don Requester**—The contact who creates the Change Order.
 - **John Approver**—The manager of the Implementation group who acts as the Change Manager to approve a change order. A manager of the CAB group who acts as a CAB approver.
 - **Sue Implementer**—The member of the Implementation Group who also completes the change order work items.
3. Log in as Don Requester and create a change order with the following values:
 - **Requester**—Specify Don Requester.
 - **Category**—Specify the change category with the Change Management Process Definition.
 - **Type**—Select Normal.
 - **Order Summary/Order Description**—Specify the reason for the change order.
 - **Schedule Start Date**—Specify a start date.
 - **Schedule Duration**—Specify the duration.
 - **CIs**—Specify the affected CIs (from Config Items tab).

Don Requester receives an email notification to complete the Risk Assessment Survey. The Change Order Detail page shows Status-RFC.
4. Click Risk Survey and answer the Risk Assessment Survey questions so the change order has a High Risk. Click Submit and Confirm.

The system generates a risk value for the change order and the requester receives an email notification to start conflict and impact analysis.

Note: You can only move to the next task after you click Confirm on the Perform Task page.
5. On the Workflow Tasks tab, follow the links to navigate to the change order Conflicts tab.
6. Click Conflict Analysis to review and resolve all scheduling conflicts for CIs.

7. On the Config Items tab, click Impact Analysis to review information about each CI.
8. On the Config Items tab, click Impact Explorer and navigate to the CMDB Relationships tab to consider the change order impact on related CIs.
9. Navigate to the Perform Task page and click Confirm.
Don Requester receives an email notification to perform change analysis.
10. On the Workflow Tasks tab, follow the links to navigate to the change order Chg Analysis tab. Answer the questions to confirm the change order and click Submit.
John Approver receives an email notification to approve the change order. The Change Order Detail page shows the following: Status—Approval In progress.
 - CAB Approval—Yes

How to Approve and Implement a Change Order Example

This example shows the approver and implementation tasks to perform while using the Change Management Process Definition to manage change orders. As an approver, you review the change analysis information and approve the change order. As a member of the implementation group, you complete the assigned work on the change order and a post implementation review that describes the outcome of the change order.

Note: For information about working with the Change Management Process Definition, see the *Administration Guide*.

To approve and implement the change order, do the following:

1. Log in as John Approver and open the change order.
2. On the Workflow Tasks tab, follow the links to navigate to the Chg Mgr Approval tab and click Approve.
Because the change order is High Risk, the status is Approval in progress. Because this example also uses John Approver as a member of the CAB board, John Approver receives an email notification to review the change order as a CAB member.
3. On the CAB Approval tab, click Approve.
The Change Order Detail page shows the status of Approved. Sue Implementer receives an email notification.
4. Log in as Sue Implementer and open the change order.
5. On the Workflow Tasks tab, navigate to the Perform Tasks page, and click Confirm.
The Change Order Detail page shows Status-Implementation in progress.
6. On the Workflow Tasks tab, follow the links to navigate to the Impl Complete tab.

7. Answer the questions to describe how the change order progressed and click Complete.

The change order closes. The Change Order Detail page shows Status-Implemented and Closure Code-Successful. Sue Implementer receives an email notification to perform the PIR.

8. On the Workflow Tasks tab, follow the links to navigate to the PIR tab.
9. On the PIR tab, answer the questions to describe the resolution and click Submit.

The change order closes. The Change Order Detail page shows Status-Closed. The Workflow Tasks tab shows the Close Change Order link with additional information. The Change Order Activities tab shows the final status of the Change Management Process Definition.

How to Configure CA Process Automation Workflow Integration

To configure the CA Process Automation Workflow Integration, do the following:

1. Verify that CA Process Automation and CA SDM operate as stand-alone entities.

Important! If CA Process Automation is configured in FIPS mode, you must also configure EEM server and EEM SDK in FIPS mode. For more information about configuring the EEM SDK in FIPS mode, see the EEM documentation.

2. Configure the CA Process Automation Workflow Options.
3. Create the necessary groups and user IDs to grant CA SDM users the appropriate access to CA Process Automation.

More information:

[Verify CA Process Automation and CA SDM Installations](#) (see page 272)

[Configure CA Process Automation Workflow Options](#) (see page 273)

[CA Process Automation User Administration](#) (see page 276)

[How to Support Single Sign-On From CA SDM to CA Process Automation Using CA EEM](#) (see page 277)

Verify CA Process Automation and CA SDM Installations

You can integrate CA Process Automation and CA SDM to coexist on a single server when the server architecture supports both products. When CA Process Automation or CA SDM components cannot integrate on the same server, consider installing each product on separate servers.

Before you configure CA Process Automation and CA SDM, you can confirm that both products are installed and working independently.

Note: For information about CA SDM and CA Process Automation product requirements, see the *CA SDM Release Notes*.

To verify CA Process Automation and CA SDM installations

1. Open a browser on the server that hosts CA SDM and verify that a CA Process Automation user can log in to CA Process Automation. Change the place holders to match the target CA Process Automation installation.
`http(s)://<server>:CA Portal/itpam`
2. Enter the following URL. Change the place holders to match the target CA Process Automation installation.
`http(s)://<server>:CA Portal/itpam/JNLRequestProcessor?processType=startUI`
The CA Process Automation product is accessible from the CA SDM host.

Configure CA Process Automation Workflow Options

When you configure CA Process Automation Workflow options, you specify connectivity between CA SDM and CA Process Automation. If you are using CA EEM for authentication, you also specify the CA EEM host name.

To configure CA Process Automation Workflow options

1. On the Administration Tab, select Options Manager, CA IT PAM Workflow.
The Option List appears.
2. Right-click the name of each option and select Edit from the context menu.
Configure the following options:

caextwf_eem_hostname

Specifies the name of the CA EEM server. For example, *pam.host.com* identifies the authentication host. You install `caextwf_eem_hostname` only if you configured CA Process Automation to use CA EEM as an authentication server. CA SDM uses this value to transform a user name and password into an CA EEM token. Then, the user name and password do not pass in plain text over HTTP.

Note: If the CA Process Automation installation is not using CA EEM, do not place a value in the `caextwf_eem_hostname` option, and do not install the `caextwf_eem_hostname`. Placing a false value or installing `caextwf_eem_hostname` when it is not necessary causes the integration to fail.

caextwf_endpoint

Specifies the URL that points to the CA Process Automation web services by including the CA Process Automation host name, port, and the mandatory `/itpam/soap` path. For example,
`http://pam.host.com:pam-Tomcat-port/itpam/soap` identifies the endpoint. If your implementation uses CA EEM, installing the `caextwf_eem_hostname` option is required for the integration between CA Process Automation and CA SDM to operate properly.

caextwf_log_categories

Specifies a comma-separated list of CA Process Automation process instance log category names to appear on the CA SDM Request, Change Order, and Issue Workflow Tasks tab. For example, *Operator,Response,MyOwnCategory* supplies three log categories.

You install `caextwf_log_categories` based on business decisions from the CA SDM and CA Process Automation process design personnel. This option adjusts the default data that appears on the Workflow Tasks tab for requests, change orders, and issues.

When you install the `caextwf_log_categories` option, all CA Process Automation process instance log messages from the Process category and the categories that you specify appear on the Workflow Tasks tab. When you do not install `caextwf_log_categories`, only the CA Process Automation process instance log messages from the Process category appear on the Workflow Tasks tab.

Note: For information about the CA Process Automation predefined log message categories, and defining custom message categories, see the CA Process Automation reference documentation.

caextwf_processdisplay_url

Specifies how to launch a graphical snapshot of a CA Process Automation process instance by supplying the host name and the mandatory `/itpam/JNLPrequestProcessor?processType=startUI&roid` path. For example, *http://pam.host.com:pam-Tomcat-port/itpam/JNLPrequestProcessor?processType=startUI&roid=* launches a snapshot of a process instance. On the Workflow Tasks tab of a request, change order or issue, the user selects View Process to see the snapshot.

Installing the `caextwf_processdisplay_url` option is required for the integration between CA Process Automation and CA SDM to operate appropriately.

caextwf_worklist_url

Specifies the process instance path by supplying the host name and the mandatory `/itpam?webPage=mytaskfilter&view=tasklist` path. For example, *http://pam.host.com:pam-Tomcat-port/itpam?webPage=mytaskfilter&view=tasklist* enables CA SDM users to see a list of CA Process Automation process instances that require attention. The list appears in CA Process Automation when the CA SDM user selects a link associated with any listed task in the request, change order, or issue Workflow Tasks tab.

Installing the `caextwf_worklist_url` option is required for the integration between CA Process Automation and CA SDM to operate properly.

caextwf_ws_password

Specifies the administrative password associated with the CA Process Automation user name from the `caextwf_ws_user` option. CA SDM uses the user name and password to access the CA Process Automation web service functions to perform integration activities such as selecting start request forms, process definition information, and process instance information.

Installing the `caextwf_ws_password` option is required for the integration between CA Process Automation and CA SDM. The password and user name that you specify requires the appropriate access to CA Process Automation. However, it is not necessary the CA Process Automation user name and password to exist within the CA SDM contact records.

caextwf_ws_user

Specifies the CA Process Automation administrative user name associated with the CA Process Automation user name from the `caextwf_ws_password` option. CA SDM uses the user name and password to access the CA Process Automation web service functions. These services perform integration activities such as selecting start request forms, selecting process definition information, selecting process instance information, or launching process instances.

Installing the `caextwf_ws_user` option is required for the integration between CA Process Automation and CA SDM to operate. The user name and password that you specify requires the appropriate access to CA Process Automation. However, it is not necessary the CA Process Automation user name and password to exist within the CA SDM contact records.

3. Click Install.
4. Restart the CA SDM service.

The CA SDM and CA Process Automation can communicate even though there is no process instance data. CA SDM and CA Process Automation are ready for you to create CA Process Automation process definitions and CA Process Automation start request forms.

Note: For more information about creating CA Process Automation process definitions and CA Process Automation start request forms, see the *Administration Guide* and the CA Process Automation user documentation.

CA Process Automation User Administration

Both CA Process Automation and CA SDM, as stand-alone products, have individual requirements for authentication and authorization. To support a unified Service Oriented Architecture (SOA) strategy, you can configure both products to use CA EEM for authentication.

When you install CA Process Automation with CA EEM as the authentication server, the installer creates several policies and four essential entities by default:

- Two application users: itpamadmin, itpamuser. For CA Process Automation 3.1 SP1, pamadmin and pamuser.
- Two application groups: ITPAMAdmins, ITPAMUsers. For CA Process Automation 3.1 SP1, PAMAdmins and PAMUsers.

CA SDM users who also use CA Process Automation can be divided between ITPAMAdmins (PAMAdmins for CA Process Automation 3.1 SP1) and ITPAMUsers as follows:

- CA SDM analysts must be members of ITPAMUsers (PAMUsers for CA Process Automation 3.1 SP1) when their duties entail:
 - Approving, rejecting, or otherwise responding to CA Process Automation Interaction Request Forms.
 - Listing CA Process Automation process instances assigned to the user.
 - Viewing the graphical display by clicking the View Process button of CA Process Automation's process status screen. The CA Process Automation ITPAMUsers (PAMUsers for 3.1 SP1) group requires an additional CA Process Automation policy to grant access the graphic.
- CA SDM analysts are members of ITPAMAdmins (PAMAdmins for 3.1 SP1) when their duties entail:
 - Creating and checking in CA Process Automation process definitions and/or start request forms.
 - Terminating process instances directly within CA Process Automation. Terminating process instances are an administrative exception to expected integration procedures.
 - Delegating CA Process Automation process instance tasks.
 - If the user is the user name defined in CA SDM Options Manager.
- CA SDM users require no access to CA Process Automation when their duties entail:
 - Creating requests, change orders, and issues that launch CA Process Automation instances.
 - Reviewing the Workflow tab which shows CA Process Automation process instance status and task information.

- Changing the status of a request, change order, or issue which causes the termination of a CA Process Automation process (such as canceling a change order).
- Selecting a CA Process Automation process definition on a CA SDM request area, change category, issue category.

Note: For information about CA EEM configuration, see the CA Process Automation documentation.

How to Support Single Sign-On From CA SDM to CA Process Automation Using CA EEM

When you have CA SDM and CA Process Automation integrated, you can set up single sign-on to work from CA SDM to CA Process Automation as follows:

1. Verify that the following requirements have been met:
 - CA SDM and CA Process Automation are configured to use the same CA EEM installation.
 - The user that logs in to CA SDM is also a user in CA Process Automation.
 - When CA EEM uses the internal database as a user store, the users must have either global permissions or belong to the same folder. Otherwise, if CA EEM references an external user store like an external directory or CA Siteminder, the users must be of the same store to access single sign-on.
2. Install CA EEM from the CA SDM DVD install media or use any existing CA EEM install (for example, CA EEM for CA Process Automation).
3. On the CA SDM Administration tab, install the following options from under the Options Manager, Security folder:
 - `eiam_hostname`
 - `use_eiam_authentication`

Note: You do not need to install the option `caextwf_eem_hostname` under Options Manager, CA Process Automation folder. But if you do install it, the value must be the same as `eiam_hostname` option.
4. Restart CA SDM.
5. To create a user in CA Process Automation, do the following:
 - a. Log in to CA EEM using the CA Process Automation application context using the `EiamAdmin` userid or any other administration user.
 - b. Select the Manage Identities tab and click the icon next to the Users folder.

- c. On the New User page, the Name field at the top is the userid that must match the userid in the CA SDM contact table.
- d. Click the Add Application User Details button and do the following:
 - Add any or both groups that are listed. Add at least one of these two groups in order to be able to log in to CA Process Automation.
 - Complete the New User fields, such as First Name, Last Name, Display, and Password.
6. Create a user in the CA SDM contact table with the same userid. Verify that the Access Type Validation Type field for the user is set to CA EEM.

You can log in to CA EEM and CA SDM with this user and the password specified in CA EEM.

Set Up Automatic Login (CA MDB Authentication)

To automate the login process for CA Workflow Worklist tasks when working with change orders, requests, incidents, problems, and issues, you can set up automatic login. When you use automatic login, you will not have to enter a userID and password when you click a Worklist link. Automatic login uses your Windows operating system domain credentials to log in to the Worklist.

Note: For automatic login to work correctly, the user does *not* have to be included in the Workflow Administrators, Workflow Process Initiators, or Workflow SuperUser groups in CA EEM. These groups provide different access levels to users logged in to the Workflow Design Environment.

To set up automatic login for Worklist tasks (Windows only)

1. [Install and configure CA Workflow](#) (see page 211).
2. [Configure Worklist and Workflow Manager for automatic login](#) (see page 263).
3. Configure CA EEM to use the CA MDB to authenticate users. When installing and configuring CA Workflow, your *Workflow User Name* and *Workflow User Password* are automatically added to CA EEM. For information, see your CA EEM documentation.

Note: A user must have a CA EEM user record to access the Worklist.

4. Log in to CA SDM and create a change order, request, incident, problem, or issue with the appropriate category.

Note: Make sure the category is configured to use CA Workflow and has a CA Workflow definition attached to it before creating the change order, request, incident, problem, or issue.

You will now be able to click a link in the Worklist and log in without being asked for a userID and password.

More information:

[Configure Workflow Design Environment for Automatic Login](#) (see page 264)

Configure Single Point of Entry

When CA SDM and CA Service Management are integrated, Single Point of Entry can permit single sign-on to CA Service Catalog.

To configure Single Point of Entry

1. Install the catalog_server General option.
Note: For more information, see the Options Manager online help.
2. Restart CA SDM.
3. Navigate to the CA SDM Employee Self-Service page.
4. Click Browse Catalog Services.

The CA Service Management logon page appears.

When CA EEM is configured for both CA SDM and CA Service Management, Single Point of Entry can permit single sign-on to CA Service Catalog. When single sign-on is configured, the CA Service Management logon page is not displayed.

Note: Single sign-on is not available if you enter CA SDM Employee Self-Service as a guest.

To configure single sign-on to CA Service Management

1. Verify that CA EEM Security options eiam_hostname and use_eiam_authentication are installed.
2. Set up your users in CA EEM and verify that these users are also CA Service Management users.
3. Click the Administration tab.
4. Open the Security and Role management folder.
5. Click Access Types
6. Select the Employee role.
7. Verify that the validation type under the Web Authentication tab is set to CA EEM-Use CA Embedded Entitlements Manager.
8. Log in as the defined CA EEM user and navigate to the Employee Self-Service page.
9. Click Browse Catalog Services.

The CA Service Management main page appears.

How to Implement Multi-Tenancy

The *service provider* is the primary tenant of a CA SDM multi-tenancy installation.

Note: For more information about the service provider and multi-tenancy, see the *Administration Guide*.

You must define tenants and populate the tenant attribute in as many tenant-required and tenant-optional objects as you require before enabling multi-tenancy in other than setup mode. However, you can select multi-tenancy enforcement before assigning tenants to all objects that need them. Objects with a null tenant in a tenant-required table are treated as public objects visible to all users, and the user interface detects and supports updates to these objects. Depending on the extent of multi-tenancy enforcement, CA SDM may or may not require a user to update a tenant-required object to supply a tenant.

Note: You must create a tenant before an instance of a tenant-required object can be updated. In addition, the `pdm_settenant` and `pdm_buildtenant` utilities can be used after activation of multi-tenancy to complete the setting of the attribute. If tenant required tables incorrectly contain untenanted data in a multi-tenancy system, a public data drop-down appears in tenant required tables.

Important! Before you run `pdm_buildtenant`, you *must* configure the service provider.

To implement multi-tenancy, complete the following steps:

1. [Set the Multi-Tenancy option to "setup."](#) (see page 297) and recycle CA SDM. You must cycle services each time you change the tenant state (setup, on, on(allow)).

Important! When multi-tenancy is in setup mode, web interface changes are active for service provider administrators, allowing tenancy-related objects and data to be viewed and edited on the web interface. However, tenancy restrictions are not enforced, and users other than service provider administrators do not see any product interface changes. Therefore, you can continue to use the product in untenanted mode while being prepared for multi-tenancy.

2. [Map any existing tenant implementation to the tenant object.](#) (see page 299)
3. [Populate the tenant columns](#) (see page 300).

Note: We recommend that you populate the tenant column in contacts first, then use the tenanted contacts to populate the tenant column in the other objects.

4. Verify that the tenant is set in all tenant-required tables.

5. [Create tenants.](#) (see page 301)

Important! The first tenant that you create must be the service provider tenant. After you create the service provider tenant, log out of CA Service Desk and log in again as a member of the service provider. An easy way to do this login is to log in as the privileged user (for example, *ServiceDesk*), because this user automatically belongs to the service provider tenant. If you want to log in as a different contact, use `pdm_settenant` first to assign the contact to the service provider.

6. [Create tenant groups.](#) (see page 303)
7. [Set the Multi-Tenancy option to "on."](#) (see page 297)

After you select this option, restart services and complete the following steps:

- a. Log in using the privileged username (typically *ServiceDesk*).
- b. Verify that the privileged user is assigned to the service provider tenant.
- c. Verify that your multi-tenancy restrictions are enforced.

Important! If untenanted data remains in the database, you can set multi-tenancy enforcement to *warn* or *allow*. This allows updates to tenant-required tables with a null tenant, preventing the loss of data when a service level agreement (SLA) or attached event executes against a ticket that has not yet been updated to contain a tenant.

Note: You can run `pdm_settenant` even after multi-tenancy is active both to monitor the completeness of the implementation (with the `-r` option) and to mass-update the tenant as required.

8. Back up data partition constraints and roles.

Multi-tenancy reduces both the number and complexity of data partition constraints required, allowing them to be simplified. Before you make changes, back up both the `Domain_Constraint` and the `usp_role` tables.

9. Remove unneeded data partition constraints.

Many domain constraints that were defined for single tenancy are not needed after multi-tenancy is activated and can be removed. Removing these additional constraints improves query performance.

10. Review and audit.

Run `pdm_settenant -r` to review the need for additional tenant population in tenant-required tables. Review the need for adding tenancy to tenant-optional tables, such as Category and Activity Notification.

11. (Optional) Disable multi-tenancy if problems occur. If there are issues after implementation, you can optionally complete the following steps:

- a. Restore the Domain_Constraint and usp_role tables.
- b. Set the Multi-Tenancy option back to "setup".
- c. Recycle the system.

The site can resume previous operations while you continue to populate tenant columns and correct whatever issues required the reversion.

Note: If tenant required tables incorrectly contain untenanted data in a multi-tenancy system, a public data dropdown appears in tenant required tables and you get the following message: "AHD05358 There were *nn* untenanted active xxx objects at Service Desk startup."

Multi-Tenancy

Multi-tenancy lets multiple independent clients (*tenants*) and their users share a single implementation of the product. Tenants share hardware and application resources, which reduces the cost of both.

Tenant users only interact with each other in defined ways, as specified by their *roles* and *tenant hierarchies*.

- **Role**—The role of a CA SDM user governs access authorization. The set of roles available to users depends on their access type. Multi-tenancy lets you control the tenant or tenant group that a user can access within the role.
- **Tenant Hierarchy**—A tenant hierarchy is a structured tenant group that is system-created or modified when you assign a parent tenant to a tenant. The tenant becomes a subtenant of the parent and higher tenants (if any) in that hierarchy.

Typically, each tenant views the implementation as solely for its own use. Each tenant cannot update or view the data of another tenant.

The Service Provider Tenant

A *service provider* provides services to other entities. In a multi-tenancy implementation, the service provider is the primary tenant (owner) and manages other tenants.

The service provider tenant can perform any of the following tasks:

- Set CA SDM options
- Set Knowledge Management options

- Set Support Automation options
- Create tables or columns
- Create, edit, or delete tenants
- Allow tenants to have subtenants
- Update public data

Tenant Hierarchies

A *tenant hierarchy* is a structured tenant group that is system-created or modified when you assign a *parent tenant* to a tenant. The tenant becomes a *subtenant* of the parent and higher tenants (if any exist) in that hierarchy. A *supertenant* is a tenant that is higher than another tenant (its relative *subtenant*) in the same tenant hierarchy. A subtenant typically represents a subdivision within its supertenants. A subtenant can have its own business rules and data, and supertenant data is "pushed" to the subtenant automatically on a read-only basis.

The product supports a tenant hierarchy of unlimited depth. However, the service provider can specify a limit on the total number of tenants and the depth of tenant hierarchies (the default is four levels). The service provider also determines whether individual tenants can have subtenants. The service provider can optionally belong to tenant hierarchies. The service provider cannot have a parent tenant.

Note: The service provider can create multiple unrelated hierarchies, or none. Even in a system with tenant hierarchies, you can define stand-alone tenants.

Tenant Attributes and Objects

When you enable multi-tenancy, you can grant each contact (user) access to all tenants (public), a single tenant, or a tenant group (user-defined or system-maintained). The role for a contact controls access, which specifies read and write access independently. Because tenant access is role-dependent and a contact can change roles during a session, tenant access for a contact can change.

In a multi-tenancy implementation, most data objects include a tenant attribute that specifies which tenant owns the object. Objects belong to the following groups, depending on their tenant attribute and how it is used:

Untenanted

Defines objects without a tenant attribute. All data in these objects is public.

Examples: Priority and urgency.

Tenant Required

Defines objects with a tenant attribute that cannot be null. The product, not the database management system, enforces this restriction. All data in these objects is associated with individual tenants, not public data.

Examples: Ticket tables (Request, Issue, and Change Order).

Tenant Optional

Defines objects with a tenant attribute that can be null. Some of the data in these objects is public, and some is associated with specific tenants. Each tenant views the object in a merged view of the public data and their tenant-specific data.

Examples: Category and location.

Multi-Tenancy Access

When a user queries the database, the product restricts the results to data objects belonging to tenants that the user is authorized to access. This restriction applies in addition to any data partition restrictions that are in effect. Users see only data in tenant-required and tenant-optional tables and the data belonging to tenants that they are permitted to access.

When a tenant user asks to create or update a database object, the product verifies the following:

- That the object belongs to a tenant that the current role for the user allows them to update.
- That all foreign key (SREL) references from the object to other objects are any of the following:
 - Public (untenanted) objects
 - Objects from the same tenant
 - Objects from tenants in the tenant hierarchy above the object of the tenant. That is, a tenanted object is allowed to reference objects belonging to its parent tenant, to the parent of its parent, and so on.

Note: An exception to the SREL reference restriction exists. Certain SREL references (such as the assignee of an incident) can reference objects that belong to tenants in tenant hierarchy of their containing object. Such references are designated as `SERVICE_PROVIDER_ELIGIBLE` in the product object schema. The `SERVICE_PROVIDER_ELIGIBLE` flag makes a difference only if the service provider tenant is not in the tenant hierarchy above the object of the tenant. When the service provider tenant is in the hierarchy, tenant validation rules permit service provider references.

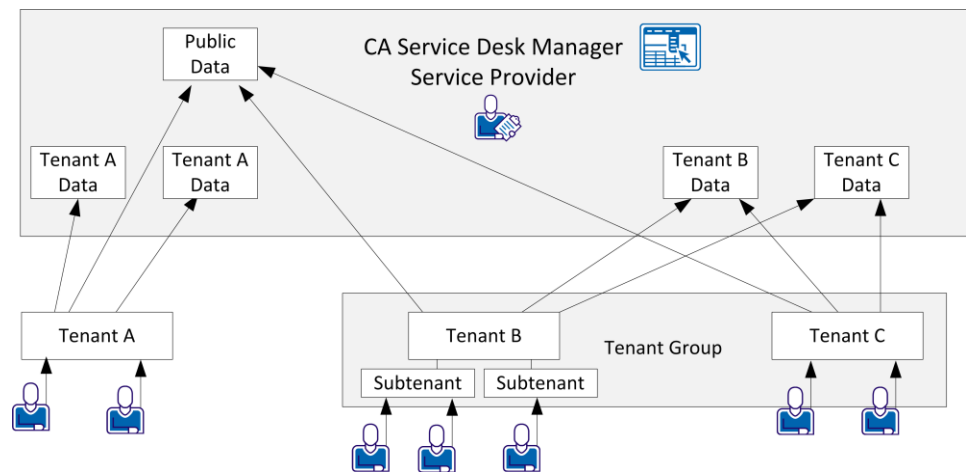
If a user that creates an object has update access to multiple tenants, the user must specify the tenant explicitly, either directly or indirectly.

A service provider user asking to create or update an object is subject to the same restrictions as tenant users. An exception is that you can authorize the service provider users to create or update public objects. The active role of the service provider user controls this authorization.

Note: If the product limits a user from updating tenant data, an error message can announce a data partition limitation. If you receive this error message, either data partition or multi-tenancy restrictions are in effect.

Example: Tenant Access to CA SDM Data

This example demonstrates how Tenant A, Tenant B, and Tenant C access their own and public data in CA SDM.



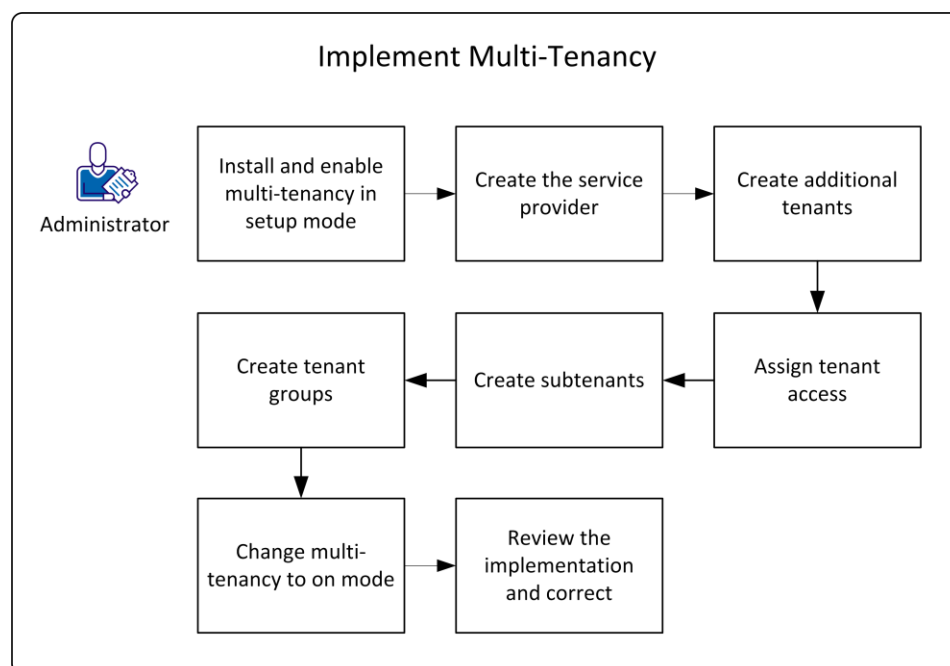
In the example, the arrows point to data that each tenant can access as follows:

- Tenant A users can access Tenant A data and public data.
- Tenant B and its subtenant users can access Tenant B data and public data.
- Tenant C users can access Tenant C data and public data.
- Because Tenant B, its subtenants, and Tenant C belong to a tenant group, users can view Tenant B, Tenant C, and public data.

How to Implement Multi-Tenancy

The following diagram describes how an administrator, as the CA SDM privileged user, implements multi-tenancy for the first-time. From start to finish, the CA SDM implementation changes as follows:

1. A single client uses a single implementation.
2. Multiple independent clients (tenants) and their users *share* a single implementation. Each tenant experiences the implementation as solely for its own use.



As the administrator, you use the CA SDM Administration interface to perform these steps:

1. [Install and enable multi-tenancy in setup mode](#) (see page 287).
2. [Create the service provider tenant](#) (see page 288).
3. [Create additional tenants](#) (see page 289).
4. [Assign tenant access for a role](#) (see page 291).
5. [Create subtenants](#) (see page 293).
6. [Create tenant groups](#) (see page 294).
7. [Change multi-tenancy to on mode](#) (see page 295) and restart services.
8. [Review the implementation and correct](#) (see page 296) any problems.

Install and Enable Multi-Tenancy

You activate multi-tenancy by installing a multi-tenancy option in the product, and then enabling the setup mode. The setup mode specifies that multi-tenancy features are in effect for administrators. This mode lets you can view and edit tenant-related objects and attributes. However, the product does not enforce tenancy restrictions, and nonadministrator users see no changes. This mode lets you prepare multi-tenancy by performing tasks such as defining tenants or assigning tenants to roles without impacting normal use of the product.

Important! When multi-tenancy is in setup mode, web interface changes are active for service provider administrators. This behavior lets you view and edit tenancy-related objects and data on the web interface. However, tenancy restrictions are not enforced, and users other than service provider administrators do not see any product interface changes. Therefore, you can continue to use the product while implementing multi-tenancy.

Follow these steps:

1. Log in to CA SDM as an administrator and click the Administration tab.
2. In the tree on the left, click Options Manager, Multi-Tenancy.
The Option List page appears.
3. Click multi_tenancy.
The multi_tenancy Options Detail page appears.
4. Click Edit.
The Update Options page appears.
5. Select setup from the Option Value drop-down list.
6. Click Install.
The multi_tenancy option is installed.
7. Click Refresh.
The page displays your changes.
8. Close the window.
The Option List page reappears.
9. Restart services.
Multi-tenancy is ready for you to implement in setup mode.

Create the Service Provider Tenant

You use the product to create the service provider tenant. When you create the first tenant, the following occurs:

1. The first tenant always becomes the service provider.

Important! You cannot change this designation—on the Create Tenant page, the Service Provider check box and Record Status field are read-only.

2. The product associates the privileged user (typically ServiceDesk on Windows, or srvcdesk on Linux/UNIX) to the service provider tenant. The product sets all system contacts (such as System_AHD_Generated) to belong to the new service provider tenant.

Note: Windows provides an Administrator system user. The privileged user must assign a tenant to the Administrator user manually.

Follow these steps:

1. Select Security and Role Management, Tenants on the Administration tab.

The Tenant List page appears.

Note: The Security and Role Management, Tenants option is available only when multi-tenancy is installed and in either setup or on mode.

2. Click Create New.

The Create New Tenant page appears.

3. Complete the following fields:

Name

Displays the tenant name.

Service Provider

Identifies that this tenant is the service provider.

Tenant Number

(Information Only) Displays the tenant number. CA SDM does not use this option.

Record Status

Sets the tenant to Active or Inactive.

Parent Tenant

Specifies another tenant above this tenant, making this tenant a subtenant in a tenant hierarchy.

Subtenants Allowed

Allows this tenant to have subtenants. The tenant cannot modify the setting.

Tenant Depth

(Information Only) Indicates the tenant depth of this tenant.

Supertenant Group

(Information Only) Identifies the system-maintained tenant group that contains this tenant and all tenants above it in the tenant hierarchy.

Subtenant Group

(Information Only) Identifies the system-maintained tenant group that contains this tenant and all tenants below it in the tenant hierarchy.

Foreign Key Group

(Information Only) Identifies the system-maintained tenant group that contains tenants that can be referenced from an SREL in data that belongs to this tenant. The foreign key group is the same as the supertenant group.

Related Tenant Group

(Information Only) Identifies the system-maintained tenant group consisting of both the supertenant and subtenant groups for this tenant.

Terms of Usage

Specifies the Terms of Usage statement for the tenant.

Logo

Specifies the URL for the tenant logo file, which can be any web image type.

Location

Displays the Location lookup page, which lets you specify a location.

Contact

Displays the Contact lookup page, which lets you specify a contact.

Note: If no contact is associated with the respective tenant, the Email Address and Pager Email Address fields are inactive.

4. Click Save.

The product creates the service provider tenant.

5. Close the window.

6. Right-click the Tenant list and click Refresh.

The Tenant List is updated and displays the service provider tenant.

7. Log out of CA SDM.

Create Tenants

You use the product to create additional tenants. You can create as many tenants as required to manage multiple separate enterprises that provide support to clients.

Follow these steps:

1. Log in to the Administrator interface as a member of the service provider. An easy way to do this login is to log in as the privileged user (for example, ServiceDesk). This user automatically belongs to the service provider tenant.

2. Select Security and Role Management, Tenants on the Administration tab.

The Tenant List page appears.

Note: The Security and Role Management, Tenants option is available only when multi-tenancy is installed and in either setup or on mode.

3. Click Create New.

The Create New Tenant page appears.

4. Complete the fields as follows:

Name

Displays the tenant name.

Service Provider

Identifies whether a tenant is the service provider. The first created tenant is always the service provider, afterward, this check box is read-only.

Tenant Number

(Information Only) Displays the tenant number. CA SDM does not use this option.

Record Status

Sets the tenant to Active or Inactive.

Parent Tenant

Specifies another tenant above this tenant, making this tenant a *subtenant* in a tenant hierarchy.

Subtenants Allowed

Allows this tenant to have subtenants. The tenant cannot modify the setting.

Tenant Depth

(Information Only) Indicates the tenant depth of this tenant.

Supertenant Group

(Information Only) Identifies the system-maintained tenant group that contains this tenant and all tenants above it in the tenant hierarchy.

Subtenant Group

(Information Only) Identifies the system-maintained tenant group that contains this tenant and all tenants below it in the tenant hierarchy.

Foreign Key Group

(Information Only) Identifies the system-maintained tenant group that contains tenants that can be referenced from an SREL in data that belongs to this tenant. The foreign key group is the same as the supertenant group.

Related Tenant Group

(Information Only) Identifies the system-maintained tenant group consisting of both the supertenant and subtenant groups for this tenant.

Terms of Usage

Specifies the Terms of Usage statement for the tenant.

Logo

Specifies the URL for the tenant logo file, which can be any web image type.

Location

Displays the Location lookup page, which lets you specify a location.

Contact

Displays the Contact lookup page, which lets you specify a contact.

Note: If no contact is associated with the respective tenant, the Email Address and Pager Email Address fields are inactive.

5. Click Save.
The product creates the tenant.
6. Close the window.
7. Right-click the Tenant list and click Refresh.
The Tenant List is updated and displays the created tenant.
8. (Optional) Repeat Steps 3 through 6 for each tenant you want to create.

Assign Tenant Access for a Role

The role of a CA SDM user governs both access authorization and the user interface. The roles available to users depend on their access type. Multi-tenancy lets you control the tenant or tenant group that a user can access within the role. When multi-tenancy is installed, the Role Detail page includes additional options that let you assign or edit tenant access.

Note: You can grant tenant users access to data other than their own. Nonservice provider tenant analysts only have access to their own tenant and subtenants. However, you can update their function access to include the tenant of the analyst. For example, you can define a role to set separate read and write access to certain tenant groups for users within that role.

Follow these steps:

1. Navigate to Security and Role Management, Role Management, Role List.

The Role List appears.

2. Click the role for which you want to assign tenant access.

The Role Detail page appears and provides Tenant Access and Tenant Write Access drop-down lists on its Authorization tab. Tenant Access is view-only, and Tenant Write Access allows create and update also.

3. Click Edit.

The Update Role page appears.

4. Select options for Tenant Access and Tenant Write Access:

Same As Tenant Access

Sets the access to be the same as the Tenant Access setting. This value is the default for the Tenant Write Access drop-down list and is only available for the Tenant Write Access option.

All Tenants

Removes tenant restrictions. A user in a role with this access can do the following:

- View any object in the database (read access).
- Create and update (write access) any tenanted object in the database.

When a user with All Tenants access creates an object, the user must select the tenant of the new object.

Single Tenant

Sets tenant access for a role to a named tenant. When you select this option, another field appears that lets you select a specific tenant. A user in this role can access only those objects associated with the named tenant.

Tenant Group

Sets tenant access for a role to a user-defined or system-maintained tenant group. After you select this option, another field appears that lets you select a specific tenant group. A user in this role can access only those objects associated with one of the tenants in this group. When a user with tenant group access creates an object, the user must select the tenant for the new object.

Contact's Tenant

Sets tenant access for the role to the tenant of the contact using it. A user in this role can access only those objects associated with their own tenant.

Contact's Tenant Group

Sets role access for an analyst role to the tenant group that the analyst works with, as specified on the contact record for the analyst. If the user with the role is not an analyst, this selection has the same effect as Contact's Tenant. This option is only available for analysts.

Contact's Subtenant Group

Sets tenant access for the role to the subtenant group of the contact using it. A user in this role can access only those objects associated with their own subtenant group.

Contact's Supertenant Group

Sets tenant access for the role to the supertenant group of the contact using it. A user in this role can access only those objects associated with their own supertenant group.

Contact's Related Tenant Group

Sets tenant access for the role to the Related Tenants Group of the contact using it. A user in this role can access only those objects associated with their own related-tenant group.

Update Public

Controls whether a service provider user in the role has the authorization to create or update public data. All users can view public data, regardless of access rights for the current role. Tenant users (users belonging to a tenant other than the service provider) cannot update public data, regardless of their role.

Click Save

Tenant access is assigned for the role. When a user queries the database, the product restricts the results to objects belonging to tenants associated with the role of the user.

Create Subtenants

Subtenancy lets you define and modify tenant hierarchies for organizational and data-sharing purposes. To place a tenant into a tenant hierarchy, you assign the tenant a parent tenant.

Follow these steps:

1. On the Administration tab, select Security and Role Management, Tenants.

The Tenant List appears.

Note: The Security and Role Management, Tenants option is available only when multi-tenancy is enabled.

2. Click an existing tenant to Edit, or click Create New.

The Tenant Detail page appears, which lets you enter any required data or changes.

3. Select a Parent Tenant.

Note: The Parent Tenant drop-down list only displays tenants that are allowed to have subtenants.

4. Click Save.

The tenant is a subtenant of the parent tenant.

Note: When a tenant is a subtenant, it belongs to the subtenant group of the parent tenant. The parent tenant joins the supertenant group of the subtenant. Each tenant joins the Related Tenants group of the other.

Create Tenant Groups

A tenant group is a collection of tenants that share access to CA SDM objects. Tenant groups let you classify, manage, and control access to tenants. You can assign a role to a tenant or tenant group. When multi-tenancy is active, the product associates each role with: all tenants (public), a single tenant, or a single tenant group. Use tenant groups whenever a role needs access to more than one tenant. For example, you can assign analysts to a tenant group containing tenants belonging to a particular geographic location.

The product generates and maintains three tenant groups automatically for each tenant in a tenant hierarchy (*tenant* is the tenant name):

- *tenant_subtenants* (tenant, its child tenants, and their lower subtenants)
- *tenant_supertenants* (tenant, its parent tenant and its higher supertenants)
- *tenant_relatedtenants* (entire single hierarchy)

You use the system-maintained tenant groups like user-defined tenant groups. However, you can only change the system-maintained tenant group names and descriptions.

Example: Role A Needs Access to Tenant A, Tenant B, and Tenant J

Instead of assigning the role to each tenant separately, you can do the following:

1. Create a tenant group, and add Tenant A, Tenant B, and Tenant J to the group.
2. Assign Role A to this tenant group.

Users (contacts) assigned to Role A can access the tenant group, which is comprised of Tenants A, B, and J.

Follow these steps:

1. Log in as the service provider, click the Administration tab, and select Security and Role Management.
2. Click Tenant Groups.

The Tenant Group List appears.

Note: The Security and Role Management, Tenant Groups option is available only when multi-tenancy is installed (either on or setup).

3. Click Create New.

The Create New Tenant Group page appears.

4. Complete the following fields:

Tenant Group Name

Displays the name of the tenant group.

Record Status

Sets the tenant group as active or inactive.

Description

Displays a description of the tenant group.

5. Click Save.

The tenant group is created.

6. Close the window.

The Tenant Group List appears.

7. Right-click the Tenant List and select Refresh.

The Tenant Group List is updated.

8. Click Update Tenants on the Tenant Group Detail page and add tenant members to the group.

9. (Optional) Repeat Steps 3 through 6 for each tenant group you want to create.

Change Multi-Tenancy to On Mode

You change changing the Multi-Tenancy option to on mode to make the multi-tenancy implementation function fully. Each tenant then views the implementation as solely for its own use. Each tenant cannot update or view the data of another tenant.

Follow these steps:

1. Log in to CA SDM as an administrator, and click the Administration tab.
2. In the tree on the left, click Options Manager, Multi-Tenancy.

The Option List page appears.

3. Click multi_tenancy.

The multi_tenancy Options Detail page appears.

4. Click Edit.

The Update Options page appears.

5. Select setup from the Option Value drop-down list.

6. Click Edit.

The Update Options page appears.

7. Select on (the default) from the following values in the Option Value drop-down list:

on

(Default) Disallows a check-in to a tenant-required table when the tenant is null and an SREL to a table with a tenant is not available.

on (warn)

Writes an error to the log but allows the check-in to proceed when a tenant-required object with a null tenant is created or updated.

on (allow)

Writes a warning to the log but allows the check-in to proceed when a tenant-required object with a null tenant is created or updated.

8. Click Save, and then Refresh.

The page displays your changes.

9. Close the window.

The Option List page reappears.

10. Restart services.

Multi-tenancy is fully functional.

Review the Implementation and Correct

Review the multi-tenancy implementation and correct any problems.

Follow these steps:

1. Log in to CA SDM using the privileged username (typically ServiceDesk).
2. Click the Administration tab and browse to the Tenant List.

The Provider shows as Yes for the privileged user in the Tenant Name.

3. Verify that your multi-tenancy restrictions are enforced by browsing to a Contact List.

If tenant-required tables incorrectly include untenanted data in a multi-tenancy system, the following message appears in the Contact List:

AHD05358 There were nn untenanted active Contact objects at CA Service Desk Manager startup.

Important! If untenanted data is in the database, you can set the multi-tenancy option mode to on (warn) or on (allow). These modes let you update tenant-required tables with a null tenant. This method prevents data loss when a service level agreement (SLA) or attached event executes for a ticket that does not include a tenant.

4. (Optional) Disable multi-tenancy if problems occur and complete the following steps:
 - a. Restore the Domain_Constraint and usp_role tables.
 - b. Set the Multi-Tenancy option to the setup mode.
 - c. Recycle the system.

The site can resume previous operations while you correct whatever issues required the reversion.

Enable Multi-Tenancy

Using the product, you can enable multi-tenancy.

To enable multi-tenancy

1. Click the Administration tab.
2. In the tree on the left, click Options Manager, Multi-Tenancy.

The Option List page appears.
3. Click multi_tenancy.

The multi_tenancy Options Detail page appears.
4. Click Edit.

The Update Options page appears.

- From the Option Value drop-down list, select *one* of the following options:

off

Disables the multi-tenancy feature.

setup

Enables multi-tenancy in setup mode. In this mode, CA SDM displays editable tenant-related objects and attributes for service provider administrators, but does not enforce tenancy requirements. Other users can continue working as if multi-tenancy was not installed.

on

Enables the multi-tenancy feature as fully operational. You can select from the following values:

- **strict**—(Default) CA SDM fails a checkin to a tenant-required table when tenant is null and the product cannot default it from an SREL to a tenanted table.
- **warn**—CA SDM writes an error to the log but allows the checkin to proceed when a tenant-required object with a null tenant is created or updated.
- **allow**—CA SDM writes a warning to the log but allows the checkin to proceed when a tenant-required object with a null tenant is created or updated.

Note: If you have not populated the `ca_tenant` table, you must select `setup` from the Option Value drop-down list. For new implementations of multi-tenancy, select `setup`.

- Click Install.

The `multi_tenancy` option is installed.

- Click Refresh.

The page displays your changes.

- Close the window.

The Option List page reappears.

- Restart services.

How to Initialize a New Tenant

As the service provider, you may want to build a standard set of data for a new tenant, such as categories, data partitions, ticket templates, and so on. This task can be done by using `pdm_extract` or `pdm_tenant_extract` to build a `pdm_userload` input file containing the data you want.

If necessary, you can edit this file with any text editor. It can then be loaded into the database using `pdm_userload` with the `-t` argument to set the tenant column to the new tenant. For information on `pdm_userload` arguments other than `-t`, see the *Administration Guide*.

The following process describes how to initialize a new tenant:

1. Create the tenant in the `ca_tenant` table.
Use the online [Create Tenant](#) (see page 301) page.
2. Load the standard data as previously described.
Use `pdm_userload -t` to set the tenant.
3. Create contact records for the new tenant.
Load outside data or use `pdm_userload -t`.

How to Convert an Existing Tenant Implementation to the Tenant Object

You may have used data partitions and another CA SDM object to achieve some of the functionality now provided by multi-tenancy. If you want to convert an implementation to multi-tenancy, the first step is to map the data in the previously-used object to the new tenant object. The previously-used object is called the *pre-tenant* object. For most sites with these requirements, the `org` (organization) object is the pre-tenant object, but the following approach can be used for any pre-tenant object.

1. If the pre-tenant object is not `org`, verify that its Majic object definition specifies `TENANT_REQUIRED`.
2. Verify the attribute mappings from the pre-tenant object to the new tenant object in the `buildtenant.xml` file in the following location:

`$NX_ROOT/samples/multi_tenancy`

Note: You must copy `buildtenant.xml` to the `$NX_ROOT/site/cfg` directory. In addition, `buildtenant.xsd` must be in the same directory as `buildtenant.xml`, or you will receive an error. When you install the product, `buildtenant.xsd` is located in `$NX_ROOT/site/cfg`, so you do not have to copy this file.

The default settings are based on `org`. If the pre-tenant object is not `org`, you must edit the file.

3. [Run `pdm buildtenant -f`](#) (see page 308).
A new tenant is created for each pre-tenant object, and sets the tenant attribute in the pre-tenant object to reference the new tenant.

4. Log in to CA SDM, and review both the tenant object and the pre-tenant object.

Note: In some situations, you want to map multiple pre-tenant objects to a single tenant object. To do this, manually update the pre-tenant objects affected, and then delete or inactivate the unused tenants.

How to Populate the Tenant Attributes in Your Tables

To populate the tenant attribute in all or a subset of a table, use the *pdm_settenant* utility. This utility uses a configuration file to select the objects to be tenanted and to specify where to obtain the tenant for the objects. You can specify an explicit tenant, or specify that the tenant should be derived from an SREL reference in the object to be tenanted.

To populate the tenant attributes in your tables using *pdm_settenant*, complete the following steps:

1. Create or edit a configuration file.

The configuration file selects the rows that will have their tenant attribute set and specifies a source for the tenant attribute's value. The product provides a sample *settenant.xml* file in the following location:

`$NX_ROOT/samples/multi_tenancy`

Note: You can modify the sample *settenant.xml* file, or create a file and copy it to the `$NX_ROOT/site/cfg` directory. In addition, *settenant.xsd* must be in the same directory as *settenant.xml*, or you will receive an error. When you install the product, *settenant.xsd* is located in `$NX_ROOT/site/cfg`, so you do not have to copy this file.

2. [Run *pdm_settenant* -f \[configuration file\] -r](#) (see page 309)

The *pdm_settenant* utility reads its configuration file and processes each rule it defines in sequence.

We recommend that you use this utility first to populate the tenant attribute in the *cnt* (contact) object, and then use the *cnt* object as a source for populating tenant into other objects.

After the *cnt* object is properly tenanted, it can be used as a base for setting tenant in other tables by completing the following steps:

- a. Specify a *TenantRule* with `type="SREL"` in the configuration file for an attribute referencing the *cnt* object to set tenant in other tables.
 - b. (Optional) Specify a *TenantRule* with `type="Name" < tenantname >` to set tenant explicitly in some of the tables.
3. Run *pdm_settenant* with a new configuration file.
 4. Rerun *pdm_settenant* as required.

After you have populated the tenant column in an object, you can use SRELs to that object as the basis of an SREL *TenantRule* for setting tenant in other objects.

Example: SREL Type Syntax

SREL type syntax checks for cnt objects that do not have a tenant value specified and uses the tenant value from the linked organization object:

```
<Object name="cnt">  
<TenantRule type="SREL">organization</TenantRule>  
<Where>tenant is null</Where>  
</Object>
```

Example: Name Type Syntax

Name type syntax checks for org objects that do not have a tenant value specified and sets their tenant field to the name of an actual Tenant object:

```
<Object name="org">  
<TenantRule type="Name">Tenant A</TenantRule>  
<Where>tenant is null</Where>  
</Object>
```

Create a Tenant

You can use the product to create a tenant.

To create a tenant

1. Select Security and Role Management, Tenants on the Administration tab.

The Tenant List page appears.

Note: The Security and Role Management, Tenants option is available only when multi-tenancy is installed (either on or setup).

2. Click Create New.

The Create New Tenant page appears.

3. Complete the editable fields if necessary:

Name

Displays the tenant name.

Service Provider

Identifies whether a tenant is the service provider. The first created tenant is always the Service Provider.

Tenant Number

(Information Only) Displays the tenant number. This field is not used by CA SDM.

Record Status

Sets the tenant to Active or Inactive.

Parent Tenant

Specifies another tenant above this tenant, making this tenant a *subtenant* in a tenant hierarchy.

Subtenants Allowed

Allows this tenant to have subtenants. The tenant cannot modify the setting.

Tenant Depth

(Information Only) Indicates the tenant depth of this tenant.

Supertenant Group

(Information Only) Identifies the system-maintained tenant group that contains this tenant and all tenants above it in the tenant hierarchy.

Subtenant Group

(Information Only) Identifies the system-maintained tenant group that contains this tenant and all tenants below it in the tenant hierarchy.

Foreign Key Group

(Information Only) Identifies the system-maintained tenant group that contains tenants that can be referenced from an SREL in data that belongs to this tenant. The foreign key group is the same as the supertenant group.

Related Tenant Group

(Information Only) Identifies the system-maintained tenant group consisting of both the supertenant and subtenant groups for this tenant.

Terms of Usage

Specifies the Terms of Usage statement for the tenant.

Logo

Specifies the URL for the tenant logo file, which can be any web image type.

Location

Displays the Location lookup page.

Contact

Displays the Contact lookup page.

Note: If no contact is associated with the respective tenant, the Email Address and Pager Email Address fields are inactive.

4. Click Save.

The tenant is created.

5. Close the window.
6. Right-click the Tenant list and click Refresh.
The Tenant List is updated and displays the created tenant.
7. (Optional) To assign this tenant to user-defined tenant groups, click Update Tenant Groups on the Tenant Groups tab.

Create a Tenant Group

You can use the product to create a tenant group.

To create a tenant group

1. On the Administration tab, select Security and Role Management.
2. Click Tenant Groups.

The Tenant Group List appears.

Note: The Security and Role Management, Tenant Groups option is available only when multi-tenancy is installed (either on or setup).

3. Click Create New.

The Create New Tenant Group page appears.

4. Complete the following fields:

Tenant Group Name

Displays the name of the tenant group.

Record Status

Sets the tenant group as active or inactive.

Description

Displays a description of the tenant group.

5. Click Save.
The tenant group is created.
6. Close the window.
The Tenant Group List appears.
7. Right-click the Tenant List and select Refresh.
The Tenant Group List is updated.
8. Click Update Tenants on the Tenant Group Detail page to add tenant members to the group.

Tenant Hierarchies

A *tenant hierarchy* is a structured tenant group that is system-created or modified when you assign a *parent tenant* to a tenant. The tenant becomes a *subtenant* of the parent and higher tenants (if any) in that hierarchy.

Note: The service provider can create multiple unrelated hierarchies, or none. Even in a system with tenant hierarchies, you can define standalone tenants.

A subtenant typically represents a subdivision within its *supertenant*s. A subtenant can have its own business rules and data, and supertenant data is "pushed" to the subtenant automatically on a read-only basis.

CA SDM supports a tenant hierarchy of unlimited depth. However, the *service provider* can specify a limit on the total number of tenants and the depth of tenant hierarchies (default is four levels). The service provider also determines whether individual tenants can have subtenants.

Note: The service provider can participate in tenant hierarchies, but this is not required. The service provider cannot have a parent tenant.

Create a Subtenant

Subtenancy allows you to build and modify tenant hierarchies for organizational and data-sharing purposes. To place a tenant into a tenant hierarchy, you assign it a parent tenant.

To create a subtenant

1. On the Administration tab, select Security and Role Management, Tenants.

The Tenant List appears.

Note: The Security and Role Management, Tenants option is available only when multi-tenancy is enabled.

2. Click an existing tenant to Edit, or click Create New.

The Tenant Detail page appears. Enter any required data or changes.

3. Select a Parent Tenant.

Note: The Parent Tenant drop-down only displays tenants that are allowed to have subtenants.

4. Click Save.

The tenant is a subtenant of the parent tenant.

Note: When a tenant is a subtenant, it belongs to the Subtenant group of the parent tenant, as do the subtenants (if any) of that subtenant, and so on. The parent tenant joins the Supertenant group of the subtenant, as do the supertenants (if any) of that supertenant, and so on. Each joins the Related Tenants group of the other.

System-Maintained Tenant Groups

CA SDM generates and maintains three tenant groups automatically for each tenant in a tenant hierarchy (*tenant* is the tenant name):

- *tenant_subtenants* (tenant, its child tenants, and their lower subtenants)
- *tenant_supertenants* (tenant, its parent tenant and its higher supertenants)
- *tenant_relatedtenants* (entire single hierarchy)

System-maintained tenant groups can be used like user-defined tenant groups. However, only their names and descriptions can be modified.

How to Export and Import Tenant Data

The service provider can extract tenant data from an existing multi-tenancy implementation and import it into a new system.

Note: Depending on the volume of your data, the extraction process can take several hours. You may have to perform the extract and import in multiple phases, as follows:

Initial

Extracts a base line and creates a control file used in subsequent phases .

Update

Uses the control file to extract only data that has changed since the previous run.

Final

Performs the same steps as Update, except that it also extracts animations. Animations are omitted from both the Initial and Update phases.

To extract data from one database and import it into another, complete the following steps:

1. Run an initial phase of [pdm_tenant_extract](#) (see page 313) to extract base-line data. This builds the control file used by subsequent phases.
2. Prepare a new, clean MDB for the extracted data.

Important! The output from the initial phase *must* be loaded into a database that has never been used for the product or for any other product. Each table loaded from initial phase data is truncated prior to the load, which could cause loss of data if the database is already in use.

3. To avoid duplicate privileged contacts appearing on the new system, you must inactivate the privileged contacts. Log onto CA SDM and change the Status of these contacts to "inactive" before loading the extracted data.
4. To avoid referential problems during the data load, run the appropriate drop constraints script:
 - (Oracle) Run `$NX_ROOT/samples/views/Oracle/OracleDropConstraints.sql`
 - (SQL Server) Run `$NX_ROOT/samples/views/SQLServer/SQLDropConstraints.sql`
5. Use [pdm_userload](#) (see page 314) to load the data from the initial phase into the clean MDB prepared in steps 2 and 3.
6. Run an update or final phase of `pdm_tenant_extract` to extract additional data created or modified since the previous phase. `pdm_tenant_extract` uses the control file created in step 1 to determine the data already processed by the previous phase.
7. Use `pdm_userload` to load the data extracted in step 5 into the same MDB containing data loaded from the previous phases.

Note: For more information about this utility, see [pdm_userload](#) (see page 314).
8. Repeat steps 5 and 6 as required until all data has been imported into the new database. The last run should be the final phase.
9. To protect the integrity of the new database, restore the constraints dropped in step 3 by running the appropriate add constraints script:
 - (Oracle) Run `$NX_ROOT/samples/views/Oracle/OracleAddConstraints.sql`
 - (SQL Server) Run `$NX_ROOT/samples/views/SQLServer/SQLAddConstraints.sql`
10. Use [pdm_tenant_delete](#) (see page 312) to delete the extracted data from the original database.
11. Ensure that all repositories associated with extracted tenants are copied to the target settings.

How to Handle Attachments and Repositories

Attachments are stored in repositories. You must copy all repositories that are associated with extracted tenants to the target system, including public repositories. This process is primarily a manual operation, with the following steps:

1. Redefine location-specific information for all repositories, after completion of the initial load of the data into the target system. This task includes changing the following values:
 - Server Name
 - Upload Path
 - Servlet Path
 - Archive Path
2. Manually create all required directories and folders.
3. Copy all attachment files from the previous location to the new repository location after (or during) the load of the data from the Final phase.

After you complete these steps, all references for attachments in the target system should be successful. However, copies of the attachments remain on the source system. [Use the `pdm clean\_attachments.pl` utility](#) (see page 309) to clean these redundant attachments.

Utilities Used for Multi-Tenancy

This section describes utilities that are used to manage a multi-tenancy environment.

Note: Required parameters are enclosed within "{ }", while optional parameters are in "[]".

More information:

[pdm buildtenant—Creating Tenants from Another Object](#) (see page 308)

[pdm clean_attachments—Delete Redundent Attachments After Importing Tenant Data](#) (see page 309)

[pdm settenant—Assigning Tenants to Objects](#) (see page 309)

[pdm tenant_delete—Deleting Tenant Data from a Database](#) (see page 312)

[pdm tenant_extract—Extracting Tenant Data](#) (see page 313)

[pdm userload—Load Tenant Data](#) (see page 314)

pdm_buildtenant—Creating Tenants from Another Object

The *pdm_buildtenant* utility is used to create tenants from another object. You may have used data partitions and another CA SDM object to achieve some of the functionality now provided by multi-tenancy. If you want to convert an implementation to multi-tenancy, the first step is to use *pdm_buildtenant* to map the data in the previously-used object to the new tenant object.

Important! Before you run *pdm_buildtenant*, you *must* configure the service provider.

In this section, the object used to hold tenant-like information is named the pre-tenant object. For most sites with these requirements, the org (organization) object is the pre-tenant object, but the following approach can be used for any pre-tenant object.

The *pdm_buildtenant* utility builds the tenant objects from pre-tenant objects. This application creates a tenant for each pre-tenant object, and sets the tenant attribute in the pre-tenant object to reference the new tenant. This utility has the following syntax:

```
pdm_buildtenant [-h] | [-f [configuration_file]]
```

-f configuration_file

(Optional) Specifies the location of a configuration file specifying the rules for creating tenants from the pre-tenant object. If this argument is not included, *pdm_buildtenant* uses the configuration file from the \$NX_ROOT/site/cfg directory. This file assumes the pre-tenant object is org; if this is not the case, you *must* edit the configuration file before using *pdm_buildtenant*.

Note: You *must* copy *buildtenant.xml* to the \$NX_ROOT/site/cfg directory. In addition, *buildtenant.xsd* must be in the same directory as *buildtenant.xml*, or you receive an error. When you install the product, *buildtenant.xsd* is located in \$NX_ROOT/site/cfg, so you do not have to copy this file.

-h

Displays usage information for *pdm_buildtenant*.

The following is the format of the configuration file:

```
<?xml version="1.0" encoding="utf-8" ?>
<BuildTenant>
  <Object from="MajicObjectName">
    <Attribute from="sourceAttribute1" to="tenantAttribute1" />
    <Attribute from="sourceAttribute2" to="tenantAttribute2" />
  </Object>
</BuildTenant>
```

The *from* attribute of the Object tag identifies the pre-tenant object. Each Attribute tag identifies an attribute to be copied from the pre-tenant object to an attribute of the new tenant.

Important! For UNIX implementations of multi-tenancy, you *must* run `pdm_task` to export LIBPATH before executing the `pdm_settenant` and `pdm_buildtenant` utilities. If you do not run `pdm_task` before executing these utilities, you receive system errors. Use `../pdm_task` to run the command.

pdm_clean_attachments—Delete Redundent Attachments After Importing Tenant Data

After importing tenant data, you should delete redundant attachments. This utility has the following syntax:

```
pdm_perl pdm_clean_attachments.pl [-h] | [-n repository_name] | [-S] [-K]
```

-h

Specifies to display command line help.

-n repository_name

Specifies the name of the repository to process. If not specified, all repositories are processed.

-S

Specifies that only CA SDM repositories are processed.

-K

Specifies that only Knowledge Management and Embedded Images repositories are processed.

Note: Running the `pdm_clean_attachments.pl` command without any arguments processes all repositories.

Important! On UNIX, the LIBPATH must be set before running several CA SDM utilities. Use `pdm_task` to set the LIBPATH before running a utility. For example, input "`pdm_task pdm_clean_attachments ...`".

pdm_settenant—Assigning Tenants to Objects

After you define tenants, you must use the `pdm_settenant` utility to set the tenant column in other objects. This utility has the following syntax:

```
pdm_settenant [-h] | {-f [configuration_file] | -r} [-d domsrvr]
```

-d domsrvr

(Optional) Specifies a domsrvr to use. If this argument is not specified, `pdm_settenant` uses the default domsrvr.

-f configuration_file

(Optional) Specifies the location of a configuration file specifying the data that will be updated and the rules for updating the file. If this argument is not specified, pdm_settenant uses the configuration file from the \$NX_ROOT/site/cfg directory (after the configuration file is copied to the \$NX_ROOT/site/cfg folder).

Note: You can modify the sample settenant.xml file, or create a file and copy it to the \$NX_ROOT/site/cfg directory. In addition, settenant.xsd must be in the same directory as settenant.xml, or you will receive an error. When you install the product, settenant.xsd is located in \$NX_ROOT/site/cfg, so you do not have to copy this file.

The following sample XML code describes the format of this file:

```
<?xml version="1.0" encoding="utf-8" ?>
<SetTenant>
  <Object name="MajicObjectName">
    <TenantRule type="SREL">MajicColumnName</TenantRule>
    <Where>tenant is null</Where>
  </Object>
  <Object name="MajicObjectName">
    <TenantRule type="Name">TenantName</TenantRule>
    <Where>tenant is null</Where>
  </Object>
</SetTenant>
```

Each Object tag specifies a CA SDM object to be tenanted. The TenantRule tag specifies how pdm_settenant should determine the tenant, and the Where tag selects the objects to be tenanted. There are two types of TenantRule tags:

- type="Name"
Specifies an explicit tenant by name.
- type="SREL"
Specifies an SREL attribute in the object. Pdm_settenant copies the tenant of the object referenced by the SREL.

-h

Displays usage information for pdm_settenant.

-r

Outputs a report displaying the total number of rows in each tenant-required table, and how many have a null tenant column.

Note: If both the -f and -r arguments are specified, pdm_settenant outputs a report after completing its update. If you only specify the -r argument, pdm_settenant outputs a report, but does not update any data.

Running `pdm_settenant` without any arguments displays usage information. To run `pdm_settenant` using the default configuration file, specify the `-f` option without the `configuration_file` argument. The `pdm_settenant` utility reads its configuration file and processes each rule it defines in sequence. It writes output to the `pdm_settenant.log` file in the `$NX_ROOT/log` directory.

You can run `pdm_settenant` as many times as needed. The first pass may take a significant time (possibly several hours at a large site). Subsequent passes run faster, as they only need to process rows that have not been updated. This prepares the database prior to installing the multi-tenancy option.

Important! On UNIX implementations of multi-tenancy, you must run `pdm_task` to export `LIBPATH` before executing the `pdm_settenant` and `pdm_buildtenant` utilities. If you do not run `pdm_task` before executing these utilities, you will receive system errors. Use `./pdm_task` to run the command.

Assign Tenants to Objects Considerations

After you define tenants, you can use the `pdm_settenant` (assign tenants to objects) utility to set the tenant column in other objects. When you change the tenant for an object, you must consider whether to change the tenancy on related tenanted objects in order to maintain data integrity. Failure to keep these objects synchronized can cause data to appear missing from CIs, relationships, MDRs, versioning, and so on. The following CA CMDB objects are tenanted:

- `nr`—CI definitions
- `nr_com`—Log entries associated with a CI
- `bmhier`—Relationships associated with CIs
- `mdr_idmap`—MDR provider definitions
- `ci_mdr_idmap`—CI/MDR federated mappings

For each CI, do the following to synchronize data when you use `pdm_settenant` to change tenancy:

- Specify `nr` for the CI object name.
- Change the log entries associated with the CI in `nr_com` so that you can view the log entries for the new tenant.

Note: For information about the `pdm_settenant` command, see the *Administration Guide*.

Example: XML to Change the Tenant and Log

The following XML changes the tenant for a CI named CITest to T2 and also changes the corresponding log entries in nr_com:

```
<TenantRule type="Name">T2</TenantRule>
<Where>name = 'CITest'</Where>
</Object>
<Object name="nr_com">
<TenantRule type="Name">T2</TenantRule>
<Where>asset_id.name = 'CITest'</Where>
\</Object>
```

pdm_tenant_delete—Deleting Tenant Data from a Database

The *pdm_tenant_delete* utility removes all data for a specified tenant from the database.

Important! The referential constraints on the *ca_* tables must be dropped before running *pdm_tenant_delete* and restored afterwards.

This utility has the following syntax:

```
pdm_tenant_delete -h|-t tenant_name [-C|-R] [-Q]
```

-h

Displays the usage information for *pdm_tenant_delete*.

-t *tenant_name*

Specifies the name of the tenant of the data to be deleted.

Note: The tenant must be marked inactive before you can use this utility to delete the data.

-C

Specifies that all contacts for a tenant will be marked inactive. Since contacts can be shared between products, default logic should not mass delete or mass inactivate contacts unless explicitly requested.

Note: This option is ignored if the *-R* option is specified.

-R

Specifies that all rows in all tenanted tables marked *CA_COMMON* in *ddict.sch* will be deleted, including the tenant object itself.

Important! These tables are shared between multiple products, so use this option with caution.

-Q

Specifies quick query processing to execute database queries as fast as possible. If this argument is not specified, the utility uses background query processing so that queries run only when the system is otherwise idle. This argument improves running time at the expense of a greater impact on an active system.

Important! On UNIX, the LIBPATH must be set before running several CA SDM utilities. Use *pdm_task* to set the LIBPATH before running a utility. For example, input "pdm_task pdm_clean_attachments ...".

pdm_tenant_extract—Extracting Tenant Data

The *pdm_tenant_extract* utility extracts all data for a specified tenant from the database. It extracts the data in *pdm_userload* format so that it can easily be loaded into another database. This utility has the following syntax:

```
pdm_tenant_extract -h | -c control_file [-d domsrvr] [-g yes|no] [-o output_file]
                    -p phase [[-t tenant_name]...] [-Q] [table1 [table2...]]
```

-h

Displays the usage information for *pdm_tenant_extract*.

-c control_file

Specifies the location of the control file for this tenant extract. For the Initial phase, the file is created in the specified location (and must not already exist). The file must exist for the Update and Final phases.

-d domsrvr

(Optional) Specifies a domsrvr to use.

-g yes|no

(Optional) Specifies whether or not public data is included in the output file. If this argument is not specified, public data from all tables is included.

-o output_file

(Optional) Specifies the location of the output file. If this argument is not specified, output is directed to stdout.

-p phase

Specifies the phase of the extract. Use one of the following values:

I—Initial

U—Update

F—Final

-t *tenant_name*

Specifies the name of a tenant to be extracted. This argument is required for the Initial phase and can be repeated for multiple tenants. It is not valid on the Update and Final phase.

-Q

Specifies quick query processing to execute database queries as fast as possible. If this argument is not specified, the utility uses background query processing so that queries run only when the system is otherwise idle

table1 [table2...]

(Optional) Specifies the tables to extract. If omitted, all tables are extracted.

Important! The output from the initial phase must be loaded into a database that has never been used for CA SDM or for any other product. Each table loaded from initial phase data is truncated prior to the load, which could cause loss of data if the database is already in use.

Note: To avoid referential problems during the data load, run the appropriate drop constraints script (\$NX_ROOT/samples/views/Oracle/OracleDropConstraints.sql or \$NX_ROOT/samples/views/SQLServer/SQLDropConstraints.sql). After the loads complete, re-apply the constraints with the appropriate xxxAddConstraints.sql script found in the same directory.

Important! On UNIX, the LIBPATH must be set before running several CA SDM utilities. Use *pdm_task* to set the LIBPATH before running a utility. For example, input "pdm_task pdm_clean_attachments ...".

More information:

[How to Export and Import Tenant Data](#) (see page 305)

pdm_userload—Load Tenant Data

The *pdm_userload* utility is used to load data into a CA SDM database. This utility is available even if multi-tenancy is not installed. Multi-tenancy adds support for one additional argument (-t) that specifies the name of a tenant whose id must be inserted into the tenant column of all rows inserted or updated into a tenanted table. The specified tenant must already be in the database.

When extracting data, complete the following steps to avoid errors in stdlog:

1. Before you start loading data, shut down CA SDM and restart the product in DBADMIN mode as follows:

Windows

Run `pdm_d_mgr -s DBADMIN`

UNIX

Run `pdm_init -s DBADMIN`

2. After the data loads, shut down CA SDM using the `pdm_halt` command.
3. Restart CA SDM in normal mode.

Note: For more information about the `pdm_userload` utility, see the *Administration Guide*.

How to Enable Auto-Failover

Server health monitoring observes how a server reacts to the operating load and tracks its responsiveness to the client requests. The purpose of this monitoring is to prevent server failures by ensuring that the server always retains sufficient capacity to conduct the required tasks. Most of the standard health monitoring tools support remote server monitoring through the HTTP and HTTPS protocols.

CA SDM automatic failover feature exposes the following HTTP based standard interfaces:

- Health Monitoring Interface: HTTP(S) interface to monitor the background server health. It also makes reliable failover decisions to initiate failover on a chosen standby server in case of any disruptions to the background server's availability or ability to conduct required tasks.
- Failover Initiating Interface: HTTP(S) interface to seamlessly promote the chosen standby server as the new background server without causing any service disruption.

Follow these steps:

1. Install Apache Tomcat on the background and all standby servers.

Note: Ensure that Tomcat is using JRE 1.7 and ensure that the Tomcat is not using the port number that is configured for the CA SDM components.

2. (Optional) Configure SSL on the Tomcat servers that you have installed. For more information about configuring SSL, see the *How to Configure SSL Authentication* scenario or the *Administration Guide*.

3. Log in to the background server.
4. Deploy the health servlet. Complete the following steps:
 - a. Copy the HealthServlet.war file from the \$NX_ROOT/samples/HealthServlet folder to the *TOMCAT_HOME*/webapps folder.
 - b. Restart Tomcat.

The HealthServlet.war file is deployed in the webapps folder. To confirm the deployment, verify that the HealthServlet folder is created in the same webapps folder.

After the successful deployment, the health servlet is ready to perform the health checks. It includes checking the status of the SLUMP and health of the CA SDM processes that are defined in the health.xml file. Find the health.xml file in the following location:

TOMCAT_HOME/webapps/HealthServlet/WEB-INF/classes

5. (Optional) Customize the health.xml based on your organization needs. For example, you want to monitor the webengine process. Add the process in the health.xml file with the correct tagname, as defined in CA SDM. Complete the following steps to find the tagname:
 - a. Open the pdm_startup.i and pdm_startup files from the \$NX_ROOT/pdmconf directory.
 - b. Look for the process that you want to monitor in both the files.
 - c. Find the corresponding tagname by matching the variables in both the files.

For example, webengine process is defined in the pdm_startup.i file as follows:

```
#define WEBENGINE(_TAG,_HOST,_SLUMP_NAME,_DOMSRVR, _CFG, _WEBDIRECTOR,  
_RPC_NAME)
```

The webengine process is defined in the pdm_startup file as follows:

```
WEBENGINE(webengine, $NX_LOCAL_HOST, web:local, domsrvr,  
$NX_ROOT/bopcfg/www/web.cfg, "", "rpc_srvr:%h")
```

From the example, we can find out that the tagname for webengine process is webengine.

Important! If you are creating a new process, the existing process is commented out in the pdm_startup file and new entries are created. Ensure that you look for the tagname in the new process entries.

Important! If you customize health.xml, ensure that the XML does not have any errors and that you restart Tomcat to reflect the changes that are made to the XML.

6. Perform steps 4 and 5 for all standby servers.
7. Configure the chosen third-party tool to monitor the health of the background server at regular intervals. To monitor the health, use the following HTTP URL:

`http(s)://Background_server_name:port_number/HealthServlet/GetHealth`

8. Configure the chosen third-party tool to initiate a failover logic when the background server health degrades. We recommend that you to configure the failover logic so as to promote the standby server as the new background server. Use the following failover servlet in the failover logic:

Important! We recommended you to configure the failover servlet on SSL with the access privileges given only to predefined users. This is also applicable while configuring third-party tool to initiate failover.

`http(s)://Standby_server_name:port_number/HealthServlet/FailoverServlet`

You have enabled auto-failover.

9. After the successful configuration, the third-party tool starts monitoring the background server health using the health servlet URL.
 - Each server type has its own set of processes. If the SLUMP and all the CA SDM processes are working properly, the third-party tool will receive an HTTP 200 response from the background server with a predefined payload, as follows:

AA-Server-Status: All OK!

AA-Server-Role: BG
 - If a SLUMP or any of the CA SDM processes (listed in health.xml) stop working and cannot resume, the third-party tool will receive an HTTP 503 response from the background server with a predefined payload, as follows:

AA-Server-Status: NOT OK!

AA-Server-Role: BG
10. If the HTTP 503 response is received, the third-party tool automatically initiates the failover logic.

Chapter 6: Customizing

This section contains the following topics:

[Customization Overview](#) (see page 321)

[How to Move the Authentication Module to an External Server](#) (see page 322)

[Notification Method Customization](#) (see page 329)

[Query and Message Customization](#) (see page 337)

[Web Interface Customization](#) (see page 351)

[Event Log Data Storage Customization](#) (see page 461)

[CA Business Intelligence Reports Customization](#) (see page 463)

[Legacy Reports Customization](#) (see page 478)

Chapter 7: Customization Overview

CA SDM lets you fulfill various IT Service Management functions. The product provides a broad feature set, and various best-practice content to help meet your service management needs.

Although the default implementation of CA SDM closely matches the processes and terminology used in most IT organizations, you can extend the product to work with the unique aspects of your organization. The product includes the following spectrum of approaches to customize the product to meet your unique needs:

- End-user personalization
- Systemwide configuration
- Tool-based adaptation
- Code-level customization

Different types of approaches exist that let you customize the product.

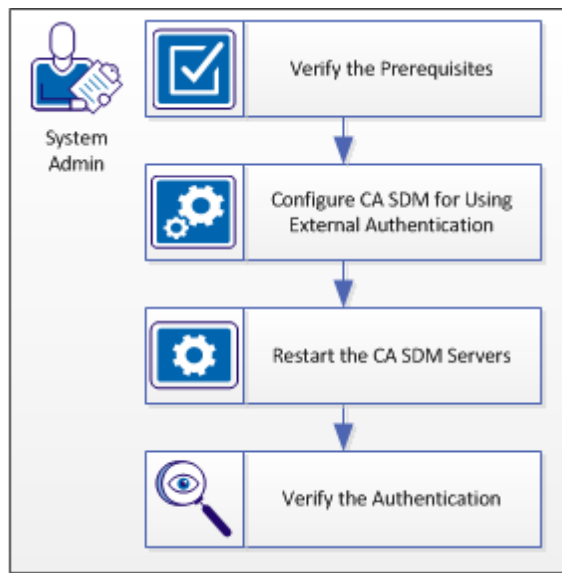
How to Move the Authentication Module to an External Server

The authentication module in CA SDM is a singleton daemon that is responsible for the user authentication. The authentication module runs on the primary server for the conventional configuration and on the background server for the advanced availability configuration. You move the authentication module to an external server under any of the following scenarios:

- Conventional configuration:
 - The primary server is on UNIX or a Linux platform and you require a Windows authentication, you move the authentication module to a Windows secondary server.
 - The primary server is on a Solaris platform and you require the CA EEM authentication, you move the authentication module to the secondary server as CA SDM does not support the CA EEM integration on Solaris.
- Advanced availability configuration:
 - The background server is on UNIX or a Linux platform and you require a Windows authentication, you move the authentication module to a Windows application server.
 - The background server is on a Solaris platform and you require the CA EEM integration, you move authentication module to an application server as CA SDM does not support the EEM integration on Solaris.

Note: The selected external server must have CA SDM installed. If you move the authentication module to an external server, it becomes a single point of failure. For example, if you move authentication module to an application server, users will no longer be able to log in if that application server is down.

The following diagram illustrates how to move the authentication module:



To move the authentication module to an external server, complete the following tasks:

1. Verify the Prerequisites.
2. [Configure CA SDM for Moving Authentication Module.](#) (see page 325)
3. [Restart the CA SDM servers](#) (see page 326)
4. [Verify the Authentication.](#) (see page 329)

Verify the Prerequisites

The analysis of the CA SDM server platforms helps you to decide how to move the authentication module to an external server.

Follow these steps:

- Identify the operating system of the following server, based on the configuration type:
 - Conventional: primary server.
 - Advanced availability: application server.
- Identify the type of required authentication from the following models:
 - Windows authentication for the CA SDM implementation on UNIX or Linux.
 - CA EEM authentication for the CA SDM implementation on Solaris.
- Make sure that CA SDM is installed on the selected external server.

Configure CA SDM for Using External Authentication

To redirect the authentication requests to an external server, you must specify the hostname of the target server where the authentication module is present. The process of configuring CA SDM for moving the authentication module is different for the conventional and advanced availability configuration of CA SDM.

Conventional Configuration

Follow these steps:

1. Log in to the primary server as an administrator.
2. From the command prompt, change the directory to `samples\pdmconf` under `NX_ROOT` and run `pdm_perlpdm_edit.pl`.
3. From the `pdm_edit.pl` top menu select `U`, and press Enter.
The User Validation server submenu appears.
4. Enter `E` to specify the hostname of the external server, and press Enter.
5. Enter primary for the primary server or the hostname of the secondary server, and press Enter.

You have configured the redirection of authentication requests to an external server.

Advanced Availability Configuration

Follow these steps:

1. Log in to the background server web interface as an administrator.
2. Select the Administration tab.
3. Expand Options Manager, Security.
4. Click the `bopauth_nxd_host` entry in the Option List.
The `bopauth_nxd_host` Options Details page is displayed.
5. Click Edit.
6. Select the host name of the target server from the Option Value drop-down list.
7. Click Save.

Note: By default, the authentication module runs on the background server.

You have configured the redirection of authentication requests to an external server.

How to Restart the CA SDM Servers

Depending on your CA SDM configuration,

- [Restart the CA SDM servers in conventional configuration](#) (see page 326).
- [Restart the CA SDM servers in advanced availability configuration](#) (see page 326).

Restart the CA SDM Servers in Conventional Configuration

For the conventional configuration, you restart the servers in the following order:

Note: To restart a server click Start, Settings, Control Panel, Administrative Tools, Services. Right-click the CA SDM Server and select Start.

1. Restart the secondary server.
2. Restart the primary server.

Restart the CA SDM Servers in Advanced Availability Configuration

For the advanced availability configuration, we recommend that you restart the CA SDM servers in the following order:

Note: To restart a server click Start, Settings, Control Panel, Administrative Tools, Services. Right-click the CA SDM Server and select Start.

1. Restart all Standby Servers.
2. [Promote the Standby Server as the New Background Server](#) (see page 326).
3. Start the Old Background Server.

When you start the background server, it becomes a standby server.

4. [Choose the Less Active Application Server](#) (see page 327).
5. Restart the Less Active Application Server.
6. [Stop the Other Application Server](#) (see page 328).
7. Start the Application Server.
8. Perform the steps 6 and 7 for the other application servers.

Promote the Standby Server as the New Background Server

Before you stop the background server, promote the standby server (that you have upgraded) as the new background server. If Support Automation is installed with CA SDM, notify the active Support Automation users about the background server shutdown.

Follow these steps:

1. Execute the following command on the background server to notify all active users using Support Automation to save their work:

```
sa_server_notifier [-h] | [-q seconds] | [-c]
```

-h

Displays the help page.

-q seconds

This option notifies a local server (background) to quiesce in a specified time interval. This interval is the number of seconds before the server goes offline. This option cannot be used for a standby server or application server.

-c

This option cancels a previously sent quiesce request.

A pop-up message is displayed to all the active users using Support Automation. This message notifies the users about the server shutdown and the time that is left for the shutdown. The users must save their work and logout within that scheduled time.

2. Execute the following command on the standby server that you wish to promote as the new background server:

```
pdm_server_control -b
```

-b

Notifies a local standby server to become the background server. The standby server must already be running. If the server is not running, it is started but no failover is performed; to start a failover, run the command again.

The background server shuts down automatically and the standby server is promoted as the new background server. This change does not affect the end-user sessions. The in-progress updates (if any) are stored and delayed, until the new background server comes online.

Choose the Less Active Application Server

You choose an application server with the least user activity. Run the following command on each application server to choose the one with no or minimal active sessions.

```
pdm_webstat
```

Note: This command does not capture the SOAP or REST Web Service sessions.

Stop the Other Application Server

You inform all the active users on an application server to move to the less active application server before you stop it. Ensure that you have restarted the less active application server before moving all the users to it.

Follow these steps:

1. (Recommended) Inform all active Support Automation analysts on the application server which you want to stop, to create a ticket in CA SDM with their session information. This process ensures that the session information is not lost. For example, the Support Automation analyst is in a session with a customer to resolve a hardware issue. In such a case, the Support Automation analyst can create an issue in CA SDM with the session information before the application server shuts down.
2. Send a notification (for example, an email notification) to all the active users on the application server to move to the less active application server that you just restarted. This notification can include the details of the updated application server.
3. Execute the following command on the application server:

```
pdm_server_control [-h] -q interval -s server_name
```

-h

Displays the help page.

-q *interval* -s *server_name*

Notifies a local or remote application server to quiesce in a specified time interval. This interval is the number of seconds before the server goes offline. When using this option without a *server_name*, the local server is notified to quiesce. This option cannot be used for a background or a standby server.

A pop-up message is displayed to all the active users on the application server to notify them about the server shutdown and the time left for the shutdown. The users must save their work and logout within that time. The application server stops after the specified time. The users log on to the other application server to resume their work. The Support Automation analyst can refer to the ticket and resume their work.

The application server is stopped successfully.

Verify the Authentication

Verify the authentication with a user id that has corresponding contact record in Windows or CA EEM, based on the authentication type. A successful login indicates that you have successfully moved the authentication module.

Follow these steps:

1. Launch the browser and enter the CA SDM URL.
2. Log in to CA SDM with a user name having a corresponding contact record in Windows or CA EEM, based on the authentication type.

If the module has been moved successfully, the Service Desk Home Page opens.

Notification Method Customization

The CA SDM automatic notification methods notify personnel at key points in the service desk management process. The standard notification methods are shown as follows:

- Email
- Notification (Log)
- Pager_Email

You can define customized notification methods to specify a new method of transmission, such as voice mail, display boards, or a specific printer. You can also access data from another application and include it in the notification message.

The Notification Process

Ticket notifications (applicable to issues, change orders, and requests) are processed when the ticket is saved, as described by the following:

- If the notification method is other than Notification, such as Email, the notification processor executes the notification method for each contact in the list. This method is typically an executable or shell script, which is launched in a new process. Details about the notification are stored in environment variables for easy access by the executable/script.
- For each notification requested, the notification processor sets the NX_NTF_MESSAGE and NX_NTF_SUMMARY environment variables using the Notification Message Title and Notification Message Body information provided on the Message Template notebook page of the Activity Notifications Detail window. If the recipient is a valid contact, additional environment variables are created using information in their Contact Detail record.
- If the Write To File option is selected for the notification, a text file is created with additional information that the notification method can use to obtain more detailed information.
- A list of contacts to receive the notification is built from the information provided on the Objects, Contacts, Types, and Survey notebook pages of the Activity Notifications Detail window. For those having a notification method matching the Notify Level and the log_all_notify Options Manager option installed, a notification is generated first to the notification log.

Notification Method Variables

Two sets of variables are created and made available to the notification method.

Basic Environment Variables

The first set of variables is created for every notification sent, independent of whether you select the Write To File option for the notification. They are written to the environment as environment variables that can be accessed by the notification method in the standard way. If you select the Write To File option for the notification method, these variables are also written to the notification file in the notification section.

The following environment variables give you basic information about the notification. They are always defined, even if the corresponding value is empty:

Environment Variable	Description
NX_NTF_MESSAGE	The completed message template text, including full expansion of all variables

NX_NTF_SUMMARY	The completed message template header, including full expansion of all variables
NX_NTF_URGENCY	The notification urgency (1 is low, 4 is emergency)

The following environment variables are created only if the recipient is a valid CA SDM contact, in which case they are set using values from the recipient's Contact Detail record as shown in the following table:

Variable	Contact Detail Window Fields
NX_NTF_BEEPER_PHONE	Pager Number
NX_NTF_COMBO_NAME	Last Name, First Name, Middle Name
NX_NTF_CONTACT	Contact ID
NX_NTF_EMAIL_ADDRESS	Email or Pager Email Address (depending on notification type)
NX_NTF_FAX_PHONE	Fax Number
NX_NTF_PUBLIC_PHONE	Phone Number
NX_NTF_USERID	User ID
NX_NTF_VOICE_PHONE	Alt. Phone #

Note: These variables are not created if the corresponding values are empty (with the noted exception of NX_NTF_CONTACT, which cannot be empty).

Attribute Variables

The second set of variables, called attribute variables, is available only if you select the Write To File option when you define the notification method. They are written to the notification file only—not to the environment. They are of the form:

```
NX_NTF_attribute[.secondary_attribute]=value
```

where:

attribute

The name of the attribute whose value you want to obtain. This is the attribute name as defined for the object. For a complete list of all attribute names for any object, see the CA SDM Technical Reference Guide. The most common objects associated with notifications are the ticket, which has an object name dependent of the type of ticket (for example, cr for requests), and the contact identifying the recipient, which has an object name of cnt. For example, the environment variable for the description attribute of a ticket might look as follows in the notification file:

```
NX_NTF_DESCRIPTION=This is a sample description.
```

secondary_attribute

If the first *attribute* is an internal identifier for another object, a secondary attribute is often attached to give more meaningful information using the dot notation. In database terms, attribute is a foreign key that points to a row in another table, rather than a simple data value. Using this raw key value would probably have little meaning. To save you the effort, many of these types of fields are resolved or de-referenced for you. When this is the case, *secondary_attribute* will be the value in the referenced table. For example, instead of writing the value for the assignee attribute, which is actually stored as the unique ID of the contact record for the assignee, the assignee's combined name is written by referring to the *combo_name* attribute for the contact object, as shown in the following example:

```
NX_NTF_ASSIGNEE.COMBO_NAME=Armstrong, Beth
```

If an attribute does not have a value, the corresponding value is usually (NULL) or blank. For example:

```
NX_NTF_CALL_BACK_DATE=(NULL)
```

```
NX_NTF_GROUP.COMBO_NAME=
```

Note: An attribute variable that exists for both the ticket and the recipient is *NX_NTF_ID* (the id attribute), which is the unique database ID for the object.

The Notification File

If you select the Write To File option when you define a notification method, all the basic environment and attribute variables are written to a text file, which is closed before executing the notification method script or program. This notification file is written every time the notification method is invoked for a contact, and is a handy mechanism for passing relevant information to the notification script that is not otherwise available in the environment.

The full path of the notification file is set in the `NX_NTF_FILENAME` environment variable, which is available to the notification method's process. The file name is also added to the end of value you enter in the Notification Method field when defining the notification method. For example, if the Notification Method is `'pdm_perl -w mymethod.pl'`, then the actual process executes `'pdm_perl -w mymethod.pl unique_notification_file_name'`.

Important! The administrator can clean up the notification files. This clean-up is especially important for a site using a high volume of notifications, which can result in thousands of notification files a day. The files are located in the standard temporary directory (TEMP on Windows and TMP on UNIX). One suggestion is to delete the file at the end of the notification method script/program.

The notification file is a standard text file that is divided into sections. Each line contains either an attribute/value pair or a section marker. Each notification file has three sections, as described by the following. All sections begin with "-----" followed by a new line.

SECTION=obj, where obj identifies the object type of the ticket

Iss

Provides information about the issue.

Chg

Provides information about the change order.

Cr

Provides information about the request.

SECTION=cnt

Provides information about the recipient.

SECTION=notification

Provides the same information that is available from the basic environment variables.

Note: The section names for the ticket and recipient are actually the object names for the attributes in that section. For a complete list of all attribute names for any object, see the *CA SDM Technical Reference Guide*.

Several lines of attribute/value pairs, each of which represents an attribute of the corresponding object, are contained in each section. The Attribute Variables in this section provide the detailed information about how these lines are formatted and what they mean.

Line breaks in an attribute value are reproduced as new lines in the notification file. Your notification method process can only use the attribute or value lines that begin with NX_NTF, and section markers. Generate a sample file and look at its contents before you work with a notification file in your notification method process.

More information:

[Attribute Variables](#) (see page 332)

[Basic Environment Variables](#) (see page 330)

Using Perl Scripts

Most notification methods invoke an executable or shell script to read the environment variables and send the message. This action works well on most UNIX servers, but difficulties arise reading the environment variables on a Windows server.

You can use a Perl script to overcome environment problems on Windows. CA SDM includes a ready-to-use installation of the Perl interpreter named `pdm_perl`. Any Perl script invoked with `pdm_perl` as a notification method can reliably obtain the environment variables. The Perl script can read and format the environment variable values and carry on with the rest of the notification, such as invoking a pager or sending an email.

For Windows-based servers, consider using the `launchit` utility. One of the functions of this utility is to invoke your scripts or programs in a shell environment similar to the Command Prompt with the proper environment variables set.

For example, if you write a Perl script named `read_env.pl` to read several of the environment variables described here, you can invoke it for a notification by entering the following in the Notification Method field on the Notification Method Detail window:

```
pdm_perl script_path/read_env.pl
```

This notification method starts the Perl interpreter and executes the instructions in `read_env.pl` script.

How to Create a Customized Notification Method

To create a customized notification step, complete the following steps:

1. Create a script to process the message template and transmit it to the recipient. The script can be any executable, depending on the platform. Third-party or public domain interpreters can also be used. Typically, Bourne shell scripts are used on UNIX and .bat files are used on Windows. If your script requires a special template, you must create it.
2. Add the new notification method to your site using the web interface.

More information:

[Create a Script](#) (see page 335)

[Add the Notification Method](#) (see page 335)

Create a Script

Use the following steps to create a notification method script:

1. Determine how you want the notification to be delivered (for example, printed on a particular printer).
2. Determine the contents of the notification message.
3. Specify what information from the message template to include in the notification.
4. Set up a script to transmit the notification.
5. Place the script in an executable file in the path of the CA SDM server.

Add the Notification Method

After you create a script, you must define the new notification method to CA SDM. There are two ways to add a notification method:

- Using the web interface
- Using a UNIX shell script

More information:

[Add a Notification Method Using the Web Interface](#) (see page 336)

[Add a Notification Method Using a UNIX Shell Script](#) (see page 337)

Add a Notification Method Using the Web Interface

Use the web interface to add a notification method.

To add a notification method using the web interface

1. Select Notification Methods from Notifications on the Administration Interface.
The Notification Method List appears.

2. Click the Create New button.

A Create New Notification Method window appears.

3. Enter data in the following fields:

Symbol

(Required) Identify the notification method.

Write to File

Select this check box to write the context information of the notification method to a file.

Description

Describe the notification method.

Notification Method

Specify the full path of the executable script for the notification method. If the script or program can be resolved using the system path, you do not have to specify the full path. For a Windows Server, consider using the launchit.exe utility to invoke your script or program.

Note: For more information about the launchit utility, see the *Online Help*.

Note: Because the notification method runs from the CA SDM server, you must put the notification method script in a directory that can be accessed from the path on the server or specify the full path to the script. On UNIX, depending on the shell you are running, you can check this by executing this command:

which *pathname_to_script*

If there appears to be a problem with the notification methods, examine the logs in the \$NX_ROOT/log directory on UNIX or \$NX_ROOT\log on Windows.

Add a Notification Method Using a UNIX Shell Script

The following steps create a notification method shell script that sends the notification message to the service desk printer, SDPR2. In this example, the notification message will consist of the message header and the message text from the message template:

1. Set up the shell script to assemble the notification text and transmit it, as follows:

```
#!/bin/sh
echo "
TO:      $NX_NTF_USERID
SUBJECT: $NX_NTF_SUMMARY
MESSAGE:
$NX_NTF_MESSAGE" |lp -dSDPR2
```

2. Name the executable file `sd_print`, and place it in any directory used for common scripts at your site, such as `/usr/local/netbin`.
3. Make the shell script an executable file using `chmod`.
4. Select Notification Methods from Notifications on the Administration Interface.
5. Select New from the File menu.
6. Enter data in these fields:

Symbol

SDPR2

Description

Send backup notification to service desk printer SDPR2

Notification Method

`/usr/local/netbin/sd_print`

7. Click the Save button to save the new record. Then click Close Window to close the detail window.

Query and Message Customization

CA SDM provides a number of features that let you narrow the focus of information so you can concentrate on requests, change orders, and issues that apply to your immediate situation. One of these functions stores queries that you can use to see relevant information on the scoreboard of the administrative or web interface. Another lets you customize the messages that notify key personnel of ticket activities.

Stored queries can provide a focus on tickets related to the logged-in user and customize the counter fields in the scoreboard area of the administrative and web interfaces. You can customize activity notification messages to include attributes from the activity log object and information on specific tickets.

More information:

[Scoreboard Queries](#) (see page 338)

[ITIL-Specific Queries](#) (see page 345)

[Activity Notification Messages Customization](#) (see page 345)

Scoreboard Queries

One of the tables in the database, `Cr_Stored_Queries`, defines stored queries. These stored queries, which are similar to SQL queries, can be used to customize the counter fields on nodes in the scoreboard area of the administrative and web interfaces. The counter fields tell how many records match the query. For example, they can tell how many of various types of requests have been assigned to the logged-in user.

Each user can customize the counter fields that appear on his or her scoreboard (this is explained in the online help.) However, the system administrator must first define the various types of requests that can be counted in these counter fields as stored queries. For information about scoreboard queries, see the *Administration Guide*.

Note: Scoreboard counts will be incorrect if database query values are equal to NULL. For example, if your Scoreboard query specifies that `assignee.organization = xyz`, and an assignee field is blank (NULL) for a record, then that record will not be part of the Scoreboard count.

Stored Queries for Logged in User

Two of the fields that must be defined on the Stored Query Detail window are Where Clause and Label. Both of these fields can contain expressions that are customized to the logged-in user. Stored queries refer to objects and attributes, rather than to table names and columns. A stored query that is customized to the logged-in user consists of two parts, as follows:

The object (such as cr for a request)

This is usually specified on the left of the equal (=) sign. The syntax for this part of the stored query is:

```
att_name[.att_name...].SREL_att_name
```

A stored query always has a Type, which is an object name that the query is executed against and provides context for the query. In the syntax above, the first `att_name` must be an attribute name of the context object.

The logged-in user (the instance of the cnt object for this user)

This must be specified on the right of the equal (=) sign if the tickets are to be selected based on an attribute of the logged-in user. The syntax for this part of the stored query is:

`@att_name[.att_name...].SREL_att_name`

Note: For more information about objects and attributes, see the *CA SDM Technical Reference Guide*.

Syntax for cr Object

Use this syntax if the reference is to the request (cr) object:

`att_name[.att_name...].SREL_att_name`

This example identifies the location of the person assigned to handle a ticket. In this example, the object name is omitted, as the type of the Stored Query implies the cr object:

`assignee.location=@cnt.location AND active=1`

assignee

The attribute in the request object that maps to the assignee field in the corresponding table. For example, the assignee attribute is defined in the cr object with SREL agt, which means it refers to the agt factory. The agt factory is part of the cnt object definition.

location

The attribute in the cnt object that maps to the c_l_id field in the Contact table. The location attribute is defined in the cnt object with SREL loc, which means it refers to the loc object.

WHERE Clause

The following example demonstrates a value you can code in a WHERE clause:

`assignee.location=@cnt.location AND active=1`

Given the Stored Queries type is a Request, this query selects all active requests where the assignee's location is the same as the location of the logged-in user.

Label

Attributes in the cnt object can be included in labels the same way they are included in WHERE clauses. Here is an example of the use of an attribute in the cnt object in a label:

```
@cnt.location.name Calls
```

This label will include the name of a location, for example, Phoenix, where Phoenix is substituted for @cnt.location.name when the label is displayed on a window. The label will be displayed as Phoenix Calls.

The IN Keyword

The IN keyword allows a stored query to reference two (or more) tables without creating a join. This can result in significant efficiencies in executing the query. It is coded as follows:

```
SREL_att_name IN ( value1 [, value2 [...]] )
```

For example, a request query could be coded as:

```
category.sym IN (\ 'Soft%' , \ 'Email' )
```

This results in the following SQL WHERE clause:

```
category IN (SELECT persid FROM prob_ctg WHERE sym LIKE 'Soft%' OR sym = 'Email')
```

One use of IN is to avoid Cartesian products. For example, the following query results in a Cartesian product and is very inefficient:

```
assignee.last_name LIKE 'MIS%' OR group.last_name LIKE 'MIS%'
```

By using IN, the query does not create a Cartesian product; in fact, it creates no joins at all, as illustrated by the following example:

```
assignee.last_name IN 'MIS%' OR group.last_name IN 'MIS%'
```

Note: The parentheses that normally enclose the list of values on the right side of IN can be omitted if there is only one value in the list. Similarly, you should avoid joins in data partitions by converting a data partition, illustrated as follows:

```
assignee.last_name LIKE 'Smith'
```

to:

```
assignee = U'374683AA82ACE34AB999A042F3A0BA2E'
```

where:

U

indicates that the value is a uuid.

'374683AA82ACE34AB999A042F3A0BA2E'

The 32 characters in single quotes indicates the string representation of an actual uuid.

This avoids the join with some loss in clarity. Using IN, the same partition can be written as illustrated in the next example, with the clarity of the first version and almost the same efficiency as the second version:

```
assignee.last_name IN 'Smith'
```

CA SDM supports the IN clause applied to QREL or BREL lists. For example, if you want to find all the Requests with Assets that are parents of another specific Asset (with id 374683AA82ACE34AB999A042F3A0BA2E), the appropriate where clause is as follows:

```
affected_resource.[parent]child_hier.child IN  
(U'374683AA82ACE34AB999A042F3A0BA2E')
```

The first part of the clause, *affected_resource*, is an SREL (foreign key) of the cr (Request) object, pointing to the Network_Resource table. The *child_hier* portion is a list of hier objects pointing to the hierarchical relationships. The last part, *child*, forms the first part of the where clause for the IN sub query. The *374683AA82ACE34AB999A042F3A0BA2E* portion is the foreign key value to match on *child*. *[parent]* specifies the sub query return. Since the id value is a string representation of a UUID it must be indicated as such and written as *U'374683AA82ACE34AB999A042F3A0BA2E'*

The following is an example of the actual SQL generated, which provides all the Requests where the Asset is a parent of a specific Asset:

```
SELECT Call_Req.id FROM Call_Req WHERE Call_Req.affected_rc IN (SELECT hier_parent
FROM Asset_Assignment WHERE hier_child = U'374683AA82ACE34AB999A042F3A0BA2E')
```

To query on multiple parents, you can provide a comma-separated list in the () portion of the SQL, as shown by the following example:

```
affected_resource.[parent]child_hier.child IN
(U'374683AA82ACE34AB999A042F3A0BA2E', U'374683AA82ACE34AB999A042F3A0BA2E')
```

The attribute name in brackets ([]) is used to form the SELECT portion of the sub-clause. Bracket notation is not used for the group Stored Queries shipped with Unicenter Service Desk Version 6.0, as illustrated in this example:

```
(assignee = @cnt.id OR group.group_list.member IN (@cnt.id)) AND active = 1
```

Note: If bracket notation is not used, the SQL subsystem assumes that it is the attribute name of the first symbol in the dot-notation portion. It works in this case, more out of luck, that the group_list object has an attribute named 'group' in it. If it were named anything else, the where clause would fail to parse! The equivalent clause with brackets illustrated as follows:

```
(assignee = @cnt.id OR group.[group]group_list.member IN (@cnt.id)) AND active = 1
```

Note: You cannot extend the dot notation. For example, the following does not work:

```
affected_resource.[parent]child_hier.child.name IN ('chicago1')
```

Query Based on Priority

In the database, the Priority table has two columns named sym and enum. The value the users see are the sym values. But the application sees the sym based on the enum values. At present, the default sym values 1 to 5 are reversed in their enum value.

Example

Sym	Enum
1	5
2	4
3	3
4	2
5	1

Therefore, when writing the stored query, when you reference a value of 5, you are actually looking for priority 1 unless you use a .sym to specify which attribute to look at.

Important! Do not change the default enum values the product assigns. Instead, when adding new sym values, just continue from the highest enum value and so on.

Time-Based Queries

Time spans can be used to create time-based stored queries. A time span specifies a period of time, which can be relative to the current date. For example, a time span could refer to today, yesterday, last week, or last month. A time span has a name, such as TODAY or YESTERDAY. You refer to a time span in a stored query by using either of two built-in functions, as follows:

StartAtTime (timespan-name)

This refers to the beginning of the period described by the time span.

EndAtTime (timespan-name)

This refers to the end of the period described by the time span.

The syntax rules for stored queries require that the time span name be enclosed in single quotes, with each single quote preceded by a backslash. For example, to refer to the beginning of last week, you would specify:

```
StartAtTime(\'PAST_WEEK\')
```

The passage of time makes it necessary to periodically refresh a stored query containing a reference to a time span. For example, the interval described by “yesterday” changes at midnight. You specify the Start Time, End Time, and Trigger Time for refreshes in the Timespan Detail window.

Start Time

Start Time specifies the beginning of the time span in absolute or relative terms. The following table describes the fields within the Start Time section of the Timespan Detail window:

Year

An explicit year, such as 2000, or a relative year, such as +1 (next year) or –1 (last year)

Month

An explicit month from 1 (January) to 12 (December), or a relative month, such as +1 (next month) or –1 (last month)

Day

An explicit day from 1 to 31, or a relative day, such as +1 (tomorrow) or –1 (yesterday)

Hour

An explicit hour from 0 to 24, or a relative hour, such as +1 (next hour) or –1 (last hour)

Minute

An explicit minute from 0 to 59, or a relative minute, such as +1 or –1

End Time

End Time specifies the end of the time span in absolute or relative terms. The End Time fields of the Timespan Detail window are the same as the [Start Time](#) (see page 344) fields of the Timespan Detail window.

Trigger Time

The Trigger Time field specifies when the WHERE clause of a stored query containing a reference to the time span is recreated and the stored query refreshed. Trigger Time must be relative to the current time as described in the following table:

Year

Must be a relative year from –1 (last year) to +36 (36 years from now).

Month

Must be a relative month from –1 (last month) to +11 (11 months from now).

Day

Must be a relative day from –1 (yesterday) to +31 (31 days from now).

Hour

Must be a relative hour from -1 (last hour) to +23 (23 hours from now).

Minute

Must be a relative minutes from +9 (9 minutes from now) to +59 (59 minutes from now).

ITIL-Specific Queries

Problems and Incidents are requests with one of two values in the *type* attribute: "I" for Incidents or "P" for Problems.

The following stored query obtains all Incidents in which the Assignee's Organization or the Group's Organization equals the logged-in Analysts Organization:

```
assignee.organization IN @cnt.organization OR group.organization IN  
@cnt.organization) AND active = 1 AND type = \'I\'
```

For Problems, the query is identical except for type = 'P'

Activity Notification Messages Customization

Notification messages can be sent automatically when request activities occur.

Note: For information about notification messages and instructions for defining activity notifications, see the *Administration Guide*.

Two of the fields that must be defined on the Activity Notifications Detail window are Notification Message Title and Notification Message Body. Both of these fields can contain attributes from the activity log object (alg for Requests/Incidents/Problems, chgalg for Change Orders and issalg for Issues. These three activity log objects are almost identical) and can identify the specific request related to the activity.

Formatting Attributes for Activity Notifications

Optional formatting and escaping of individual attributes can be achieved using the properties listed below. This can be useful especially if formatting HTML notification where the data in the attribute may need to be escaped to conform to HTML standards.

To include formatting, use the following syntax:

```
@{property=value property=value:attribute_name}
```

Property values pairs are separated by at least one space and are not case sensitive. A colon separates the formatting properties from the attribute name. If no properties are listed, no formatting or escaping will be done on attribute.

The following table the available formatting properties:

Property	Description
DATE_FMT	Specifies the date format for attribute. Valid values are: MM/DD/YYYY MM-DD-YYYY DD/MM/YYYY DD-MM-YYYY YYYY/MM/DD YYYY-MM-DD Valid only for Date attributes. Dates embedded in strings are not affected.
ESC_STYLE=NONE HTML URL	Specifies the escape type of the formatted text. Valid values are: NONE Default setting. Specifies that no special treatment be given to any character in the content body. HTML Give special treatment to the following characters, which are meaningful in HTML text: ■ & becomes &amp; ■ " _ becomes &quot; ■ < becomes &lt; ■ > becomes &gt; URL Translate all characters other than letters, digits, and '@*-_.#' to '%xx', where xx is the hexadecimal coding of the translated character.

Property	Description
JUSTIFY=LEFT CENTER RIGHT TRUNCATE WRAP LINE	Specifies the justification of the formatted text. Valid values include: TRUNCATE (default if formatting) Truncates text to WIDTH property value if a positive integer. If ESC_STYLE=HTML, eliminates HTML formatting by replacing '<' and '>' with &lt; and &gt; (see KEEPLINKS and KEEPTAGS). LEFT CENTER RIGHT Produces exactly WIDTH characters, truncated or padded with spaces as necessary, with any embedded new lines replaced by a single space. If ESC_STYLE=HTML, the output text is delimited by [set the pre variable for your book] and </pre> tags. The WIDTH argument must be specified as a positive integer. WRAP Same as LEFT, except that text wrapping honors word boundaries (line breaks are not placed within words). LINE Same as TRUNCATE, except that it also replaces all embedded line breaks with
 tags if ESC_STYLE=HTML.
KEEPLINKS=YES NO	If KEEPLINKS=YES is specified, the action of JUSTIFY=LINE or JUSTIFY=TRUNCATE is modified to preserve HTML anchor tags (Action:) while converting all other '<' and '>' characters. Mutually exclusive with KEEPTAGS. Only valid if ESC_STYLE=HTML.
KEEPNL=YES NO	The normal action of PDM_FMT is to convert all embedded new lines and any following spaces to a single space. If KEEPNL=YES is specified, embedded new lines are preserved. This argument is ignored for JUSTIFY=LINE.
KEEPTAGS=YES NO	If KEEPTAGS=YES is specified, the action of JUSTIFY=LINE or JUSTIFY=TRUNCATE is modified to preserve all HTML tags. Mutually exclusive with KEEPLINKS. Only valid if ESC_STYLE=HTML.
PAD=YES NO	If PAD=NO is specified, PDM_FMT does not convert empty strings to a single space. This is the normal action when WIDTH is non-zero, or JUSTIFY is TRUNCATE or WRAP.
WIDTH=nn	When non-zero, specifies that the text should be formatted to exactly WIDTH characters.

For example, to format the Request description for an HTML notification by escaping HTML specific characters, adding
 tags for line breaks and keeping any HTML Links as links, enter the following:

```
@{ESC_STYLE=HTML JUSTIFY=LINE KEEPLINKS=YES:call_req_id.description}
```

To format the open_date of a Request to European format, enter the following:

```
@{DATE_FMT=DD-MM-YYYY:call_req_id.open_date}
```

Attributes from the Activity Log Object

To include an attribute from the activity log object, include this in the Notification Message Title or Notification Message Body field:

`@{att_name}`

The name of the object, alg or chgalg or issalg, is the default and need not be specified. For example, to include the type of activity in the message title, enter this in the Notification Message Title field (along with the rest of what you want in the title):

`@{type}`

To include the description of the activity in the message body, enter this in the Notification Message Body field (along with the rest of what you want in the body):

`@{description}`

Information on Specific Change Orders

For messages to provide information on the specific change order that triggered the notification, the Notification Message Title or Notification Message Body fields must contain an attribute in the activity log object that references the change order object. Enter the reference in this format:

`@{change_id.chg_att_name}`

In this reference, the following information applies:

@

Indicates to replace this expression.

change_id

The attribute in the activity log object that links it to a specific instantiation of the change order object (chg).

chg_att_name

Any attribute in the chg object.

For example, to include the priority of the change order in the message title, enter the following in the Notification Message Title field, along with the rest of what you want in the title:

`@{change_id.priority.sym}`

To identify who reported the change order (Affected End User) in the message body, enter the following in the Notification Message Body field, along with the rest of what you want in the body:

`@{change_id.requestor.combo_name}`

If you want to reopen a specific change order by number, and want the message to appear as follows, use the following syntax:

Reopen Change Order @{change_id.chg_ref_num}

Note: For messages to provide information about an issue that triggered a notification, the Notification Message Title or Notification Message Body fields must contain an attribute in the activity log object that references the issue object, *iss*. Using the information for requests and change orders presented in this section, along with the information about objects and attributes in the *CA SDM Technical Reference Guide*, you can see how to accomplish this.

For example, to include the priority of the issue in the message title, enter the following in the Notification Message Title field, along with the additional information you want in the title:

@{issue_id.priority.sym}

Information on Specific Requests

For messages to provide information on the specific request that triggered the notification, the Notification Message Title or Notification Message Body fields must contain an attribute in the activity log object that references the request object. Enter this reference in this format:

`@{call_req_id.cr_att_name}`

@

Indicates to replace this expression.

call_req_id

The attribute in the activity log object that links it to a specific instantiation of the request object (cr).

cr_att_name

Any attribute in the cr object.

For example, to include the impact of the request in the message title, enter this in the Notification Message Title field (along with the rest of what you want in the title):

`@{call_req_id.impact.sym}`

To identify the affected resource in the message body, enter this in the Notification Message Body field (along with the rest of what you want in the body):

`@{call_req_id.affected_resource.name}`

If you want to reopen a specific request by number, and want the message to appear as follows, use the following syntax:

Reopen Request `@{call_req_id.ref_num}`

There are several other mechanisms by which messages can be sent which are in the context of the request itself (or change order or issue). When the context is the request itself, you do not need (and cannot use) the "call_req_id" part of the reference. So, in these cases, you need to use:

`"@{ref_num}"` rather than `"@{call_req_id.ref_num}"`

Web Interface Customization

The CA SDM web interface (also referred to as the browser interface) provides you with CA SDM functionality through the Internet. This functionality includes the ability to open, update, or close tickets, display and post announcements, and access supporting data tables. It enables independent browsing of the knowledge base to help reduce the number of calls to the service desk and speeding resolution times. The web interface can be fully customized and can be used with many web browsers.

If you installed and configured the web interface, you can integrate it into your existing web interface and customize it to suit your needs. For customization, be familiar with HTML and the web browser in use at your site.

Note: WSP Design view works for CA SDM controls (PDM_MACROs). When working on forms that do not contain CA SDM controls, you can only work on the Source tab. The Employee and Customer web forms do not contain CA SDM controls and therefore appear on the Source tab rather than the Design tab. Some Analyst forms do not contain CA SDM controls, and therefore would appear on the Source tab too.

Important! CA SDM r12.9 no longer uses any customized .mac files for pdm_macro in the \$NX_ROOT\$\site\mods\www\macro directory. You cannot customize macros.

Important! Technical support cannot provide assistance with design or debugging of customizations (including documentation, such as online help systems). We provide general information for customizing the CA SDM web interface. When doing so, be aware that you are solely responsible for your own customizations. CA SDM technical support can assist you in interpreting and understanding customization.

Support for the customization techniques here extends to helping ensure that the techniques and facilities perform as documented. Be careful not to exploit undocumented features or to extend documented features beyond their documented capabilities. Such exploitation is not supported and can result in system problems or instability that may appear unrelated to the customization. For this reason, support may ask you to remove customizations to reproduce the problems. Sites should prepare for this eventuality by carefully following the guidelines on placing all modifications in the site mods directory tree and maintaining change logs. Sites that make frequent, complex, or extensive changes should consider approaching CA SDM customization as a software engineering project with disciplined source control, testing, and controlled releases to production.

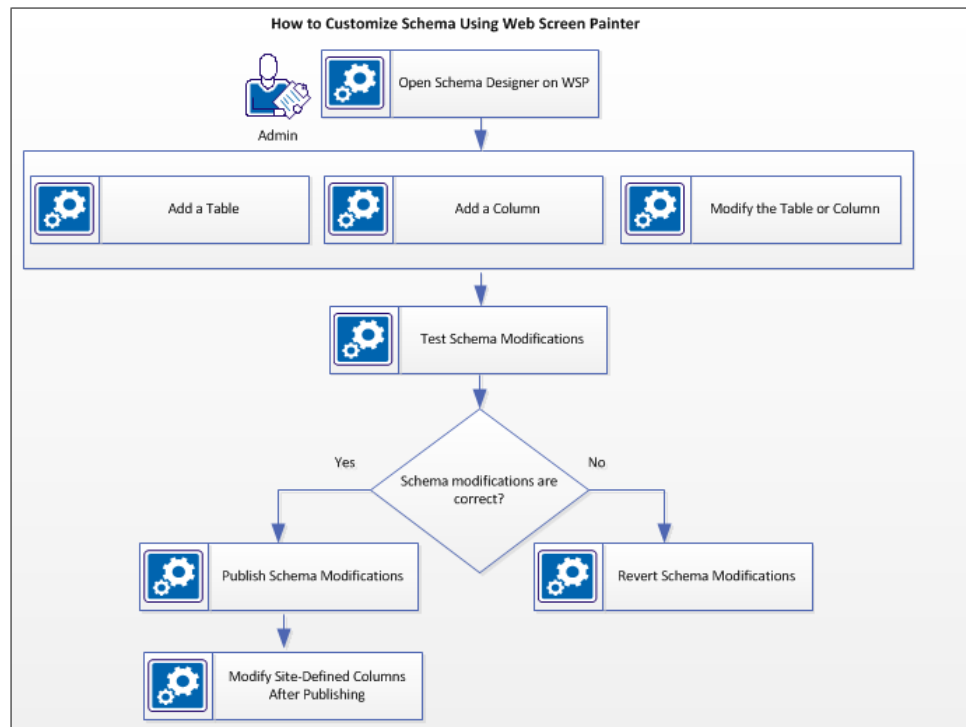
Migrating customizations between releases can present unique challenges, and we have developed the product in ways to preserve the efforts put into customization. However, we always assume that the product has been customized only as documented in this guide, particularly with regard to placement of all customizations in the site mods tree. In addition, if Level Two support supplies a patch to a system, the patch is written with these same assumptions. Patching or upgrading a system with undisciplined customizations is a risky undertaking that often results in costly system down time. Avoid it by following this guide and practicing sound software engineering principles.

Note: For information about how to secure and configure the web interface, see the *Administration Guide*.

How to Customize Schema Using Web Screen Painter

Use the Schema Designer of Web Screen Painter to modify the database schema of CA SDM. Schema Designer provides a graphical user interface to review and modify this schema.

The following diagram shows how to customize schema using Web Screen Painter:



Follow these steps:

1. [Verify the Web Screen Painter Considerations](#) (see page 353).
2. [Open Schema Designer on WSP](#) (see page 354).
3. [Add a Table](#) (see page 354) or [Add a Column](#) (see page 356) or [Modify the Table or Column](#) (see page 361).
4. Test Schema Modifications. For example, create, update, and view web forms using them before making any changes to the physical database. For more information about creating web forms, see the [How to Customize Web Interface Using WSP](#) (see page 367) topic.
 - If the schema modifications are correct, [Publish Schema Modifications](#) (see page 361).
 - If the schema modifications are incorrect, [Revert Schema Modifications](#) (see page 365).
5. (If necessary) [Modify Site-Defined Columns After Publishing](#) (see page 366).

Verify the Web Screen Painter Considerations

Consider the following information before using Web Screen Painter:

- You cannot use WSP to change the length of an existing column, and we strongly recommend that you *do not* use other tools to do so. Changes to the length of an existing column are not supported, and may cause other applications accessing the CA SDM database to fail.
Important! Do not shorten a field or delete an existing field, because these actions could cause CA SDM to fail.
- Be careful when adding columns to an existing table, because you can inadvertently exceed the record length capacity of the underlying database. Check the specifications for the database that you are using with CA SDM and make modifications within the limits of that database.
- Publishing changes to the database schema could require limited or considerable downtime, depending on the changes you make and the capabilities of your underlying database.
- If you are a new user of CA SDM, it is easier to make all of your changes during testing instead of waiting until you are in production.
- Review general procedures you must complete before and after changing the database schema.
- Use specific procedures to customize your schema. Most of these procedures are followed by an example of a change you might want to make to the standard database schema.

Open Schema Designer on WSP

To start working on the Schema Designer, ensure that you have WSP installed on the CA SDM server. For more information about the WSP installation, see the *Implementation Guide*.

Follow these steps:

1. Log in to the following CA SDM server where WSP is installed, depending on your CA SDM configuration:
 - Conventional: Primary server
 - Advanced availability: Background server
2. Start WSP using any of the following actions, depending on the operating system that is installed on the CA SDM server:
 - (Windows) From the Start menu, select Program Files, CA, CA SDM, Web Screen Painter.
 - (UNIX) Enter the command `pdm_wsp` with `$NX_ROOT/bin` in your path.The Web Screen Painter login window opens.
3. Enter your login credentials.
4. Select Tools, Schema Designer.

The Schema Designer window opens. The left side of the Schema Designer window shows the CA SDM database in a tree format. The tables and columns are displayed by their Object Name. If the Display Name differs from the Object Name of the table or column, the Display Name is displayed in parentheses along with the Object Name.

Add a Table

Use the Schema Designer to add a table in the database.

Follow these steps:

1. Select Edit, Add Table.
The Add New Table dialog opens.
2. Enter the table name in the New Table Name field and click OK. Ensure that you begin the name of a site-defined table with the letter z to prevent conflict with possible future standard tables.

WSP adds a z to the beginning of the table name if you do not add.

3. Complete the following fields, as appropriate:

Name

(Read-only) Specifies the object name of the table. For example, the object name of the cr table is cr.

Display Name

Specifies the user-friendly name of the table. For example, the Display Name of the cr table is Request. You can change the Display Name of a table by entering a new name in this field.

Schema Name

(Read-only for standard tables) Specifies the name used to refer to the table in CA SDM utilities, such as pdm_userload. For site-defined tables, Schema Name defaults to the Object Name. You can change the Schema Name by entering a new value in this field.

DBMS Name

Specifies the name used to refer to the table in the physical DBMS. This field is read-only for all tables. For site-defined tables, it is always the same as Schema Name.

Default Display Field (common name)

Specifies the column displayed on the UI for a field that references this table. For example, the assignee field of a request is a reference to the Contact table. Because the common name of the Contact table is combo_name (last, first middle), the combo name of the referenced contact displays as assignee. You cannot change the value of common name.

Foreign Key Field (rel attr)

Specifies the column stored in the database for a field that references this table. For example, the assignee field of a request is a reference to the Contact table. Because the rel attr of the Contact table is id, the assignee column in a Request contains the id of the referenced contact. You cannot change the value of rel attr.

Function Group

Specifies the name of the group that controls the level of access that users have to records in this table. Each access type of a contact specifies whether they have read, modify, or no access to data in tables in each function group. You can change the value of rel attr by selecting a new value from the drop-down list.

Important! The Schema Designer includes an Advanced tab. Information on this tab is intended for CA Technologies Support and field representatives. You will not need to work with this tab for most uses of the Schema Designer, and it will not be discussed further in this document.

4. Do one of the following to save the table:
 - If you are working on the test system, select File, Save.
 - If you are working on the production system, select File, Save and set to Test Mode.

This selection saves your changes in the database, and creates a file (wsptest.mods) on the server defining your changes to the Object Engine. This file is stored in the site/mods/majic subdirectory of your CA SDM installation directory. After creating the wsptest.mods file, WSP causes its Object Engine to recycle so that it will use the new changes. This may take from a few seconds to a couple of minutes, depending on the complexity of your schema.

A message is prompted. Click Yes to continue. The wsptest.mods file affects only the Object Engine designated by the wsp_domsrvr option. Other Object Engines on the same server do not process this file, and the file is not distributed to other servers. In addition, new tables and columns in Test mode are defined to the Object Engine as local objects. This means that the Object Engine knows about them and you can use them on web forms. However, they do not exist in the database, and do not affect other users. Typical CA SDM users do not use WSP Object Engine, so they are unaffected by the schema modifications you are testing.

The table is added.

Add a Column

Use the Schema Designer to add a column in the database.

Follow these steps:

1. Select the table for which you want to add a column (or select any of its existing columns).
2. Select Edit, Add Column.

The Add New Column dialog opens.

3. Enter the column name in the New Column Name field and click OK. Ensure that you begin the names of a column with the letter z to prevent conflict with possible future standard columns.

WSP verifies that you added the prefix, but adds a z to the beginning of the column name if necessary.

4. Complete the following fields as appropriate:

Name

(Display-only) Specifies the object name of the column. For example, the object name of the Contact alt_phone column is alt_phone.

Display Name

Specifies the user-friendly name of the column. You can change the Display Name of a column by entering another name in this field. For example, the display name of the Contact alt_phone column is alternative phone.

Schema Name

(Read-only for standard tables) Specifies the name used to refer to the column in CA SDM utilities, such as pdm_userload. For site-defined tables, Schema Name defaults to the Object Name. You can change the Schema Name by entering another value in this field.

DBMS Name

(Read-only for all tables) Specifies the name used to refer to the table in the physical DBMS. For site-defined tables, the DBMS Name equals the same as Schema Name.

Description

Provides a brief description of the column.

Field Type

(Read-only for all standard columns in standard tables, and saved site-defined columns) Specifies the data type of the column. You can specify or change the field type of new site-defined columns by selecting a value from the drop-down. The following list describes the available Field Types:

INTEGER

Indicates a numeric value.

STRING

Indicates a text string. The String Length field indicates the number of characters in a string.

DATE

Indicates a date and time. The integer value stored in the database contains the number of seconds since midnight on January 1, 1970.

DURATION

Indicates a period of time. The value stored in the database is an integer containing a number of seconds.

DOUBLE

Indicates a real (floating point) number.

SREL

Indicates a foreign key reference to another table. The SREL Table field specifies the referenced table. The value stored in the database is the rel attr of the referenced table, which can be either an integer or a string. The value displayed in the product is the common name of the referenced table row. For information on setting SREL attributes with foreign key values, see the *Technical Reference Guide*.

BREL

Indicates a virtual column representing the set of all objects with an SREL to this table. It exists only in the Object Engine and is not physically stored in the database. Select this field type only on direction from a CA Technologies employee.

QREL

Indicates a virtual column representing a set of objects selected by the where clause on the Advanced tab. It exists only in the Object Engine and is not physically stored in the database. Select this field type only on direction from a CA Technologies employee.

DERIVED

Indicates a virtual column constructed by the Object Engine from the values of other columns, under the direction of a formula specified on the Advanced tab. It exists only in the Object Engine and is not physically stored in the database. Select this field type only on direction from a CA Technologies employee.

String Length

The length of a string column. This field is blank for non-string columns. It is read-only for all standard columns, and for site-defined columns that have been saved. You can specify or change the length of new site-defined STRING columns by entering an integer between 1 and 32767 in this field.

SRel Table

The table referenced by an SREL column. This field is blank for non-SREL columns. It is read-only for all standard columns, and for site-defined columns that have been saved. You can specify the table referenced by a new site-defined SREL by selecting it from the drop-down list.

On New Default

The default value assigned to this column when a new row of the table is defined. It should be a value appropriate to the field type. Some keyword values are available for particular field types:

NOW

Specifies the current date and time for a DATE column.

USER

Specifies the active user for an SREL to the Contact table.

On Save Set

The value assigned to this column when a row of the table is updated. It should be a value appropriate to the field type. Some keyword values are available for particular field types:

NOW

Specifies the current date and time for a DATE column.

USER

Specifies the active user for an SREL to the Contact table.

Required

When checked, this option indicates that a value must be supplied for the column before a row of the table containing it can be saved. You can set this option for both standard and site-defined columns, and you can disable an option that you have set. However, you cannot turn off the option of a standard column unless it was set by your site.

Updatable only for new record

When checked, this option indicates that a value for this column can be provided only when a row of its table is initially created, and cannot thereafter be changed. You can set this option for both standard and site-defined columns, and you can disable an option that you have set. However, you cannot turn off the option of a standard column unless it was set by your site.

Key for pdm_userload

When checked, this option indicates that this column is one of the columns tested by pdm_userload to determine whether or not its input is an update to an existing row. This option is available only for STRING columns. It is read only for all columns in standard tables.

DBMS Index Options

These options specify characteristics of a column that is an index of the physical DBMS. They are available only for columns in site-defined tables.

Unique

Specifies that the column is unique within the table and that no two rows have the same value for the column.

Ascending

Specifies that the DBMS index is listed in ascending sequence by this column. Mutually exclusive with Descending.

Descending

Specifies that the DBMS index is listed in descending sequence by this column. Mutually exclusive with Ascending.

Important! The Schema Designer includes an Advanced tab. Information on this tab is intended for CA Technologies Support and field representatives. You will not need to work with this tab for most uses of the Schema Designer, and it will not be discussed further in this document.

5. Do one of the following to save the column:
 - If you are working on the test system, select File, Save.
 - If you are working on the production system, select File, Save and set to Test Mode.

This selection saves your changes in the database, and creates a file (wsptest.mods) on the server defining your changes to the Object Engine. This file is stored in the site/mods/majic subdirectory of your CA SDM installation directory. After creating the wsptest.mods file, WSP causes its Object Engine to recycle so that it will use the new changes. This may take from a few seconds to a couple of minutes, depending on the complexity of your schema.

A message is prompted. Click Yes to continue. The wsptest.mods file affects only the Object Engine designated by the wsp_domsrvr option. Other Object Engines on the same server do not process this file, and the file is not distributed to other servers. In addition, new tables and columns in Test mode are defined to the Object Engine as local objects. This means that the Object Engine knows about them and you can use them on web forms. However, they do not exist in the database, and do not affect other users. Typical CA SDM users do not use WSP Object Engine, so they are unaffected by the schema modifications you are testing.

The column is added to the table.

Modify Table or Column

To modify information about a table or column, click table or column on the Schema Designer, and enter the new information in the appropriate fields. The information you can modify depends on the status of the table or column:

Standard Tables

Lets you modify the Display Name, Description, and Function Group fields.

Standard Columns

Lets you modify Display Name, Description fields, the On New Default Value, and the On Save Set value. In addition, if the check boxes for Required or Updatable only for new record are not selected, you can select them. You cannot remove these options if they are set by default. However, you can reverse your own changes.

Site-Defined Table

If the table is not published, you can modify all fields, except Name, which cannot be changed after the new table has been saved. After a site-defined table has been published, you can modify only the Display Name, Description, and Function Group fields.

Site-Defined Column

If the column is published, you can modify all fields, except Name, which cannot be changed after the new column has been saved. After a site-defined column has been published, you can modify only the Display Name and Description fields, the On New Default Value, the On Save Set value, and the check box for Required, Updateable only for new record, Key for pdm_userload, and the DBMS index options.

Publish Schema Modifications

After you are satisfied with your schema modifications, you can make them available to all users by publishing them. WSP stores your new or updated tables and columns in the `wspTbl` and `wspCol` tables of the database, respectively.

Follow these steps:

1. Create or update files describing the modified schema to the Object Engine and to CA SDM utility programs. WSP creates the following files on the web engine designated by the `wsp_webengine` option (which defaults to `web:local`):

wsp.mods

Describes all Web Screen Painter-maintained schema changes to the Object Engine.

wsp_schema.sch

Describes all Web Screen Painter-maintained tables and columns.

wsp_index.sch

Describes DBMS indexes for Web Screen Painter-maintained tables.

wsp.altercol

Names new columns created by WSP but not yet defined to the DBMS.

wsp.altertbl

Names new tables created by WSP but not yet defined to the DBMS. In addition, WSP distributes the wsp.mods file to all CA SDM servers with an Object Engine.

2. Select File, Save and Publish.

The necessary files are created on the CA SDM servers, but does not recycle any of them. Thus, the new files have no immediate impact. However, after the files are created, they will be used the next time CA SDM services are recycled.

3. If you are using the *conventional configuration*, complete the following steps:

- Shut down the CA SDM services on the primary server and run the following command:

```
pdm_publish
```

This command modifies the physical DBMS to contain information about the new schema.

Important! Running pdm_publish process has a significant impact on other users. Ensure that you carefully plan the publishing of the schema changes. We recommend you use CA SDM Change Orders to schedule and obtain approval for your planned schema publication.

4. If you are using the *advanced availability configuration*, complete the following steps:

- a. Execute the following command on the background server to notify all active users using Support Automation to save their work:

```
sa_server_notifier [-h] | [-q seconds] | [-c]
```

-h

Displays the help page.

-q seconds

This option notifies a local server (background) to quiesce in a specified time interval. This interval is the number of seconds before the server goes offline. This option cannot be used for a standby server or application server.

-c

This option cancels a previously sent quiesce request.

A pop-up message is displayed to all the active users using Support Automation on the background server. This message notifies the users about the server shutdown and the scheduled time left for the shutdown. The users must save their work and logout within that scheduled time.

- b. Shut down the CA SDM services on the background server.

Important! Do not restart the CA SDM services on standby or application servers after "save and publish" is performed from WSP. This action corrupts the advanced availability configuration. If the CA SDM services on standby or application servers are stopped and you want to start the services, run the `pdm_server_control -v` command on the servers to suppress the version control before starting the CA SDM services.

Important! If the background server fails during the publishing activity, ensure that you recover the WSP changes. For more information, see the [Recover WSP Changes During Background Server Failure](#) (see page 364) topic.

- c. Execute the following command on the standby server that you wish to promote as the new background server:

```
pdm_server_control -b
```

-b

Notifies a local standby server to become the background server. The standby server must already be running. If the server is not running, it is started but no failover is performed; to start a failover, run the command again.

The background server shuts down automatically and the standby server is promoted as the new background server. This change does not affect the end-user sessions. The in-progress updates (if any) are stored and delayed, until the new background server comes online.

- d. Run the following command on the original background server (now the standby server) to update the DBMS with the schema changes:

```
pdm_publish
```

The `pdm_publish` command creates a control file that causes the next CA SDM startup to suppress synchronizing the standby server with the background server. This action is necessary to preserve the schema file changes made by `pdm_publish`. This command optionally performs the second fail-over after successful publishing of the schema changes. The following message is prompted to the user at the end of successful publishing:

Do you want `pdm_publish` to start CA Service Desk Manager in this standby server and perform fail-over(Y/N)?

- If you enter Y, `pdm_publish` starts the CA SDM services on the standby server and performs fail-over automatically. Skip to step g to apply the schema changes on all the application servers.
- If you enter N, go to Step e.

- e. Start CA SDM services on the standby server (original background server).

The startup detects the control file that is created by `pdm_publish`, but does not synchronize the standby server with the background server. This lack of synchronization preserves the changes made by `pdm_publish` for this startup.

Important! Ensure that you follow these directions exactly, as the failure to failover to the original background server after a `pdm_publish` results in corrupted services.

- f. Run the following command on the standby server (original background server) to make it the background server again:

```
pdm_server_control -b
```

This command also deletes the control file, so that version control works normally when this server again becomes a standby server.

- g. Execute the following command on the application servers:

```
pdm_server_control -q interval -s server_name
```

-q interval -s server_name

Notifies a local or remote application server to quiesce in a specified time interval. This interval is the number of seconds before the server goes offline. When using this option without a `server_name`, the local server is notified to quiesce. This option cannot be used for a background or a standby server.

A pop-up message is displayed to all the active users on the specified application server. This message notifies the users about the server shutdown and the scheduled time left for the shutdown. The users must save their work and logout within that scheduled time. The users log on to the updated application server to resume their work.

- h. Restart all standby servers.

Recover WSP Changes During Background Server Failure

You can recover the MDB schema changes when the background server fails during the publishing activity.

Important! We recommend you not to perform the recovery steps directly on the production environment. Ensure that you first validate them on the test or development environment.

Follow these steps:

- If the background server has crashed before publishing, the last saved schema changes are preserved in MDB. You log in to the new background server and resume your publishing tasks.

- If the background server crashed after publishing, perform the following actions:
 - a. Stop CA SDM services on the crashed background server.
 - b. Choose a standby server that you want to promote as the new background server.
 - c. Copy the following files from crashed background server to the same location on the standby server:
 - "\$NX_ROOT\$/site/mods/majic/wsp.mods"
 - "\$NX_ROOT\$/site/mods/wsp.altertbl"
 - "\$NX_ROOT\$/site/mods/wsp.altercol"
 - "\$NX_ROOT\$/site/mods/wsp_index.sch"
 - "\$NX_ROOT\$/site/mods/wsp_schema.sch"
 - d. Run the following command on the standby server to publish the schema changes and to perform the automatic fail-over:

`pdm_publish`
 - e. Select Y on the message prompt that appears after successful publishing of schema changes.

The CA SDM services are started on the standby server.

Note: If automatic fail-over does not occur, run the `pdm_server_control -b` command from the standby server to promote it as the new background server.
 - f. Quiesce and recycle each application server. Restart all standby servers. For more information, see the [Publish Schema Modifications](#) (see page 390) topic.

Revert Schema Modifications

If you change your mind about your schema modifications after putting them in test mode, you can revert back to the published, version of the schema. Reverting schema modifications has the potential of impacting other users. For this reason, this option is available only if your installation has installed both the `wsp_domsrvr` and `wsp_webengine` options to dedicate an Object Engine and a Web Engine to WSP.

Follow these steps:

1. Select File, Revert Test Mode.

WSP deletes the `wsptest.mods` file, causing WSP Object Engine to revert its schema back to the published version.

After deleting the `wsptest.mods` file, WSP causes its Object Engine to recycle so that it can rebuild its internal schema. This may take from a few seconds to a couple of minutes, depending on the complexity of your schema.

After the Object Engine has completed recycling, the active schema is back to its published version.

Note: Web forms modified to work with the new schema are not automatically reverted, and may not work correctly when used with the published schema.

Modify Site-Defined Columns after Publishing

After site-defined schema modifications are published, WSP treats them similarly to the standard schema and restricts further changes. You can delete a site-defined column or can change the length of a site-defined string column by manually updating the DBMS and schema external to WSP. Then you run the `pdm_wspupd` script to update the database `wspcol` table to synchronize WSP with the external changes.

Follow these steps:

1. Log in to the following server, depending upon your CA SDM configuration:
 - Conventional: Primary server
 - Advanced availability: Background server
2. Find the `site/mods` subdirectory in your CA SDM installation directory.
3. Edit the `wsp_schema.sch` file to delete unwanted site-defined columns or change the length of site-defined STRING columns. These updates are the only changes supported by this procedure. You can use any standard text editor to edit the `wsp_schema.sch` file.

Important! If any of the index options (such as, `UNIQUE`) were specified for deleting a column, edit the `wsp_index.sch` file and remove references to the column. If the column was the only indexed column in the table, remove all references to the table from `wsp_index.sch`.

4. Edit `majic/wsp.mods` file with the same changes made to `wsp_schema.sch`:
 - Delete unwanted site-defined columns.
 - Change the length of site-defined STRING columns.
5. Enter the following command using the command prompt:

```
pdm_wspupd
```

The pdm_wspupd script reads wsp_schema.sch and compares it with the wspcol table in the database, writing a line to the console for any differences. For example, see the following output:

```
PDM_WSPUPD - Update wspcol table from wsp_schema.sch
```

```
Reading wsp_schema.sch to for current DBMS information...
```

```
Reading wspcol table for WSP schema information...
```

```
String column zSalesOrg.description length changed from 350 to 400
```

```
Column zSalesOrg.sym not found in wsp_schema.sch - deleting wspcol row
```

```
pdm_wspupd found 1 WSP-maintained column(s) to update and 1 to delete. Please  
verify that your DBMS has been manually updated to correspond to wsp_schema.sch,  
then reply Y to update wspcol or anything else to cancel.
```

6. Verify that the changes found by pdm_wspupd correspond exactly to the changes you made to wsp_schema.sch. If they match, type **Y** to confirm the changes.

After you confirm the update, the script uses standard CA SDM utilities to update the wspcol table. Then, Schema Designer shows your changes.

7. Stop the CA SDM servers.
8. Using the appropriate utility for your DBMS, alter the DBMS definition of the columns you changed:
 - Delete any columns from the database that you deleted from wsp_schema.sch.
 - Change the database length of any string columns you changed in wsp_schema.sch.

Take care that the changes you make to the DBMS correspond exactly to the changes you made to wsp_schema.sch.

9. Delete the wsp_schema.log file.
10. [Publish Schema Modifications](#) (see page 361).
11. Start the CA SDM servers.

How to Customize Web Interface using Web Screen Painter

Web Screen Painter (WSP) lets you customize web forms to the requirements of your site without programming.

Some of the Knowledge Management forms cannot be customized in the design view of WSP. For these forms, there are alternate approaches to providing the customization, such as:

- Document view—the document template that is used when creating the document determines the contents of this page. These templates can be modified on the administration tab under documents, document templates.
- Knowledge categories document list—you can modify this page by using Web Screen Painter, but it is also managed by user preferences. The “preferences” screen provides personalization per user for defining which document properties displays in the document list and how many documents display per page.

Follow these steps:

1. [Start Web Screen Painter](#) (see page 369).
2. [Verify the Prerequisites](#) (see page 368).
3. [Choose the Form to Customize](#) (see page 369):
 - [Create a Form](#) (see page 370).
 - [Open an Existing Form](#) (see page 372).
4. [Customize a Form](#) (see page 373)

WSP always saves changes on the server where WSP is installed. When you save a file, it becomes accessible to other WSP users in a preview session, but is invisible to typical CA SDM users. This is because WSP saves all files in the site/mods/wsp directory, and this directory is not used by a typical CA SDM session.
5. If you are making web form changes in the test system, [Migrate from Test to Production System](#) (see page 390).
6. [Publish Form Changes](#) (see page 390).
7. (If necessary) [Delete Forms After Publishing](#) (see page 392).

Verify the Prerequisites

Verify the following prerequisites before you begin the customization:

- Customized the schema that you want to add in the web forms.
- (For advanced availability configuration only) Verified that the following prerequisites to publish the web forms successfully:
 - (Recommended) CA SDM services are up and running on all the CA SDM servers. Otherwise WSP publishes only on the CA SDM servers that are up and running.
 - (Required) At least one webengine instance running on every CA SDM server.

Start Web Screen Painter

Start WSP to customize web forms.

Follow these steps:

1. Log in to the computer where you have Web Screen Painter installed.
2. Start WSP.
 - (Windows) Click Start, Programs, CA, Service Desk, Web Screen Painter.
 - (UNIX) Enter the command `pdm_wsp` with `$NX_ROOT/bin` in your path.
Important! When you use UNIX, ensure that you have Firefox installed to use WSP.

The Web Screen Painter login window opens.

3. Enter your credentials.
WSP displays the main form.

Choose the Form to Customize

You can create a form or can open an existing form to customize. Choose from the following possibilities:

- [Create a Form](#) (see page 370).
- [Open an Existing Form](#) (see page 372).

Create a Form

Create a form in WSP.

Follow these steps:

1. Click File, New.

The New Form dialog opens.

2. Complete the following fields, as appropriate:

Interface or File Type

Indicates the file type of the form. For example, to create an HTML form select an interface (Analyst, Customer, Employee, Default, or PDA). To create a form of other file type by select the type directly (CSS Stylesheet, HTML, or JavaScript). When you select an interface or file type, WSP displays a list of all available templates for the selected file type in the File Name field.

Form Group

Indicates the form group (as defined for your CA SDM installation) where you want to create your new form or file. If you have not defined any form groups, only the DEFAULT form group is listed.

File Name

Indicates the template for the selected interface or file type. A template contains the basic requirements for a new form or file of the desired type.

Select table for new list or detail form

Indicates the CA SDM tables for which you can create a new list or detail form. This field is populated according to your selection of an interface (Analyst, Customer, Employee, Default, or PDA).

Note: Only one detail or list form can exist for each table in a forms group, so edit an existing form (rather than create one) for tables that already have an existing form. If you want to have multiple versions of a form, create one or more form groups to hold the additional versions.

3. Click New.
4. The form is displayed for your customizations. The following two tabs are displayed:

Design

Available for detail forms, list forms, and menu bar forms, and shows the controls on the form laid out more or less as a user would see them. It is not an image of how the form looks to an end user. To see this, select Tools, Preview.

Source

A Notepad-style editor allowing you to review and edit the source code for a form. Some forms are editable only in the Source tab. For those forms, the edit window opens up on the Source tab, and the Design tab is disabled.

The form is ready for customization.

Important! When you create or edit a detail or list form, use the list_ and detail_ prefixes to name the HTML file. For example, use list_test.html and detail_test.html. This prefix lets you correctly preview a form. When you save a detail template with a custom name, you must also manually edit the <PDM_WSP> tag. For example, <PDM_WSP mode=edit preview="test.html+OP=CREATE_NEW" factory=cr>.

More information:

[How to Create a Web Form Group](#) (see page 396)

Open an Existing Form

Open an existing form in WSP to customize it.

Follow these steps:

1. Select File, Open.

The Open Form dialog opens.

2. Select the Interface (Analyst, Customer, Employee, Default) or File Type (CSS Stylesheet, JavaScript, or HTML) and the forms group that contains the form you want to edit.

3. Select either the form you want from the list, or enter its name in the textbox.

When you enter a name in the textbox, WSP automatically scrolls the list to the first name matching the characters entered. You can use the Files of Status drop-down list to restrict the list of files displayed:

Site Modified with Unpublished Changes (+)

Restricts the list to files that have been modified with WSP, but not yet published. These files are identified with a plus sign (+) after the file name.

Site Modified (*)

Restricts the list to forms modified at your site, both published and unpublished. The unpublished files are identified with a plus sign (+) after the file name. The published site modifications are identified with an asterisk (*) after the file name.

All

Displays the list with no restrictions. The unpublished files are identified with a plus sign (+) after the file name. The published site modifications are identified with an asterisk (*) after the file name.

4. Click Open.

The form is displayed and ready for your customization.

Customize a Form

After you open the form you want to edit in WSP, you can use the toolbar, menu commands, and shortcuts to customize it. You can perform the following customization:

- [Insert a Control](#) (see page 373)
- [Edit Control Properties](#) (see page 376)
- [Modify Menu Bars](#) (see page 376)
- [Modify Stylesheets](#) (see page 381)
- [Modify Mouse-Over Preview Form](#) (see page 384)
- [Modify Data Grid List on List Form](#) (see page 387)
- [Modify Notebooks on Detail Form](#) (see page 388)
- [Modify HTML and JavaScript Files](#) (see page 389)

Insert a Control

Add a control on the form. For example, add a textbox in the form.

The controls that can be inserted on both list and detail forms are the following:

Control	Icon	Description
Insert Row		Causes the selected control to be the last in its current row (moves following controls to the next row).
Delete Row	N/A	Deletes all controls on the same row as the currently selected control.
Textbox		Inserts a single or multi-line textbox for editing a string or text field.
Dropdown		Inserts a drop-down list for editing a field validated against a table.
Lookup		Inserts a lookup control for editing a field validated against a table. The control consists of a textbox with a hyperlink in the label that pops up a select form.
Button		Inserts a button.

Control	Icon	Description
Hierarchical Lookup		Similar to a Lookup control, except that it is used for a field with a hierarchical selector (such as request category).
Date		Inserts a date field. The control consists of a textbox with a hyperlink in the label that pops up a date selector.

The following additional controls are available for detail forms only:

Control	Icon	Description
Checkbox		Inserts a check box.
HTML Editor		Inserts an HTML editor for a text field that contains HTML.
Read Only Textbox		Inserts a non-editable text field.
Read Only Lookup		Inserts a non-editable lookup field. The field is displayed as a hyperlink to pop up the detail form defining it.
Read Only Date		Inserts a non-editable date field.
Notebook		Inserts a notebook. There can only be one notebook on a detail form, so this control can be inserted only on forms that do not already contain a notebook.

The following additional control is available for list forms only:

Control	Icon	Description
List		Inserts a list. There can only be one list on a list form, so this control can only be inserted on new list forms.

Follow these steps:

1. Right-click the form at the location where you wish to add the control and select Insert Control.
A dropdown list is displayed.
2. Select the [insert control dialog options](#) (see page 375).
The control is placed on the form.
3. Select Tools, Preview to check how the form is displayed to the end user. Although it resembles a standard CA SDM window, and most buttons and menus are functional, it is not a standard session, and you should not attempt to use it that way.
4. Click File, Save.
The controls are added on a form.

Insert Control Dialog Options

Open the Insert Control dialog from the File menu. The dialog lists all of the appropriate UI controls for the section of the form you select to edit.

The dialog contains the following options:

Insert Before

Inserts the selected control from the list before the currently selected control on the base form, and makes it the currently selected control.

Insert After

Inserts the selected control from the list after the currently selected control on the base form, and makes it the currently selected control.

Prev

Moves the currently selected control to the control that precedes it on the form.

Next

Moves the currently selected control to the control that follows it on the form.

Properties

Opens the Properties dialog for the currently selected control.

Close

Closes the Insert Control form.

Close Form After Insert

(Enabled) Inserts the selected control and closes the Insert Control dialog when you click Insert Before or Insert After.

(Disabled) Inserts the selected control when you click Insert Before or Insert After. The Insert Control dialog remains open to insert additional controls or request properties for the currently selected control. After you clear the check box, the Close Form After Insert check box remains unchecked until you either select it again or end your WSP session.

Default: Enabled

Edit Controls Properties

Edit the properties of a control.

Follow these steps:

1. Select the control and press F4.
The Properties dialog opens.
2. Change properties as appropriate. For example, the Caption property specifies the header label that is displayed above a control. To specify this property, enter the desired value in the cell to the right of the Caption property.
3. Close the Properties dialog.
4. Select Tools, Preview to check how the form is displayed to the end user. Although it resembles a standard CA SDM window, and most buttons and menus are functional, it is not a standard session, and you should not attempt to use it that way.
5. Click File, Save.

The properties of the control is modified and the form is saved.

Modify Menu Bars

Forms with names beginning *menubar_* define a menu bar. The Design view for a menu bar displays the menu at the top. You can click a menu item to lower the menu, but cannot otherwise edit the menu bar directly in Design view. To edit a menu bar, double-click the menu item to display the Menu Designer.

Note: Menus (and menubar forms) are used only in the analyst interface. The customer and employee interfaces use a "launch bar" containing actual links, not drop-down lists. To customize the customer or employee launch bar, edit form `std_body_site.html` from the appropriate interface.

Follow these steps:

1. Select Tools, Menu Designer or double-click the menu shown in the Design tab of a menubar form.

The Menu Designer dialog is displayed.

2. Complete the fields in the [Menu Designer dialog](#) (see page 378) to add or edit menu items. For more information about adding menu items, see the [Functions Useful in Menu Items](#) (see page 379) topic.
3. Click OK to close the dialog.
4. Select Tools, Preview to check how the form is displayed to the end user. Although it resembles a standard CA SDM window, and most buttons and menus are functional, it is not a standard session, and you should not attempt to use it that way.
5. Click File, Save.

The menu bar is modified in the form.

Menu Designer Dialog

Note: You can access the Menu Designer only while editing HTML forms with a name beginning with “menubar_”, such as menubar_admin.html.

The Menu Designer dialog appears when you select Menu Designer from the Tools menu, or double-click the menu shown in the Design tab of a menubar form. Use the Menu Designer dialog to add a menu bar, menus, submenus, and menu commands to the open form. The Menu Editor dialog contains the following controls:

Menu List

From the menu list, select the menu item you want to change. To change the menu label, for example, select a menu label from the list, type a new name in the Caption text box, and click Apply.

Add

Click to add a new item to the end of the menu list.

Insert

Click to insert a new item above the selected item in the menu list.

Delete

Click to delete the selected item from the menu list.



Click to move the selected menu item up one level.



Click to move the selected menu item down one level.



Click to move the selected menu item one level to the right, for example, to define the item as a submenu or command instead of a menu.



Click to move the selected menu item one level to the left, for example to define the item as a menu instead of a submenu or command.

Note: Only one level of indentation is possible.

Caption

Enter the name for the selected menu item. See the Caption property for more information.

Function

Enter the JavaScript function to execute when the user clicks the menu. See the description of the Function property for more details, including some pre-defined functions that maybe useful in menus.

ID

Enter the HTML/JavaScript id to be assigned to the menu item.

Hot Key

Enter a list of characters directing CA SDM's selection of the hotkey for this menu item. The hotkey is underlined in the menu caption when it is displayed. CA SDM typically selects the first key in the menu caption not already in use as a hotkey. You can specify one or more characters here to restrict the selection to those characters, or specify one or more characters preceded by an explanation point to prevent selection of those characters.

Image

Enter the location of the image that you want to appear next to the menu item.

Internal

Select this option to specify that the JavaScript invoked by the function should be executed in the context of the current window (which could be a pop-up detail window). Leave this option unchecked to specify that the function should be executed in the context of the main form.

Variable

Enter the JavaScript variable to be assigned to the menu item.

Tool Bar

Adds a tool bar icon and tooltip that corresponds to a non-top-level menu item.

Icon File

Identifies the location of the Tool Bar icon.

Tip

Specifies the tooltip text.

OK

Click to close the dialog and save your changes.

Cancel

Click to close the dialog without saving changes.

Functions Useful in Menu Items

CA SDM provides a menu bar on almost every form to control its functions. The menu bar is generated by an HTML form with a name of the form `menubar_xx.html`. We recommend that you use WSP to customize existing menu bars and define new ones.

The following predefined functions may be useful for scripts invoked by menu items:

`upd_frame(form)`

Loads a new form into the main window content frame.

create_new(factory, use_template, width, height [,args])

Pops up a form to define a new record.

Popup_window(name, form[, width, height [,features [,args]]])

Pops up a new window.

showDetailWithPersid(persid)

Pops up a detail record.

The following terms and definitions apply to the previous functions:

form

This is either an HTMLPL file name of the form xxx.htmlpl or an operation code (for example CREATE_NEW).

factory

This is the name of a database object.

use_template

This is either true or false.

width

This represents the desired form width or zero for default.

height

This represents the desired form height or zero for default.

features

This is a list of window features, in the same format used with the standard window.open function.

args

This is one or more args of the form "keyword=value" for the operation specified for form.

persid

This is a persistent ID in the form factory:ID.

Modify Stylesheets

You can use WSP to edit or create CSS (cascading stylesheet) files.

Note: For performance reasons, CA SDM stylesheets are delivered in two forms: Individual files (such as `search_filter.css`) and combination files grouping a number of individual files with comments and excess white space removed (such as `analyst_styles.css`). WSP always edits the individual files; you cannot edit a combination file directly. When you publish stylesheet changes, WSP automatically builds the associated combination file if necessary.

Follow these steps:

1. Create or open CCS stylesheet file.
WSP displays the Source view of the stylesheet.
2. You can edit directly in Source view, or display the Style Designer by selecting Tools, Style Designer..
3. Complete the fields in the [Style Designer dialog](#) (see page 382), as appropriate. There are a number of style attributes, such as margin and border that can neither be seen nor edited in the Style Designer. These must be edited in Source view.
4. Click OK in the Style Designer.
WSP reformats the stylesheet and updates the Source view.
5. Click File, Save.
The stylesheet is customized.

Style Designer Dialog

The Style Designer lets you modify or customize style sheets. By default the Style Designer dialog opens in the Font and Color tab and contains the following controls:

Style Classes

From the drop down list, select a style element you want to modify.

Add

Click to add a new style class.

Rename

Click to rename the style class selected in the Style Classes dropdown list.

Delete

Click to delete the style class selected in the Style Classes dropdown list.

Installed Fonts

This property lists the fonts that are installed on the system. Click  and  to move the selected fonts between the Installed Fonts list and the Selected Fonts list.

Selected Fonts

This property specifies a hierarchical list of preferred fonts that a browser uses to draw the style class element. A browser uses the first font in the list that is installed on the system it is running on.

Click  and  to move the selected fonts up or down the hierarchy.

Font Size

Select the font size from the dropdown list.

Bold

Select a font style from the dropdown list.

Italics

Select a font style from the dropdown list.

No Effect

Select this option if you do not want any text decoration or special effects.

Underline

Select this option if you want the text to be underlined.

Strikethrough

Select this option if you want the text to appear with a line through it.

Overline

Select this option if you want the text to appear with a line above it.

Foreground Color

Select the foreground color for the text element by clicking the Browse button to the right of the Foreground Color property. Then select the color you want from the Color palette, and click OK.

Background Color

Select the background color for the text element by clicking the Browse button to the right of the Background Color property. Then select the color you want from the Color palette, and click OK.

Transparent

Select this option if you want the background of the style element to be transparent.

A sample of the style element is displayed in the preview area at the bottom of the dialog.

To set the position of the style element, click the Position tab. The Position tab contains the following controls:

Position

From the dropdown list, select one of the positions for the element. The position property places an element in a static, absolute or relative position. Selecting a Static value will place the element in accordance with the normal flow. Selecting an Absolute value will place the element anywhere on a page. Selecting a Relative value moves the element relative to its normal position.

Left

Enter a value for the left margin in the text box for the element. Select a size from the dropdown list. This property is disabled when the selected position is Static.

Top

Enter a value for the top margin in the text box for the element. Select a size from the dropdown list. This property is disabled when the selected position is Static.

Width

Enter a value for the width in the text box for the element. Select a size from the dropdown list.

Height

Enter a value for the height in the text box for the element. Select a size from the dropdown list.

Z-Index

Enter a value for the stack order in the text box for the element. An element with greater stack order is always in front of an element with lower stack order. Z-index only works only on elements that have Absolute position.

Note: Elements can have negative stack orders.

Click the Other tab to set some of the specific properties for the element. The Other tab contains the following controls:

Visibility

Select the type of the visibility for the element from the dropdown list. The Visibility property sets how the content of an element is displayed if it overflows its area.

Overflow

Select the type of overflow for the element from the dropdown list. The Overflow property sets what happens if the content of an element overflow its set area.

Display

Select the type of the display for the element from the dropdown list. The Display sets how an element is displayed.

Cursor

Select the type of cursor for the element from the dropdown list. The cursor property specifies the type of cursor to be displayed when pointing on an element.

OK

Click to close this dialog and save your changes.

Cancel

Click to close the Style Designer dialog.

Modify Mouse-Over Preview Form

The Mouse-over previews let you view key details within the current form without the need to click a link or open a new web page. The mouse-over preview appears when you place a cursor over an object link on a list or detail form for a certain amount of time. If you move the mouse away from the link before the delay time expires, the preview does not appear. Mouse-over previews appear by default on all list and detail forms in read-only mode.

You can create mouse-over previews for forms that do not have preview_ forms by default. You can also create mouse-over previews for custom forms you created in your CA SDM environment.

The following predefined mouse-over preview forms are available:

- preview_chg.html (Change Order)
- preview_cnt.html (Contact)
- preview_cr.html (Request)
- preview_in.html (Incident)
- preview_iss.html (Issue)
- preview_KD.html (Knowledge Document)

- preview_nr.html (Configuration Item)
- preview_pr.html (Problem)

Follow these steps:

1. Open one of the following forms for the customization:
 - Open an existing form that does not have a preview_ form by default. For example, detail_loc.html
 - Open an existing mouse-over preview form. For example, preview_chg.html.
2. Customize the form. For example, add or remove custom controls from the form.
3. Click File, Save As, specify a file name using the preview_ prefix, and click Save. For example, enter preview_loc.html.

The mouse-over preview form is created and customized.

Chapter 8: Modify Data Grid List on List Form

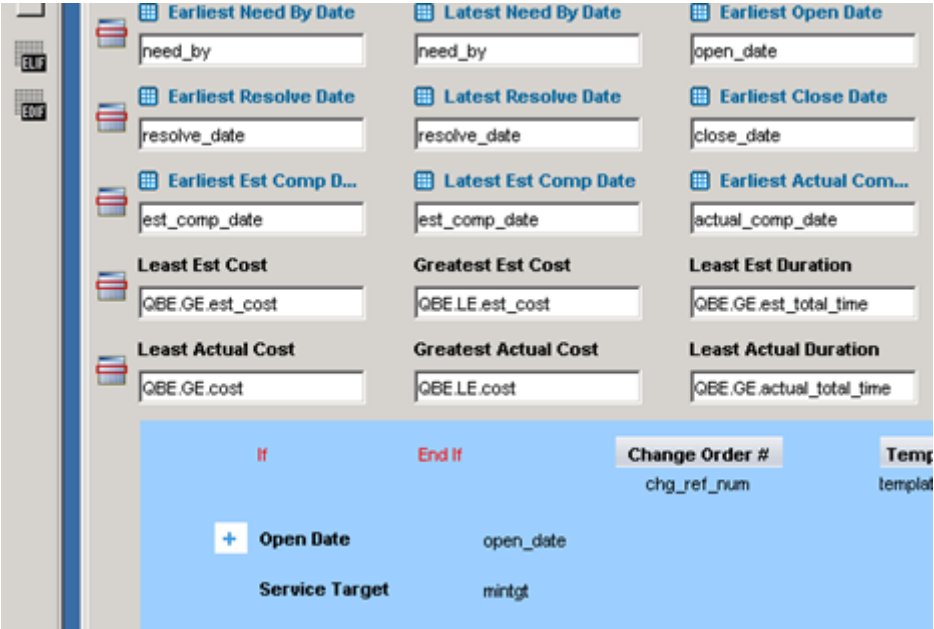
Data grid lists let you view the contents of a product page on a list form without opening a new page. This data-bound control lists items from the data source in a table so you can select items, sort items, and fetch data. For example, the expand and collapse options on the Incident List form.

Follow these steps:

- 1. Open a list form.
- 2. Locate the blue area after the labeled fields near the end of the form in the Design view. If you prefer Source view, the data grid appears between the following lines of code:

```
<PDM_MACRO name=lsStart>  
<PDM_MACRO name=lsEnd>
```

The following example shows this data grid area in Design view:



The plus sign in the data grid area represents the beginning of the expansion section of the row (the fields that are displayed only when a user clicks plus on the row in the list form grid). The following code generates the plus sign in the Source view:

```
<PDM_MACRO name=lsCol attr=open_date label="Open Date" sort="DESC" startrow=yes>
```

The *startrow=yes* parameter specifies to start a row, and it starts the expansion section of the row.

3. Drag-and-drop columns to move them in a list. You can move columns between the main part of the row and the expansion section. You cannot move an existing control after the grid area.
4. To insert a list column, right-click a control or anywhere within the blue background, and select either Insert Column or Insert Control.
 - If you select Insert Column, WSP inserts a column to the left of the currently selected control.
 - If you select Insert Control, WSP displays the Insert Control dialog that lets you add the desired control to the form.
5. Select Tools, Preview to check how the form is displayed to the end user. Although it resembles a standard CA SDM window, and most buttons and menus are functional, it is not a standard session, and you should not attempt to use it that way.
6. Click File, Save.

The data grid list is modified on the list form.

Modify Notebooks on Detail Form

The Nested tabs (notebook) control lets you expand or collapse key details within the current form. For example, use the control to customize how you organize tabs on the Incident Detail Form. From the Design View, you can use the Notebook control to add nested tabs to a detail form that does not already contain one. Double-click the Notebook control to modify it. Use drag-and-drop to add, insert, and delete notebook tabs, and to change their captions. You can also use the up and down arrow buttons to rearrange tabs by changing the position of the currently selected tab. The New Row check box specifies whether or not the selected tab begins a new row in the notebook header.

Follow these steps:

1. Open a detail form.
2. Locate the blue area of the form in the Design view that contains the first numbered label.

If you prefer Source view, the notebook area appears between the following line of code:

```
<PDM_MACRO name=startNotebook hdr=cng_nb>  
<PDM_MACRO name=endNotebook>
```

Note: In CA SDM r12.6, a notebook can contain nested tabs. In WSP, a high-level tab (a tab containing other tabs) is named a tab group. WSP displays a tab group as a dark blue solid bar that spans the entire blue notebook area, with a numbered label in its center. A low-level tab (a tab that does not contain other tabs) is named a tab. WSP displays low-level tabs as rectangles with rounded corners.

3. Click a tab to select it. Selecting a tab highlights and displays a link to the contents of the tab at the bottom of the notebook.

You can move tabs and tab groups within a notebook using drag-and-drop. Moving a tab group moves all the tabs within the group with it.

4. To insert a tab or tab group, right-click a control or anywhere on the blue notebook background and select Insert Tab, Insert Tab Group, or Insert Control.

If you select Insert Tab or Insert Tab Group, WSP inserts a new tab or tab group to the left of the currently selected control. If you select Insert Control, WSP displays the Insert Control dialog that lets you add the desired control to the form.

5. Select Tools, Preview to check how the form is displayed to the end user. Although it resembles a standard CA SDM window, and most buttons and menus are functional, it is not a standard session, and you should not attempt to use it that way.

Click File, Save.

Modify HTML and JavaScript Files

You can use WSP Source view to edit HTML and JavaScript forms. Open an HTML or JavaScript file and make the necessary changes.

Note: For performance reasons, some CA SDM JavaScript files are delivered in two forms: Individual files (such as `window_manager.js`) and combination files grouping a number of individual files with comments and excess white space removed (such as `std_head.js`). WSP always edits the individual files; you cannot edit a combination file directly. When you publish script changes, WSP automatically builds the associated combination file if necessary.

Migrate from Test to Production System

One of the design goals for WSP was to make it safe to develop and test forms modifications on a production database. Such features as a Web Screen Painter-only directory tree on the server, dedicated Web Screen Painter server processes, and read-only preview sessions support this goal. However, many users prefer to develop their forms modifications in an independent test system and then migrate the forms to a separate production system after they are complete as follows:

1. Copy any HTMPL forms to be migrated from the appropriate subdirectory of site/mods/www/html on the test system to the same subdirectory of site/mods/wsp/project on the production system.
2. Copy any CSS, JavaScript, and HTML files to be migrated from the appropriate subdirectory of site/mods/www/wwwroot on the test system to the same subdirectory of site/mods/www/wwwroot/wsp/project on the production system.

Note: Ensure that you copy the files and forms on the following servers of the production system, depending on your CA SDM configuration:

- Conventional: Primary server
- Advanced availability: Background server

Note: You can use any file copying method supported by your operating system to perform the copying described in steps 1 and 2 above. Windows users should substitute backslash (\) for slash (/) in the directory paths shown.

Publish Form Changes

When you are satisfied with the changes, you can make them available to all CA SDM users by publishing them. Publishing updates all CA SDM servers with new or revised forms.

Follow these steps:

1. Select File, Publish.

If you have any unsaved changes, WSP prompts you to save them, and then displays a confirmation dialog showing all pending Web Screen Painter changes (including those saved in previous sessions, or saved by other Web Screen Painter users). By default, all changes are selected for publication. You can change the selection of changes to be published by clicking them.

2. Click OK when you are satisfied with the selection.
3. (Advanced availability configuration only) If the webengine is not running on any of the CA SDM servers, an error message is displayed with the list of CA SDM servers on which WSP failed to publish. Complete the following steps:
 - a. Configure the CA SDM server (the server specified in the error message) to make the corrections.
 - b. Edit the file in WSP to add a white space character in the <PDM_IF 0> macro and save it.
 - c. Go back to step 1 to republish the web form.

Note: If you do not want to make any configuration changes, you have to manually copy the nx_root/site/mods/www folder from the background server to all the other servers.

4. (Advanced availability configuration only) If the background server crashes while publishing, [recover the HTML changes](#) (see page 391).
5. (For mouse-over preview forms) Execute the following command after publishing the changes:

```
pdm_webcache -H
```

The web cache is refreshed. WSP makes the selected changes available to all users active on all the servers.

Recover the HTML Changes

You recover the HTML changes when the background server fails during the publishing activity.

Important! We recommend you not to perform the recovery steps directly on the production environment. Ensure that you first validate them on the test or development environment.

Follow these steps:

1. Go to the following directory on the crashed background server:


```
$NX_ROOT$/site/mods/www/wwwroot/wsp/project/web
```
2. Copy all the content from the web folder.
3. Log in to the new background server and paste all the copied content in the \$NX_ROOT\$/site/mods/www/wwwroot/wsp/project/web folder.
4. Resume publishing the changes on the new background server. For more information, see the [Publish Form Changes](#) (see page 390) topic.

Delete Forms After Publishing

Only site-modified forms can be deleted. Requests to delete a previously published form take effect when you publish changes.

To cancel a pending delete request, select File, Undelete Form. You undo changes to a form after publication; the only way to change a published form is to edit it again.

HTML Templates (HTMPL Form)

Forms in the CA SDM web interface are delivered as HTML templates, in files with a suffix of .html. These are called HTMPL forms in the remainder of this document.

An HTMPL form contains standard HTML (including JavaScript) plus language extensions that are interpreted by a CA SDM server daemon (or service) called the web engine that delivers standard HTML to the browser. These extensions are:

- References to server variables. These are indicated by a name beginning with a dollar sign. They can be the values of columns in the CA SDM database, references to web engine configuration properties, or other server information.
- Special tags directing the web engine to perform tasks on the server, such as read information from the CA SDM database. These tags have names of the form <PDM_...> or <pdm_...>.

Note: You do not need to understand the HTMPL extensions or even HTML itself to be able to customize CA SDM forms with WSP.

More information:

[Server Variables](#) (see page 419)

[HTMPL Tags](#) (see page 396)

Template Naming Conventions

The following naming conventions are used to identify the four basic types of HTMPL files, where xxx is the object:

Template Type	Name
List (search filter and results)	list_xxx.html
Combined read-only and edit detail form (analyst interface)	detail_xxx.html
Read-only detail form	detail_xxx_ro.html
Edit detail form	detail_xxx_edit.html

You can find the definitions of the objects and their properties in the following locations:

- (UNIX) `$NX_ROOT/bopcfg/majic/*.maj`
- (Windows) `installation-directory\bopcfg\majic\*.maj`

For information about the objects and attributes that define CA SDM, see the *CA SDM Technical Reference Guide*.

HTMPL Directories

The *Administration Guide* describes the web interfaces supplied with CA SDM. There are different sets of HTMPL files supplied to implement these interfaces, as shown in the following table:

Operating System	Directory Containing HTMPL Files
Windows	<code>Installation-directory\bopcfg\www\html\web\interface</code>
UNIX	<code>\$NX_ROOT/bopcfg/www/html/web/interface</code>

In this table, *interface* is the name of the interface (analyst, customer, or employee).

Note: There is no separate directory for guest interface files; by default, this interface uses the employee interface files. You can change the guest user interface by changing the access type associated with user `System_Anonymous`. Both the customer and employee files dynamically modify themselves depending on whether the current user is a known user or a guest, using the `<PDM_IF>` template command described in this document.

There are three additional interface subdirectories under the `html` directory:

default:

Contains HTMPL files common to all interfaces. When searching for a file, the web engine looks first in the directory corresponding to the current user's interface, and then in the default directory.

pda/analyst: (UNIX)

pda\analyst: (Windows)

Contains HTMPL files used by the mobile device interface. In Unicenter Service Desk r11.0, the mobile device interface is provided only for analysts.

web/interface/legacy: (UNIX)**web\interface\legacy: (Windows)**

Contains HTML files from your previous release of CA SDM that are no longer used. This directory is automatically created if you upgrade from a previous release when you install CA SDM. You can delete the legacy directory when none of its files are referenced by your customized files.

We strongly recommend that you do not directly modify the supplied HTML files. Instead, either use WSP, or manually copy the file you want to modify to the site mods directory, and modify it there. The CA SDM web server looks for a new form in the appropriate site mods directory before checking the distribution directory. The standard site mods directories for each of the interfaces are as follows:

Operating System	Directory For Site-Modified HTML Files
Windows	<i>installation-directory\site\mods\www\html\interface\interface</i>
UNIX	<i>\$NX_ROOT/site/mods/www/html/interface/interface</i>

Note: If you change the form and save it into the *install directory\site\mods\www\html\interface* directory, the form will be seen by everyone, regardless of the form group to which they belong. If you save it into the *install directory\site\mods\www\html\interface\interface* directory, only those Contacts that are defined as belonging to that form group will see the changed forms.

In the previous table, *interface* is the name of the interface (analyst, customer, or employee). There is no separate directory for guest interface files; this interface uses the employee interface files. The advantage of storing your modified HTML files in the site mods directory is that this directory is preserved when you install CA SDM maintenance or a new release. In addition, keeping your modified files in site mods while preserving the originals ensures that you always have a correct copy of the originally distributed HTML file.

Each web interface page has a primary function, as indicated in the following table that lists the major HTML templates. However, you can add <PDM_FORM> blocks to any template to directly access any web interface supported operation. For example, you can modify the main menu to include fields for submitting an issue without using the intermediate page, or you can add search criteria fields and a search button to a list form:

Web Page	HTML Template
Main form	menu_frames.html
Display/create/update a change order	detail_chg.html

Web Page	HTML Template
Display a list of change orders	list_chg.html
Display/create/update and issue	detail_iss.html
Display a list of issues	list_iss.html
Display/create/update a request	detail_cr.html
Display a list of requests	list_cr.html
Display announcement detail information	detail_cnote.html
Display a list of announcements	list_cnote.html
Login	login.html

Note: For a complete list of templates, view the contents of the directories in the table at the beginning of this section.

Web Form Groups

You can collect customized web pages into one or more form groups. Form group directories are in the following directories:

Windows

install-directory\site\mods\www\html\web\interface
 install-directory\site\mods\www\wwwroot\subdirectory

UNIX

\$NX_ROOT/site/mods/www/html/web/interface
 \$NX_ROOT/site/mods/www/wwwroot/subdirectory

Each form group is a subdirectory under these directories. You specify the customized form directory in the Customization Form Group field of the access type.

When a user requests a form, the web engine looks first in the appropriate customized form group directory, then in the standard directory for the user's web interface, and finally in the default directory. You can define more than one access type for the same web interface, each with a different customized form group. This lets you define a few specialized forms for different types of users, and still take the majority of the forms from the standard interface.

A similar process occurs when a web page requests a file from one of the subdirectories of wwwroot (css, html, img, or scripts). The webengine examines an HTML reference of the form CAisd/img/xxx.gif and converts it to one of the following GIF files, selecting the first one where it finds xxx.gif:

- /CAisd/sitemods/img/formgroup/xxx.gif
- /CAisd/sitemods/img/xxx.gif
- /CAisd/img/xxx.gif

How to Create a Web Form Group

Complete the following steps to create a web form group:

1. If you want a form group besides the predefined Analyst, Customer, or Employee form groups, create a form group by selecting Save As from the File menu in WSP and clicking the Add Form Group button on the Save Form As dialog. For example, if you want to provide two separate customized versions of the Analyst interface, you might create form groups called Analyst1 and Analyst2 to handle these. You might also define a new form group if the interface you are defining does not logically fit into one of the predefined form groups.
2. On the web interface (not a Web Screen Painter preview session), select Security, Access Types from the Administration menu. Then click an access type (or create one) and use the Customization Form Group drop-down list on the Access Type Detail window to assign a form group to an access type. CA SDM determines the access type when a contact logs in and uses customization form group to determine where to look in the site mods directory structure for customized forms. If the web engine does not find a form in the form group directory, it looks first in the standard directory for the user's access type, and then in the default directory.
3. In WSP, select Save from the File menu, or manually copy the customized HTML files to the following directory:

In Windows: *installation-directory\site\mods\www\html\web\form_group_name* directory

In UNIX: *\$NX_ROOT/site/mods/www/html/web/form_group_name*

After you set up a new web form group and copied any supporting files to the appropriate subdirectories, you must restart the web service before the changes take effect.

HTML Tags

This section outlines PDM commands to add HTML tags.

More information:

[PDM_EVAL: Insert the Value of a Pre-Processor Variable](#) (see page 397)
[PDM_FORM: Start an HTML Form with a Session ID](#) (see page 397)
[PDM_FMT: Format Text from a Server Variable](#) (see page 398)
[PDM_IF: Conditional Processing](#) (see page 401)
[PDM_INCLUDE: Inserting from a Different File](#) (see page 402)
[PDM_JSCRIPT: Conditionally Include a JavaScript File](#) (see page 403)
[PDM_LINK: Create a Hyperlink Invoking an HTML Operation](#) (see page 404)
[PDM_LIST: Format a List of Database Rows](#) (see page 405)
[PDM_MACRO: Insert Text from a Macro File](#) (see page 409)
[PDM_NOTEBOOK: Create a Notebook](#) (see page 415)
[PDM_PRAGMA: Specify Server Information](#) (see page 415)
[PDM_SCOREBOARD: Build a Scoreboard Tree](#) (see page 416)
[PDM_SET: Set the Value of a Server Variable](#) (see page 417)
[PDM_TAB: Create a Tab within a Notebook](#) (see page 417)
[PDM_WSP: Control WSP Preview](#) (see page 418)

PDM_EVAL: Insert the Value of a Pre-Processor Variable

The `pdm_eval` tag is used to insert the value of a pre-processor variable into the input of the webengine parser. If used inside a macro, its effect is deferred until the macro completes.

The `pdm_eval` tag works similarly to `pdm_include` or `pdm_macro`. It inserts the text into the parser at the point of the tag, exactly as if the value of its variable had been coded in place of the tag.

`pdm_eval` has the following syntax:

```
<PDM_EVAL TEXT=PRE.name>
```

name

(Required) The name of the pre-processor variable whose value is to be inserted into the webengine's input.

PDM_FORM: Start an HTML Form with a Session ID

`<PDM_FORM>` and `</PDM_FORM>` can be added to any web interface HTML template to create an HTML form including two hidden fields for the server variables SID (session ID) and FID (form ID). The optional OP operand creates an additional hidden field for one of the supported operations, as with the `PDM_LINK` tag. Except for the automatically-generated hidden fields, `<PDM_FORM>` and `</PDM_FORM>` are used in the same way as the standard HTML `<form>` and `</form>` tags (and generate these tags as part of their expansion).

PDM_FMT: Format Text from a Server Variable

The <PDM_FMT> and </PDM_FMT> tags are used to format blocks of text inserted by server variables (\$args.xxx) as directed by its arguments.

Note: <PDM_FMT> is ignored for literals, including \$prop.xxx variables.

The following table describes these tags:

Property	Description																						
ESC_STYLE= NONE C HTML JS JS2 URL	Specifies the escape type of the formatted text. Valid values are: NONE Default setting. Specifies that no special treatment be given to any character in the content body. C Give special treatment to the characters ' , " , \ , \r , ` , and \n, which are meaningful in C programs. These characters will be escaped. HTML Give special treatment to the following characters, which are meaningful in HTML text: <table> <tr><td>&</td><td>becomes &amp;</td></tr> <tr><td>'</td><td>becomes &apos;</td></tr> <tr><td>"</td><td>becomes &quot;</td></tr> <tr><td><</td><td>becomes &lt;</td></tr> <tr><td>></td><td>becomes &gt;</td></tr> </table> JS Give special treatment to the following characters, which are meaningful in JavaScript text: <table> <tr><td>'</td><td>becomes %27</td></tr> <tr><td>"</td><td>becomes %22</td></tr> <tr><td>/</td><td>becomes %2F</td></tr> <tr><td>\</td><td>becomes %5C</td></tr> <tr><td>\r</td><td>becomes %0D</td></tr> <tr><td>\n</td><td>becomes %0A</td></tr> </table> JS2 Same as JS, but give no special treatment to the character, /, and give special treatment to two additional characters: - % becomes %25 - Line breaks are suffixed with %0A URL Translate all characters other than letters, digits, and '@*_-.#' to '%xx', where xx is the hexadecimal coding of the translated character.	&	becomes &	'	becomes '	"	becomes "	<	becomes <	>	becomes >	'	becomes %27	"	becomes %22	/	becomes %2F	\	becomes %5C	\r	becomes %0D	\n	becomes %0A
&	becomes &																						
'	becomes '																						
"	becomes "																						
<	becomes <																						
>	becomes >																						
'	becomes %27																						
"	becomes %22																						
/	becomes %2F																						
\	becomes %5C																						
\r	becomes %0D																						
\n	becomes %0A																						

Property	Description
JUSTIFY=LEFT CENTER RIGHT TRUNCATE WRAP LIN	Specifies the justification of the formatted text. Valid values include: TRUNCATE Default setting. Eliminates HTML formatting by replacing '<' and '>' with &lt; and &gt;; Note: For more information, see the following information about KEEPLINKS and KEEPTAGS. LEFT CENTER RIGHT Produces exactly WIDTH characters, truncated or padded with spaces as necessary, with any embedded new lines replaced by a single space, and the output text delimited by [set the pre variable for your book] and </pre> tags. The WIDTH argument must be specified as a positive integer. WRAP Same as LEFT, except that text wrapping honors word boundaries (line breaks are not placed within words). LINE Same as TRUNCATE, except that it also replaces all embedded line breaks with
 tags.
KEEPLINKS=YES NO	If KEEPLINKS=YES is specified, the action of JUSTIFY=LINE or JUSTIFY=TRUNCATE is modified to preserve HTML anchor tags (Action:) while converting all other '<' and '>' characters. Mutually exclusive with KEEPTAGS.
KEEPNL=YES NO	The normal action of PDM_FMT is to convert all embedded new lines and any following spaces to a single space. If KEEPNL=YES is specified, embedded new lines are preserved. This argument is ignored for JUSTIFY=LINE.
KEEPTAGS=YES NO	If KEEPTAGS=YES is specified, the action of JUSTIFY=LINE or JUSTIFY=TRUNCATE is modified to preserve all HTML tags. Mutually exclusive with KEEPLINKS.
PAD= YES NO	If PAD=NO is specified, PDM_FMT does not convert empty strings to a single space. This is the normal action when WIDTH is non-zero, or JUSTIFY is TRUNCATE or WRAP.
WIDTH= <i>nn</i>	When non-zero, specifies that the text should be formatted to exactly WIDTH characters.

<PDM_FMT> without WIDTH or JUSTIFY does no formatting on the enclosed text, but surrounds the text with [set the pre variable for your book]and </pre>.

For example, to produce a multi-line description, enter the following:

```
<PDM_FMT WIDTH=50 JUSTIFY=WRAP>$args.description</PDM_FMT>
```

To produce multi-column output, enter the following:

```
<PDM_FMT><PDM_FMT WIDTH=20 JUSTIFY=LEFT>$cst.last_name</PDM_FMT>
<PDM_FMT WIDTH=20 JUSTIFY=LEFT>$cst.first_name</PDM_FMT>
<PDM_FMT WIDTH=20 JUSTIFY=TRUNCATE>$cst.middle_name</PDM_FMT>
</PDM_FMT>
```

PDM_IF: Conditional Processing

These tags are used to conditionally include text. <PDM_IF> blocks can be placed anywhere in an HTML file - in HTML, in JavaScript, and even within HTML tags. <PDM_IF> and <PDM_ELIF> (else if) both take a simple conditional clause as their properties rather than name-value pairs. If the clause is true, the text after the tag to the closing tag is included in the file; if the clause is false, the server discards the text between the tag and the closing tag. The closing tag can be <PDM_ELIF>, <PDM_ELSE>, or </PDM_IF>.

The <PDM_ELSE> and <PDM_ELIF> tags are optional. If both are specified, all <PDM_ELIF> tags must precede <PDM_ELSE>. There can be any number of <PDM_ELIF> tags between <PDM_IF> and <PDM_ELSE> (or </PDM_IF> if <PDM_ELSE> is omitted).

The syntax of the conditional in <PDM_IF> and <PDM_ELIF> is as follows:

- 0 is false; any other number is true
- "" is false; "any-string" is true
- "value op value" evaluates the left and right values against each other according to *op*. If both values consist of digits (optionally preceded by - or +), the comparisons are done numerically. Otherwise, they are done lexically (ASCII collation). Valid *op* values include:

op Value	Description
==	Equal to
!=	Not equal to
>=	Equal to or greater than (must be written as \>= or >=)
<	Less than (must be written as \< or <)
>	Greater than (must be written as \> or >)
<=	Equal to or less than (must be written as \<= or <=)
&	Performs a bit-and of the left and right values. True if any bits are set; false if none are set.

op Value	Description
%	Returns true if the left value is an even multiple of the right value, and false otherwise (useful for building two-dimensional tables).
:	Performs a byte-oriented pattern match like the UNIX grep command. It returns true if the left value contains the regular expression defined by the right value.

Example:

```
<PDM_IF $count \>= 10> . . .  
<PDM_ELIF $count &lt; 5> . . .  
<PDM_ELSE> . . .  
</PDM_IF>
```

There can be more than one conditional in a PDM_IF statement. Conditionals are separated by connectors, either && (and) or || (or). There is no precedence for either connector. The web engine examines a conditional from left to right until it reaches a connector. If the initial condition is true and the connector is ||, it considers the entire condition to be true without further evaluation. If the initial condition is false and the connector is &&, it considers the entire condition to be false without further evaluation. Otherwise, it considers the condition undetermined, and evaluates the conditional from after the connector.

PDM_INCLUDE: Inserting from a Different File

The <PDM_INCLUDE> tag is used to insert text from a second file into an HTML file. The server replaces the <PDM_INCLUDE> tag with the contents of the second file.

Included files can contain <PDM_INCLUDE> tags. There is no limit to the depth of nesting.

The <PDM_INCLUDE> tag supports the following properties:

Property	Description
FILE=filename	(Required) Specifies the file to include. The web engine searches the directories used for HTML files, as defined in the current user's access type.

Property	Description
FIXUP=[YES NO]	(Optional) Indicates whether the file should be interpreted by the web interface like a normal HTML template file, such as expanding variables beginning with dollar signs (\$) and interpreting other CA SDM tags, such as PDM_LIST, and PDM_FORMAT. The value YES, indicates that the file should be treated as a regular HTML template file, and the value NO means that the included file should be treated as literal text. The default is YES. Note: For compatibility with previous releases, the values TRUE or 1 can be substituted for YES, and the values FALSE or 0 can be substituted for NO. These values are deprecated, and should not be used in new pages.
propname=value	Specifies that property propname should have the specified value. The property's value can be accessed within the included file by prefixing propname with \$prop. For example, the following specification would allow the included file to reference \$prop.menubar: <pre><PDM_INCLUDE ... menubar=no></pre> Global properties can also be specified in the web.cfg configuration file. For information about web.cfg, see the <i>Administration Guide</i>. Note: For compatibility with previous releases, property values specified on <PDM_INCLUDE> can be referenced without the preceding 'prop.', in the form \$propname. This usage is deprecated and should not be used in new pages.

PDM_JSCRIPT: Conditionally Include a JavaScript File

The <PDM_JSCRIPT> tag is used to conditionally include a JavaScript file on a form. This tag has two forms:

```
<PDM_JSCRIPT file=xxxx.js [include=yes|no]>
```

Pdm_jscript with file=xxx.js specifies that JavaScript file xxx.js is required by this form. The webengine adds the file to a list of JavaScript files required by the form. Processing of the tag occurs while the form is being parsed, and is not affected by pdm_if. That is, a pdm_jscript tag referencing a file adds that file to the list of JavaScript files if it occurs anywhere in the file or in an included file, or in a macro.

The optional argument *include=no* can be specified to instruct the webengine to ignore the tag. This argument provides conditional processing for the tag, and is primarily useful when the tag is invoked in a macro. For example, the dtlTextbox macro specifies the following:

```
<PDM_JSCRIPT file=spellcheck.js include=&{spellchk}>
```

This indicates that any form containing a dtlTextbox macro that specifies spellchk=yes requires the JavaScript file spellcheck.js.

The second form of the pdm_jscript tag is the following:

```
<PDM_JSCRIPT insert=here>
```

Pdm_jscript with insert=here requests the webengine to insert standard HTML <script> tags for all required JavaScript files. The webengine processes this form of the tag during the HTML generation phase, so that it is affected by pdm_if. A pdm_jscript tag with insert=here is part of std_head_include.htmlpl, so it is present on virtually every form.

Note: The webengine inserts script tags only the first time it encounters pdm_jscript insert=here.

PDM_LINK: Create a Hyperlink Invoking an HTML Operation

<PDM_LINK> and </PDM_LINK> can be added to any web interface HTML template to create links a link that invokes an HTML operation. The <PDM_LINK> tag generates the standard HTML tag and has similar arguments, except that it allows specification of a CA SDM operation in place of a URL.

The format is as follows, where *operation* is one of the [supported operations](#) (see page 425):

```
<PDM_LINK OP=operation> ... </PDM_LINK>
```

Example:

```
<PDM_LINK OP=MENU> Menu </PDM_LINK>
<PDM_LINK OP=CREATE_NEW FACTORY=iss> Submit Issue </PDM_LINK>
<PDM_LINK OP=LOGOUT> Logout </PDM_LINK>
```

PDM_LIST: Format a List of Database Rows

The `<PDM_LIST>` and `</PDM_LIST>` tags are used to delimit repeating sections of HTML for multi-record output. Everything between `<PDM_LIST>` and `</PDM_LIST>` is repeated once for each record to be output. There are two types of PDM_LISTs:

- Lists taken from an object attribute that implies a list. For example, the properties attribute of the request object is the list of properties associated with that request. This type of PDM_LIST always has a SOURCE property.
- Lists with an explicit where clause. This type of PDM_LIST always has a WHERE property.

An object attribute `<PDM_LIST>` takes the following properties:

Property	Description																						
ESC_STYLE= NONE C HTML JS JS2 URL	Specifies the escape type of the formatted text. Valid values are: NONE Default setting. Specifies that no special treatment be given to any character in the content body. C Give special treatment to the characters ' , " , \r , ' , and \n , which are meaningful in C programs. These characters will be escaped. HTML Give special treatment to the following characters, which are meaningful in HTML text: <table> <tr><td>&</td><td>becomes &amp;</td></tr> <tr><td>'</td><td>becomes &apos;</td></tr> <tr><td>"</td><td>becomes &quot;</td></tr> <tr><td><</td><td>becomes &lt;</td></tr> <tr><td>></td><td>becomes &gt;</td></tr> </table> JS Give special treatment to the following characters, which are meaningful in JavaScript text: <table> <tr><td>'</td><td>becomes %27</td></tr> <tr><td>"</td><td>becomes %22</td></tr> <tr><td>/</td><td>becomes %2F</td></tr> <tr><td>\</td><td>becomes %5C</td></tr> <tr><td>\r</td><td>becomes %0D</td></tr> <tr><td>\n</td><td>becomes %0A</td></tr> </table> JS2 Same as JS, but give no special treatment to the character , / , and give special treatment to two additional characters: - % becomes %25 - Line breaks are suffixed with %0A URL Translate all characters other than letters, digits, and '@*_._#' to '%xx', where xx is the hexadecimal coding of the translated character.	&	becomes &	'	becomes '	"	becomes "	<	becomes <	>	becomes >	'	becomes %27	"	becomes %22	/	becomes %2F	\	becomes %5C	\r	becomes %0D	\n	becomes %0A
&	becomes &																						
'	becomes '																						
"	becomes "																						
<	becomes <																						
>	becomes >																						
'	becomes %27																						
"	becomes %22																						
/	becomes %2F																						
\	becomes %5C																						
\r	becomes %0D																						
\n	becomes %0A																						
LENGTH= <i>nn</i>	Specifies the number of rows of output (defaults to all).																						

Property	Description
<code>PREFIX=prefix</code>	Specifies the prefix on references to attributes from records in the list. These are referenced in the form <i>\$prefix.attr_name</i> in the text between <code><PDM_LIST></code> and <code></PDM_LIST></code> . The PREFIX property is optional in an object variable list. If PREFIX is omitted, the value of SOURCE is also used for the prefix.
<code>SEARCH_TYPE=DISPLAY GET_DOB</code>	Specifies the method the server should use to build the list form: DISPLAY specifies the server should issue a single query for the entire form GET_DOB specifies the server should issue separate queries for each row of the form The choice affects list performance, and depends on the complexity of the list (the number of joins required to display it) and the characteristics of your DBMS. GET_DOB has more predictable performance than DISPLAY, and is the default.
<code>SORT=index-name</code>	Specifies the index name to use for sorting. The default value of this argument is DEFAULT (which means the first sort index for the underlying factory).
<code>SOURCE=source</code>	Specifies the object variable defining this list. This field is required. Do not put a dollar sign (\$) in front of <i>source</i> on the PDM_LIST statement itself. If the PREFIX property is not specified, <i>source</i> is also used as the prefix for references to attributes from records on the list, in references of the form <i>\$source.attr_name</i> . When used in a reference, <i>source</i> does require a preceding dollar sign.
<code>START=nn</code>	Specifies the first output row (defaults to zero).

Example:

```
<table border>
<tr>
<th>Child Change Order Number</th>
<th>Summary</th>
</tr>
<PDM_LIST SOURCE=args.children>
<tr>
[assign the value for TD in your book]$args.children.chg_ref_num</td>
[assign the value for TD in your book]$args.children.summary</td>
</tr>
</PDM_LIST>
</table>
```

Because no prefix was specified, references to attributes of the listed records are prefixed by `$args.children`, the source value.

A where clause `PDM_LIST` takes the following properties:

Property	Description
<code>FACTORY=<i>name</i></code>	Specifies a class of object to be searched. This property is required.
<code>LENGTH=<i>nn</i></code>	Specifies the number of rows of output (defaults to all).
<code>ORDER_BY=<i>attr-name</i></code>	Specify the attribute name to sort by. It can contain the DESC (descending) or ASC (ascending) modifiers.
<code>PREFIX=<i>prefix</i></code>	Specifies the prefix on references to attributes from records in the list. These are referenced in the form <i>\$prefix.attr_name</i> in the text between <code><PDM_LIST></code> and <code></PDM_LIST></code> . The PREFIX property is required in a where clause list.
<code>START=<i>nn</i></code>	Specifies the first output row (defaults to zero).
<code>WHERE=<i>where-clause</i></code>	Specify the where clause for the search. It can contain (dotted) attributes. This property is required.

For example:

```
<table>
<tr>
<th>Child Change Order Number</th>
<th>Summary</th>
</tr>
<PDM_LIST PREFIX=list FACTORY=chg WHERE="status = 'OP'">
<tr>
[assign the value for TD in your book]$list.chg_ref_num</td>
[assign the value for TD in your book]$list.summary</td>
</tr>
</PDM_LIST>
</table>
```

PDM_MACRO: Insert Text from a Macro File

The <PDM_MACRO> tag is used to insert a macro file into an HTML file. Its functionality is similar to PDM_INCLUDE, with two important differences:

- A file included by PDM_MACRO has a formal argument list, with required arguments and arguments with default values.
- A file included by PDM_MACRO always comes from the directory specified for the configuration property MacroPath, regardless of the current user's access type.

NAME=*macroname*

(Required) Specifies the macro to include. The web engine affixes the suffix “.mac” and searches for the file in the path specified by configuration file property MacroPath.

Other properties may be required, depending on the macro included. A macro file has the general layout:

```
comments
#args
name1 [= value1]
name2 [= value2]
...
#data
data to insert
```

The following descriptions explain the file layout, line by line:

- **comments**—The only valid statements in a macro prior to the #args statement are comments. Comments are indicated by either a # sign or a // as their first non-blank character or characters.
- **#args**—Must be coded exactly as shown, with the # sign in column one and no other information on the line. This statement begins the args section, which can contain argument definitions and comments.

- **name [= value]**—Defines an argument for the macro. Only arguments explicitly mentioned in the args section are valid for the macro. A value specified for an argument in the args section is that argument's default value. Arguments without a default value are required, and must be supplied by the caller on the <PDM_MACRO> statement itself.
- **#data**—Must be coded exactly as shown, with the # sign in column one and no other information on the line. This statement begins the data section, which is the part of the macro inserted into the file using PDM_MACRO. Everything in the data section is inserted into the calling file, including lines that would be comments prior to the data section.
- **data to insert**—The data to insert into the calling file. This data can contain references to arguments in the form:
- **&{arg_name}**—These references are replaced with the value of the argument supplied by the caller, or with the default value if the caller did not supply a value.

The web engine normally reads a macro file only once, the first time it is used, and then stores the parsed macro in its own memory. This improves performance, but can be inconvenient if you are developing a macro. Use the configuration file property `SuppressMacroCache` to prevent this behavior and cause the web engine to discard all macros in its memory each time it begins processing a new form.

To Comment Out PDM_MACRO Tags

To comment out <PDM_MACRO> tags, enter an exclamation point in front of the P as follows: <!PDM_MACRO>. To prevent the browser from processing the commented out portion of the form, place <PDM_IF 0> before the <!PDM_MACRO> tag, and </PDM_IF> after the line you commented out.

Example:

```
<PDM_IF 0>
```

```
<!PDM_MACRO NAME=dtlDropdown hdr="Status" attr=status lookup=no  
evt="onBlur=\\\\"detailSyncEditForms(this)\\\\"">  
<!PDM_MACRO NAME=dtlDropdown hdr="Priority" attr=priority lookup=no  
evt="onBlur=\\\\"detailSyncEditForms(this)\\\\"">
```

```
</PDM_IF>
```

Predefined Macros Used by WSP

CA SDM includes a number of predefined macros. Most of these macros insert JavaScript text to create an element on a web form. Use Web Screen Painter to create and modify forms using these macros.

Detail Form Macros

The following list describes the Detail Form macros:

button

Inserts a graphic button.

dtlCheckbox

Inserts a check box on a detail form.

dtlDate

Inserts a date field on a detail form.

dtlDateReadonly

Inserts a read-only date field on a detail form.

dtlDropdown

Inserts a drop-down list on a detail form.

dtlEnd

Ends a detail form.

dtlEndTable

Ends a table within a detail form.

dtlForm

Begins a detail form.

dtlHTMLEditBox

Inserts a detail form field that is a text box containing an HTML editor.

dtlHier

Inserts a detail form field that is a text box validated against an external table with a hierarchical lookup.

Important! We recommend that you do not change the `dtlHier` macro to `dtlLookup` in the HTML file. Use the Options Manager `suppress_web_hier_search` option instead so that autocomplete works correctly.

dtlLookup

Inserts a detail form field that is a text box validated against an external table.

dtlLookupReadonly

Inserts a detail form field that is a read-only hyperlink to an external table.

dtlReadonly

Inserts a read-only text field on a detail form.

dtlStart

Begins the first table in a detail form.

dtlStartExpRow

Begins an expandable row on a detail form.

dtlStartRow

Begins a normal row on a detail form.

dtlTextbox

Inserts a text box on a detail form.

contactLookup

The contactLookup macro creates a contact lookup. This macro has the following arguments:

```
contactLookup("&{header}","&{frameName}","&{factory}","&{lookupName}");
```

header

Identifies the lookup header.

frameName

(Required) Identifies the form name.

factory

Specifies the factory.

Default: agt

lookupName

(Required) Identifies the lookup name.

You can also enable and disable this element by using the following:

```
contactLookupDisable( Name, bDisable )
```

bDisable=

- true

Disables the element.

- false

Enables the element.

dtlCheckboxReadOnly

The dtlCheckboxReadOnly macro specifies a readonly checkbox field on an HTML detail form. The macro has the following arguments:

```
detailCheckboxReadOnly("&{hdr}", "&{attr}", &{colspan}, "$args.&{attr}", "&{on}", "&{off}");
```

hdr

Specifies the text of the header.

Default: "\$args.&{attr}.DISPLAY_NAME"

attr

(Required) Specifies the name of the attribute.

on = "X"

Specifies the value shown on readonly form when field is checked.

off = ""

Specifies the value shown on readonly form when field not checked.

colspan = 1

Specifies the number of columns on the form.

On both the readonly and edit forms, the field is displayed as specified in "on" and "off" arguments.

Note: This macro is similar to dtlCheckbox.mac, except that it is always read-only, even in Edit mode.

List Form Macros

IsCol

Specifies a column in a list form.

IsEnd

Ends the list portion of a list form.

IsStart

Begins the list portion of a list form.

IsWrite

Inserts text into the repeating section of a list form.

sfDate

Inserts a date field in a search filter.

sfDropdown

Inserts a drop-down list on a search filter.

sfEnd

Ends a search filter.

sfHier

Inserts a search filter field that is a text box validated against an external table with a hierarchical lookup.

sfLookup

Inserts a search filter field that is a text box validated against an external table.

sfStart

Begins a search filter.

sfStartRow

Begins a row within a search filter.

sfTextbox

Inserts a textbox into a search filter.

Menubar Macros

The following list describes the Menubar macros:

endMenu

Ends a menu within a menu bar.

menuItem

Defines a global item on a menu.

endMenubar

Ends a menu bar.

menuItemLocal

Defines an item on a menu invoked in the context of the current window.

menubarItem

Defines a menu within a menu bar.

startMenu

Begins a menu within a menu bar.

startMenubar

Starts a menu bar.

PDM_NOTEBOOK: Create a Notebook

Several of the forms in the CA SDM analyst interface use nested tabs (notebooks). Nested tabs display several sets of fields in the same physical area of the screen, with only one set visible at a time. The user selects the set of fields that is visible by clicking a named tab at the top of the notebook, or by pressing the access key combination `Alt+n`, where n is the number of the tab. An example of a form using a notebook is the Issue Detail (`detail_iss.html`). We recommend that you use WSP to modify the contents of notebooks, or insert a notebook into a form that does not already contain one.

The following tag marks the end of a notebook:

```
<PDM_MACRO name=endNotebook>
```

PDM_PRAGMA: Specify Server Information

The `<PDM_PRAGMA>` tag is used to specify information used by the web engine, such as form release and version. It does not generate any HTML code, and can be placed anywhere in a form. Possible arguments are:

Argument	Description
RELEASE=value	Specifies the CA SDM release number corresponding to this form. This value is "110" on all Unicenter Service Desk r11.0 forms. It is accessible within the form in the <code>\$prop.release</code> variable.
SITEMOD=value	Specifies a site-defined string identifying the modifications applied to this form. It is accessible within the form in the <code>\$prop.sitemod</code> variable.
VERSION=value	Specifies a CA Technologies-defined string identifying the version number of this form. It is accessible within the form in the <code>\$prop.version</code> variable.
OVERIDE=YES NO	Specifies whether or not values in this <code>PDM_PRAGMA</code> statement override values in previous <code>PDM_PRAGMA</code> statements.

CA Technologies uses `PDM_PRAGMA` statements to document form versions. All Unicenter Service Desk r11.0 forms include the following `PDM_PRAGMA` statement:

```
<PDM_PRAGMA RELEASE=110>
```

In addition, the `std_head.html` form includes the following JavaScript statement:

```
cfgFormRelease = "$prop.release" - 0;
```

The PDM_PRAGMA statement and the cfgFormRelease variable allows the CA SDM web interface to distinguish Unicenter Service Desk r11.0 forms from previous release forms. Releases prior to Unicenter Service Desk r6.0 did not support the PDM_PRAGMA statement.

Normally, only PDM_PRAGMA statements in the highest-level file of a form (that is, a file not brought in by PDM_INCLUDE) are used to set \$prop.release, \$prop.sitemod, and \$prop.version. In addition, a PDM_PRAGMA statement will not override a non-empty value set by a previous PDM_PRAGMA statement. You can specify OVERRIDE=YES to specify that a PDM_PRAGMA statement can override previous PDM_PRAGMA statements, or that a PDM_PRAGMA statement in an included file can be used.

PDM_SCOREBOARD: Build a Scoreboard Tree

The <PDM_SCOREBOARD> tag is used to generate the scoreboard shown on the left side of the main form. It takes the following property:

TARGET=value

Specifies the name of the target frame for lists requested by clicking a node on the scoreboard. Lists are loaded into the target specified, which can be any value supported for the target attribute of a link. The default value is *_self* (the window containing the PDM_SCOREBOARD tag).

Any HTML form including a <PDM_SCOREBOARD> tag must also include the fldtree.js JavaScript file. This file can be included with the following statement in <HEAD> section of the form:

```
<SCRIPT LANGUAGE="JavaScript" SRC="$CAisd/CAisd/fldtree.js"></SCRIPT>
```

In addition, it is desirable to include a link with the name scoreboard_asof_data to display the effective date of the numbers in the tree. See the distributed file scoreboard.html for an example of the use of this tag.

The queries included on the scoreboard are defined by the contents of the User_Query table (object name usq) for the current user. A record in this table defines each line on the tree (folder or node).

Initially, users have no entries in their User_Query table. A user with no User_Query entries receives the default set of scoreboard queries associated with their access type. A user with administrative authority can also customize the default scoreboard for an access type.

PDM_SET: Set the Value of a Server Variable

The <PDM_SET> tag is used to assign a value to a server variable. It has the following syntax:

<PDM_SET arg.name[+]=value>

arg

(Required) Specifies the variable type, and must be arg for normal use.

Note: There is no \$ character.

Name

(Required) Specifies the name of the variable.

+

(Optional) Specifies that the value should be appended to the existing value of the variable. There cannot be any spaces before or after.

=

(Required) Must be specified exactly as shown, with no spaces before or after.

value

(Required) Specifies the text to be assigned or appended to the variable.

The PDM_SET tag can also be used in the preprocessor phase to create or update a preprocessor variable.

More information:

[Web Engine PreProcessing](#) (see page 444)

PDM_TAB: Create a Tab within a Notebook

The <PDM_MACRO name=startNotebook hdr=cng_nb> tag is used to define a notebook tab. We recommend that you use WSP to modify the contents of notebooks, or insert a notebook into a form that does not already contain one.

PDM_WSP: Control WSP Preview

The <PDM_WSP> tag is used to control the WSP preview feature. It does not generate any HTML code, and can be placed anywhere in a form.

By default, WSP determines how to preview a form by examining the form name:

- For detail forms (names of the form `detail_<factory>.html`), WSP displays the form in edit view, with data from the most recently created row of the appropriate table. If there is no data you are allowed to view in the table, WSP displays the form set up to create a row. WSP preview sessions are typically prohibited from updating the database. WSP displays forms in edit view to allow you to preview all features. However, CA SDM ignores a Save request from a read-only preview session. The web engine changes the text on the Save button to noSave as a visual reminder of this.
- For list forms (names of the form `list_<factory>.html`), WSP displays the form in list view, with the list displaying data from the most recently created row of the appropriate table. If there is no data you are allowed to view in the table, WSP displays the form in search view, with the filter open.
- For other forms, WSP displays the form with no database context.

You can change this default behavior by placing a PDM_WSP tag anywhere on the form. For example, you can display a notebook tab form on its associated detail form, or provide prerequisite arguments for forms normally invoked with an environment provided by another form. Possible arguments are the following:

Property	Description
FACTORY= <i>value</i>	Specifies the Object Engine factory used by this form.
PREVIEW= <i>name.html</i> <i>value</i> no	Specifies the preview URL. This can be an HTML file name, in the form <code>xxxx.html</code> ; a CA SDM URL (used unaltered if it begins with "OP="); or the keyword "no", indicating the form cannot be previewed. A value not beginning OP= is modified by replacing a reference of the form <code>{<factory>}</code> or <code>{<factory>:}</code> with an ID or persistent ID (respectively) of the most-recently created row from the referenced factory that the current user is authorized to view.
WHERE= <i>value</i>	Specifies a where clause used to search for a representative row or rows to show on the previewed form.

Property	Description
MODE= <i>value</i>	Specifies the mode of the constructed URL. Can be the following: ■ GENERAL. General format. Determine the mode by examining the preview argument: detail_xxxx.html - READONLY list_xxxx.html - LIST any other - GRONK ■ READONLY. Detail file in read-only view. ■ EDIT. Detail file in edit view. ■ LIST. List file. ■ GRONK. Unspecified file. In this situation, gronk the file.

Server Variables

CA SDM information is included in the HTML template using variables beginning with a dollar sign (\$). Each page is created with some variables that are documented in the template file. These variables can be put on the page or used in conditional statements:

- Simple Variables
- Property Variables
- Environment Variables
- Business Object Variables
- List Variables

Simple Variables

Simple variables specify flags that are passed to the web page. To access a simple variable, use the variable name preceded by a dollar sign (\$). This makes the value of the variable available. For example, two such variables are \$CAisd and \$cgi. Putting \$CAisd in a template results in the substitution of the main CA SDM web server installation directory, whereas \$cgi refers to the URL of the pdmweb.exe program. Simple variables are documented in the upper section of the HTML file that uses them.

The following shows a list of variables that can be used in all the HTML files:

\$ACCESS.group

The user access privilege object contains the privilege settings on the function group *group* for the current login user. For example, \$ACCESS.admin holds the privilege value for the admin functional group. Valid privilege values are:

- 0-NO ACCESS
- 1-VIEW
- 2-MODIFY

This variable is not available in the login form.

\$cgi

The URL of the pdmweb.exe program.

\$cst

The data object of the current login user. This variable is not available in the login form. You can reference individual attributes of this object with the form *\$cst.attrname*; for example, *\$cst.first_name*.

\$CAisd

The URL of main CA SDM web server installation directory.

\$MachineName

The MachineName defined in the web.cfg file.

Note: For information about web.cfg, see the *Administration Guide*.

\$ProductName

The product name defined in the NX.env file.

\$SESSION

The session object saves all session variables including session ID (\$SESSION.SID) and all variables defined in the web.cfg file.

Note: For information about web.cfg, see the *Administration Guide*.

\$USER_STATE

User-defined state information.

Property Variables

Property variables represent a property of the configuration file, web.cfg. You can access any entry in the web.cfg file (including user-defined entries) within an HTML template file by prefixing it with “\$prop.”

For example, one of the lines in web.cfg, which specifies the number of entries displayed in a single page on a list form is as follows:

```
ListPageLength 10
```

You can refer to this variable in an HTML template with the specification:

```
$prop.ListPageLength
```

If you use the <PDM_INCLUDE> special tag to incorporate another file into a template file, you can specify additional properties as attributes of the <PDM_INCLUDE> tag. You can reference these properties in the included file in the same way as web.cfg properties. A property specified as a <PDM_INCLUDE> attribute that has the same name as a web.cfg property overrides the web.cfg property within the included file.

For example, the following <PDM_INCLUDE> tag creates a property called \$prop.menubar that can be referenced within the std_body.html file:

```
<PDM_INCLUDE FILE=std_body.html menubar=no>
```

Note: You can refer to configuration file property xxx in two ways: \$prop.xxx or \$SESSION.xxx. Both return the same value. However, the \$prop.xxx syntax is preferred because it involves less server overhead.

In addition to properties from web.cfg, there are several predefined properties that can be accessed with \$prop. These are:

\$prop.browser

A string identifying the browser in use. This will be “IE” for Internet Explorer.

\$prop.combo_name

A string containing the current user's name, in the form “last_name, first_name middle_name.”

\$prop.factory

A string containing the factory associated with the current form, such as “cr” for requests or “iss” for issues.

\$prop.FID

A string containing the numeric form ID of the current form.

\$prop.form_name

A string containing the name of the current HTML template, in the form xxx.html.

\$prop.form_name_1

A string containing the substring of the form name before the first underscore. For example, for the form detail_chg_edit.html, form_name_1 would be "detail."

\$prop.form_name_2

A string containing the substring of the form name after the first underscore and before the last underscore (or dot). For example, for the form detail_chg_edit.html, form_name_2 would be "chg."

\$prop.form_name_3

A string containing the substring of the form name after the last underscore and before the dot. For example, for the form detail_chg_edit.html, form_name_3 would be "edit." For the combination detail form, which has a file name of the form detail_xxx.html, \$prop.form_name_3 is set to the current view, either "ro" or "edit".

\$prop.release

A string containing the release level of the form. The PDM_PRAGMA statement contains more details on this property.

\$prop.SID

A string containing the numeric session ID of the current session.

\$prop.sitemod

A string containing the site-defined modification name of the form. The PDM_PRAGMA statement contains more details on this property.

\$prop.user_type

A string containing "analyst," "customer," "employee," or "guest."

\$prop.version

A string containing the version of the form. The PDM_PRAGMA statement contains more details on this property.

More information:

[PDM_PRAGMA: Specify Server Information](#) (see page 415)

Environment Variables

Environment variables represent an entry within the NX.env configuration file. You can reference any entry in NX.env within an HTMPL template file by prefixing it with “\$env.”

For example, one of the lines in NX.env, which specifies the host name of the CA SDM server is as follows:

```
@NX_SERVER=hostname
```

You can refer to this variable within an HTMPL template file with the specification:

```
$env.NX_SERVER
```

Business Object Variables

Business object variables represent a CA SDM object, such as an issue or a request. To access an object, you need to start with the variable name, followed by a period (.), followed by whatever attribute names you want to display. For example, on an issue where, by convention, the object is represented by the variable args, you can display the description, the open date, the assignee's phone number, the number of activities on the issue, and the description of the first activity, as shown by the following:

```
$args.description  
$args.open_date  
$args.assignee.phone_number  
$args.act_log.length  
$args.act_log.0.description
```

You can use braces to delimit the variable name if it is not surrounded by white space. For example, \$foo bar and \${foo}bar are both valid. You can also use the variable args to access non-attribute values (for example, \$args.KEEP.name as described in [Supported Operations](#) (see page 425)).

It is possible that a non-attribute variable may not be defined. For example, it may be possible to get to a form from two different places, only one of which provides a value for \$args.KEEP.foo. You can provide a default value for a \$args reference with the following syntax, where the string after the colon is substituted for the reference if *variable* is undefined:

```
${args.variable:default}
```

Time Zone Date Variables

Time zone date variables are a special case of business object variables. They provide a means to convert universal dates (UTC) represented as integers to string dates adjusted for the time zone of the user's browser. The variable for representing integer dates is:

`$args.attr_name_INT_DATE`

Example: `$args.open_date_INT_DATE`

Factory Data Variables

Factory data variables are a special case of business object variables. A factory data variable is replaced by information about a referenced object. There are seven such variables available:

`$args.attr_name.COMMON_NAME`

The common name (externally readable string) of the table referenced by the attribute. For example, on the Request Detail form, the value of `$args.assignee.COMMON_NAME` is the assignee's combo name ("last, first, middle").

`$args.attr_name.COMMON_NAME_ATTR`

The attribute name of the common name in the table referenced by the attribute. For example, on the Request Detail form, the value of `$args.assignee.COMMON_NAME_ATTR` is "combo_name".

`$args.FACTORY_attr_name`

The name of the factory associated with the specified attribute. For example, on the Request Detail form, the value of `$args.FACTORY_assignee` is "agt".

`$args.LENGTH_attr_name`

The maximum length of the attribute. For example, on the Request Detail form, the value of `$args.LENGTH_summary` is 240.

`$args.attr_name.REL_ATTR`

The rel attr (foreign key) of the attribute. For example, on the Request Detail form, the value of `$args.assignee.REL_ATTR` is the value of the assignee's ID field.

`$args.attr_name.REL_ATTR_ATTR`

The attribute name of the rel_attr in the table referenced by the attribute. For example, on the Request Detail form, the value of `$args.assignee.REL_ATTR_ATTR` is "id".

\$args.REQUIRED_attr_name

A string, either “0” or “1” indicating whether the referenced attribute is required.

\$args.attr_name.SELECTIONS

A list of valid selections for *attr_name*. This value is an empty string if *attr_name* is not a reference to another table, or if the size of table referenced by *attr_name* exceeds the value of the configuration file property `SellListCacheMax`. Otherwise, the SELECTIONS variable is a string containing the common name and rel attr of all the entries in the referenced table. Successive values are separated by the string “@, @”, so the variable's value has the form:

"cname1@, @rel_attr1@, @cname2@, @rel_attr2"

\$args.factory_SEL_UNDER_LIMIT

A string, either “0” or “1”, indicating whether the current number of rows in the table corresponding to *factory* is less than the value of the configuration file property `SellListCacheMax`. This variable is deprecated in favor of the SELECTIONS variable, which should be used in all new forms.

Factory data variables containing a dotted reference (COMMON_NAME, REL_ATTR, and SELECTIONS) can be used with a dotted reference of any length. For example, on a Request Detail form `$args.assignee.organization.COMMON_NAME` is replaced by the external name of the assignee's organization.

List Variables

List variables are used to iterate through data. They are accessed using list tags as described in [PDM LIST: Format a List of Database Rows](#) (see page 405).

Supported Server Operations

The following operations are supported to let you integrate the CA SDM web pages with your web pages:

CREATE_NEW

Provides a generic interface to let the user create a row in a specified table. The object name must be specified, and by default a template named *detail_xxx_edit.html* is used for object *xxx*. You can override the .html file by specifying the HTMLPL property.

Required specifiers:

FACTORY=*object-name*

Optional specifiers:

ALG_PRESET=preset_expression
ALG_PRESET_REL=preset_expression
CREATE_ALG=activity_log_type
HTMPL=zdetaillxxx_factory.htmpl
KEEP.attr_name=value
PRESET=preset_expression
PRESET_REL=preset expression
SET.attr_name=value
use_template=1 | 0 (0 is the default)

Note: To use the HTMPL specifier with CREATE_NEW, the referenced form must have a name conforming to the naming convention *zdetaillxxx_factory.htmpl*. The name must begin with the string *zdetaill*, followed by any alphanumeric characters (including a null string), followed by an underscore and the factory name.

ENDSESSION or LOGOUT

Ends the current logged-in session. ENDSESSION is the preferred operation.

GENERIC_LIST

Provides a generic interface to allow the user to display a list from any table in the database. The object name must be specified, and by default a template named *list_xxx.htmpl* is used for object *xxx*. You can override the .*htmpl* file by specifying the HTMPL property.

Required specifiers:

FACTORY=object-name
KEEP.attr_name=value

DISPLAY_FORM

Provides a generic interface to let the user display any customized form.

Required specifiers:

HTMPL=htmpl_file

Note: DISPLAY_FORM replaces JUST_GRONK_IT. Existing implementations can continue to use JUST_GRONK_IT, which functions exactly like DISPLAY_FORM. DISPLAY_FORM is the preferred operation.

MENU

Displays the main menu page, which is defined in the web.cfg file in the Menu property.

Optional specifiers:

HTMPL=menufile

menufile is the name of an alternate main menu file.

PAGE_EXTENSION

Allows the webmaster to specify additional extensions to the interface.

Required specifiers:

NAME=*html_file*

html_file is one of the file names listed in the configuration file
UserPageExtensions directive.

Optional specifiers:

REQUIRES_LOGIN=1

If present, a login page appears first if the user is not currently logged in. If omitted or set to zero, the file is shown without checking if the user is currently logged in.

RELOG

Displays the login page.

SEARCH

Provides a generic interface to allow the searching of any table in the database. This operation assumes that an appropriate search_XXX.html has been created, where XXX is the *object-name*, as defined in the .maj files in the majic directory in bopcfg.

Note: For more information, see the *CA SDM Technical Reference Guide*. By default, the results of this search are displayed in list_XXX.html, but this can be overridden by specifying the HTMPL property.

Required specifiers:

FACTORY=*object-name*

QBE.op.attr_name=*value*

Optional specifiers:

ALG_PRESET=*preset_expression*

ALG_PRESET_REL=*preset_expression*

CREATE_ALG=*activity_log_type*

HTMPL=*list_html_file*

KEEP.attr_name=*value*

SEC_REFRESH

Refreshes the user access information from the security subsystem. A hyperlink for this operation is provided to users who have MODIFY privileges (for the admin functional group) on the menu screen. After updating user access privileges with the security program, this operation provides a means to refresh access information. (This operation refreshes the security information for all users.)

Note: Security refresh is an asynchronous process. When the security refresh is done, a message shows in the standard log file (stdlog).

SET_MENU

The behavior of this operation is the same as MENU when MENU is used with the HTMLPL variable. The only difference is that this operation also sets the default menu form to the menu form specified with the HTMLPL property.

Required specifiers:

HTMLPL=*htmlpl_file*

Note: This operation overrides the MENU set in the web.cfg until the web service is restarted.

SHOW_DETAIL

Provides a generic interface to allow the user to display a read-only detail of a row in a specified table. The persistent ID name must be specified (from which the object name is inferred). By default, a template named detail_XXX_ro.html is used for object XXX. The .html file can be overridden by specifying the HTMLPL property.

Required specifiers:

PERSID=*persistent-id*

Optional specifiers:

ALG_PRESET=*preset_expression*

ALG_PRESET_REL=*preset_expression*

CREATE_ALG=*activity_log_type*

HTMLPL=*readonly_detail_html_file*

UPDATE

Provides a generic interface to editing any table. The ID and object name must be passed in and a detail form that the user can edit is displayed to the user. By default, the user has exclusive access to the record for two minutes, and is guaranteed to get changes into the database if they are submitted in this time.

Required specifiers:

PERSID=*persistent-id* or

SET.id=*id-of-row-to-update* FACTORY=*object-name*

Optional specifiers:

NEXT_PERSID=*persistent-id* (of record to display after successful update)

KEEP.*attr_name=value*

KEY.*attr_name=value*

HTMPL=*zdetailxxx_factory.html*

Note: To use the HTMPL specifier with UPDATE, the referenced form must have a name conforming to the naming convention *zdetailxxx_factory.html*. The name must begin with the string “zdetail”, followed by any alphanumeric characters (including a null string), followed by an underscore and the factory name.

Note: For information about web.cfg, see the *Administration Guide*.

Operation Variables

This table lists the variables that can be set for each of the operations in the supported operations:

Variables	Description	Operations
ALG_PRESET ALG_PRESET_REL	Specifies values for one or more of the attributes of the activity log created as a result of the CREATE_ALG variable. If CREATE_ALG is not specified, ALG_PRESET and ALG_PRESET_REL are ignored.	CREATE_NEW SEARCH SHOW_DETAIL
CREATE_ALG	Specifies the activity log type of an activity log to be created as a side effect of the operation. Use the ALG_PRESET or ALG_PRESET_REL variables to specify values for the attributes of the new activity log. The timing of creation of the activity log depends on the operation, as follows: CREATE_NEW The activity log is created when the new record is saved. If the new record is not saved, no activity log is created. SEARCH The activity log is created when a record is selected from the list form. If the record is viewed instead of selected (that is, the user explicitly selects the View command from the list form's mouse-over menu), no activity log is created. SHOW_DETAIL The activity log is created before the record is displayed.	CREATE_NEW SEARCH SHOW_DETAIL
FACTORY	Specifies the class of object to be searched, created, or updated. You can use any name specified as an OBJECT in the *.maj files in \$NX_ROOT/bopcfg as listed in the CA SDM Technical Reference Guide.	CREATE_NEW GENERIC_LIST SEARCH UPDATE

Variables	Description	Operations
HTML	Allows the HTML author to override the default template naming convention and explicitly specify the HTML file to display, instead of the default template. Note: When the HTML specifier is used with CREATE_NEW or UPDATE, the name of the referenced form must conform to the naming convention <code>zdetailxxx_factory.html</code>, where <code>xxx</code> are any characters, and <i>factory</i> is the factory name.	CREATE_NEW DISPLAY_FORM JUST_GRONK_IT MENU SEARCH SET_MENU SHOW_DETAIL UPDATE
KEEP.name	Specifies the value that can be saved and passed between pages.	CREATE_NEW GENERIC_LIST SEARCH UPDATE
KEY.attr_name	Similar to the SET.attr_name, except that this specifies a lookup on attr_name, which must be a reference to another table or object.	UPDATE
NEXT_PERSID	Specifies the persistent ID of the record to be displayed next.	UPDATE
PERSID	Specifies the persistent ID of a record to be displayed. You can specify this in either of the following ways: Directly, with a persistent ID consisting of a factory name, a colon (:), and a unique integer database ID. For example, PERSID=chg:1234, specifies the change order with database ID 1234. Indirectly, with a persistent ID consisting of a factory name, a colon (:), an attribute name, a second colon (:), and a value. This form of PERSID specifies the record of the specified factory that has an attribute of the specified value. For example, PERSID=chg:chg_ref_num:demo:3 specifies the change order with reference number demo:3.	SHOW_DETAIL UPDATE
PRESET PRESET_REL	Specifies values for one or more of the attributes of the record created as a result of the CREATE_NEW variable. If CREATE_NEW is not specified, PRESET is ignored.	CREATE_NEW

Variables	Description	Operations
QBE. <i>op.attr_name</i>	Specifies the values to use when performing a search. These values are identified using a QBE keyword, where <i>attr_name</i> identifies any attribute name on a ticket that can be set and <i>op</i> indicates to search where the attribute: EQ is equal to the value NE is not equal to the value GT is greater than the value LT is less than the value GE is greater than or equal to the value LE is less than or equal to the value NU is null NN is not null IN matches the SQL LIKE expression KY contains the text entered If you do not define any QBE variables, the standard search window is displayed.	SEARCH
SET. <i>attr_name</i>	Specifies an attribute name to use when a ticket is created, where <i>attr_name</i> identifies any attribute in a ticket that can be set. The attribute names will vary depending on the underlying object. All objects and their attributes can be found in the *.maj files in the majic directory in bopcfg as listed in the CA SDM Technical Reference Guide.	CREATE_NEW UPDATE
SET. <i>id</i>	Specifies the database ID of the row to be updated.	UPDATE
SKIPLIST	When set to 1, searches that result in 1 hit do not display the search result list. Instead, the read-only detail is displayed directly.	SEARCH
use_template	When set to 1, the SEARCH operation will return a list of templates. The returned template selected will be used in the CREATE_NEW operation to populate a new record. This variable is valid for change orders, issues, and requests.	CREATE_NEW SEARCH

More information:

[Syntax of PRESET, PRESET_REL, ALG PRESET, and ALG PRESET_REL](#) (see page 432)

Syntax of PRESET, PRESET_REL, ALG_PRESET, and ALG_PRESET_REL

The PRESET, PRESET_REL, ALG_PRESET and ALG_PRESET_REL keywords in the URL specify initial values for attributes of the ticket and its activity log, respectively. There are two possible formats:

[ALG_]PRESET=attr:value

Indicates that the specified attribute of the ticket or activity log should be set to the specified value. For example, the following specification sets the description of the new ticket to "Hello:"

```
PRESET=description:Hello
```

[ALG_]PRESET_REL=attr:obj.relattr:testattr:value

Indicates that the specified attribute of the ticket or activity log should be set to a value copied from another database table. The value is copied from the *relattr* attribute of the *obj* whose *testattr* has the specified *value*. For example, the following specification sets the analyst attribute of the new ticket to the ID of the contact with user ID xyz123:

```
PRESET_REL=analyst:cnt.id:user:xyz123
```

When this format is used, the implied query must retrieve a unique record. If more than one contact has a user ID of xyz123 (or none), the example PRESET specification has no effect.

The PRESET, PRESET_REL, ALG_PRESET and ALG_PRESET_REL keywords can occur as many times as desired in a URL, allowing the setting of multiple attributes. Alternatively, a single keyword operand can specify multiple values separated by @@. If the '@@' separator is used, you cannot mix value formats for [ALG_]PRESET and [ALG_]PRESET_REL keywords. For example, the following example shows two different ways of specifying values for ticket description, summary and analyst:

```
PRESET=description:Hello+PRESET=summary:HelloThere+PRESET_REL=analyst:cnt.id:user  
id:xyz123  
PRESET=description:Hello@@summary:HelloThere+PRESET_REL=analyst:cnt.id:user:xyz  
123
```

For requests, issues, incidents, problems, and change orders, both PRESET and PRESET_REL support a keyword attribute ASSET to link an object to an asset. The ASSET attribute updates the affected_resource attribute of a request, incident, or problem, or the asset LREL of an issue or change order.

Link Examples

The following link examples do not include the path to CA SDM. All CA SDM URLs begin with coding of the following form:

```
http://hostname[:port]/CAisd/pdmweb.exe
```


In this example, *hostname* is the name of your server and *port* (optional) is the port number if you are using Tomcat. This coding is shown as an ellipsis (...) in the following URL examples:

- To create a request with an affected end user with the userid tooda01, use the following example URL:

```
...?OP=CREATE_NEW+FACTORY=cr+PRESET_REL=customer:cnt.id:userid:tooda01
```

- To display a list of all requests assigned to userid tooda01, use the following example URL:

```
...?OP=SEARCH+FACTORY=cr+QBE.EQ.assignee.userid=tooda01
```

- To display the detail form for request 1234, use the following example URLs:

```
...?OP=SHOW_DETAIL+FACTORY=cr+PERSID=cr:ref_num:1234 (read-only view)
```

```
...?OP=UPDATE+FACTORY=cr+PERSID=cr:ref_num:1234 (update view)
```

Note: You can bypass the logon challenge by using Web Services for authentication. For information about the getBopsid() method, see the CA SDM Technical Reference Guide.

Advanced Customization

You must be aware of various aspects of customizing web pages if you elect to use tools other than Web Screen Painter to modify HTML, or if you have unusually complex customization requirements. However, we strongly recommend that you work with WSP to customize CA SDM web pages before trying any other approach. WSP is capable of doing almost any customization you need, and it automatically handles housekeeping issues, such as placing updates in the site mods directory, and distributing published files to all servers.

The Web Engine and Its Cache

When customizing web pages, it is helpful to understand the structure of the CA SDM web server. The web interface uses either a J2EE servlet container, such as Tomcat, or a standard HTTP server, such as Apache or Microsoft Internet Information Server (IIS). When a user requests a CA SDM web page, the HTTP server invokes the supplied program pdmweb.exe.

After it starts, pdmweb.exe sets up a connection with a CA SDM daemon (or Windows service) called the web engine. The web engine interprets the user's request. Most requests require the web engine to look up a template (HTML) file and translate it into standard HTML. Usually, the translation process requires the web engine to communicate with a CA SDM server to read or update the database, and include database information in the generated HTML. After the HTML is complete, the web engine sends it to pdmweb.exe, which in turn sends it back to the user's browser.

To maximize performance, the web engine typically reads each HTML file only once. After parsing the file and determining how to translate it to HTML, the web engine stores the parsed file in its cache, significantly reducing the processing time the next time the file is requested. While the cache is beneficial in a production environment, it can be inconvenient in development, as it means that changes to HTML files do not take effect until either the web engine is recycled or the `pdm_webcache` utility is used. In a development environment, you can avoid this behavior by specifying the configuration file property `SuppressHtmlCache`. However, we recommend that you do not suppress the HTML cache in a production environment because it severely impacts overall performance of the web engine.

Note: For more information, see the *Administration Guide*.

The web pages served up by `pdmweb.exe` are generated by reading HTML files and using them to generate HTML. HTML template files are identified by a file suffix of `.html`. You can modify these template files, and thereby customize the CA SDM web pages.

The `pdm_webcache` Utility

Use the `pdm_webcache` utility to remove one or more HTML forms from the web engine cache. This forces the web engine to fetch these forms from the disk the next time they are used, allowing changes to forms to take effect.

```
pdm_webcache [-f form-name] [-g form-group] [-i interface] [-p process] [-v]
```

-f form-name

Specifies the name of the form to be removed from the cache, such as `detail_cr.html`. You can use `'%'` (or `'*'`) as a wildcard character to select more than one form. For example, the specification:

```
-f detail%
```

selects all detail forms.

This argument is optional. If it is omitted, all forms in the cache are selected.

-g form-group

Specifies the name of the form group to be removed from the cache, such as `Analyst`. You can use `'%'` (or `'*'`) as a wildcard character to select more than one form group. For example, the specification:

```
-g Anal%
```

selects all form groups beginning with "Anal".

This argument is optional. If it is omitted, all form groups in the cache are selected.

-i *interface*

Specifies the name of the web interface to be removed from the cache, such as analyst, customer, or employee. You can use '%' (or '*') as a wildcard character. For example, the specification:

`-i a%`

selects the analyst interface.

This argument is optional. If it is omitted, all interfaces in the cache are selected.

-p *process*

Specifies the name of the web engine process whose cache is to be modified, such as web:local.

This argument is optional. If it is omitted, all web engines are selected.

-v

Specifies verbose output. When this argument is specified, pdm_webcache lists the full name of every form removed from the cache, in the form:

interface:form-group:form-name

This argument is optional. If it is omitted, pdm_webcache reports only a count of forms removed from each web engine's the cache.

How to Modify HTML Templates

Typically, you can make two types of changes to the HTML templates:

- You can make modifications that will be visible to the user but will not be altered by the web interface prior to display. For example, you could add a GIF file for your company logo to the web interface pages (a “pass through”) by adding the reference to the appropriate template file or you could add JavaScript to your page to validate input. Any changes you make to the HTML file that are not contained within a PDM tag, as defined in the following, are passed unchanged in the HTML returned to the user.
- You can modify the replaceable sections of the templates. For example, you can add new application data to the request detail page.

Several kinds of template entries let you do the following:

- Display information from CA SDM to the user.
- Set up a query page.
- Create links to other CA SDM pages using link tags.

Files That Should Not be Modified

Certain HTML templates and JavaScript files contain information required by many CA SDM web forms. The information in these templates is both release dependent and critical to the successful operation of the CA SDM web interface. Therefore, these files are always replaced when a new version of CA SDM is released; changes made to them are not upgraded.

The templates affected by this restriction are as follows:

ahdtop.html

Contains styles, scripts, and JavaScript variables used throughout the CA SDM web interface. This file is part of the main frameset of the web interface, and is always present during a session. All CA SDM forms have access to the JavaScript variable ahdtop that references the window containing ahdtop.html.

menu_frames.html

Defines the HTML frameset used by the CA SDM main form.

msg_cat.js

Contains the text of all messages used in CA SDM JavaScript files.

reports.html

Contains data required for web reports.

std_body.html

Contains standard information used at the beginning of the BODY section of most HTML templates.

std_footer.html

Contains standard information used at the end of the BODY section of most HTML templates.

std_head.html

Contains standard information used at the beginning of the HEAD section of almost all HTML templates.

styles.html

Contains CSS styles used throughout the CA SDM web interface.

Although you cannot modify these files directly, you can add additional information to them. Each restricted file xxx.html (except for menu_frames.html and reports.html) has a corresponding xxx_site.html file that you can customize. For example, you can add additional information to ahdtop.html by customizing ahdtop_site.html, or add new messages by customizing msg_cat_site.js.

The xxx_site.html file corresponding to each restricted file is loaded after the main file so you can override or change JavaScript in the main file. Use caution when adding information, as badly designed changes to these files can cause unexpected problems throughout the CA SDM web interface.

More information:

[Directories Used by Your HTTP Server](#) (see page 440)

Guidelines for New HTML Files

You can add your own HTML files to the CA SDM web interface. Follow these guidelines to help ensure your HTML file works well with the rest of the CA SDM interface:

1. Include the following statement somewhere in the <HEAD> section of the file. This statement should follow the <TITLE> statement (if any). It defines several JavaScript global variables required by CA SDM web interface, and also registers your page with the CA SDM window manager:

```
<PDM_INCLUDE FILE=std_head.html>
```

2. Include the following attribute as part of the <BODY> tag of the file. This attribute helps the CA SDM window manager keep track of your page:

```
onUnload="deregister_window()"
```

3. Include the following statement at the beginning of the <BODY> section of your file. The "menubar=no" argument is optional; if specified, it suppresses the CA SDM menu bar:

```
<PDM_INCLUDE FILE=std_body.html [menubar=no]>
```

4. Include the following statement at the end of the <BODY> section of your file.

```
<PDM_INCLUDE FILE=std_footer.html>
```

How to Add User Defined State Information

Many customers want to be able to embed their own state information in the CA SDM web pages, and have CA SDM pass the state information to all subsequent pages it serves up to the user's session. This information can be interrogated with conditional statements in the HTML files.

State information for a user's session is accomplished by setting the special attribute `USER_STATE` in your links or forms. After it is submitted into the CA SDM web engine, every page that is presented to the user will have the HTML variable `USER_STATE` available and set to the value last submitted for `USER_STATE`.

The following examples show how you might set up an entry into CA SDM from some other part of your site, such as from pages that are oriented to your sales force:

- Using a hyperlink

```
<a href="/CAisd/pdmweb.exe?USER_STATE=Sales">Service Desk</a>
```

- Using a form with a hidden field

```
<form action="http://yourhost.com/CAisd/pdmweb.exe">  
<input type="hidden" name="USER_STATE" value="Sales">
```

Click the button for the Service Desk

```
<input type="submit">  
</form>
```

Then you can customize your HTML forms based on the state information:

```
<PDM_IF "$USER_STATE" == "Sales">  
    custom information for sales audience  
  
<PDM_ELIF "$USER_STATE" == "Engineering">  
    custom information for engineers  
  
<PDM_ELSE>  
    information for everyone else  
  
</PDM_IF>
```

How to directly create a Request from a Template

It is possible to create a Request directly from a Template using an URL.

Example

```
http://machinename/CAisd/pdmweb.exe?FACTORY=cr+OP=CREATE  
NEW+PERSID=cr:3106+use_template=1
```

where cr:3106 is the persid of the template.

How to Configure a Quick Close Ticket with Preset Information

In the Quick Profile View, you can create a Quick Close ticket, for example, a Quick Close Incident. Add a preset string to the URL when you create a Quick Close ticket to add a description, a summary, or other field information automatically.

To add a preset string to the Quick Close ticket feature, complete the following steps:

1. Copy the `ahdtop_site.html` file from `NX_ROOT/bopcfg/www/html/default` to `NX_ROOT/site/mods/html/www/default`.
2. Edit the [ahdtop_site.html file](#) (see page 439) with the appropriate variable (depending on the type of Quick Close ticket).
3. Log in to CA SDM.
4. Create a Quick Close ticket.

The preset information is added to the ticket.

Create a Quick Close Ticket With Preset Options

In Quick Profile you can create a Quick Close ticket, for example, a Quick Close Incident. The Quick Close option lets you open and close a new ticket in one step, for example, when you open and resolve the incident in the same session. You can add a preset string to the URL when you create a Quick Close ticket to add a description, a summary, or other field information automatically.

To create a quick close ticket with preset options

1. Copy the `ahdtop_site.html` file from `NX_ROOT/bopcfg/www/html/default` to `NX_ROOT/site/mods/html/www/default`.
2. Edit the `ahdtop_site.html` file to add the appropriate variable (depending on the type of Quick Close ticket) with the preset string.

- Quick Close Incident—`var quick_close_preset_in`
- Quick Close Problem—`var quick_close_preset_pr`
- Quick Close Request—`var quick_close_preset_cr`
- Quick Close Issue—`var quick_close_preset_iss`

For example, the following string sets the description to `HelloIncident` and summary to `HelloIncidentSummary` for a Quick Close Incident.

```
var quick_close_preset_in =  
"PRESET=description:HelloIncident@summary:HelloIncidentSummary";
```

3. Log in to CA SDM.
4. Select View, Quick Profile in the Service Desk tab.
The Quick Profile Contact Search page appears.
5. Complete one or more of the search fields for the contact, and click Search.
The Quick Profile Contact List populates with those contacts that match your search criteria.
6. Select a contact.
The right pane displays the information for that contact.
7. Click Quick Close.
The ticket is created with the preset information.

Directories Used by Your HTTP Server

The default installation of CA SDM defines two virtual directories to your HTTP server:

- The `CAisd` virtual directory points to the following directory in your CA SDM installation:

In Windows: `installation-directory\bopcfg\www\wwwroot`

In UNIX: `$NX_ROOT/bopcfg/www/wwwroot`

- The `CAisd/site` virtual directory points to the following directory in your CA SDM installation:

In Windows: `installation-directory\site\mods\www\wwwroot`

In UNIX: `$NX_ROOT/site/mods/www/wwwroot`

Subdirectories under these virtual directories are:

Subdirectory	Stores
css	Style sheets
help	Web interface help
html	HTML files
img	Graphic files
scripts	JavaScript
sitemods	Site-defined customizations

If you decide to create a customized version any of the files in the css, html, img, or scripts directories, we strongly recommend that you do not update the file in /CAisd. Instead, store the file in the appropriate subdirectory of /CAisd/sitemods. For example, if you decide to modify a style sheet in /CAisd/css, store your customized version in /CAisd/sitemods/css. When the web engine parses an HTML file, it automatically modifies file names beginning with \$CAisd to point to sitemods if the file exists in a subdirectory of sitemods.

Using the /CAisd/sitemods directory has these advantages:

- It allows you to keep a record of the distributed files you have changed.
- It gives you easy access to the original version in case there is a question or a problem.
- It makes the process of installing maintenance or a new release easier, since CA SDM installation never places anything in the /CAisd/sitemods directory.

Note: There is no /CAisd/sitemods/help subdirectory. Because the help data is in standard HTML files (not HTML templates), the web engine cannot dynamically change file references. If you need to customize help, you must make your changes in /CAisd/help.

The HTML subdirectory contains a few heavily used files that do not need to be processed by the web engine and can improve performance when cached on the browser. If you create a customized version of any of these files, carefully check the file for references to other customized files. Because there is no web engine processing, you must manually insert a reference to sitemods where appropriate.

Download PDF Attachments

When you download and try to view a PDF attachment in CA SDM, the PDF file may not display correctly, or a blank window may appear after you upgrade to Adobe Acrobat release 7.0 or 8.0. With CA SDM, you can display the PDF file correctly by completing the following steps:

1. Set the *forceDecompressOnDownload* parameter to YES in
\$NX_ROOT\bopcfg\www\CATALINA_BASE\webapps\CAisd\WEB-INF\web.xml.

Note: On Linux, \$NX_ROOT is /opt/CAisd

2. Restart the CA SDM services.

Looking Up Information in Reference Tables

Input fields on a detail form editing a database record are named SET.attr_name. When the record is saved, data from SET fields are copied directly to the underlying record. Thus, an input field for an attribute that references another table should contain the REL_ATTR (foreign key) of that table. This is normally the id, persistent_id, or code of the reference record.

Users do not directly provide REL_ATTR values, and the SET fields for attributes referencing another table are hidden. The visible field on the form is named KEY.attr_name, and it contains the common name of the referenced record. A common name must be converted into a REL_ATTR to update the record. There are several times when this might be done:

- For fields with a drop-down list, the SET value is provided directly by the drop-down.
- For fields with a lookup when the user clicks the lookup and selects an item, the SET value is copied from the selected item.
- For fields with a lookup where the user provides a partial key that uniquely identifies the record and then clicks the label, the browser requests the SET value from the server and copies both it and the full key back to the form.
- If the Autofill configuration file property is provided or defaulted, and the user both provides a partial key that uniquely identifies the record and clicks Notebook to exit the field, the browser requests the SET value from the server and copies both it and the full key back to the form.

Otherwise, when the record is saved with a KEY value and no SET value, the web engine resolves the value during the save. If any KEY values cannot be resolved to a unique SET value, the save is prevented, and the edit form is redisplayed.

If a form has been redisplayed as a result of a save that failed due to a lookup resolution failure, the following variables are available in the HTML for each attribute field for which a lookup was performed:

LIST_attr

Contains all the matches found. Typically this is specified as the right-hand side of the SOURCE= field in a <PDM_SELECT> statement.

FLAGS_attr

This is set to one of the following values:

0

Display initial search field.

1

More than one and fewer than MaxSelectList were found (typically a <PDM_SELECT> list would be displayed in this case).

2

No matches were found.

3

Too many matches were found (more than MaxSelectList).

SEARCH_STATUS_attr string

Contains the TooManyMatches text string from the web.cfg file.

Note: For information about web.cfg, see the *Administration Guide*.

Specifying Lookups on Contacts

When specifying a contact (last name, first name, middle name) in an editable form, you can delimit the contact name with commas (,) or blank spaces, but not both. Commas are preferable because names often have embedded spaces, which cause problems.

Since a combination of commas and blank spaces is not allowed, the presence of commas implies that all parts of the name are comma-separated; if no commas are present, names are delimited by spaces.

Since the information is eventually passed to an SQL query, the percent symbol (%) serves as a wildcard character. For example, 'P%, J%' would match 'Public, John', 'Penxa, Jane', and any other names whose last name begins with P and first name begins with J. (Case-sensitivity depends on the underlying database.) Similarly, 'P% J%' would bring up the same names.

However, 'P%, Jon D' would not bring up all contacts with a first name of Jon, a middle initial of D, and a last name beginning with P, because the presence of one comma means all delimiters are commas. Therefore, the last name would be looked up as 'P%' and the first name would be looked up as 'Jon D'. To avoid this error, specify 'P%, Jon, D' instead.

Web Engine PreProcessing

The web engine goes through two phases when processing an HTML file:

- The preprocessing phase, when it reads the HTML file and any referenced files (including files referenced by PDM_INCLUDE and PDM_MACRO tags). The output from preprocessing is an entry in the web engine's internal cache.
- The generation phase, where it reads the form from its cache and generates HTML. The output from generation is HTML delivered to the browser.

The pre-processing phase is typically done once for each form in the lifetime of the web engine. The generation phase is done each time a form is requested.

You can use the PDM_SET and PDM_EVAL tags during the preprocessor phase to generate and store information, such as HTML text, that the web engine can use in the generation phase.

Preprocessor Variables

Preprocessor variables begin with the string "\$PRE.". They are created and updated with the [PDM_SET](#) (see page 417) tag. This tag has the following syntax when used with a preprocessor variable:

```
<PDM_SET PRE.name[+]=value>
```

This tag assigns or updates a preprocessor variable, creating it if necessary. It is processed when the web engine encounters it while reading a form. Only the invariant PDM_IF statements affect PDM_SET of a preprocessor variable; others are ignored.

Invariant PDM_IF Detection

When parsing a form, the web engine detects invariant PDM_IF statements. An invariant PDM_IF is one whose argument consists entirely of literals, environment variables, constant properties, and preprocessor variables. When the web engine detects an invariant PDM_IF, it evaluates its condition immediately. This has the following effects:

- PDM_SET and PDM_EVAL tags that are bypassed by an invariant PDM_IF are ignored. All other pdm_eval tags and PDM_SET tags referencing preprocessor variables are executed when processed, even if they are within a non-invariant PDM_IF.
- Form variable references bypassed by an invariant PDM_IF are ignored, and their value is not fetched when the form is used. You can use this technique to improve the performance of a form. For example, if a form contains the following, the web engine fetches the value of \$args.def before it displays the form:

```
<PDM_IF "$env.NX_OTB_MARKET == "itil" && "$args.a" == 1>  
<h1>This is form $args.def</h1>  
</PDM_IF>
```

However, if the following segment has been written, the web engine determines that the first PDM_IF is invariant, and retrieves the value of \$args.def only if \$NX_OTB_MARKET is "itil".

```
<PDM_IF "$env.NX_OTB_MARKET == "itil">  
<PDM_IF "$args.a" == 1>  
<h1>This is form $args.def</h1>  
</PDM_IF>  
</PDM_IF>
```

PDM_EVAL: Insert Text from a Preprocessor Variable

The PDM_EVAL tag inserts the value of a preprocessor variable into the input to the web engine parser. If used inside a macro, its effect is deferred until the macro completes.

The PDM_EVAL tag works similarly to PDM_INCLUDE or PDM_MACRO. It inserts the text into the parser at the point of the tag, exactly as if the value of its variable had been coded in place of the tag.

PDM_EVAL has the following syntax:

```
<PDM_EVAL text=PRE.name>
```

where PRE.name specifies the name of the preprocessor variable whose value is to be inserted into the web engine's input

Execution of the PDM_EVAL tag can be controlled by invariant PDM_IF statements.

Important! On UNIX, the LIBPATH needs to be set before running the utility. Use pdm_task to perform this task. For example, before running the utility, input "pdm_task pdm_eval".

Free-Form Customization of Detail Forms

The topics in this section describe how to perform free-form customization of Detail Forms.

Using JavaScript on Detail Forms

Use WSP to add your own fields to a detail form, or rearrange or change edit characteristics of fields provided on the form by default. However, sometimes you want to customize a form beyond simply adding new fields to a grid. There are a number of JavaScript functions provided with CA SDM to make it easy to merge your own customizations into a combination detail form and give it any appearance you want. These functions are summarized as follows:

- You can place any HTML whatsoever prior to the DetailForm() statement or after the endDetail() statement without affecting the operation of the detail form at all.
- You can use the detailEndTable() function to close the table that lays out detail form elements in a grid. After you have done this task, you can lay out your own HTML in any desired format. In this case, your HTML is inside the detail form, and any form fields within it are submitted to the web engine when the user clicks Save. You can use the detailNextID() function to generate ID fields for your HTML elements that allow them to participate in mouse-less navigation of the detail form. You can see several examples of this technique in the notebook tabs, such as xx_alg_tab.html.

- You can follow your own HTML with a `dtlStartRow` macro to restart standard detail form formatting. This starts a second grid, whose fields will not necessarily be aligned with the first. This technique is used in every notebook tab.
- If you want to insert a custom element at the end of a row, you can use the `detailWriteRow()` function to write out the contents of a row without closing it. You can see an example of this technique in the code that generates the “24 Hour” button in `detail_cr.html` and `detail_iss.html`.
- If you want to explicitly specify the contents of an element in a row without closing out the table that lays out the grid, you can use the `detailRowHdr()` function to specify the header text and the `detailSetRowData()` function to specify the data text. You can see an example of this technique in the code that generates the timer field in `detail_cr.html` and `detail_iss.html`.
- If you provide a function to validate a field's value (normally in an event handler), and want its results reported during browser-side validation (so that an erroneous field is redrawn with a thick red border, and an error message appears in a yellow band at the top of the form), use the function `detailReportValidation()`. You can see an example of this in the `validate_duration()` function used to validate the duration fields in `xx_candp_tab.html`. The `validate_duration()` function is in the file `val_type.js`.
- If you want review the HTML generated for a detail form, you can use functions `docWrite()` and `docWriteln()` in place of the standard functions `document.write()` and `document.writeln()`. Then if you invoke the function `holdHTMLText()` anywhere in the `<HEAD>` section of your form, CA SDM will pop up a debugging form containing a TEXTAREA with all of the HTML generated for the form, which you can review or copy and paste into a validation tool.

While you are composing your modifications, remember that the combination detail form is displayed in both a read-only and an edit view. If your customizations apply specifically to one view or the other, you can test the current view in one of two ways:

- In JavaScript, the expression `_dtl.edit` is true in the edit view and false in the read-only view.
- In either JavaScript or open HTML, the statements:

```
<PDM_IF "$prop.form_name_3" == "edit">
```

(Used only in the edit view)

```
</PDM_IF>
```

or

```
<PDM_IF "$prop.form_name_3" == "ro">
```

(Used only in the read-only view)

```
</PDM_IF>
```

Used to bracket code intended only for the edit or read-only view, respectively.

detailEndTable()

This function closes the HTML table that lays out the detail form elements in a grid. It has no arguments.

You can start a new grid with the `dtlStartRow()` macro. However, elements in a new grid are not necessarily aligned with elements in a previous grid.

detailNextID([colspan,][lastelement])

This function returns a string of the form:

```
" ID=df_nn_nn TABINDEX=n onFocus=func onBlur=func"
```

Inserting this string into an HTML element causes the element to follow the conventions of CA SDM mouse-less navigation, including accessibility with the arrow keys and turning pale yellow when focused. The returned string begins with a space and ends with no space.

colspan

Specifies the number of columns in the grid occupied by the element. This argument is optional; it defaults to one if not provided. If omitted, the element is assumed to occupy one column of the grid. This affects arrow key behavior. The *colspan* argument can be omitted even if the *lastelement* argument is provided.

lastelement

A Boolean value specifying whether the element for which the ID being generated is the last one in its row. If omitted, the element is assumed to be followed by other elements. This affects arrow key behavior.

detailNextLinkID()

This function returns a string of the form:

```
" ID=dflnk_nn_nn TABINDEX=0 onFocus=func onBlur=func"
```

Inserting this string into an HTML element defining a link element causes the element to follow the conventions of CA SDM mouse-less navigation, including accessibility with the up arrow key from the base element and turning pale yellow when focused. The returned string begins with a space and ends with no space.

This function takes no arguments.

detailReportValidation(field, has_error, emsg)

This function reports the result of external field validation. If validation is reported to have failed, the field is redrawn with a thick red border and the error message provided is shown in a yellow band at the top of the form. The user is not permitted to save the record until a subsequent call to detailReportValidation() reports the field as error-free.

The detailReportValidation() function is functional only for fields registered for browser-side validation. All fields created with detail form macros are automatically registered for validation. You can register other fields with the detailSetValidateFunction().

field

(Required) Specifies the form element object containing the field. The easiest way to obtain this is to pass this argument to the event handler performing the validation. Another way is to use the standard JavaScript function document.getElementById().

has_error

(Required) A Boolean or integer value specifying whether the field is in error. Setting a field in error prevents the user from saving the record, causes the field to be highlighted with a thick red border, and places the error message supplied as the third argument in a yellow band at the top of the form. Setting a field as not in error reverses these changes.

emsg

A text string specifying the message to display in the yellow band at the top of the detail form when the *has_error* flag is set. This argument is required if *has_error* is set.

detailSetValidate(hdrtext, is_required, maxsize)

This function specifies that the most recent field created with an ID supplied by detailNextID() is subject to browser-side validation. Validation for required fields and for fields with a maximum size is automatic. Other forms of validation may be provided through JavaScript functions or event handlers calling detailReportValidation().

You should call detailSetValidate() only for form fields you have defined yourself whose ID was created by detailNextID(). The detailSetValidate() function must be called immediately after creating a field that you want validated. It is unnecessary (and will caused unexpected results) to call detailSetValidate() for fields created by detail form macros.

hdrtext

(Required) Specifies a string used to identify the field in error messages.

is_required

(Required) A Boolean or integer value specifying whether the field is required. CA SDM automatically verifies that all required fields are provided whenever the user attempts to save a record.

maxsize

An integer specifying the maximum length of data allowed for the field. CA SDM automatically verifies that all fields with a *maxsize* value have a length within limits whenever the user attempts to save a record. This argument is required. To suppress *maxsize* validation, specify a value of 0.

detailRowHdr(*hdrtext*, *colspan*, *is_required*)

This function stores text for the header (TH) element of an item in the grid. The text is not actually written to the form until a `detailWriteRow()` function or `dtlStartRow` macro is invoked.

hdrtext

Specifies the text in the header element. This argument is required.

colspan

Specifies the number of columns in the grid occupied by the element. This argument is optional; it defaults to one if not provided. If omitted, the element is assumed to occupy one column of the grid. This affects arrow key behavior. The *colspan* argument must be provided if the *is_required* argument is provided.

is_required

Specifies whether the *hdrtext* should be displayed in the style corresponding to a required field. The argument can be a Boolean, a number, or a string. A number or a string is interpreted as false if zero and true otherwise. This argument is optional; if omitted, the *hdrtext* is styled as a non-required field.

detailSetRowData(*text*)

This function stores HTML text for the data (TD) element of an item in the grid. The text is not actually written to the form until a `detailWriteRow()` function or `dtlStartRow` macro is invoked. The single argument is the HTML text of the element to be stored.

detailWriteRow()

This function writes the HTML stored for the current row. This creates two HTML table rows, one for the header (TH) elements and one for the data (TD) elements. The function also writes the [assign the value for TD in your book] tag that begins a new data element. The TD tag is automatically closed by the dtlStartRow macro, so it is unnecessary (and incorrect) to provide the [assign the value for TD in your book] tags in HTML text that follows detailWriteRow(). This function has no arguments.

Understanding List Forms

The following information provides background information about the internals of CA SDM list forms. We recommend that you use the Web Screen Painter Design View to modify these forms.

CA SDM list forms are defined with the following macros (invoked with the PDM_MACRO tag):

lsStart

Begins a list

lsCol

Defines a column in a list

lsWrite

Inserts text into the pdm_list part of a list

lsEnd

Ends a list

The general form of a list using these macros is the following:

```
<pdm_macro name=lsStart>
<pdm_macro name=lsCol hdr=hdr1 attr=attr1>
<pdm_macro name=lsCol hdr=hdr1 attr=attr1>
<pdm_macro name=lsEnd>
```

This results in text similar to the following example in the output HTML:

```
var rs = new Resultset();          From lsStart
rs.startList(); From lsStart
rs.header("hdr1"); From lsCol
rs.setData("attr1","options"); From lsCol
rs.header("hdr2"); From lsCol
rs.setData("attr2","options"); From lsCol
<PDM_LIST SOURCE=list> From lsEnd
rs.data(attr1) From lsCol/lsEnd
rs.data(attr2) From lsCol/lsEnd
</PDM_LIST> From lsEnd
```

Note: There are two distinct sections to the output list: the setup section before the `<PDM_LIST>` tag, and the actual list between the `<PDM_LIST>` and `</PDM_LIST>` tags. The `IsCol` macro makes use of preprocessor variables and the `<PDM_SET>` tag to output data to both sections of the list. The entire list section of the list is created by a `<PDM_EVAL>` tag generated by the `IsEnd` macro.

To insert your own JavaScript in the setup section of the list, simply include it where needed. Use the `IsWrite` macro to insert your own code into the list section of the list.

The `IsWrite` Macro

The `IsWrite` macro specifies text for the list section of a list (the portion between the `<pdm_list>` and the `</pdm_list>` tags). Text specified for the text argument of this macro is deferred, and not written to the output HTML until the `IsEnd` macro.

`IsWrite` [both=no|yes]

text="xxx"

both

Specifies that the text operand is to be written both immediately to the output HTML and to the deferred text buffer. This can be useful to output JavaScript to conditionally bypass both the setup and the list information output by a subsequent `IsCol` macro. Optional; defaults to no.

text

Specifies the text generated by this macro. Text specified is deferred until the `IsEnd` macro.

It is often desirable to include `pdm` tags and references to form variables in the text output by an `IsWrite` macro. To prevent these from being interpreted by the web engine during parsing of the `IsWrite` macro itself, follow these syntax rules:

- If the `IsWrite` macro generates a `pdm_tag`, omit the surrounding "`<`" and "`>`" delimiters of the tag. For example, to insert a `<pdm_else>` statement into the list section of the list, code:

```
<PDM_MACRO NAME=IsWrite text="pdm_else">
```

The web engine automatically inserts the "`<`" and "`>`" before producing the text when it detects that the first four characters are "`pdm_`" (or "`PDM_`").

- If the `IsWrite` macro generates a reference to a form variable, code an `@` character in place of the `$` character that designates the variable. For example, to generate a reference to the list variable `$list.persistent_id`, code:

```
<PDM_MACRO NAME=IsWrite text="@list.persistent_id">
```

The web engine automatically converts the "`@`" to "`$`" before producing the text. To produce a literal `@` sign, precede it with a backslash.

Edit in List Customization

Several list forms, such as the Request and Issue lists, include an Edit in List button. When this button is available and a result set is displayed, the user can click Edit in List to replace the search filter with a small edit form. The edit form allows the user to update records directly on the list form. The user can even update everything selected in the list by placing the desired new data in the edit form and clicking Change All.

Editing list data involves no communication with the server until the user clicks Save. When the user clicks Save, all the updates (marked by yellow highlights on the form) are sent to the server, which applies all the changes in a single operation, returning a status message and redisplaying the list.

You can customize this feature by controlling whether the Edit in List button is available on a particular list form, and by controlling the fields that appear in the edit form displayed when the user clicks Edit in List.

To place an Edit in List button on a list form, including the following statement somewhere in the <HEAD> section of the form:

```
<SCRIPT LANGUAGE="JavaScript" SRC=$CAisd/CAisd/list_edit.js></SCRIPT>
```

Simply adding this statement puts the button on the form. However, the button is disabled unless JavaScript statements specifying the contents of the edit form are also included in the form. These statements must be placed immediately prior to the results set specification, and have the following format:

Statements	Comments
<code>startListEdit(_search_filter);</code>	Specify exactly as shown
<code>listEditStartRow();</code>	Specify exactly as shown
<code>listEditField("attr", "hdr");</code>	Specify zero or more
<code>listEditReadonly("attr", "hdr");</code>	Specify zero or more
<code>endListEdit();</code>	Specify exactly as shown

The `endListEdit()` statement must be followed by the `ResultSet()` statement that begins the results set. You specify the fields in the edit form and their sequence on the form by coding one or more `listEditReadonly()` or `listEditField()` statements.

`startListEdit( _search_filter );`

This statement begins the list edit form. It must be coded exactly as `startListEdit( _search_filter );`.

listEditStartRow();

This statement begins a new row of fields on the list edit form. It must be coded exactly as *listEditStartRow()*. You must place a *listEditStartRow()* statement immediately after the *startListEdit()* statement. You can optionally include additional *listEditStartRow()* statements among the *listEditField()* and *listEditReadonly()* statements that specify the fields on the form.

listEditField(attr_name[,hdr]);

This statement specifies an attribute to be included on the list edit form.

attr_name

Specifies the name of the attribute to be included in the edit form (including dots, if appropriate). All attributes specified for a list edit form must also be in the results set. The *attr_name* specified must be identical to that specified in the *rs.showData()* or *rs.showDataWithLink()* that adds the attribute to the results set.

The attribute appears on the edit form in the same format that it appears in the search filter. If the attribute is not in the search filter, it is edited in a 20-character text box.

attr_name is a required argument.

hdr

Specifies the text of the header on the field in the edit form. This argument is optional; if omitted, the header text is taken from the search filter. If *hdr* is omitted and the attribute is not in the search filter entry for *attr_name*, the header text defaults to the attribute name surrounded by question marks.

listEditReadonly(attr_name[,hdr]);

This statement specifies a non-editable attribute to be included on the list edit form. Its arguments have the same significance as those for *listEditField()*.

endListEdit();

This statement ends the list edit form. It must be coded exactly as *endListEdit()*.

Integrating with Your Own Web Pages

You can integrate the CA SDM web interface functionality with your web pages to present a seamless interface for your users.

Note: The web engine, which is the executable that acts as the gateway between the web server and the CA SDM server, allows multiple simultaneous connections from a given user. More than one frame at a time can have an open connection to the CA SDM web engine process.

You can integrate the web interfaces in the following ways:

- By creating links from any of your web pages to the appropriate CA SDM web page without having to go through the web interface menu page.
- By adding HTML forms to your web pages that collect input and perform supported operations directly, without displaying any CA SDM web data entry pages.
- By creating web form groups that can be used to associate HTML web-based forms to users through their access type. Similar to the form groups used by the administrative interface, web form groups can be used to customize your HTML pages.

More information:

[Supported Server Operations](#) (see page 425)

Linking to CA SDM Functions

You can link directly to major CA SDM functions without displaying the main page. You typically do this by accessing the pop-up window for the new window containing the CA SDM information. You can also replace your web page with the CA SDM page.

In both cases, the product displays the requested page in the same way that the user sees it in a typical session, but without the main page and scoreboard. If you are an analyst, display the main page and scoreboard by selecting File, Restore Scoreboard, which is available only on pages displayed by bypassing the main page.

To create a link that bypasses the main page, specify a URL of the following form:

`http://hostname[:port]/CAisd/pdmweb.exe?OP=operation+var=value+...`

In this example URL, *hostname* is the web server host computer; *port* is the port number (typically 8080) required only if you are using Tomcat as your http server; *operation* is one of the supported operations, and *var=value* is one or more of the variables allowed with the operation.

For example, a link that loads the form for creating a request can be specified as the following:

```
<A HREF=http://hostname/CAisd/pdmweb.exe?OP=CREATE_NEW+FACTORY=cr>Define Request</A>
```

More information:

[Link Examples](#) (see page 432)

Posting Forms to CA SDM

You can also access CA SDM functionality by adding HTML forms to your web pages that refer to [supported operations](#) (see page 425). If the form is submitted with sufficient information to perform the operation, such as creating a request, the operation is performed without displaying a form to collect additional input.

When you add an HTML form to your web page:

- The ACTION for the form is the URL for pdmweb.exe.
- The METHOD is POST.
- Either the name of the SUBMIT button should be one of the supported operations, or you should have a hidden field named OP whose value is one of the [supported operations](#) (see page 425).

For example, to create an HTML form that loads the page for creating a request, specify the following code:

```
<FORM ACTION=/CAisdCAisd/pdmweb.exe METHOD=POST>
<INPUT type=HIDDEN NAME=FACTORY VALUE=iss>
.
.
.
<INPUT type=SUBMIT NAME=CREATE_NEW VALUE=" OK ">
</FORM>
```

JavaScript Customization

The CA SDM web interface makes extensive use of JavaScript and includes a number of JavaScript files in the /CAisd/scripts directory. If you decide to customize any of these script files, place the modified version in /CAisd/sitemods/scripts, as described in [Directories Used by Your HTTP Server](#) (see page 440).

For performance reasons, the JavaScript files delivered in the /CAisd/scripts directory are compressed, with comments and unnecessary white space removed. This compression can make them difficult to read. You can find uncompressed versions of all JavaScript files in one of the following directories:

- (UNIX) \$NX_ROOT/sdk/scripts
- (Windows) \$NX_ROOT/sdk/scripts

If possible, avoid creating customized versions of entire JavaScript files, because each file contains a number of functions and you may only want to modify one function. In most cases, you can override individual functions by placing a modified version in the JavaScript file sitemods.js. We strongly recommend that you take this approach when modifying JavaScript.

sitemods.js

A skeleton *sitemods.js* file is distributed with CA SDM. All distributed HTML files include this file at the end of their <head> section, making it the last JavaScript file loaded. Because it is the last file, any functions defined in it override functions with the same name included earlier. This lets you provide your own version of a distributed JavaScript function without directly modifying distributed code.

This approach is not effective for functions invoked at load time in the <head> section, such as those in *menubar.js* and *ahdmenus.js*.

However, you can customize most JavaScript functions by completing the following steps:

1. Place a modified version of the function in *sitemods.js*.
2. Store the updated copy of *sitemods.js* in *CAisd/site/mods/www/wwwroot/scripts*.

More information:

[Modify Menu Bars](#) (see page 376)

Modifying Context Menus

A number of forms within CA SDM use context menus, accessed by right-clicking an object. Using the Web Screen Painter, you can modify context menus to add, remove, or modify their items.

Note: For more information about adding menu items, see the *Web Screen Painter Help*.

Updating and Creating Change Orders as Employee User

By default, a user can only view change orders from the Employee web interface. Use the following steps to enable creating and updating change orders by employees:

1. Sign on to the web as the Administrator, and select the Administration tab.
2. Select Access Type from the Security menu.

The Access Type List appears.

3. Select the Employee link to display the Employee Access Type Detail window.
4. Set the Change Orders to "modify" under the Function Access tab and save.

5. Click the Back button to return to the Administration tab, and then select Data Partitions, Data Partition List.
6. Click Employee to display the Data Partition Detail window. On the Constraints List portion of the window, review the Type column for following Change_Request Tables:
 - Pre-Update
 - Create
7. For each Table that you want to edit, click the Table name to display that table's Data Partition Constraint Detail window.
8. Click the Edit button.
9. Edit the constraint as follows:
change "id = 1" to "affected_contact = @root.id".
10. Click Save.

Now when you login to the web interface as an employee user, the *Create Change Order* link appears.

Add a "Closed Change Orders" link to the Employee Scoreboard

You can use the product to add a Closed Changes node option to the Employee web interface scoreboard.

To add a Closed Changes node

1. Log in to the product as an Administrator.
2. Click the Service Desk tab.
3. Select File, Customize Scoreboard.
The Customize Scoreboard dialog appears.
4. Click the Role option and select Employee in the drop-down list.
5. Under Add New Node, click the Node's Stored Query link.
The Stored Query List dialog appears.
6. Search and select Closed Changes from the Stored Query list. This is typically displayed as code CHGUBIN7.
7. Specify a location for the new node by selecting an item in the scoreboard tree on the left.
8. Click Add New Node.
The new node named Closed Changes is added to the scoreboard tree.
9. Click Finished.

Download Attachments

When you download an attachment in CA SDM, it automatically displays the attachment in the browser window without prompting for a response from you. This action can be dangerous if a virus is associated with the attachment.

With CA SDM, you can force a save-as dialog that prompts you to respond if you want to save the attachment on the disk or open it. Saving an attachment can be a secure method because you can save the attachment on the disk and scan it before you can actually open it. You also have the option to force the save-as dialog only on certain attachment types.

You can force the save-as dialog to appear through the web.xml servlet configuration file. The web.xml file is located at the following paths:

Windows:

`$NX_ROOT\bopcfg\www\CATALINA_BASE\webapps\CAisd\WEB-INF\web.xml`

Linux: \$NX_ROOT is “/opt/CAisd”

Chapter 9: Event Log Data Storage Customization

The system environment variable `@NX_EVENT_LOG_EXCLUDE`, which is set in the `NX.env` file and requires a restart of the CA SDM services, lets you control the amount of data that is stored in the event log (event_log table). This variable lets you store only the events you want to track, report on, and use as part of the Recent Activity that can be launched as a button from the Quick Profile page.

In this variable, commas separate list items (for example, `@NX_EVENT_LOG_EXCLUDE = FAQ,KD_OPEN`). For example, if you use the LOGIN,LOGOUT events from the following table (`@NX_EVENT_LOG_EXCLUDE` value of LOGIN,LOGOUT), the product does not record login and logout events.

Refer to the following information when customizing data to store in the event log using this variable:

Event	Enum	By	Sets	Comments
LOGIN	1	CA SDM		Specifies that the User logs in to the system.
LOGOUT	2	CA SDM	numdata1	Specifies that the User logs out, where numdata1=logout reason: 0 —normal 1 —timeout 2 —abnormal
CR_CREATE	3	CA SDM	sd_obj_type, sd_obj_id, kd, numdata1	Indicates that the User creates a request, where numdata1=id of affected end user.
ISS_CREATE	4	CA SDM	sd_obj_type, sd_obj_id, kd, numdata1	Indicates that the User creates a change order, where numdata1=id of the affected end user.
CHG_CREATE	5	CA SDM	sd_obj_type, sd_obj_id, kd, numdata1	Indicates that the User creates an issue, where numdata1=id of the affected end user.
EMAIL	6	Knowledge Management	kd	Specifies that the Analyst emails a document.
LINK	7	Knowledge Management	kd, sd_obj_type, sd_obj_id	Indicates that the User accepts a solution, and links it to a ticket.

Event	Enum	By	Sets	Comments
UNLINK	8	CA SDM	sd_id, sd_obj_type, sd_obj_id	Specifies that the User unlinks a solution from a ticket.
SEARCH	9	Knowledge Management	numdata1,	Indicates that the User searches knowledge, where numdata1= CI_ASKED_QUES id.
FAQ	10	Knowledge Management	numdata1	Indicates a FAQ search, where numdata1= O_INDEXES id (category).
DT_NAVIGATE	11	Knowledge Management	kd, numdata1, textdata1	Indicates that the User navigates a decision tree, where numdata1= ES_NODES ID textdata1=path.
KD_BOOKMARK	12	Knowledge Management	kd	Indicates that the User bookmarks a KD.
KD_COMMENT	13	Knowledge Management	kd, numdata1	Indicates that the User adds a comment to a KD, where numdata1= O_COMMENTS id.
KD_CREATE	14	Knowledge Management	sd_ob_type, sd_obj_id, kd	Specifies that a User creates a document. CA SDM IDs are used when a KD is created using submit knowledge from a request or an issue.
KD_OPEN	15	Knowledge Management	kd, numdata1	Indicates that a User opens a KD, where numdata1=BU_TRANS ID.
KD_RATE	16	Knowledge Management		Indicates that a User rates a KD, where numdata1=BU_TRANS ID.
KD_NEW	17	Knowledge Management	numdata1	Specifies that a User clicks on the New Documents folder in the Knowledge tab.
NX_ATTACH_AUDIT_TO_NEW_TICKET	18	CA SDM		When a User opens a new ticket, all events for the current session appear by default on the Event Log tab of the ticket. 0—Only events relevant to the ticket appear on the Event Log tab. 1—All events for the current session appear on the Event Log tab of the ticket.

Event	Enum	By	Sets	Comments
TICK_OPEN	19	CA SDM		Indicates that the ticket was viewed.
TICK_SEARCH	20	CA SDM		Indicates the user who searched for tickets and links the number of searches.
KD_PRNT	21	Knowledge Management	kd	Indicates the knowledge document was printed.

CA Business Intelligence Reports Customization

You can customize CA Business Intelligence reports, starting at the point after fields and tables have been defined in the CA SDM schema.

Note: For information about performing schema modifications, see the Schema Designer Modification Overview.

Before you begin, verify that you have done the following:

- Installed CA Business Intelligence and configured CA Business Intelligence so it works correctly with CA SDM.
- Established user permissions, roles, authentication options, and data partitions security for your Reporting environment.

Note: For information about setting up CA Business Intelligence security, see the *Administration Guide*.

CA Business Intelligence Infrastructure

CA Business Intelligence (CA BI) is an enterprise reporting infrastructure that enables you to create, maintain, store, schedule, and distribute reports for CA SDM users and roles. BusinessObjects Enterprise XI, Release 2 and its associated tools, coupled with BusinessObjects Crystal Reports XI are the backbone of the architecture. BusinessObjects Enterprise tools are contained in a CA SDM created package, merging CA SDM reporting essentials into an industry leading business intelligence framework.

Note: Although Crystal reports are delivered as the primary component of CA BI, the report creation and maintenance tool, Crystal Reports XI, is not delivered. Crystal Reports XI is a separately licensed product that can be purchased from BusinessObjects and used in conjunction with CA BI.

Reporting Components

Following are the primary components included in the CA Business Intelligence infrastructure:

- **CA SDM Database/ Domsrvr / ODBC Driver**—Report data is stored in a SQL Server or Oracle CA SDM database. BusinessObjects reporting applications (Crystal Reports and Web Intelligence) access the database using an ODBC driver that connects directly with the CA SDM object engine (domsrvr). All CA SDM security, including data partition and tenancy restrictions, is automatically applied to reports.
- **Central Management Server**—The Central Management Server (CMS) is the central repository that stores all objects used in every reporting process.
- **Central Management Console**—The Central Management Console (CMC) is the main administrative facility for BusinessObjects. It provides access to all BusinessObjects administration functions. Using the CMC, you can deploy reports and assign user access and folder permissions for InfoView.
- **BusinessObjects Universe**—The universe provides a business representation of a data warehouse or transactional database. It describes the classes (tables) and objects (columns) which are used in reports. The CA SDM universe is installed and configured during the installation. At the completion of the installation, the universe connection is assigned to various groups and users in CA SDM.
 - **Designer**—The Designer is a tool in BusinessObjects Enterprise that lets you modify the CA SDM Universe, which is a metalayer between CA SDM schema, and BusinessObjects reporting tools. The Import/Export Wizard facilitates object population or extraction within the CMS.
- **Default Predefined Reports**—Predefined reports are web-based CA SDM and Knowledge Management reports developed with either BusinessObjects Web Intelligence (WebI) or Crystal Reports. The reports can be used as models for defining site-specific reports.
- **InfoView**—BusinessObjects InfoView is a web interface that allows authorized CA SDM users to interact with web-based predefined reports by viewing, running, and scheduling report types including, but not limited to, WebI and Crystal Reports. Reports are contained in folders in the public section in InfoView.
- **Ad Hoc Reports**—Ad hoc reports are created and administered from InfoView using a WebI plugin-based interface. This tool is intended for users who want to create basic reports easily without writing queries.

Development Environment

Updating the CA BI infrastructure with CA SDM schema changes is an administrative function. An administrator who is promoting modified schema into the reports must set up the environment, apart from their production environment.

Some of the tools used by CA BI require a Windows-based architecture. This means that installations of Linux/UNIX must configure CA BI on a Windows computer to interact with the Linux/UNIX production environment CA BI installation. If you are using Windows servers in production, you should configure an additional Windows computer for your development environment.

Tools

Updating the CA BI infrastructure with CA SDM schema changes is an administrative function. To promote modified schema changes into the reports, you must include the following tools in your development environment:

Business Objects Designer

This full client Windows tool is installed on the CA BI production server as part of the base CA BI installation for windows. When the CA BI server is a non-Windows architecture, or when login access to the production CA BI application server is undesirable, you must create a separate CA BI installation on a Windows (development) server. A development CA BI server installation allows you to access the production CA BI objects remotely, no matter the architecture of the CA BI production server installation.

BusinessObjects Web Intelligence

This web-based report creation tool is used for modifying and creating Web Intelligence (WebI) reports. You can access the WebI tool through the BusinessObjects InfoView interface. Administrative permissions for the WebI and InfoView tools are available within CA BI, specifically using the BusinessObjects Central Management Console (CMC) tool.

CA SDM ODBC Driver

Provided with the CA BI installation is the CA SDM ODBC Driver. This component enables WebI and Crystal Reports to access CA SDM data while enforcing data partition security. The ODBC Driver is installed as part of the base CA BI installation on the CA BI application server. It is also available as a client installation so that it can be used on a computer not running CA BI along with the Crystal Reports XI client.

Note: For information on defining data partitions security for your reporting environment, see the *Administration Guide*.

How to Create a Development Environment

To create a development environment, do the following:

1. Secure a server with a supported Windows operating system.
2. Install and configure CA SDM.
3. Install and configure CA Business Intelligence.

4. Change the default ODBC DSN Name from casd_XXXXX to casd_YYYYY where YYYYY is exactly the same as the DSN on the production implementation.

Important! Regardless of the actual connection properties, the DSN name must be identical on the development and production implementations.

5. (Optional) Install and configure Crystal Reports XI.

Note: It is not required to install Crystal Reports on the same computer as CA BI. Crystal Reports can be installed on a different computer, as long as the CA SDM ODBC Driver is also installed on the Crystal Reports computer, and the DSN Name is modified to be identical to the production implementation, regardless of the actual connection properties. For more information about installing an individual copy of the CA SDM ODBC driver, separate from the CA BI installation, see your ODBC Driver documentation.

6. [Create the Framework](#) (see page 467).

Framework

After the tools are available in your development environment, the next step is to create a framework that will allow schema changes to be preserved through product upgrades.

Important Do not modify the default development CA SDM universe installed with CA BI. Otherwise, your schema changes may be overwritten during patch and upgrade processes. Modifying the CA SDM universe will eventually result in lost schema changes within the CA BI infrastructure.

The BusinessObjects universe is the metalayer that describes the schema within the CA BI infrastructure. Instead of changing the CA supplied universe, you can create a customer-specific universe linked to the CA SDM universe. Using this approach, you can maintain local schema changes with minimal effort during the upgrade process, and CA SDM will be able to provide upgrades to the base universe.

CA SDM customers familiar with BusinessObjects universe documentation will be aware of other documented procedures available from BusinessObjects that allow tying universes together. The process discussed here, however, is the only process that is supported by CA for maintaining customer modifications.

The default universe is named "CA SDM" and it is stored in the "CA Universes" folder within the Central Management Console (CMC). This default universe is the "kernel" universe in a structure where universes are linked.

The CA SDM universe can be named anything you choose. The name will be displayed to report writers when they are building reports, so make sure the name is meaningful. The customer universe is the "derived" universe in a structure where universes are linked.

Within this framework, any number of derived universes can be maintained, but only one is required for maintaining schema changes. Multiple derived universes may be used for ease of maintenance or security requirements, but such decisions are solely at the discretion of your production support needs.

In any multiple derived universe environment, ensure that you do the following:

- Maintain the z_ naming convention for the universe file name on all universes.
- Use the CA SDM connection, then store the universe in the CA Customer Universe folder.
- Do not delete the link to the kernel universe.

Create a Framework for Promoting Schema Changes to CABI

Use the BusinessObjects Designer to create a framework for promoting schema changes to CA Business Intelligence.

To create a framework for promoting schema changes

1. Open the BusinessObjects Designer.
Select File, New from the Designer menu.
The Universe Parameters window appears.
2. Click the Definition tab and enter a meaningful name for this universe in the Name field.
3. (Optional) Enter a description in the Description field.
4. Select CA SDM from the Connection drop-down list.
5. Click the Add Link button on the Links tab.
The Universe to Link dialog appears.
6. Expand the CA Universes folder and complete these tasks:
 - a. Open the CA Service Desk.unv file. The Universe to Link dialog closes and the CA SDM universe appears on the Links tab.
 - b. Click OK to close the Universe Parameters dialog.Designer may take a few minutes to process the link and create the derived universe.
7. After the derived universe is created, perform these tasks:
 - a. Modify the following parameter(s) as appropriate.
 - Select Parameters from the File menu.
 - Click the Parameter Tab.
 - Specify ANSI92 = YES.

- b. Click the Controls tab and set the following fields to a value appropriate to your implementation, then click OK to save the values and close the parameter dialog:

- Limit size of result set
- Limit execution time
- Limit size of long text objects (minimum of 4000).

- c. Define hierarchies. Note that customer hierarchies are not imported.

- Select Tools, Hierarchies.
- Multi-select all custom hierarchies, then click the Add arrow button. All hierarchies are moved to the right side.

8. From the Designer menu, click File, Save.

The Save As dialog appears.

9. In the File Name field, select any descriptive file name, and proceed the file name with "z_". For example, a universe named "ACME Anvil Co" might default to: "ACME_Anvil_Co.unv." Change this file name to "z_ACME_Anvil_Co.unv" before saving.

10. Export the derived universe to the CMS as follows:

- a. Select File, Export from the Designer menu.
- b. From Domain field drop-down list, select <Browse>, then locate and select CA Customer Universes.
- c. Click OK to export the universe to the local CMS

The Universe Successfully Exported dialog appears.

The framework now exists to promote custom schema changes throughout CA BI.

11. Log into BusinessObjects InfoView as an administrative user and do the following:

- a. Select Public Folders.
- b. From the InfoView toolbar, click New, Folder.
- c. In the Folder Name field, provide a description meaningful to report users, such as "Organization Name Reports."
- d. Click OK to see the folder created under Public Folders.

This creates the minimum framework to use and store reports by your organization. Any number of subfolders and objects can be added to this folder structure.

Schema Changes to the Infrastructure

After the CA BI development environment is established and schema changes have been published to CA SDM using the documented process for customizing schema data, the schema changes are ready to be promoted through the CA BI infrastructure. You can make the new schema available for report creation and modification.

Add Schema Changes to Derived Universe

Promoting schema changes into the CA BI infrastructure is as straight-forward as adding the new schema object to the derived universe.

Note: Before you begin, verify that the appropriate steps have already been completed, and the new schema objects have been added to the CA SDM flexible schema.

To add schema changes to the derived universe

1. Open the BusinessObjects Designer, and import the derived universe to a local file system as follows:

- a. Select File, Import from the Designer menu.

The Universe Successfully Imported dialog appears.

- b. Click OK.

2. Refresh the structure of the derived universe as follows:

- Select View, Refresh Structure from the Designer menu.

The following questions appear:

- "Do you want to refresh the out of date columns in selected tables?" Click OK.

Note: If the message "No update needed" appears, it means the CA SDM object layer has not been appropriately updated with the new schema. Review the steps for publishing schema changes to CA SDM.

- "Refresh structure: The structure has been successfully modified." Click OK.

New columns appear in the universe structure on the right side of the window, making new object(s) available for use within the derived universe.

The objects are available to the CA BI tools after they are moved from the right pane to the left pane. When you add objects to the left pane, make sure that you follow the [common schema modifications](#) (see page 470) standards.

3. Drag and drop the new object(s) to the desired location in the left pane.
4. Click Save.
5. Select File, Export from the Designer menu.

The Universe Successfully Exported dialog appears.

6. Click OK.

Changes added to the derived universe schema are exported to the local CMS.

7. From the Designer menu, select Tools, Check Integrity.

- a. In the dialog that appears, select the Parse Objects check box. (Do not change other settings.)
- b. Click OK. The integrity check is started.

Note: No parse errors should be reported. If errors are found, modify your objects in the left pane so that they do not produce parse errors.

8. Click OK to close the dialog.

9. Export the derived universe to the CMS as follows:

- a. Select File, Export from the Designer menu.
- b. From Domain field drop-down list, select <Browse>, and then locate and select CA Customer Universes.
- c. Click OK to export the universe to the local CMS.

The Universe Successfully Exported dialog appears.

10. Save your changes and export the CA SDM universe.

The changes are now available in your CA BI reporting environment, including Web Intelligence and Crystal Reports.

Common Schema Modifications

You can implement schema modifications in the Universe. To familiarize you with the process, the following table lists the common schema modifications that you might encounter.

When a field type is defined in Web Screen Painter as...	Follow these rules when using the field in the Universe: Right click the attribute and select...
INTEGER	Object Properties, Definition Tab, Type = Number
STRING	Object Properties, Definition Tab, Type = Character
DATE	Object Properties, Definition Tab, Type = Date Object Format, Number Tab: Choose category "Date/Time"; Choose Format mm/dd/yyyy hh:mm:ss AM/PM

When a field type is defined in Web Screen Painter as...	Follow these rules when using the field in the Universe: Right click the attribute and select...
DURATION	Object Properties, Definition Tab, Type = Number; Object Properties, Definition Tab, Select = PdmSeconds(object.attr)
SREL	Create a CA SDM attribute alias.
BREL	Not Applicable
QREL	Not Applicable
DERIVED	Use an appropriate data type and object format for the value stored in the derived field, if desired. The Derived field can produce any result, so there is not a specific standard to follow.
Special Case: Local This is not a data type defined within Web Screen Painter, but instead a data type used by the universe sometimes to indicate an unsupported data type.	The Local field is displayed in the right pane of the universe with type "L". These fields can be dragged, but not dropped into a class on the right universe pane. Most often, fields data types such as binary, are not supported by the Universe. However, they can be added to the left pane of the universe by creating an object and placing the PdmString (object.attribute) in the "SELECT" window of the Edit Properties dialog.

Reports and Folder Structures

Included with the CA BI installation are several Crystal Report XI and WebI report objects. The reports are contained in the following CA SDM folder: CA Reports\CA SDM.

Important! Do not modify the CA SDM universe and report objects contained in the CA SDM folder structure.

Consider the following information about reports and the folder structures:

- The steps for creating a framework explain how to add a folder in the InfoView public section, which is specific to the end user. Within this folder, a user can create additional subfolders and report objects.

- In an implementation where each user is authorized access to CA BI by their unique CA SDM login ID, users can save reports for personal use within the My Folders section. BusinessObjects enforces security on this folder by showing these objects only to the logged in user.
- In an implementation where all users have a single reporting user ID for accessing CA BI, the My Folders section is available to all users.

Create a Web Intelligence Report

Use CA Business Intelligence to create a Web Intelligence report.

To create a Web Intelligence report

1. From the CA SDM Reports tab, click the InfoView button.
The InfoView home page appears.
2. Click New, Web Intelligence Document from the menu bar.
3. Select the derived universe that you created when you defined your development framework.

The Web Intelligence report creation tool appears.

Note: Save your document at regular intervals. If the connection session times out, your report modifications will be lost. For information on how to increase the Web Intelligence connection session time-out value, see the *Administration Guide*.

4. From the Web Intelligence toolbar, select Save, Save as.
The Save Document dialog appears.
5. In the General section, specify a meaningful name for this report in the Title field.
6. In the Location section, select the appropriate folder.
7. (Optional) modify the properties as desired.
8. Click OK to save the report.

The report appears in the specified folder and is available to all report users.

Modify a Web Intelligence Report

Use CA Business Intelligence to modify a report that was delivered in the CA Reports\CA Service Desk folder structure.

To modify a CA Business Intelligence report

1. From the CA SDM Reports tab, click the InfoView button.
The InfoView home page appears.
2. In the left pane, navigate the CA Reports folder structure, and open the desired Web Intelligence report.

3. Click the name of the report so that the report runs and displays a result.
4. From the Web Intelligence toolbar, select Document, Save as.
The Save Document window appears.
5. In the Location section, select the appropriate folder.
6. Click OK to save the report in the new location.
7. Select Document, Edit.
8. Click Edit Query (the name of the universe CA SDM appears on the Data tab).
9. Click the Properties tab. If necessary, click the down-facing arrows next to the Universe, so that the CA SDM text is displayed with an ellipse (...).
10. Click the ellipse (...) button to display the Universe dialog.
The Other Available Universes window appears.
11. Select the name of your universe and click OK.
Web Intelligence will automatically map all known fields from the CA SDM universe to your universe and display the Change Source dialog. Green check boxes appear next to each mapped field. If all fields are mapped correctly, click OK to confirm the change. If any fields are displayed with a red "X", click the ellipse (...) button next to the field name, and select the appropriate field.
12. From the Web Intelligence toolbar, click Edit Report, and select the Properties tab.
13. Expand the General node.
14. Click the ellipse (...) button next to the Document Properties value.
The Document Properties dialog appears.
15. In the Document Options section, select the Refresh on Open check box.
16. Click Save and then close Web Intelligence.
The report is associated with the appropriate universe and can be modified as needed.

Create a Crystal Report

Use Crystal Reports to save a report in the CA Business Intelligence Universe.

To create a Crystal report

1. Launch Crystal Reports XI.
2. Select File, New, Blank Report.
The Database Expert dialog appears.

3. Expand the Create new Connection node and click Universes.
The Business Objects Enterprise dialog appears.
4. Log on to BusinessObjects Enterprise using your administrator credentials.
5. Navigate to the folder containing the derived universe.
6. Select the derived universe and click Open.
The Business Objects Query Panel dialog appears.
7. In the Universe tree structure, drag and drop the appropriate attributes into the Select and Filter sections of the Query panel.
8. When the query building process is complete, the standard Crystal Reports designer tool is presented.
9. Build and run the report.
Note: For detailed information on building and running reports, see Crystal Reports documentation.
10. Save the report in the Business Objects Enterprise repository as follows:
 - a. Select File, Save as.
 - b. In the Save As dialog, select Enterprise.
 - c. Navigate to the folder created when you defined your development framework, and save the new report in BusinessObjects Enterprise.The new report is now available in the enterprise, and can be modified as needed.

Modify a Crystal Report

Use Crystal Reports to modify a report in the CA Business Intelligence Universe.

To modify Crystal Reports XI Reports

1. Open Crystal Reports XI.
2. Select File, New, Blank Report.
The database expert dialog displays.
3. Click to expand Create new Connection.
Click Universes.
The Business Objects Enterprise dialog displays.
4. Log on to Business Objects Enterprise as administrator.

5. Click to navigate the folder housing the derived universe and click to select the derived universe.

Click Open.

The Business Objects Query Panel dialog displays.

6. Navigate the universe tree structure to find, drag, and drop attributes to the select and filter portions of the query panel.

When the query building process is complete, the report writer is presented with the standard Crystal Reports designer tool.

7. Build and run the report as per Crystal Reports instructions.
8. When ready, save the report to the Business Objects Enterprise repository.
 - a. Choose File, Save as
The Save as dialog displays.
 - b. On the left side of the save as dialog, click the Enterprise icon.
 - c. Navigate the folder structure starting with the customer-specific folder created earlier in this document and click Save to save this report in Business Objects Enterprise.
9. The new report is now available in the enterprise, and can be modified as needed.

Move New Crystal Reports into CA Business Intelligence

You can move Crystal reports into a CA Business Intelligence Universe.

To move new Crystal reports into CA Business Intelligence

1. Open Crystal Reports XI.
2. Select File, Open.
The Open dialog appears.
3. From the left side, click Enterprise.
The Log on to BusinessObjects Enterprise dialog appears.
4. Log on to BusinessObjects Enterprise using your administrator credentials.
Navigate the folder structure beginning with "CA Reports\CA Service Desk" until the target report displays.
5. Select the target report and click Open.
The report appears in Crystal Reports.
6. Click File, Save As.
The Save As dialog appears.

7. Specify the folder that you created when you defined your development framework.
8. Click Save.
9. From the Crystal Reports menu, select Database, Database Expert.
The Database Expert dialog appears.
10. From the left pane, select Create New Connection, Universe.
11. Select the derived universe.
12. Drag and drop all attributes used by this report into the new query and click OK.
13. In every formula and cell, replace the original attributes with attributes from the new query.
14. After all attributes are replaced, do the following:
 - a. Select Database, Database Expert from the Crystal Reports menu.
 - b. In the Database Expert dialog, select the original query, and click the left facing arrows in the center of the two panes to remove the old query.
 - If all attributes have been properly replaced, the original query will be removed without issue and you can continue modifying the report.
 - If any original attributes remain in the report, the following message appears: "The report is using fields from one or more tables. Continue?"
 - Click Cancel and return to the report.
 - Continue replacing all original attributes with attributes from the new query until the original query can be removed without any warning messages.

The report is ready for customization.

How to Move Existing Access Reports into CA Business Intelligence

Microsoft Access predefined reports are no longer developed or provided with CA SDM. You can, however, move your existing Access reports into the CA Business Intelligence reporting environment by performing the following steps:

1. Add the appropriate CA SDM schema changes to CA Business Intelligence.
2. Use Web Intelligence or Crystal Reports to rewrite the report.

Move from Development to Production

At this point, a derived universe has been added, folder structures have been created and reports have been created and modified. Therefore, you can move the development structure into production. In this step, you will use the BusinessObjects Import Wizard.

To move from development to production

1. From the Start menu, select All Programs, BusinessObjects XI Release 2, BusinessObjects Enterprise, Import Wizard.

The Import Wizard interface appears.

2. In the Source Environment screen, select Business Objects XI R2 and fill in the necessary credentials for the development system.
3. In the Destination Environment screen, select *one* of the following options:
 - **The production system.** This option moves all selected objects immediately into the production system.
 - **An external file that can be imported into the production system at a later time.** This option stores all objects in a Business Intelligence Archive Resource (BIAR) file.
4. In the Select Objects to Import screen, clear all settings, then select the following check boxes: "Import folders and objects" and "Import Universes".

Note: Ignore any warnings that might appear.

5. Select the folder structure containing your specific folder and uncheck any objects that should not be moved.
6. In the Import Options for Universes and Connections screen, click the following option: "Import the universes and connections that the selected Web Intelligence and Desktop Intelligence documents use directly."
7. On the Universe Folder and Universes screen, expand the appropriate folder where the universe is stored.

Note: Ignore any warnings that might appear.
8. Click Finish.

If the folders and reports were moved directly to the production computer, you can view the changes in InfoView. If the objects were placed in a .biar file, use the Import Wizard at a later time, selecting the .biar file as the Source Environment, and the production server as the Destination Environment.

Legacy Reports Customization

CA SDM lets you customize legacy reports or design your own reports. You can:

- Customize legacy Summary, Detail, and Analysis reports to contain exactly the information you need, such as additional fields.
- Produce a new report with any information available from the database in a format that is useful to you.
- Pass arguments of variable information into the report by including command line arguments. Arguments can be values or expressions, such as the current value of a field or an SQL WHERE clause expression.
- Generate reports at the command line, from a script file, or from a menu option.

To generate a custom report

1. Design the report:
 - Decide what data you want to include in the report.
 - Create a report template that contains SQL-like queries, expressions, and functions to manipulate data, and statements to format the data for the printed page.
2. Generate the report from:
 - The command line
 - A CA SDM menu option
 - A script file

Note: If you have a third-party database system you can use its report generating tools to create reports with data from the CA SDM database. CA SDM provides several database views that simplify the process of creating customized reports using third-party database systems. See the documentation for your database system for information about reporting on databases. For more information about database views, see the *Administration Guide*.

More information:

[Customize Crystal Reports](#) (see page 502)

Custom Report Design

To design a custom report, you must have a basic understanding of the following concepts:

- Writing SQL queries.
- Programming, especially in C.
- Creating special programs or script files that you may need to execute before you execute the report template program. For example, you may want to create a program that prompts the user to enter an argument, such as the conditions for a WHERE clause.

Note: Before you create a custom report, be sure to check if the report you need is already provided. CA SDM provides a wide variety of Crystal and Microsoft Access reports, and runtime versions of these products to let you run the reports. For more information about reports, see the *Administration Guide*.

Selecting Information for the Report

To help you select data from the CA SDM database for customized reports, see the *CA SDM Technical Reference Guide*. It lists database tables, fields, descriptions, and other database information.

How to Create a Report Template

A report template is a file that, when executed by a CA SDM report program, generates a report of a particular design. A report template contains variable expressions, functions, and statements that define how the data is fetched, calculated, and printed.

To create a report template, create a file containing the following types of report statements:

Block statements

Defines the CA SDM database tables from which data will be fetched and the actions that are to be performed on the fetched data.

Layout statements

Defines how the data variables and literal text display on the report output.

Note: Store all your .rpt files in a new directory, \$NX_ROOT/site/mods/rpt (UNIX) or *installation-directory\site\mods\rpt* (Windows). This directory preserves them when you upgrade to a new release of CA SDM.

More information:

[Report Template Reference](#) (see page 487)

[Example: Report Template](#) (see page 483)

Block Statements

Block statements provide the report template with its framework. They define the data to be manipulated and control the execution of the report. Block statements begin with a name that must be unique throughout the report template. They then have the following two sections:

Data query section

Contains SQL SELECT, WHERE, and SORT clauses to define which data is fetched from the database.

Output program section

Defines the actions that are to be performed on the fetched data. It contains variable declarations, functions, and other block statements, including nested statements, which can be used to create conditional reports. It can also contain layout statements, which format and print the data as ASCII text.

A simplified version of the syntax of a block statement that shows the relationship between the two sections follows:

```
BLOCK blockname ("SELECT clause", "WHERE clause")
```

```
    SORT clause {output program statements}
```

The [BLOCK](#) (see page 494) in the Reference section discusses the detailed version of the syntax, along with a description of each clause and parameter.

Layout Statements in Report Templates

Layout statements define how variables and literal text will appear on the report output:

- You can use the PAGE HEADER and PAGE FOOTER statements to place information at the top and bottom of each report page.
- You can nest HEADER, HEADER2, FOOTER, and PRINT statements within the braces section of the parent BLOCK statement to create titles and summary totals for the various *reporting sections* (parts of the report output).

Note: When nesting, be careful not to confuse the braces used in layout statements with the braces that encompass the nested statements within a parent BLOCK statement.

- You can include literal text to create labels and line drawing characters to enhance the appearance of the report.

The layout statements are as follows:

PAGE HEADER

Places information at the top of each report page. It is placed outside the BLOCK statement.

PAGE FOOTER

Places information at the bottom of each report page. It is placed outside the BLOCK statement.

HEADER

Places information at the top of each reporting section. It is placed inside the BLOCK statement.

HEADER2

Places continuation header information at the top of each succeeding page of a reporting section, if that reporting section extends over multiple pages. It is placed inside the BLOCK statement.

FOOTER

Places information at the bottom of each reporting section. It is placed inside the BLOCK statement.

PRINT

Places the data in a reporting section. It is placed inside the BLOCK statement.

You can also use the following predefined variables in layout statements:

- CT prints the current time
- CD prints the current date
- PG prints the page number

Data Fields

Specifies any variable in a layout statement that results in a piece of data when you generate the report. Use the following guidelines when placing fields in your report template:

- Enclose data fields in square brackets ([]).
- The field's square brackets define its print space on each line of output. This space is the number of characters delimited by the square brackets, including the brackets. If the output of a variable is longer than the print space, the output is truncated. To ensure that the field has enough print space, you can add trailing spaces between the variable name and the closing bracket. For example, these trailing spaces allow for contacts with long names:

[contact]

- For output that is less than one line, the field can be closed with a greater than right angle bracket (>). This extends the print space to the right margin. For example, the right angle bracket used in a HEADER statement allows the current date to print without being truncated:

```
[CD                >
```

Note: When the field is more than one line and the variable is flagged as MULTILINE, the right angle bracket (>) acts exactly the same as the right square bracket (]). If the print statement for a MULTILINE variable is closed with the right angle bracket (>), characters wrap on white space to stay within the field defined by the left bracket ([) and the right angle bracket (>). Also, if the variable is not MULTILINE, the right angle bracket (>) causes all the data to be displayed on the current line regardless of its length.

- A field in a layout statement can refer to a previously defined variable or a column name.
- To reference a variable or column name in another block statement, use the following syntax:

```
blockname::column | variable-name
```

Literal Text

Literal text allows you to include supplementary information in your report. It will appear on the report output exactly as specified in the template. To include literal text in a layout statement, place it on any line after the opening brace ({) and before the closing brace (}). Do not enclose it in quotes or square brackets.

In this example, “ACME Company” and “Page: ” are interpreted as literal text by the CA SDM report program:

```
PAGE HEADER {  
  
                ACME Company           Page: [PG]  
  
}
```

More information:

[Report Template FOOTER Statements](#) (see page 497)

[Report Template PAGE FOOTER Statements](#) (see page 500)

[Report Template HEADER Statements](#) (see page 498)

[Report Template HEADER2 Statements](#) (see page 499)

[Report Template PAGE HEADER Statements](#) (see page 500)

[Report Template PRINT Statements](#) (see page 501)

Variable Expressions in Report Templates

Every value that you want to appear on the report output can be assigned to a variable. Variable expressions let you:

- Manipulate CA SDM data
- Use functions to perform calculations on fetched values

The following example creates a variable named *desc* to reference the contents of the *chg_desc* field in the Change Order window. The MULTILINE flag allows the variable to print in its entirety over multiple lines:

```
desc = description MULTILINE;
```

The following example prints the description. The output will be as long as the length defined in the brackets. If you want a longer description to appear, increase the number of spaces in the brackets.

```
PRINT { [desc ] }
```

Example: Report Template

The following Affected Contact Report template shows how to create a report template. It produces a report that lists open change orders with the same affected contact:

```
PAGE HEADER {
                                                    As Of: [CD>
                                                    [CT>
}
PAGE FOOTER {
                                                    Page: [PG>
}
BLOCK chg ("SELECT \
            chg_ref_num, description, priority, \
            status, category, assignee \
FROM Change_Request",
"WHERE #Change_Request.status = 'OP' \
AND #Change_Request.requestor = #ca_contact.id \
AND #ca_contact.last_name = ? \
AND #ca_contact.first_name = ? \
AND #ca_contact.middle_name = ? " , $1, $2, $3)
{
    BLOCK st ("SELECT sym FROM Change_Status",
              "WHERE code = ? ", chg::status) {}
    BLOCK (strlen(category)) cat ("SELECT sym FROM Change_Category",
                                  "WHERE code = ? ", chg::category) {}
```

```
HEADER {
                                OPEN CHANGE ORDERS WITH SAME REQUESTOR/FROM CONTACT
CHANGE ORDER Summary          Pri   Status   Category          Assignee
}
HEADER2 {
CHANGE ORDER Summary          Pri   Status   Category          Assignee
-----
}

    num = chg_ref_num;
    desc = description MULTILINE;
    pr = deref (priority);
    stat = st::sym;
    catgry = cat::sym;
    asgn = deref (assignee);
PRINT {
[num      ] [desc          ] [pr ] [stat  ] [catgry          ] [asgn ]
}
}
```

Page Header

Specifies what to print on the top of each page of the report. CD and CT are predefined variables that give the current date and time. They will appear in the header on the top of each page. Each of these fields ends with an angle bracket, which allows the field to expand towards the right margin. Because “As Of:” is outside of a field and because it is on a line after the opening brace, it will appear as literal text on the report output.

```
PAGE HEADER {                                As Of:  [CD>
                                                [CT>
}
```

Page Footer

Includes the page number with “Page: ” as literal text.

```
PAGE FOOTER {
                                                Page: [PG>
}
```

Note: Since PAGE HEADER and PAGE FOOTER statements produce global headers and footers, they are not included in a BLOCK statement.

Reporting Section

Creates a reporting section for the main BLOCK statement, along with its nested statements. A reporting section is usually only part of the data in the report, but this report has only one reporting section. The unique name of this block is chg.

The SELECT clause selects the columns to be included in the data for the report FROM three tables, but only where conditions specified by the WHERE clause are met.

The last three AND expressions in the WHERE clause contain question marks, which act as argument placeholders that take the values of the \$1, \$2, and \$3 arguments, in order. Thus \$1 is for ca_contact.last_name, \$2 is for ca_contact.first_name, and \$3 is for ca_contact.middle_name. The \$1, \$2, and \$3 arguments obtain the values of command line arguments.

```
BLOCK chg ("SELECT \
...",
"WHERE \
...\
AND #ca_contact.last_name = ? \
AND #ca_contact.first_name = ? \
AND #ca_contact.middle_name = ? ", $1, $2, $3)
```

Reporting Section Headers

Specifies that the opening brace starts the output program part of the BLOCK statement: its statements tell what to do with the data fetched by the SELECT and WHERE clauses. This example has nested HEADER and HEADER2 statements that will apply to this reporting section only. HEADER2 prints only if the report output is on multiple pages.

```
{
...
  HEADER {
      OPEN CHANGE ORDERS WITH SAME REQUESTOR/FROM CONTACT
CHANGE ORDER Summary          Pri    Status  Category  Assignee
  }
  HEADER2 {
CHANGE ORDER Summary          Pri    Status  Category  Assignee
-----
  }
}
```

Variable Assignments

Specifies variable expressions that act on the data specified by the SELECT clauses. They assign variables to the values of columns and to the results of expressions. These variables match the fields in the PRINT statement that follows.

The MULTILINE flag on the desc variable causes them to print or display on multiple lines rather than being truncated. The deref function is used to return the string expression contained in the referenced columns.

```
num = chg_ref_num;
desc = description MULTILINE;
pr = deref (priority);
stat = st::sym;
catgry = cat::sym;
asgn = deref (assignee);
```

Printing

Contains the fields to be printed. This statement could have also included literal text of lines that could enhance the appearance of the report. The final ending brace matches the opening brace of the output program section of the BLOCK statement.

```
PRINT {  
[num ] [desc          ] [pr]  [stat] [catgry] [asgn          ]  
  
}  
}
```

More information:

[The Report Command](#) (see page 486)

How to Generate Reports

After you create the report template, you can generate the report by running the CA SDM report program. The program can be executed from:

- The command line
- A CA SDM menu option
- A script file

Note: If you are working on a UNIX server, you can include the report output redirector (rptuiDsp) parameter with the report command to display a dialog with options for sending the report to the screen, a file, or the printer.

More information:

[How to Display a Dialog \(UNIX Only\)](#) (see page 487)

The Report Command

To generate a report from the command line in UNIX, you must use the CA SDM report command:

```
pdm_task report [-h][-e][-f][-F ffstring][-p pagelength] filename [command-line arguments]
```

Note: The report command is preceded by the pdm_task command, which sets necessary environment variables. If the report is designed to accept command line arguments, you must enter one for each argument in the report template.

On Windows, use the `rpt_srv` command:

```
rpt_srv report-title
```

The following example includes the three command line arguments (Smith, Jane, and L) needed for the Affected Contact Report described in the report template example earlier in this section:

```
pdm_task report /reports/myrpt.rpt Smith Jane L
```

If an argument is empty, you must use a null string. For example, if Jane Smith did not have a middle initial, the syntax would be:

```
pdm_task report /reports/myrpt.rpt Smith Jane ""  
rpt_srv \reports\myrpt.rpt Smith Jane L
```

How to Display a Dialog (UNIX Only)

You can include the report output redirector (`rptuiDsp`) parameter with the report command to display a dialog. The dialog displays the options to print the report to a file, display it in an Xterm window, or send it to the printer.

Example:

```
pdm_task rptuiDsp report /reports/myrpt.rpt Smith Jane L
```

This example adds the title “Inventory Report” to the dialog:

```
pdm_task rptuiDsp report /reports/myrpt.rpt Smith Jane L "title:Inventory Report"
```

Report Template Reference

You can use variable expressions, functions, and statements in a report template.

Report Template Variable Expressions

Variable expressions define the data to be printed or displayed in a report template. They are placed in a layout or block statement.

Variable Expression Syntax

Syntax refers to the rules governing the formation of statements in a programming language. The structure of this string is as follows:

```
variable-name = expression [flags]
```

Variable Expression Flags

Flags format the result of a variable expression. Use these flags to format text fields:

MULTILINE

Displays on multiple lines rather than truncating.

RIGHT

Right justifies.

Use these flags to format numeric fields:

BLANKZERO

Functions as null-value fields, which do not print a zero.

BOOL

Converts zero to no or non-zero to yes.

REAL

Displays as floating point (default is integer).

ZEROFILL

Shows leading or trailing zeros

Use these flags to format date and time fields:

DATE

Shows only date portion of date/time.

DAYS

Displays durations with days.

HOURS

Displays durations with hours.

MINUTES

Displays durations with minutes.

SECONDS

Displays durations with seconds.

TIME

Shows only time portion of date/time.

Variable Expression Example

The following line displays a Variable Expression example:

```
desc = description MULTILINE
```

Variable Expression Remarks

Variable names must be unique within a BLOCK statement and must not duplicate any column in the SELECT clause for the block. The same variable name can be used in different BLOCK statements but it cannot be repeated within a BLOCK statement.

Follow these syntax rules when including expressions in your report template:

- Use any valid C expression.
- Do not enclose variable or column names in quotes.
- Enclose string constants in single or double quotes.
- You can refer to a nested block, but only if it contains exactly one row.
- To include a column name that is the same as a keyword, precede the column name with a backslash (\). For example, ALIAS is a keyword and \alias is a column name.
- Use the dollar sign (\$) to reference environment variables, such as \$name, and to reference command line arguments, such as \$n, where *n* is the position of the argument on the command line.
- To specify the number of command line arguments, use \$#. For example, the following expression means that if the number of command line arguments is greater than one, use the additional argument as an argument; otherwise, set the value of the argument to an empty string. The report template itself is considered a command line argument. Therefore, the number of arguments is at least one.

```
$# > 1 ? $1 : "
```

- Use ## to concatenate two strings, for example:

```
title = "This is the " ## "first line. "
```

```
long_name = fn
```

```
irst_name ## last_name
```

- The following casts are supported:
 - (number)
 - (string)
 - (date_time)
 - (duration)
- To reference a variable or column name in another block, precede the name with its block name and two colons. For example:
blockname::column | variable-name

Report Template Functions

The following functions can be used in your report template:

is_null (*expr*)

This function returns true if the expression is null.

```
false = 0
true = is_null (false)
```

sqrt (*expr*)

This function calculates the square root of the expression.

```
nine = 9
three = sqrt (nine)
```

pow (*expr1*, *expr2*)

This function raises *expr1* to the power *expr2*.

```
two = 2
three = 3
eight = pow (two,three)
```

log (*expr*, *expr*)

This function calculates the natural log of the expression.

```
ten = 10
result = log (ten)
```

catname (*expr*, *expr*, *expr*)

This concatenates three strings representing a contact name into a string with commas, according to rules in the field format file.

```
last = "Murphy"
first = "Fred"
middle = "P"
contact_name=catname (last, first, middle)
```

strlen (*string*)

This function returns the length of the string.

```
buffer = "A thirty character long string"
thirty = strlen(buffer)
```

strindex (*string*, *pattern* [, *start_index*])

This function returns the index of the first pattern match, or the next pattern match after the *start_index*, in the string. Returns -1 if there is no match.

```
buffer = "A thirty character long string"
zero = strindex(buffer, " [A-Z] ")
two = strindex(buffer, " [a-z] ")
```

substr (*string*, *pattern* [, *length*])

This function returns the portion of the string after the first pattern match. If *length* is defined, it limits the length of the output string. Returns a string of zero length, if there is no match.

```
buffer = "A thirty character long string"
last_word = substr(buffer, " [a-z]*$ ")
first_capital_letter = substr(buffer, " [A-Z] ",
1)
```

substr (*string*, *index* [, *length*])

This function returns the portion of the string after the index. Its *length* is defined and limits the length of the output string. Returns a string of zero length, if there is no match.

```
buffer = "Summary: The network card displays a
code of ... "
summary = substr(buffer, 9)
30_char_summary = substr(buffer, 9, 30)
```

The remaining functions (pseudofunctions) perform on a block of data rather than on variable expressions. These functions are usually placed in a BLOCK statement to get information about a nested BLOCK statement's data.

count (*block-name*)

Returns the number of rows in the block specified in the BLOCK statement. The block-name must be a simple string.

```
BLOCK sample ("SELECT id FROM Contact") {  
  entries = count (sample)  
}
```

sum (*block-name, expr*)

Executes the expression for each row of the specified block and sums the result.

```
BLOCK sample ("SELECT actual_cost, est_cost FROM Change_Request") {  
  difference = sum (sample, est_cost-actual_cost)  
}
```

average (*block-name, expr*)

Executes the expression for each row of the block and returns the average of the result.

```
BLOCK sample ("SELECT actual_cost, est_cost FROM Change_Request"){  
  avg_difference = average (sample, est_cost-actual_cost)  
}
```

prev (*expr*)

Returns the previous value of the expression. This function should be used with caution so its value does not overwrite the latest value by accident.

downtime (*sla_schedule, expr1, expr2 [, delay-block, expr, expr]*)

Invokes an SLA downtime calculation. The first argument must be a string that identifies a workshift. The other arguments are start and end times:

expr1 is the start date/time of the event

expr2 is the end date/time of the event

In this example, the wrkshft BLOCK fetches the work shift schedule, the evt_dly BLOCK statement fetches the delays and the downtime function uses these records to calculate the downtime.

```
BLOCK attev ("SELECT start_time, fire_time, event_tmpl, obj_id FROM
Attached_Events")

{
BLOCK evt ("SELECT persid, sym, work_shift FROM Events ", "WHERE persid = ?",
attev::event_tmpl) {}
BLOCK wrkshft ("SELECT sched FROM Bop_Workshift", "WHERE persid = ?",
evt::work_shift) {}

BLOCK evt_dly ("SELECT start_time, stop_time FROM Event_Delay", "WHERE obj_id =
?", attev::obj_id) {}
total_downtime = downtime(wrkshft::sched,
attev::start_time, attev::fire_time,
evt_dly,
evt_dly::start_time, evt_dly::stop_time);
}
```

deref (column-name)

Returns the string representation of the pointer by performing an automatic lookup in the appropriate table.

```
BLOCK chg ("SELECT organization FROM Change_Request") {
org = deref (organization)
}
```

Because this pseudofunction involves lookups, it is valid only if it is the only thing in the expression. For example, this is valid:

```
model = deref (nr_model)
```

This is not valid:

```
model = "model" ## deref (nr_model)
```

Note: Forward references to variables or blocks are not allowed.

Report Template BLOCK Statements

Block statements define the database tables from which data will be fetched, and can include actions to perform on the fetched data.

Block Statement Syntax

Syntax refers to the rules governing the formation of statements in a programming language. The structure of this string for BLOCK is as follows:

```
BLOCK blockname (
    "SELECT [ALIAS,] field_name[, field_name ...]
    FROM table_name[, table_name ...] "
    [,"WHERE where_clause"][, arguments,] )
    [SORT "sort clause"]
{
    output program statements
}
```

Block Statement Parameters

blockname

Identifies the block. Each *blockname* must be unique.

SELECT clause

Follows the *blockname* and is delimited by double quotes. Lists the columns to be fetched, followed by the keyword FROM, followed by the tables from which the columns are to be fetched. It is required. Here is an example with three tables specified:

```
"SELECT open_date, chg_ref_num \
last_name, first_name \
FROM Change_Request, \
ca_contact"
```

You cannot include an SQL alias, such as:

```
"SELECT open_date As OpenDate"
```

WHERE clause

(Optional) Follows the SELECT clause and further qualifies the information selected. It may be a string constant or an expression evaluating to a string. If the WHERE clause is an empty string, all records are returned. WHERE clauses can contain replacement arguments (which refer to variables or command line arguments) using the syntax of a question mark (?). The following WHERE clause could follow the previous SELECT clause:

```
"WHERE #Change_Request.open_date >= ? \
AND #Change_Request.active_flag = 1 \
AND #ca_contact.last_name = ? ", $1"
```

Note: The WHERE clause must be separate from the SELECT clause because the WHERE clause can be an expression evaluating to a string, whereas the SELECT clause is exclusively a string constant. This gives you more flexibility and data manipulation capabilities in producing your report.

SORT clause

(Optional) Follows the SELECT and WHERE clauses and sorts the fetched rows of data. The SORT clause is formatted like the SQL ORDER BY clause. Here is an example:

```
SORT "open_date"
```

Output program statements

Controls execution of the report. Before the data query, the HEADER statement, if included, prints the header test for the block. The data query then runs. If data is returned, each statement executes in the order written, with one exception. Block functions, like sum and average, behave as though they were at the end of the output program. In fact, their values are not stable until execution begins on the next data record.

Important! The output program depends on the success of the data query. If no data is returned from the query, then, except for the HEADER statement, the output program will not execute.

Block Statement Example

This BLOCK statement assumes that an argument will be passed that holds an integer equal to the change order priority. The WHERE clause first checks the number of arguments passed (\$#). If one is present, it is used to evaluate the expression to produce the WHERE clause; otherwise a null WHERE clause is substituted ("").

```
BLOCK chg ("SELECT priority FROM Change_Request",  
$# > 1 ? "WHERE priority =" ## $1 : "") {}
```

Footer Statement Example

The following lines display a Footer Statement example:

```
FOOTER {  
    Summary Information:  
        Total Failures: [Fail_count >  
        Total Downtime: [Downtime >  
}
```


Block Statement Remarks

HEADER, HEADER2, FOOTER, PRINT and variable expressions can be placed in the braces. Any statement will be executed for each row selected.

Note: PAGE HEADER and PAGE FOOTER statements cannot be placed in a BLOCK statement.

Report Template FOOTER Statements

This layout statement places information at the bottom of a reporting section.

Footer Statement Syntax

Syntax refers to the rules governing the formation of statements in a programming language. The structure of this string for FOOTER is as follows:

```
FOOTER {parameters}
```

Footer Statement Parameters

The parameters are as follows:

CD

A predefined variable used to display the current date.

CT

A predefined variable used to display the current time.

PG

A predefined variable used to display the current page number.

column | variable-name

This field can be a variable from an earlier variable expression or a reference to a column in the SQL clause of a BLOCK statement.

literal-text

Any text that is not a predefined variable or a column or variable name is interpreted as literal text. Literal text that you include in the FOOTER statement appears in the exact horizontal location where you enter it.

Footer Statement Remarks

FOOTER statements are printed at the bottom of a reporting section. A typical use might be to present summary information or statistics. You can include a FOOTER statement in a BLOCK statement.

A field's content occupies the exact space delineated by the square brackets. Any excess characters are truncated. However, you can close a field with an angle bracket (>) to permit its content to expand in its entirety towards the right margin.

To reference a variable or column name in another BLOCK statement, use the following syntax:

```
blockname::column | variable-name
```

Report Template HEADER Statements

This layout statement places information at the top of a reporting section.

Header Statement Syntax

Syntax refers to the rules governing the formation of statements in a programming language. The structure of this string for HEADER is as follows:

```
HEADER {parameters}
```

Header Statement Parameters

For a list and explanation of the valid parameters for this statement, see [Report Template PAGE HEADER Statements](#) (see page 500).

Header Statement Example

The following lines display a Header Statement example:

```
HEADER {  
    Contact Summary Report  
    Contact Name    Contact Alias    Organization  
}
```

Header Statement Remarks

HEADERS are printed at the beginning of a reporting section and can be included in a BLOCK statement. HEADERS are typically used to present section and/or column headings.

A field's content occupies the exact space delineated by the square brackets. Any excess characters are truncated. However, you can close a field with an angle bracket (>) to permit its content to expand in its entirety towards the right margin.

Note: If the print statement for a MULTILINE variable is closed with the right angle bracket (>), characters wrap on white space to stay within the field defined by the left bracket (|) and the right angle bracket (>). Also, if the variable is not MULTILINE, the right angle bracket (>) causes all the data to be displayed on the current line regardless of its length.

To reference a variable or column name in another BLOCK statement, use the following syntax:

blockname::column | variable-name

Report Template HEADER2 Statements

This layout statement places continuation HEADER information at the top of each succeeding page of a reporting section, if that reporting section extends over multiple pages.

Header2 Statement Syntax

Syntax refers to the rules governing the formation of statements in a programming language. The structure of this string for HEADER2 is as follows:

HEADER2 {*parameters*}

Header2 Statement Parameters

For a list and explanation of the valid parameters for this statement, see [Report Template HEADER2 Statements](#) (see page 499).

Header2 Statement Example

```
HEADER2 {  
    Contact Summary Report (continued)  
    Contact Name    Contact Alias    Organization  
}
```

Header2 Statement Remarks

A HEADER2 statement can be included in a BLOCK statement.

A field's content occupies the exact space delineated by the square brackets. Any excess characters are truncated. However, you can close a field with an angle bracket (>) to permit its content to expand in its entirety towards the right margin.

To reference a variable or column name in another BLOCK statement, use the following syntax:

blockname::column | variable-name

Report Template PAGE FOOTER Statements

This layout statement places information at the bottom of each report page.

Page Footer Statement Syntax

```
PAGE FOOTER {parameters}
```

Page Footer Statement Parameters

With the exception that you cannot use column and variable names, the parameters for this statement are the same as those for FOOTER. For a list and explanation of the valid parameters for this statement, see [Report Template PAGE FOOTER Statements](#) (see page 500).

Parameters for a Page Footer Statement Example

```
PAGE FOOTER {  
    Page Number: [PG>  
}
```

Parameters for a Page Footer Statement Remarks

A field's content occupies the exact space delineated by the square brackets. Any excess characters are truncated. However, you can close a field with an angle bracket (>) to permit its content to expand in its entirety towards the right margin.

To reference a variable or column name in another BLOCK statement, use the following syntax:

```
blockname::column | variable-name
```

Report Template PAGE HEADER Statements

This layout statement places information at the top of each report page.

Page Header Statement Syntax

Syntax refers to the rules governing the formation of statements in a programming language. The structure of this string for PAGE HEADER is as follows:

```
PAGE HEADER {parameters}
```

Page Header Statement Parameters

With the exception that you cannot use column and variable names, the parameters for this statement are the same as those for FOOTER. For a list and explanation of the valid parameters for this statement, see [Report Template PAGE FOOTER Statements](#) (see page 500).

Page Header Statement Example

```
PAGE HEADER {  
    Date of Report: [CD>  
    Time of Report: [CT>  
}
```

Page Header Statement Remarks

PAGE HEADERS are printed at the top of every report page. They can be defined at any point within the report template file, but they cannot be included within a BLOCK statement.

A field's content occupies the exact space delineated by the square brackets. Any excess characters are truncated. However, you can close a field with an angle bracket (>) to permit its content to expand in its entirety towards the right margin.

To reference a variable or column name in another BLOCK statement, use the following syntax:

blockname::column | variable-name

Report Template PRINT Statements

This layout statement places data in a reporting section.

Print Statement Syntax

Syntax refers to the rules governing the formation of statements in a programming language. The structure of this string for PRINT is as follows:

```
PRINT {parameters}
```

Print Statement Parameters

Refer [FOOTER](#) (see page 497) for a list and explanation of the valid parameters for this statement.

Print Statement Example

```
PRINT {  
    [num ] [desc          ] [pr] [stat] [catgry] [asgn          ]  
}
```

Print Statement Remarks

Place PRINT where you want the data for a reporting section to appear in the report. You can include a PRINT statement in a BLOCK statement.

A field's content occupies the exact space delineated by the square brackets. Any excess characters are truncated. However, you can close a field with an angle bracket (>) to permit its content to expand in its entirety towards the right margin.

Note: If the print statement for a MULTILINE variable is closed with the right angle bracket (>), characters wrap on white space to stay within the field defined by the left bracket ([]) and the right angle bracket (>). Also, if the variable is not MULTILINE, the right angle bracket (>) causes all the data to be displayed on the current line regardless of its length.

To reference a variable or column name in another BLOCK statement, use the following syntax:

blockname::column | variable-name

Customize Crystal Reports

Before you can display any of these reports, the following conditions apply:

- You must make the Crystal reports available to the Crystal Report Selector by copying them to the Crystal directory: \$NX_ROOT/bopcfg/rpt.
- Your database client must be up and running, with connectivity established to the database server running on the same or another computer. If you are using a CA SDM Client to run your Crystal or Access reports you need to have installed a database client for the specific database and have established connectivity with the database server in order to run these reports.

After creating any custom Crystal reports, perform the following:

1. Copy custom Crystal reports to the following crystal directory:
\$NX_ROOT/bopcfg/rpt
2. Add the file names of custom Crystal reports to the following configuration file:
crystal.cfg

You can then access the Crystal reports by clicking Start on the taskbar, and then choosing Reporting, Service Desk Reporting (Crystal Reports) from the CA SDM menu (accessible from the Programs menu). The Service Desk Reporting (Crystal) window appears.

Important! CA SDM clients cannot be upgraded. Therefore, if you create and use Crystal reports on the CA SDM Server and you plan to upgrade your version of CA SDM, you need to copy all custom reports to a different location so you will not lose them. Following the upgrade, copy the reports back to the `$NX_ROOT/bopcfg/rpt` Crystal directory and modify the `crystal.config` file to make them accessible from the Report Selector.

Chapter 10: Populating CA CMDB

This section contains the following topics:

[Database Population](#) (see page 505)

[How GRLoader Populates the Database](#) (see page 505)

[Use GRLoader to Import the Data](#) (see page 506)

[Family and Class Assignments](#) (see page 506)

[How to Load CA APM Data](#) (see page 507)

Database Population

Populating the CMDB with the CIs and relationships in your IT infrastructure is a part of using the application efficiently. You can populate the CMDB with data manually using the built-in Configuration Item Editor, GRLoader, or by importing items from other asset management tools.

Note: For information about the Configuration Item Editor, see the *Online Help*.

How GRLoader Populates the Database

Complete the following tasks to populate the database by loading CIs and relationships:

1. Convert input data containing information about CIs and their relationships to XML or in a spreadsheet.
2. The CA CMDB GRLoader program uses the XML data as input.
3. GRLoader loads the data into the database.

Note: For information about GRLoader parameters, see the *CA CMDB Technical Reference Guide*.

More information:

[Use GRLoader to Import the Data](#) (see page 506)

Use GRLoader to Import the Data

Import data by using the GRLoader program provided with CA SDM, which creates CIs based on the data in an XML file or Excel spreadsheet file.

Follow these steps:

1. From the Start menu, select Run.
2. Enter **cmd**.

A DOS command window appears.

3. Enter the following command:

```
Grloader -u <username> -p <password> -s http://<ca_sdm_servername>:8080  
-i <xml_document or spreadsheet>
```

GRLoader creates CIs using the data in the XML file. If errors are found during this process, an error file is created, listing the CIs that could not be imported and the reason.

GRLoader import completes.

4. Start CA SDM and verify that the CI data has been correctly populated.
5. Start the CMDB Visualizer to verify that relationship data has been populated correctly.

The data is imported and verified.

Note: For more information about GRLoader, see the *CA CMDB Technical Reference Guide*.

Family and Class Assignments

Apply a classification scheme to each CI; this scheme involves assigning each CI the following attributes:

- Family—A collection of configuration items having similar attributes
- Class—A subset of configuration items within a family

You can create assignments in the following ways:

- Populate manufacturer data identifying family and class for each hardware asset.
- Include nonblank values for family and class in the respective columns in the input file.

The GRLoader does not import any CI being loaded which cannot resolve family and class to an existing family and class.

How to Load CA APM Data

The primary input to the CA Asset Portfolio Management (CA APM) Loader program is a table or view that contains an extract of the CA APM import data. This data is contained in the `CMDB_Export_Asset_Data` database table or view. In some cases, the import data into the MDB is located in the same database as the target. However, in many circumstances, the import data resides in a different database, for example, when importing data across subsidiaries. In either case, create a view on the same database as the source data.

The CA APM data view does not contain the class and family attributes, and can come from a system with a different classification scheme. For example, if the source of the asset data is a different company, a different classification system can be in effect.

The `CA_MODEL_DEF` table contains a list of models, which are matched against the data in `CMDB_Export_Asset_Data`. If there is a match, the family and class from the model are assigned to the asset being imported. If there is no match, define a new model for the asset. Consider either copying entries from the source `CA_MODEL_DEF` table to the target MDB, or updating the `CA_MODEL_DEF` table with entries for all new hardware makes and model numbers.

Chapter 11: Using the MDR Launcher

This chapter describes how to define MDRs, import data, map CIs back to their source, and display federated data for a CI.

This section contains the following topics:

[The MDR Launcher](#) (see page 510)

[MDR Terminology](#) (see page 511)

[MDR Mapping](#) (see page 512)

[MDR Launching](#) (see page 512)

[CMDBf Viewer](#) (see page 512)

[Define an MDR to CA CMDB](#) (see page 513)

[Federation Using GRLoader](#) (see page 521)

[Map Between MDR CIs and CA CMDB CIs](#) (see page 523)

[How To Configure MDRs for CMDBf Viewer](#) (see page 524)

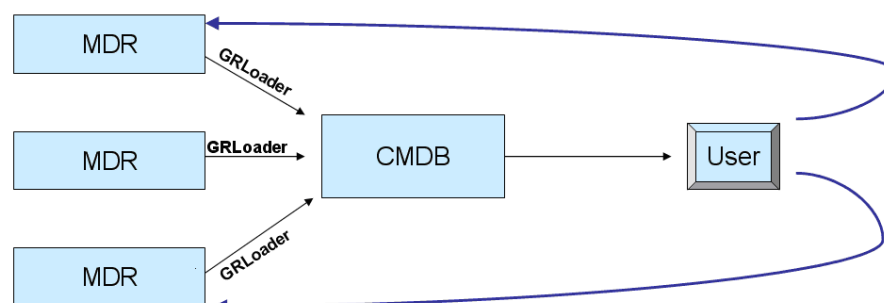
[Launching the MDR Web Browser Interface](#) (see page 525)

[CA Cohesion Integration](#) (see page 525)

The MDR Launcher

One of the main purposes for implementing CA CMDB is to aggregate data from multiple data sources (known as MDRs). However, a CI must always include a reference back to its MDR origin.

CA CMDB provides facilities for importing and loading CIs and also for associating the CIs with their origins. In addition, by using the MDR Launcher capability when viewing a CI in the CA CMDB, you can navigate seamlessly back into the system from which the CI originated, as shown in the following diagram.



Using the MDR Launcher, it is possible to implement a “closed loop” change management process such as the following one:

1. Create a change record.
2. Implement the change.
3. Verify the change by checking the MDR source.
4. Update the CMDB to indicate the change has been made.

From a Problem Management process perspective, you can use the MDR Launcher in the following way:

1. Detect a problem.
2. Determine the severity and pervasiveness of the problem by utilizing the CI relationship data to determine what dependent CIs are affected.
3. Determine possible causes of the problem by researching provider CIs.
4. Perform an in-depth analysis if necessary using the highly detailed information available in the MDR, and use the MDR to take corrective action.

MDR Terminology

The following terms are used in CMDB-MDR integration:

A management data repository (MDR) represents software or data that contains source information about a CI. An MDR generally contains more unrefined CI information than the CMDB, which contains a managed subset of that data.

An *MDR class* (MDR_CLASS) is used to group MDRs that are processed similarly by CA CMDB. There are three special MDR classes: **COHESION**, **GLOBAL**, and **cmdbf**.

An *MDR name* (MDR_NAME) is the name that an MDR uses to reference itself. Verify that the `mdr_name` and `mdr_class` value combination must be unique within your enterprise.

A Federated asset ID (FEDERATED_ASSET_ID) is a unique MDR identifier for a CI.

Different CI families typically use different respective MDRs as data providers. However, a single CI can have multiple MDR data providers. For example:

CI Family	MDR_CLASS
Contact	human resources system
	telephone directory
	single sign-on authentication system
Document	document management system
Air Conditioning	document management system
	contract management system
	air conditioning control system
Mainframe	tape management system
	DASD management system
	performance management system
	job scheduler
Storage	storage management system
	asset management system
Location	asset management system
	education calendar
	office directory
Network	network management systems
	problem management system

There can be multiple MDRs in each MDR class, and each MDR can contribute data to multiple CIs. A given CI can receive data from zero or more MDRs. A CI also can have data contributed to it independently. For example, one mainframe CI may have data which was donated by Disk Management System 1, while another mainframe CI can have data donated by Disk Management System 2 and Job Scheduler 2. CA CMDB manages the relationships among CIs and all their related MDRs.

MDR Mapping

Every MDR has a unique way of identifying the CIs that it manages. Those identifiers are seldom synchronized across MDRs. For example, when referencing a specific Contact CI, different MDRs can use the national identity number, telephone number, license number, or Employee ID; all refer to the same person. The process of associating these disparate identifiers with the same unique identifier (UUID) maintained in the MDB is named *mapping*. Mapping occurs automatically when data is imported using GRLoader when the CI contains the <mdr_name> <mdr_class> and <federated_asset_id> tags. Mapping can also be accomplished manually through the Administration functions in the user interface. A CI that has no mappings associated with it is named *unfederated*. Every CI is automatically mapped to global MDRs using the UUID as the federated_asset_id.

MDR Launching

When you view a CI by using the CA CMDB user interface, you can click a series of buttons to directly launch an MDR user interface. There is one button per MDR mapping for the focus CI. This launching is typically used when you want to verify that a change request has been completely successfully or to obtain additional information about a CI when that data is not collected by the CMDB.

CMDBf Viewer

CA SDM provides the CMDBf Viewer to display the results of CI federation across MDRs. From a CI Detail page (or the CI right-click menu on the CI List), click CMDBf Viewer to see CI attributes of federated CMDBs and MDRs in parallel. On the Federated View page, you can click Retrieve to update the information from any of the federated MDRs. For better readability, CA CMDB metadata files can reconcile MDR attribute names and CA CMDB attribute names.

Note: This feature requires MDRs that support Query. You configure the MDR CMDBf Endpoints to display their results on Federated View. For more information, see the *Implementation Guide*.

Define an MDR to CA CMDB

Before you use the CMDBf Viewer, you must define the MDR to CA CMDB.

To define a new MDR to CA CMDB

1. On the Administration tab, navigate to CA CMDB, MDR Management, MDR List.
2. Click Create New.

The Create New MDR Definition page appears.

3. Complete the following fields:

Tenant

Identifies the tenant owner of this MDR (if multi-tenancy is installed).

Button Name

Specifies the button label to appear on the CI Detail page. This name must be unique for each MDR. Required for “launch in context” and CMDBf Viewer.

MDR Name

Specifies the string to match the XML data that is sent in the `mdr_name` field. While the MDR can use any string, the host name is used frequently. This name together with the `mdr_class` form a unique name for the MDR. Required for “launch in context” and CMDBf Viewer.

MDR Class

Specifies the class that must match the data that is sent in the `mdr_class` field in the XML. While this name can be anything, it must together with the `mdr_name` field form a unique identifier for the MDR. Global MDRs are defined with an MDR Class of GLOBAL.

- CA Cohesion ACM MDRs must specify an MDR class of COHESION, which automatically sets the Path, Parameters and URL to be Launched fields to the required CA Cohesion ACM launch-in-context values.
- CA Asset Portfolio Management r11.3.4 MDRs must specify an MDR name of APM and MDR class of GLOBAL, which sets the Path, Parameters and URL to be Launched fields to the required CA Asset Portfolio Management r11.3.4 launch-in-context values.
- CA APM r12.5 MDRs must specify an MDR name of ITAM and MDR class of GLOBAL, which sets the Path, Parameters, and URL to be Launched fields to the required CA APM 12.5 launch-in-context values.
- For CMDBf Viewer, MDR Class must be `cmdbf`.

Active

Denotes this MDR definition as active or inactive. Inactive MDR definitions are logically deleted, but they can be made active again by using the Search utility.

Owner

Specifies the contact responsible for this MDR.

Description

Specifies a description in free-form text.

Hostname

Specifies the host name, DNS name, or IP address of the host, which contains the web server which hosts the web page to be launched. Required for “launch in context”.

Port

Specifies the TCP/IP port used by the MDR web server to serve up web pages. Port 80 is the default. Required for “launch in context”.

Path

Specifies the portion of the URL that precedes the question mark (?) character. This information can be obtained from your MDR documentation.

- For `mdr_class` of Cohesion, the value is set automatically to "CAisd/html/cmdb_cohesion.html" and cannot be changed.
- For `mdr_name` of APM and `mdr_class` of GLOBAL, the value is set automatically to `apm/frmObject.aspx` and cannot be changed.
- For `mdr_name` of ITAM and `mdr_class` of GLOBAL, the value is set automatically to `ITAM/Pages/Asset.aspx` and cannot be changed.

Parameters

Specifies the portion of the URL that follows the question mark (?) character. This information can be obtained from the MDR documentation.

- For `mdr_class` of Cohesion, the value is set automatically to "hostname={hostname}+port={port}+family={family}+name={name}+secret={password}+federated_asset_id={federated_asset_id}" and cannot be changed.
- For `mdr_name` of APM and `mdr_class` of GLOBAL, the value is set automatically to `ObjectID={cmdb_asset_id}&obj=11&FUNCTION=1&WinID=OBFRASSET{cmdb_asset_id}&WinContainerID=` and cannot be changed.
- For `mdr_name` of ITAM and `mdr_class` of GLOBAL, the value is set automatically to `ParentClass=Asset&assetid={cmdb_asset_id}&TicketID={itam_ticketid}` and cannot be changed.

Userid

Specifies the MDR user logon, if required. This value is substituted into the URL wherever {userid} is found. If blank, userid defaults to whomever is currently signed on.

For CA Cohesion ACM, "Shared Secret" is the secret used to access CA Cohesion ACM, if required. This value is substituted into the URL wherever {password} is found.

Note: For more information about defining the MDR, see the *CA Cohesion ACM Implementation Guide*.

Shared Secret

Specifies information that is shared between CA CMDB and the MDR. This value is substituted into the URL wherever {password} is found. For CA Cohesion ACM MDRs, the value must match the value of the "com.cendura.security.oneclickauth.secret". For more information about creating a shared secret, see "Integrating with CA CMDB" in the *CA Cohesion ACM Implementation Guide*. Required for CMDBf Viewer.

CMDBf Namespace

Specifies the federated_asset_id that is passed to the query as a local ID. For CA CMDB, the value is http://cmdb.ca.com/r1.

CMDBf Timeout

(Optional) Specifies time limit for CMDBf endpoint query. Default is ten (10) seconds.

URL to be Launched

Default value of `http://{hostname}:{port}/{path}?{parameters}`. For some MDRs, it can be overridden if necessary to accommodate MDR-specific requirements. Required for "launch in context".

For `mdr_name` of APM and `mdr_class` of GLOBAL, the value is `http://{hostname}:{port}/{path}?{parameters}`

For `mdr_name` of ITAM and `mdr_class` of GLOBAL, the value is `http://{hostname}:{port}/{path}?{parameters}`

For `mdr_class` of Cohesion the default value is `http://cmdb_hostname:cmdb_port/{path}?{parameters}`

where:

cmdb_hostname is the host name, DNS name or IP address of the CA CMDB web server. Defaults to the current hostname that is currently accessing the CA CMDB web server.

cmdb_port is the TCP/IP port of the CMDB web server. Defaults to the current port number used to access the CA CMDB web server.

Note: If you have enabled SSL support for CA Cohesion ACM, set the URL to:

`http://{hostname}:{port}/{path}?{parameters}+https=yes`

For information about enabling CA Cohesion ACM HTTPS support, see the CA Cohesion ACM online help topic [Creating the HTTPS Certificate and Enabling HTTPS](#).

CMDBf Endpoint

Specifies the Query Service endpoint for the MDR. Required for CMDBf Viewer and retrieving updated MDR data. If you use CA CMDB as an MDR provider, the value is `http://cmdb_hostname:cmdb_port/axis/services/QueryPort`.

4. Click Save.

The MDR is defined.

MDR URL Definitions

The URL to be launched has the default value of `http://{hostname}:{port}/{path}?{parameters}`. This expression can be modified if necessary to accommodate any MDR-specific considerations. The URL is required for "launch in context".

For `mdr_name` of APM or ITAM and `mdr_class` of GLOBAL, the default value is:

`http://{hostname}:{port}/{path}?{parameters}`

For `mdr_class` of Cohesion, the default value is:

`http://cmdb_hostname:cmdb_port/{path}?{parameters}`

cmdb_hostname

Specifies the hostname, dnsname or IP address of the CA CMDB web server.
Defaults to the current hostname currently accessing the CA CMDB web server.

cmdb_port

Specifies the TCP/IP port of the CA CMDB web server. Defaults to the current port number that is used to access the CA CMDB web server.

If you have enabled SSL support for CA Cohesion ACM, set the URL to the following:

`http://hostname:port/{path}?{parameters}+https=yes`

Note: For information about enabling CA Cohesion ACM HTTPS support, see the CA Cohesion ACM online help.

MDR Launch URL

The MDR launch URL has the following default value:

`http://{hostname}:{port}/{path}?{parameters}`

You can modify this expression to accommodate MDR-specific considerations. The URL is required for "launch in context."

- For `mdr_name` of APM or ITAM and `mdr_class` of GLOBAL, the default value is:

`http://{hostname}:{port}/{path}?{parameters}`

- For `mdr_class` of Cohesion, the default value is:

`http://cmdb_hostname:cmdb_port/{path}?{parameters}`

cmdb_hostname

Host name, DNS name or IP address of the CA CMDB web server. Defaults to the host name currently accessing the CA CMDB web server.

cmdb_port

TCP/IP port of the CA CMDB web server. Defaults to the current port number that is used to access the CA CMDB web server.

If you have enabled SSL support for CA Cohesion ACM, set the URL to:

`http://hostname:port/{path}?{parameters}+https=yes`

Note: For information about enabling CA Cohesion ACM HTTPS support, see the Cohesion online help.

Defining Launch Parameters for URL Substitution

When defining an MDR, the following parameters can be used to construct its URL for display. These parameters are substituted with their appropriate values at run time. These variables must be specified in the fields described previously.

hostname is the MDR host name from the MDR definition.

alarm_id is the IP address of the selected CI.

federated_asset_ID is the unique identifier of the selected CI in the MDR.

cmdb_asset_id is the asset ID for the CI.

port is the MDR port number from the MDR definition.

userid is the user ID from the MDR definition. If blank, *userid* defaults to whomever is currently signed on.

password is the shared secret from the MDR definition.

mdr_name is the *mdr_name* from the MDR definition.

mdr_class is the *mdr_class* from the MDR definition.

class is the class of the selected CI.

family is the family of the selected CI.

path is the path as described in the MDR definition.

name is the name of the selected CI.

model is the model of the selected CI.

manufacturer is the manufacturer of the selected CI.

itam_ticketid is the ticket id to log into CA APM.

Example: Launching an MDR

A CA CMDB user is looking at a Server CI named `server1`, which has a map to an internally developed application named Comet. Comet uniquely identifies `server1` as `server:server1`.

Comet is defined as an MDR with the following properties:

- Hostname: CometServer
- Port: 80
- Path: index.php
- Parameters: item={federated_asset_id}
- Launch_url: http://{hostname}:{port}/{path}?{parameters}

In CA CMDB, when the user clicks the Comet button on the Attributes tab of the `server1` CI, a web browser window opens the following URL:

`http://CometServer:80/index.php?item=server:server1`

Parameters for URL Substitution

When defining an MDR, you can use the following parameters to construct its URL for display. These parameters are substituted with their appropriate values at runtime. These variables must be specified in the MDR field definitions.

{hostname}

Specifies the MDR host name from the MDR definition.

{alarm_id}

Specifies the IP address of the selected CI.

{federated_asset_ID}

Specifies the unique identifier of the selected CI in the MDR.

{cmdb_asset_id}

Specifies the asset ID for the CI.

{port}

Specifies the MDR port number from the MDR definition.

{userid}

Specifies the user ID from the MDR definition. If blank, `userid` defaults to whomever is currently signed on.

{password}

Specifies the shared secret from the MDR definition.

{mdr_name}

Specifies the mdr_name from the MDR definition.

{mdr_class}

Specifies the mdr_class from the MDR definition.

{class}

Specifies the class of the selected CI.

{family}

Specifies the family of the selected CI.

{path}

Specifies the path as described in the MDR definition.

{name}

Specifies the name of the selected CI.

{model}

Specifies the model of the selected CI

{manufacturer}

Specifies the manufacturer of the selected CI

Example: Use Parameters for URL Substitution

A CA CMDB user is looking at a Server CI named server1, which has a map to an internally developed application called Comet. Comet uniquely identifies server1 as server:server1.

Comet is defined as an MDR with the following properties:

- Hostname: CometServer
- Port: 80
- Path: index.php
- Parameters: item={federated_asset_id}
- Launch_url: http://{hostname}:{port}/{path}?{parameters}

In CA CMDB, when the user clicks the Comet button on the Attributes tab of the server1 CI, a web browser window opens the following URL:

http://CometServer:80/index.php?item=server:server1

Federation Using GRLoader

When using GRLoader, the following XML tags must be populated in every CI in the XML document. These tags apply to every MDR family.

- <mdr_name>
- <mdr_class>
- <federated_asset_id>

Note: CA Cohesion ACM automatically provides mdr_name, mdr_class and federated_asset_id.

If this information is not present in the XML, “launch in context” is not possible because the origin of the CI cannot be determined.

To identify the source of a CI, you can modify the XML before it is input into GRLoader. You can use a text editor to modify the XML and make a global change, or this task can be done programmatically.

Note: For more information about MDR identification and GRLoader, see the *CA CMDB Technical Reference Guide*.

Federate a CI

If CIs are loaded into CA CMDB before their corresponding MDR is defined, they are unfederated, which means that they are not yet connected to an MDR and do not yet support “launch in context”.

To federate a CI

1. Define the required MDR.
2. Do one of the following:
 - Manually map the CI.
 - Re-run the CA Cohesion ACM report which created the CI, specifying Allow update of existing CIs on the report.

Note: For more information about CA Cohesion ACM Reports, see the *CA Cohesion ACM Product Guide*.

3. Re-run GRLoader, specifying the same input file that was used to create the CIs.
The CA CMDDB reconciliation engine merges the MDR information into the existing CIs.
4. Create an XML document that describes the CI and its MDR and run GRLoader in Update mode.
The CA CMDDB reconciliation engine merges the new information into the existing CI. The existing CI is federated.

Example: Specify CI Location

You must verify that the reconciliation engine is provided with enough information to locate the CI you want to update. In the following example, end tags are removed and spaces added for readability.

```
<ci>
  <name>          server3
  <mac_address>
  <serial_number>
  <asset_num>
  <dns_name>
  <mdr_name>      mdr_one
  <mdr_class>     Cohesion
</ci>
```

Define Multiple MDRs to a CI Using GRLoader

You can define multiple MDRs to a CI by using GRLoader.

To define multiple MDRs to a single CI, the XML document can repeat the <ci> node, with each duplicated <ci> node specifying a different mdr_name and mdr_class. In other words, each MDR can contribute its attributes independently of any other MDR that contributes data to the CI.

Example: Define Multiple MDRs to a CI

If MDR1 and MDR2 both contribute data to the server2 CI, the XML document looks something like the following example. In the example, end tags are removed and spaces added for readability.

```
<ci>
  <name>          server2
  <mdr_name>      mdr1
  <mdr_class>     Cohesion
  <diskspace>     500 gb
  <disktype>      SCSI-3
</ci>
```

```
<ci>
  <name>      server2
  <mdr_name> mdr2
  <mdr_class>Service Assure
  <sla>
</ci>
```

CA CMDB reconciles the two previous CIs to the same CI and associates each of the two MDRs to that single CI.

Note: The CIs can be imported in one or two runs of GRloader.

Map Between MDR CIs and CA CMDB CIs

After you define a CI manually using the File, New Configuration Item... option, you must manually define the mapping between this CI and the CI in the federated MDR. There are two ways to associate a CI with an MDR:

- Editing the CI.
- Using the Federated CI Mapping node on the CA CMDB Administration tab.

To create a mapping by editing the CI

1. Display the CI Detail page of the CI that you want to associate with an MDR.
2. Click Edit.
3. Display the Attributes tab.
4. Click Add MDR.

The CI is associated with the MDR.

To create a mapping using the Federated CI Mapping page

1. Click the CA CMDB Administration tab.
2. Open the Management Data Repository node.
3. Select the Federated CI Mapping node.

The Federated CI Mapping List appears.

4. Click Create New.

The Create New Federated CI Mapping For page appears.

5. Associate the CI with the MDR by completing the Federated CI Mapping fields:

CI Name

Specifies the name to use to identify the configuration item.

Federated Asset ID

Specifies the string identifier used by the source MDR to identify this CI. The identifier is determined by the MDR software.

MDR Name

Specifies the name that identifies the MDR (and its MDR button).

Active

Denotes whether this mapping is active or not. Mappings cannot be deleted, only inactivated.

6. Click Save.

The mapping between this CI and the CI in the federated MDR is defined.

How To Configure MDRs for CMDBf Viewer

Before you can use the CMDBf Viewer, set up your federated MDR providers to point to the CMDBf query service, as follows:

- External MDRs must provide a query service that can handle InstanceIdConstraint query.
- Button Name, MDR Name, and MDR Class are required to show the CMDBf Viewer button on the CI Detail page.
- MDR Class must be defined as **cmdbf**
- For CA CMDB, CMDBf Namespace must be set to **http://cmdb.ca.com/r1**. For other CMDBs and MDRs, see the appropriate documentation.
- Timeout is optional. Default is ten (10) seconds.
- To display a working Retrieve button on the Federated View, you must define CMDBf Endpoint, Userid, and Shared Secret.

Note: An existing CA CMDB system can be set up as a CMDBf provider by specifying an CMDBf Endpoint of "http://servername:port/axis/services/QueryPort" where:

- hostname is the computer where CA CMDB is installed (localhost or computer name).
- port is the port where CA CMDB is configured.

Launching the MDR Web Browser Interface

After a mapping between a CI and an MDR is created, a button is placed automatically on the Attributes tab. If there are multiple MDRs associated with this CI, multiple buttons appear.

When you click an MDR button, a new page opens and the fully substituted MDR URL that is defined in the MDR definition appears.

Example: Launch CA Cohesion

When a CI has been correctly associated with its MDR, a Cohesion button appears on the Attributes tab. If a button does not appear on the Attributes tab, review the mapping for the CI that is displayed. Verify that there is a mapping for this CI and that the target MDR has a URL that can be launched. Clicking the button to launch the MDR causes a new window to open to the target URL to launch CA Cohesion.

CA Cohesion Integration

Consider the following when integrating CA Cohesion ACM with CA CMDB:

- Integrating Cohesion with CA CMDB

Note: For information about Cohesion-CA CMDB integration, see the *CA Cohesion ACM Implementation Guide*.

- Importing CIs from a Cohesion MDR

Note: For information about how to import CIs from a Cohesion MDR, see the online help that is available from CA Cohesion ACM Reports Report Templates tab.

- Launch-in-Context for Cohesion MDRs

For launch-in-context integration to work best with CA Cohesion ACM, we recommend that you use the CA CMDB Administration tab to define the Cohesion MDR *before* running the Cohesion CMDB Report.

Note: Because CA Cohesion ACM does not support a unique Federated asset ID for NIC or File System CIs, Cohesion does not support MDR Launcher for NIC or File System CIs. Therefore, a Cohesion-based NIC or a File System CI does not display an MDR launch button even when it was imported successfully.

Chapter 12: Managing Web Services

Important! For additional information on web services, see the CA SDM Technical Reference Guide.

This section contains the following topics:

[Web Services Management](#) (see page 527)
[CA SDM Components](#) (see page 527)
[Tips for SOAP Web Services Clients](#) (see page 528)
[SOAP Web Services Configuration](#) (see page 531)
[Web Services Security](#) (see page 533)
[SOAP Error Handling](#) (see page 535)
[Web Services Installation](#) (see page 538)
[External Specifications](#) (see page 538)
[Objects](#) (see page 556)
[ITIL Methodology](#) (see page 562)
[Use the Web Services](#) (see page 564)

Web Services Management

Web Services are a set of data exchange standards that enable communication between products, even if they are on different operating environments. This ability is analogous to browsing the Web on a personal computer—all remote websites are accessible regardless of whether they are hosted on Solaris, AIX, Windows, and so on. In the same manner, Web Services allow products to communicate over HTTP to various servers regardless of operating environment. For example, a Microsoft Office product can communicate with a program on a UNIX server, and a Java Server Page can access a server hosted on a Windows server. This platform-neutral communication allows for powerful integrations.

The Web Services take advantage of this technology, allowing almost any product to access CA SDM and Knowledge Management. Web Services clients can create tickets, update assets, search the knowledge base, and so forth.

CA SDM Components

CA SDM provides the installation files for this version of the J2EE Web Services in the following directory:

```
<NX_ROOT>/sdk/websvc/R11
```

Note: <NX_ROOT> specifies the root installation path for CA SDM.

Tips for SOAP Web Services Clients

The samples directory of the CA SDM installation provides a sample Java client application for Web Services. This sample assists developers with web services client application development.

Many of the Web Services methods require arrays as input parameters. For example, the method `createIssue()` permits an empty array for `propertyValues`. Sometimes these arrays are optional, but the service requires an empty array for a successful pass. When you use Visual Studio .NET to access Web Services, specify an empty array with one of the following arrays:

C# language

```
String[] emptyArray = new string[0];
```

Visual Basic .NET

```
Dim emptyArray As String() = {}
```

Java

```
ArrayOfString attr = new ArrayOfString();  
attr.setString(new String[0]);  
ArrayOfString is a proprietary class.
```

You can then pass `emptyArray` to array parameters that accept empty arrays.

Note: The CA SDM Web Services use the Apache implementation of standards established by the World Wide Web Consortium (W3C). Ideally, a client on any type of operating environment can access the services, but vendor implementations vary. Many programming environments provide a tool to generate proxy classes from a Web Services Description Language (WSDL) description.

More information:

[Java Clients](#) (see page 529)

Java Clients

The TableOfContents.doc in \$NX_ROOT/samples/sdk/websvc lists several Java sample programs.

Each sample program contains notes on how it can be compiled and run using the script files run_java_test.bat.txt (Windows) and run_java_test.sh.txt (UNIX). These scripts demonstrate how to use org.apache.axis.wsdl.WSDL2Java to generate the CA SDM web services client-side stub files.

The -w parameter is required to properly generate the stub files when using Axis 1.4. Running WSDL2Java as shown will generate the stub files in subdirectory com/ca/www/UnicenterServicePlus/ServiceDesk. The following files are generated:

- ArrayOfInt.java
- ArrayOfString.java
- ListResult.java
- USD_WebService.java
- USD_WebServiceLocator.java
- USD_WebServiceSoap.java
- USD_WebServiceSoapSoapBindingStub.java.

Import these classes with the following statement:

```
import com.ca.www.UnicenterServicePlus.ServiceDesk.*;
```

Many Web Service methods have parameters of type ArrayOfString, a proprietary class. For example, the createRequest() method's attrVals, propertyValues and attributes parameters are all ArrayOfString parameters.

To set the values in an ArrayOfString variable, instantiate the variable and then use setString() as follows:

```
ArrayOfString attrVals = new ArrayOfString();  
attrVals.setString(new String[]{"customer", customerHandle, "description",  
"description text"});
```

To set it to empty

```
attrVals.setString(new String[0]);
```

Use a variable of type `ListResult`, another proprietary class, as the return value from the `List` methods: `doQuery()`, `getRelatedList()`, `getNotificationsForContact()`, `getPendingChangeTaskListForContact()` and `getPendingIssueTaskListForContact()`. A `ListResult` contains `listHandle` and `listLength` elements, which can be retrieved using `getListHandle()` and `getListLength()` as shown in this example:

```
ListResult doQueryResult = new ListResult();
doQueryResult = USPSD.doQuery(sid, "iss", "active = 1");
int listHandle = doQueryResult.getListHandle();
int listLength = doQueryResult.getListLength();
```

The `getListValues()` method uses the `listHandle`, retrieving the values from a subset of the list.

The `Handles` parameter of the `freeListHandles()` method is an `ArrayOfInt`, another proprietary class. Call `freeListHandles()` using the `listHandle` taken from a `ListResult`:

```
ArrayOfInt handleList = new ArrayOfInt();
handleList.setInteger(new java.lang.Integer []{ new java.lang.Integer(listHandle)
});
USPSD.freeListHandles(sid, handleList);
```

Some methods have pass by reference parameters of type `javax.xml.rpc.holders.StringHolder`. For example, `createRequest()` has two parameters of this type, `NewRequestHandle` and `NewRequestNumber`.

```
StringHolder NewRequestNumber = new StringHolder();
StringHolder NewRequestHandle = new StringHolder();
String result;
result = USPSD.createRequest(sid, creatorHandle, attrVals, propertyValues, template,
attributes, NewRequestHandle, NewRequestNumber);
```

The Request's handle and reference number (`ref_num`) can then be obtained from `NewRequestHandle.value` and `NewRequestNumber.value` respectively.

SOAP Web Services Configuration

You can configure the CA SDM SOAP Web Services with entries in special web configuration files. The following table summarizes the names and descriptions of the configuration options:

Option Name	Description
design_mode_stubs	Sets the Web Service to <i>design mode</i> (CA SDM only).
require_secure_logon	Requires the login() and loginService() web methods to be called with a secure protocol, such as https.
require_secure_connection	Requires that every web method be called with a secure protocol.
disable_user_logon	Disables both login() and loginService() web methods, so only loginServiceManaged() can be used to log in.

CA SDM adds protection to the integrity of the running Tomcat server by verifying the length of the attribute values that pass to Web Service methods. By default, web service calls return an Axis Fault if the length of an attribute exceeds 900,000 bytes.

You set the following parameters in the deploy.wsdd file:

fatal_max_string_length

Sets the length of the largest attribute value that a web service method accepts.

Default: 900,000 bytes

validate_parameters

Sets whether the attribute value length checking is performed. Set the parameter to 0 to turn off the validation.

Default: 1 (on)

exception_methods

Displays a comma-delimited list of Web Service methods that are exempt from the attribute value length validation.

More information:

[Redeploy the Web Services](#) (see page 532)

Redeploy the Web Services

New configuration settings take effect when you redeploy CA SDM Web Services. Complete the following steps to redeploy the Web Services:

1. Open a command prompt and set the CLASSPATH environment variable to include the required Axis jar files, which are supplied in <NX_ROOT>/java/lib.

For example, to set it on Windows, execute the following command:

```
set AXISHOME=%NX_ROOT%\java\lib
set classpath=
%AXISHOME%\axis.jar;%AXISHOME%\jaxrpc.jar;%AXISHOME%\saa.jar;%AXISHOME%\commons-logging.jar;%AXISHOME%\commons-discovery.jar;%AXISHOME%\wsdl4j.jar;%AXISHOME%\log4j-1.2.8.jar;%classpath%
```

2. Modify the directory to <NX_ROOT>/sdk/websvc/R11 and execute the following commands:

```
java org.apache.axis.client.AdminClient undeploy.wsdd
java org.apache.axis.client.AdminClient deploy.wsdd
```

3. Recycle Tomcat by recycling the CA SDM service. You can avoid shutting down the entire CA SDM system by recycling Tomcat by simply using the following commands:

```
pdm_tomcat_nxd -c stop
pdm_tomcat_nxd -c start
```

The Web Service is redeployed.

4. Verify that the service deployed by viewing the Axis services listing page at the following default URL:

```
http://<servername>:<port>/axis/services
```

Note: The exact URL depends upon your installation settings.

Web Services Security

When you deploy web services, understand the important security considerations. The default configuration when using HTTP is insecure, as it is for all information in web service calls sent between the client and the server in plain text over the network using the HTTP protocol. This includes not only application data, such as ticket descriptions and contact names, but also web service session identifiers (SID). Depending upon the web service application login methods used, it can include passwords.

We recommend that Administrators deploying web services review this information carefully, and to take additional configuration steps at the application and network levels to secure their web service environment.

Important! The default web service configuration used with HTTP is insecure and vulnerable to security threats, which can include password discovery, session fixation, and data spying, among others.

There are three interrelated key security considerations in deploying Web Services:

- What (application level) access authentication schemes should this deployment support?
- What additional networking level security features does this deployment require?
- How will these requirements be enforced through web service configuration options?

The following describes each security feature:

- **Web Service Application Level Authentication Schemes**—To access Web Services, a web service client application must be authenticated with the web service application. Web Services provides two schemes of access authentication. The first is by username/password, and the other is by Public Key Infrastructure (PKI) technology. Both work with the Access Control and Management component in Web Services, using access policy. Access authentication and access management are the most important security features of Web Services.

Authentication with username/password methods may be disabled using the following security configuration command:

```
disable_user_logon
```

Before enabling this option, the administrator needs to determine if each web service client for which an enterprise is requesting Web Services access, can actually provide support for the alternative authentication method, which is the PKI-based login method. The key advantage to the PKI technology is that Web Services client applications do not require *maintained* system user accounts, that is; the maintenance, storage, and transmission of their passwords.

- **Networking Level Security Configuration**—In both authentication schemes, username/password and Public Key Infrastructure (PKI), notice that the session identifier returned from the specific login method (as well as all subsequent information), are transmitted in plain text when using HTTP. Furthermore, if the username/password authentication scheme is used, the password is sent unprotected (in plain text) from the web service client application to the Web Services. During product development, the W3C did not have recommended standards for web services security. Subsequently, WS-Security is not used by these Web Services implementations to provide a security context. Instead, point-to-point transport layer security (SSL/TLS) and other network level security mechanisms (for example, IPSec), are recommended to protect the otherwise plain text transmission of the application-level authentication exchange(s), and subsequent session identification and data.

Important! We recommend using SSL (or https) when deploying Web Services to protect the application-level authentication exchanges and subsequent transmissions of session identification and data.

- **Web Service Configuration**—To allow administrators to enforce communications protocol-level security at the level of the Web Services application, the following two security configuration commands are supported:

`require_secure_logon`

This security feature requires you to use SSL (or https) for calling the `Login()` and `LoginService()` methods. This feature also provides a handy method for protecting the username and password, while avoiding the overhead of SSL for the rest of the web services.

Important! If you use the `require_secure_logon` command, the Web Services application will not confirm that communications protocol-level security is enforced for methods other than `Login()` and `LoginService()`. Unless other precautions are taken, the other Web Services methods may be invoked insecurely, causing greater vulnerability to security threats.

`require_secure_connection`

This security feature requires you to use SSL to access any part of the web service. If https is required but not used, then a SOAP Fault with code `UDS_SECURE_CHANNEL_REQUIRED` is returned.

Note: For information about how to configure SSL, see your J2EE Servlet Container documentation.

More information:

[External Specifications](#) (see page 538)

SOAP Error Handling

If an error occurs with a Web Services method, a SOAP Fault is returned. The SOAP Fault is the standard means of returning exception information for Web Services.

The Fault message contains standardized <Message> and <Code> elements, but the most informative is the <Detail> element. The <Detail> element contains <ErrorCode> and <ErrorMessage> elements. The <ErrorCode> element returns an enumerated error code specific to either the CA SDM or Knowledge Management product. The <ErrorMessage> element contains an English string describing the errors. The <ErrorMessage> elements are more suitable for aiding the developer and more appropriate messages should display to users.

For example, the following illustrates a SOAP Fault when a bad parameter is supplied to the CA SDM getObjectValues() method:

```
<soap:Fault>
  <faultcode>soap:Client</faultcode>
  <faultstring>Error on fetch with attribute
list:persistent_id,first_name,last_nameParamErrorHere</faultstring>
  <detail>
    <ErrorCode>1001</ErrorCode>
    <ErrorMessage> Error on fetch with attribute list:
persistent_id,first_name,last_nameParamErrorHere </ErrorMessage>
  </detail>
</soap:Fault>
```

If you are using a client built with Microsoft .NET managed code, a failed Web Services method call raises a "SOAPException" exception. All errors cancel the operation invoked.

In some cases, the servlet container may write errors and therefore, display in the servlet container logs. In other cases, error information may be written to CA SDM logs. These logs are located in the following subdirectories:

- In the /bopcfg/www/CATALINA_BASE/logs subdirectory of CA SDM installation
- In the /log subdirectory of the CA SDM installation and to all logs that have the prefix "stdlog".

Note: We recommend that you constantly monitor these logs, as the server may log its own errors without reporting them to the CA SDM Web Services.

Lock Errors

CA SDM objects are locked during updates. Methods that update objects (such as, `updateObject()` or `transfer()`) may return the following lock error code:

UDS_LOCK_ERR

This code indicates that another user is updating the record. Often the locking user's handle is returned in the `ErrorMessage` element.

Time Outs

If the CA SDM server is heavily loaded, a method may take a long time to process. In rare cases, a method may never return because a separate process failed to reply or some other error occurred. To guard against excessive blocking, every Web Services method times out after a number of seconds. Web Services method time-out is a CA SDM server time-out, *not* a Web server time-out, network time-out, and so on.

Note: The Web Services delay a few seconds the first time accessed after the J2EE application server is recycled. This happens because the application is initializing, loading DLLs, libraries, and so on, and occurs only with the first Web Services method call. All subsequent calls return much faster.

If a method times out, it returns the following error code:

UDS_TIMEOUT_ERR

The operation is not aborted! The server may have received the request and processes it successfully, although slowly. This type of problem may occur when using the `doSelect()` method to retrieve several 1000 records.

Note: For information about the `doSelect` method, see the *CA SDM Technical Reference Guide*.

Error Codes

The following table lists the possible values for the `<ErrorCode>` value in a SOAP Fault returned from a Web Services call:

Error Name	Value	Description
UDS_OK	0	Successful.
UDS_FAILURE	1	General failure, check system logs.

Error Name	Value	Description
UDS_BAD_PARAM	1000	A bad parameter was passed to a method. This error occurs if a required parameter is missing, the wrong type was passed, or an invalid value was used.
UDS_INTERNAL_ERR	1001	Signals that an internal error occurred. A description is found in the return array and the system logs.
UDS_LOCK_ERR	1002	An attempt was made to update an object locked by another user or process. Usually the ID of the contact responsible for locking the object is returned in the return data.
UDS_UPDATE_ERR	1003	An error occurred updating an object. Make sure all required attributes were set and check the system log.
UDS_CREATION_ERR	1004	An error occurred creating an object. Make sure all required attributes were set and check the system logs.
UDS_NOT_FOUND	1005	A search method failed to find any matches or failed to find an object specified. This can happen if a bad or invalid handle is passed to any method.
UDS_SESSION_TIMEOUT	1006	The current method timed out, the CA SDM server may be heavily loaded or the method itself was bad.
UDS_SERVER_GONE	1007	The CA SDM server connection is lost, UDS methods will no longer function and all list references are lost.
UDS_FETCH_ERR	1008	An error occurred while retrieving list data.
UDS_BAD_SESSION	1010	An invalid SID was used.
UDS_CNTXT_TIMEOUT	1011	The SID timed out.
UDS_SECURE_CHANNEL_REQUIRED	1012	The Web Services (or a web service method) requires a secure channel (for example: SSL) for access, but an unsecured channel is being used.
UDS_SECURITY_VIOLATION	1013	The attempted operation violates CA SDM security and was aborted.
UDS_OVER_POLICY_LIMIT	3002	The attempted request is refused because it exceeds the limit defined in the policy.

Web Services Installation

Depending on your configuration type, CA SDM installs web services for the following servers:

- Conventional: Both primary and secondary servers. For web service clients to use a URL on a secondary server, you add a web engine to the secondary server
- Advanced Availability: Application server

Web services use the default object manager that is installed on the CA SDM server. To use any other object manager, install and set the *webservice_domsrvr* option in Options Manager.

Note: For information about adding and configuring object managers, web directors, and web engines, see the *Administration Guide*. For information about installing and setting the *webservice_domsrvr* option, see the *Online Help*.

How to Activate Design-Time

The CA SDM Web Services includes a method stub configuration feature for developers in the Java version. When activated, the Web Services ignores the CA SDM server and returns simulated data for method calls so that Web Services calls can be made without running a CA SDM server.

Follow these steps:

1. Edit *deploy.wsdd* to uncomment the sections for “*design_mode_stubs*”.
2. Reverse the deployment and redeploy the server.
3. Restart the application server.

The design-time feature is activated.

Note: The design-time feature applies to CA SDM Web Services methods only.

External Specifications

CA SDM lets you specify user access authentication and the features available by access control and management.

User Access Authentication

CA SDM Web Services provides two access authentication schemes. They are associated with the new access control and management feature, which uses an access policy.

User Name/Password

Verifies the User Name/Password, as described in previous releases of the product.

Public Key Infrastructure (PKI) Technology

Verifies that the person requesting the access has ownership of a certain private key.

Important! If you plan to use an application that accesses this version of CA SDM Web Services, we recommend strongly that you first define a Web Service Access Policy, complete with its code value, in CA SDM. A default access policy with a policy code of DEFAULT is available when CA SDM is installed and configured.

More information:

[Define an Access Policy](#) (see page 547)

User Name/Password Authentication

If you plan to use the User Name/Password type of access authentication, the user application needs to invoke one of following two web services methods to gain access to CA SDM Web Services.

Note: The login user that you specify in the username parameter (not the proxy contact specified in the policy) is responsible for activities initiated in a session. All function group security and data partition is enforced for this login user.

login (Username, Password)

This method is provided for backward compatibility, where access authentication is performed on the username and password supplied. A SID (session ID) is returned only if the access is authenticated. All subsequent web services calls need to include this SID. Default access policy is then applied to all subsequent web services accesses labeled with the SID.

Username and password are required fields that require plain text when you define them.

loginService (Username, Password, Policy)

This method is similar to the previous login function in that access authentication is performed on the username and password supplied. A SID is returned only if the access is authenticated. However, a specific access policy, as identified in the third parameter, is applied to control and manage all subsequent Web Services accesses. Empty content in the policy parameter automatically applies the default policy.

Username and password are required fields that require plain text when you define them. Policy is required, but can be empty, and you must use plain text. Use the policy code defined in a policy.

How a login is validated depends on the contact's assigned *access type*. The access type object is hosted by CA SDM and sets the validation type. You can use the product to view the access type record, and you can also use the `getAccessTypeForContact()` web method to retrieve any access type object information.

Note: For more information about access types, see the *Administration Guide*.

Public Key Infrastructure (PKI) Authentication

If you plan to use the PKI authentication, realize that the content of the login request is encrypted with a private key that can only be decrypted by its matching public key. The response of the login request is returned as plain text.

Generally, each application accessing CA SDM Web Services is assigned with a policy. CA SDM Web Services stores detailed information about a policy, along with the public key of a digital certificate. An application, as the policy holder, uses the private key of the digital certificate and the policy code (as policy identifier) to assemble a login request.

loginServiceManaged (Policy, Encrypted_Policy)

CA SDM Web Services performs the user authentication by locating the policy through the plain text policy code, retrieving the policy holder's public key associated with the policy, decrypting the encrypted policy code, matching the decrypted content with the policy code, and finally, opening a session with a back-end server. The plain text session ID (SID) is returned and can be used for subsequent method invocations. Only the policyholder holds the private key that matches the policy's associated public key stored in CA SDM.

All subsequent web services calls must include the returned session ID (SID). The Proxy contact specified in the policy is responsible for all web services activities initiated in this session. All function group security and data partition is enforced for the proxy contact.

Important! The `Encrypted_Policy` parameter should be in the BASE64 text format. The user application must perform proper conversion from the binary format.

Policy is a required field. When you define it, use plain text policy code as defined in a policy. `Encrypted_Policy` (the digital signature of the policy code encrypted with the policy holder's private key) is required. When you define `Encrypted_Policy`, use the algorithm SHA1 with RSA to obtain the digital signature.

Implement loginServiceManaged in Java

The following shows how to generate Certificates and then use these generated Certificates to access the CA SDM web services.

In the following example, the login process completes using the CA SDM Certificate and then performs two common web services calls. The `getBopsid()` web services method call allows you to obtain a token that is linked to a specific user. This token can be used to login to the CA SDM web interface as the linked user without being prompted for a password. This allows seamless integration to be enabled between different applications.

Important! The generated BOPSID token expires after 30 seconds, so it must be used promptly.

Important! There is a known issue when using the 1.4 version of the AXIS tool. For more information, see the *Release Notes*.

Follow these steps:

1. Generate the stub classes with AIXS Tool WSDL2Java. For more information, see the Generating Stub Classes with AXIS Tool WSDL2Java section from the PKI_loginServiceManaged_JAVA_steps file. Find the file in the following location:

`$NX_ROOT/samples/sdk/websvc/java/test1_pki`

2. Start the CA SDM service.
3. Run `pdm_pki -p DEFAULT`.

DEFAULT.p12 is created in the current directory. This policy will have the password equal to the policy name (in this case DEFAULT).

Note: This command will also add the Certificate's public key to the field `pub_key` field (`public_key` attribute) in the `sapolicy` table/object.

4. Log into CA SDM
5. Select SOAP Web Services Policy, Policies on the Administration tab.

The SOAP Web Services Access Policy List page opens.

6. Click DEFAULT.

The SOAP Web Services Access Policy Detail page opens.

7. Complete the Proxy Contact field (in this example, ServiceDesk) and confirm that the DEFAULT policy record Has Key field displays "Yes."

8. Copy DEFAULT.p12 (from the directory where command `pdm_pki` is executed), the JSP file called *pkilogin.jsp* and the HTML file called *pkilogin.htm* (from the `$NX_ROOT/samples/sdk/websvc/java/test1_pki` directory) to the following directory:

`$NX_ROOT/bopcfg/www/CATALINA_BASE/webapps/axis`

9. Open the HTML form (from the axis directory). For example, `http://localhost:8080/axis/pkilogin.htm`

Complete the appropriate fields.

Note: The Directory field identifies the location of the Certificate file. Modify the path to the correct location.

10. Click Log me in!

The results page opens.

11. Click the BOPSID URL.

Important! Click this immediately! The BOPSID has a limited life token of about 30 seconds.

The format of a URL using a BOPSID is as follows:

`http://<server name>:<port>/CAisd/pdmweb.exe?BOPSID=<BOPSID value>`

Note: In order to use the `loginServiceManaged` method for a Java client program running on AIX, you may need to replace a pair of security policy files within your `JAVA_HOME`. Go to <http://www.ibm.com> and search for "developerworks java technology security information AIX". In the "developerWorks : Java technology : Security" document, follow the link to "IBM SDK Policy files". Download the unrestricted policy files, `local_policy.jar` and `US_export_policy.jar`. Use these files to replace the original files in your `JAVA_HOME/lib/security` directory."

Configuration for the PKI Authentication Type

To configure for PKI authentication, you must first create an access policy. The process flow is as follows:

Create an Access Policy

The administrator performs this task using the product (Web Interface only), and as part of the process, needs to assign a unique text code to each access policy.

Obtain a Digital Certificate with a Public/Private Key Pair and Associate it with the Access Policy

For PKI access authentication, a user application needs to obtain a digital certificate that contains both a public key and private key pair. An administrator can obtain the digital certificate through third-party Certificate Authority (CA) or security products that support digital certificates. CA SDM also provides a server-side utility that can generate a digital certificate. It is located in `<NX_ROOT>/bin` directory as follows:

```
pdm_pki -p policy_code [-l certificate file] [-f] [-h]
```

-p

Identifies a unique policy code.

-f

Allows the utility to replace the existing public key with a new public key.

-l

Loads the public key stored in a X509 V3 certificate.

-h

Displays help on the command line window.

If you obtain a digital certificate through a third-party, CA Technologies, or security products, import it to where the CA SDM server is located, and then associate it to an access policy. The administrator of the user application should obtain a digital certificate file that includes the content of an X509 V3 certificate in DER/ASN.1 format.

In addition, the certificate should contain only the public key of the public/private key pair. Using the `-l` option, the administrator should invoke the `pdm_pki` utility to load the certificate. The utility then loads the certificate, extracts the public key, converts the public key to BASE64 text format, and saves it with the access policy specified by the policy code.

When a digital certificate is generated by the `pdm_pki` utility, the administrator invokes the command in CA SDM without the `-l` option. The utility then generates a public and private key pair (keys are RSA1024 bit keys). The public key is converted to BASE64 text format where it is stored along with the access policy specified by the policy code. An X509 V3 certificate is also created to hold the public key along with other information (the default pass phase is set as the policy code). Finally, the X509 V3 certificate is packaged with the private key to a standard portable certificate format of PKCS12. It is then saved in a file with a file name of *policy_code.p12*, depending on the policy code supplied. This file can then be exported to clients.

Note: If an access policy has already been associated with a public key of a certificate, users need to specify the `-f` option when calling the `pdm_pki` command in order to overwrite the existing public key with a new public key.

More information:

[Define an Access Policy](#) (see page 547)

Login to Web Services

The following describes the process flow for logging in to Web Services configured with PKI authentication:

Process	Description
Load the Digital Certificate and Extract the Private Key	The digital certificate must be stored in secure storage on the user side, where it can be retrieved and used for logging in to Web Services. Example of secure storages include the following: ■ Windows Certificate Store ■ Java Certificate Store (managed by java_keytool utility) ■ Certificate store (created by other CA Technologies security products). A user application should be able to load the digital certificate and extract the private key using appropriate APIs, depending on user environments.
Create a Digital Signature of the Plain Text Policy Code with the Private Key	After the private key is extracted from the digital certificate, it can be used to generate a digital signature of policy code. Creating a digital signature encrypts a digest of a text with a private key. The digest algorithm must be standard SHA1, and the encryption algorithm should be RSA. Also, the binary digital signature should be converted to BASE64 text format before it can be used for logging in to Web Services. Depending on user environments, appropriate API calls should be used to archive this information.
Invoke the Web Service Call	A user application should invoke the Web Services method loginServiceManaged(), along with the plain text policy code and the BASE64 text formatted digital signature of the policy code.
Obtain the Returned SID	If the access request is authenticated, a plain text SID is automatically returned.

After a SID is generated, it establishes a successful binding between a Web Service session and an access policy. The user application can invoke other web services methods with this SID, and all of its access to Web Services becomes controlled and managed by this access policy.

Session and Authorization

A successful validation returns a SID that is associated with the validated username, whether it is the user name supplied for login or the proxy contact specified in a policy. Because of this process, each CA SDM user is assigned security rights that you may want enforced in your web service application.

For example, a specific user may have a Data Partition restricting which Requests the user can view. When using a SID for the user to get Request information, the CA SDM system ensures the data partition is enforced.

Function Group security is also applied. For example, a user may not have access to the Call Manager function group. Invoking any web services methods, such as viewing or creating Requests, is denied because access is denied to the Call Manager function group.

When your application is finished doing work for a user, call the Logout() method to invalidate the SID.

Each SID expires after a period of inactivity. That is, a SID expires if the interval between method calls is greater than a certain timeout value. The timeout interval is set in Options Manager and is specified by the following CA SDM option:

```
'webservice_session_timeout'
```

If this value is set to zero (0), a SID never times out. If this option is missing or not set, the default is one hour. If a Web Service method is called with an expired SID, a Fault is returned with an error code of UDS_SESSION_TIMEOUT the first time it is referenced, and UDS_BAD_SESSION each time thereafter.

To keep a SID active, call any web service method before the time out is reached. To keep the SID active without working the server, call serverStatus().

Access Control and Management

To minimize the potential problem of web services ticket flooding and to maintain the stability of the CA SDM server, this version of CA SDM Web Services uses an Access Control and Management system. It works primarily to handle the excessive service activities initiated by trusted user applications that can result from programming errors or exceptions. It also works as a barrier for controlling access to CA SDM Web Services from malicious attackers. An administrator of a web service application is able to create and define an access policy in CA SDM that controls access to CA SDM Web Services from a web service application.

Note: A default access policy with a code of DEFAULT is provided. The default access policy contains no access restrictions and is only applied to sessions authenticated through username and password.

Define an Access Policy

To create any SOAP web services access policy, an administrator defines an access policy.

To define the access policy

1. Click the Administration tab.
2. In the tree on the left, click SOAP Web Services Policy, Policies.

The SOAP Web Services Access Policy List page appears.

3. Click Create New.

The Create New SOAP Web Services Access Policy dialog appears.

4. Enter the information for the new access policy:

Note: The default value of -1 in any operation counter indicates that no restrictions apply to the corresponding operation. A value of 0 (zero) indicates that the corresponding operation is not allowed.

Symbol

(Required) Identifies a symbolic name of the access policy.

Code

(Required) Indicates the unique text that identifies this access policy.

Status

(Required) Identifies the status of an access policy. An inactive policy is not used.

Proxy Contact

Identifies the contact to use for all web services operations and CA SDM security.

Default

Identifies the default policy. Set this policy as the default policy. Only one active default policy is allowed to exist. Creating a default policy automatically sets the current default policy to a nondefault status.

Has Key

(Read-Only) indicates whether a public key has been associated with this policy. This field is updated when a public key is associated with a policy through the pdm_pki utility.

Allow Impersonate

Identifies the allow impersonate permission. When you set this field, the policyholder can invoke the impersonate() web services method and create a web services session in the name of the user to be impersonated. Additional access authentication is not performed when creating the session. However, only when the access_level of the new access type for the user is less than or equal to the grant_level of the proxy access type for the user can this method be successfully called.

Description

Indicates the detailed description of this access policy.

Ticket Creation

Indicates the number of ticket (call request, change order, and issue) insertion operations allowed per hour.

Object Creation

Indicates the number of CA SDM object (other than ticket object) insertion operations allowed per hour.

Object Updates

Indicates the number of CA SDM object update operations allowed per hour.

Attachments

Indicates the number of attachment-related operations allowed per hour.

Data Queries

Indicates the number of data query operations allowed per hour.

Knowledge

Indicates the number of knowledge-related operations allowed per hour.

5. Click Save.

The SOAP web services policy is defined.

Web Services Methods by Category

Each CA SDM Web Services method belongs to a specific category. The following lists each category and their corresponding methods:

Ticket Creation

- createTicket()
- createQuickTicket()
- createRequest()
- createChangeOrder()
- createIssue()

Object Creation

- logComment()
- createAsset()
- addAssetLog()
- createAssetParentChildRelationship()
- createObject()
- createWorkFlowTask()
- createActivityLog()
- notifyContacts()
- addBookmark()
- addComment()
- createFolder()

Object Updates

- addMemberToGroup()
- removeMemberFromGroup()
- closeTicket()
- createLrelRelationships()
- removeLrelRelationships()
- deleteWorkFlowTask()
- updateObject()
- transfer()
- escalate()
- attachChangeToRequest()
- detachChangeFromRequest()
- changeStatus()
- clearNotification()
- updateLrel()
- deleteBookmark()
- updateRating()

Attachments

- createAttmnt()
- createAttachment()

- attachURLLink()
- deleteAttmnt()
- deleteComment()
- removeAttachment()

Data Queries

- impersonate()
- serverStatus()
- getBopsid()
- getConfigurationMode()
- getHandleForUserid()
- getAccessTypeForContact()
- getPermissionsGroup
- getObjectTypeInfoInformation()
- getRelatedList()
- getRelatedListValues()
- getGroupMemberListValues()
- getPendingChangeTasksForContact()
- getPendingIssueTasksForContact()
- getWorkFlowTemplates()
- getWorkflowTemplateList()
- getTasksListValues()
- getNotificationsForContact()
- getPolicyInfo()
- getAssetExtensionInformation()
- getLrelValues()
- getObjectValues()
- doSelect()
- doQuery()
- getPropertyInfoForCategory()
- getValidTaskTransitions()
- getListValues()

- `getListInfo()`
- `findContact()`
- `getAttmntInfo()`
- `getAttmntList()`
- `getBookmarks()`
- `getCategory()`
- `getComments()`
- `getContact()`
- `getDecisionTrees()`
- `getDocument()`
- `getDocumentTypes()`
- `getFolderInfo()`
- `getFolderList()`
- `getLrelLength()`
- `getPriorities()`
- `getRepositoryInfo()`
- `getStatuses()`
- `getTemplateList()`

Knowledge

- `createDocument()`
- `deleteDocument()`
- `doSelectKD()`
- `faq()`
- `attmntFolderLinkCount()`
- `getAttmntListPerKD()`
- `isAttmntLinkedKD()`
- `getDocumentByIds()`
- `getKDListPerAttmnt()`
- `getQuestionsAsked()`

- `modifyDocument()`
- `rateDocument()`
- `search()`

When an access policy is updated by CA SDM, Web Services dynamically updates the corresponding policy information. Active Web Services sessions controlled under this policy remain controlled with configurations in the policy. New Web Services sessions for this policy to manage and control, take the latest configurations in effect.

Note: For information about each method, see the *CA SDM Technical Reference Guide*.

Define an Error Type

Error types are assigned when creating tickets and an access policy defines one set of these error types. A CA SDM Web Services user application may use low-level web methods to create a ticket (request, change order or issue), specifying one of these types to categorize the error addressed in the ticket. Error types can be used only with the high-level `createTicket()` method. Low-level methods, such as `createRequest()`, do not use error types.

More information:

[Simplified Web Services Access](#) (see page 555)

Web Services Error Types

CA SDM Web Services also provides a defined set of default error types, which are created for *every* policy. These default types, designated as *internal* error types, can be deactivated, but cannot be deleted. In the product, you can use the Web Services Access Policy Detail page to see the default error types provided when a new policy is created.

The following information describes each internal error type:

ACCESS_ERROR

Indicates that the system failed to connect to or find a resource, such as a file, website, and so on.

EXCEPTION_FATAL

Indicates that the application is shutting down unexpectedly.

EXCEPTION_RUNTIME

Indicates that the application code encountered an exception.

LOGIN_ERROR

Indicates that the operator failed to gain access to the application.

Additional Error Types

The administrator of an access policy can add additional error types as described in the following information:

Error Type	Description
Ticket Template	Identifies a template of a Incident or Error, issue, or change order that you use to create a ticket when this error type is reported. Note: The owning policy's contact is used as the end user. The Ticket Type and Ticket Template Name define the ticket template.
Default	Indicates if this error type is the default for the policy. Only one default is allowed per policy. Note: A new default error type overwrites the existing default error type associated with the policy.
Active	Represents an active error type. Note: An inactive type does not create tickets.
Internal	Identifies the field as read-only, which indicates whether this error type is an internal, default error type.
Symbol	Indicates the symbolic name of the error type.
Code	Identifies the unique text identifier of the error type.
Description	Describes the detailed description of the error type.
Duplicate Handling	Defines the action to take when the product detects that an identical ticket already exists.

Error Type	Description
Return Data	Identifies the user-defined return message you can specify for the web method "createTicket()" to return to client applications. Return data might be used for indicating an action the application should take (Application Data Return), or a message (User Data Return) to display to the end user.

More information:

[Duplicate Ticket Handling](#) (see page 554)

Duplicate Ticket Handling

The Web Service Access Policy can detect and handle duplicate tickets, which is helpful for preventing ticket flooding. A ticket created with the potential of being a duplicate applies if all of the following conditions are true:

- At least one ticket of the same type (cr, iss, or chg) already exists and is ACTIVE.
- The existing ticket was created by the web service.
- The existing ticket was created with the same Policy and Error Type as the ticket being created.
- The "create date" of the existing ticket is within a specified threshold (for example, it was opened less than 2 days ago).

Note: The create date field is configured using the Maximum time interval for searching duplicates.

- The duplicate ID matches the one provided by users when invoking the createTicket() method.

Users can also assist in preventing duplicates by classifying tickets as being unique or different, based on criteria known to the user. To do this, add an optional string parameter to the createTicket Web Services call. If duplicate handling is on, the string parameter is inspected after other duplicate handling criteria match to determine whether this is a unique or duplicate call to this method.

Duplicate Ticket Results

If the create ticket action results in a duplicate, the existing Error Type may be configured to do one of the following:

Reconfigured Error Type	Results
Create the New Ticket and Ignore Duplicates	A new ticket handle and number are returned (default).
Do Not Create a New Ticket; Add an Activity Log to the Existing Duplicate Instead	The ticket handle and existing ticket number are returned.
Do Not Create a New ticket; Add an Entry to the CA SDM Standard Log Instead	A ticket handle and existing ticket number are returned.
Create a New Ticket and Attach it as a Child to the Duplicate	A new ticket handle and number are returned.

Simplified Web Services Access

CA SDM Web Services provides an abbreviated set of high-level web services methods that are simplified versions of existing web services methods. The majority of users applications do not have to completely rely on a large set of web services methods before requesting service desk services through CA SDM Web Services. Working closely with user-defined access policies and using default parameters defined in the policies, this set of high-level web services methods can function with little knowledge of the CA SDM object schema. Also, the high-level methods cover a common set of CA SDM functionalities that most service-aware applications need.

The following describes the use of these high-level web services methods:

createTicket (SID, Description, Error_Type, Userid, Asset, DuplicationID)

You must specify an error type for the reported error if you use this method. The error type should contain the ticket template appropriate for the ticket you want to create. It should define the action to take in the case of a duplicate ticket, specify the data outputs, and finally, it must be associated to the access policy that is defined for the user application.

When this method is invoked, CA SDM Web Services locates the current access policy and the error type required for the ticket creation. The following shows the sequence that CA SDM Web Services uses for locating the proper error type:

- If a specific error type code is provided as input and it matches a error type that is associated to the policy, this error type is used, regardless of whether it is internal.

- If an error type is not specified or the previous step fails to locate an error type, the default error type is used if there is one defined for the policy.
- If a default error type is not defined for the policy or the previous step fails, the default error type defined for internal error types is used.

After an error type is defined, CA SDM Web Services uses it to create a ticket. The proxy user defined in the access policy is used for the ticket creation if the userid is empty, and asset information is added to the ticket (if the input is not empty). After the ticket is created, CA SDM Web Services returns both user data and application data, as specified by the error type.

closeTicket (SID, Description, TicketHandle)

Users can call this function to close an open ticket. It simply sets the status of an open ticket to 'close' and adds the input description to the activity log.

logComment (SID, TicketHandle, Comment, Internal_Flag)

Adds an entry with the input comment to the activity log for the open ticket.

getPolicyInfo (SID)

Lets users obtain the policy information that controls the current web services session. You can use this information as an indicator of server capacity for this user application. Users may want to adjust their web services calls to fit into the capacity.

By having this set of simplified Web Services APIs, a majority of users are spared the tremendous effort of understanding the complete set of web services API and CA SDM schema. Using them simplifies and accelerates the process of creating service-aware enabled applications for these users.

Objects

CA SDM treats each entity, such as a contact or an issue, as an *object*. These high-level objects are defined in majic (.maj) and mod (.mod) files on the CA SDM server in the following directory:

/bopcfg/majic

Customized objects are defined in the following directory:

/site/mods/majic

Objects are essentially high-level wrappers around a database table.

An object's type (sometimes referred to as *factory*) defines the object. For example, request objects belong to the 'cr' type. Each object's type is defined by the "OBJECT" declaration in a majic file.

Note: All objects shipped with CA SDM are enumerated in the CA SDM Technical Reference Guide.

An object has *attributes*, which are essentially columns in a database table (do not confuse these with XML attributes). Web Services offers many methods to retrieve values for attributes. Many methods require you to name attributes for setting or retrieving values. You must use the attribute name assigned in the majic or mod file that defines the object, which can be different from the actual database name. Client sites can add additional attributes as a customization.

Note: For a list of all the attributes for each object, see the *CA SDM Technical Reference Guide*.

Web Services uniquely identifies an object by its *handle*, which is a string value of the form *objectType:ID*, where *objectType* is the object's type (factory) name, and ID is a unique value. The ID value matches that of the 'id' attribute found in every CA SDM object. Because the 'id' attribute is almost always indexed in the DBMS, using the ID portion of the object handle is especially valuable for forming efficient queries. Each object, regardless of its type, stores this value in an object attribute named "persistent_id".

Note: In prior releases, the ID portion of the handle was always a string of integers. In Unicenter Service Desk r11.0 and later, the ID portion may also be the string representation of a UUID, typically 32 characters.

The following information lists the object and factory names of the entities that use UUIDs:

Object Name	Factory Name
Contact	cnt
Asset	nr
Organization	org
Location	loc
Company/Vendor	ca_cmpny
Model	mfrmod

Handles are *persistent*; a handle representing a particular object is always unique for its lifetime, even across database migrations. Clients may want to take advantage of this persistence when working with fairly static objects, for example, Status or Contact Types.

Object handles are the key to using CA SDM Web Services. Many methods, especially those that update data, require handles. Most methods that return object data also include the object's handle.

System Updates and Caching

Web Services caches information for object types. Type information is not cached until the type is referenced for the first time, and will cause a small delay.

To avoid any server or caching delays, you may want to run a primer client to activate the Web Services and cache the most popular object type information. The easiest way to cache the object type information is to perform repeated calls to `GetObjectTypeInfo()`. The object types to consider for this technique could be one of the following:

Object Type	Definition
cr	Request
chg	Change Order
iss	Issue
cnt	Contact
nr	Asset
wf	CA Workflow (Change Orders)
iss_wf	CA Workflow (Issues)
prp	Property (for Change and Issue)
prptpl	Property Template (for Change and Issue)
cr_prp	Request Property
cr_prptpl	Request Property Template

Add any additional object types your client code references.

Categories and Properties

The request, change order and issue objects all have a category field, which is used to classify the nature of the ticket. A category may have property objects, which are attached to the ticket when the category is assigned. Some of these may be marked *required*, which means a value must be supplied before the ticket can be saved (applies to both insert and update operations).

CA SDM Web Services automatically supplies default values for any ticket created with the Web Services. The default value (currently, “-”) is obtained from the CA SDM localized message catalog.

If you need to set property values at creation time, there are three ticket creation methods: `createChangeOrder`, `createIssue`, and `createRequest`. Each has a parameter with which you can pass in values for any properties. To discover which properties will be attached, you must find out the properties associated with the category you intend to assign to the ticket. The easiest method to use is `getPropertyInfoForCategory()`.

Note: For more information about the `getPropertyInfoForCategory()`, see the *CA SDM Technical Reference Guide*.

To identify the valid values for a property, first find the property validation rule for the appropriate property template. To do this, request the `validation_rule` attribute when calling the `getPropertyInfoForCategory` method. Then, retrieve the associated `validation_type` for that rule. If the type is dropdown, you can then use the `getRelatedList` method to retrieve the values associated with the rule, using the "values" BREL attribute in the `prpval_rule` object.

Note: For more information, see the *CA SDM Technical Reference Guide*.

To set property values after an update operation with `updateObject()`, you must query the property list after the update. `getRelatedList()` can help with this task.

Validation of property values through Web Service methods is not currently supported. For example, to assign property values to a validation rule with a validation type of drop-down option, you would have to write additional code to create property values while creating the drop-down option validation rule. Do not attach a property value to a check box validation rule.

Note: For more information about property validation rules, see the *Administration Guide*. For information about creating property validation rules through the CA SDM interface, see the *Online Help*.

XML Object Returns

Many of the Web Services methods return an XML representation of CA SDM objects. The Web Services uses a standard XML structure beginning with the following root element:

```
<UDSObject>
```

The format of the XML representation is described in the following table:

XML Element	Type	Description
<UDSObject>	N/A	Identifies the root node.
<Handle>	String	Identifies the object's handle.

XML Element	Type	Description
<Attributes>	Sequence	Identifies the attribute values. This holds zero or more elements for the object's attribute values.
<attrName0 DataType = "typeEnum">	String	Identifies the <i>AttrName0</i>, which is an object attribute name as defined in the CA SDM majic (.maj) or mod (.mod) file. This name may use dot-notation depending on the web method used. The element's value is the attribute's value. An empty element indicates a null/empty value for this object's attribute. The DataType attribute is an integer indicating the attribute's data type in the CA SDM environment.

For example, a call to `getObjectValues()` can return information illustrated by the following:

```
<UDSObject>
  <Handle>cnt:555A043EDDB36D4F97524F2496B35E75</Handle>
  <Attributes>
    <Attribute DataType="2003">
      <AttrName>first_name</AttrName>
      <AttrValue>first name</AttrValue>
      <DisplayValue>Yaakov</DisplayValue>
    </Attribute>
    <Attribute DataType="2005">
      <AttrName>organization</AttrName>
      <AttrValue>342</AttrValue>
      <DisplayValue>Accounting Crew</DisplayValue>
    </Attribute>
  </Attributes>
  <Lists>
    <List name="mylist1">
      <UDSObject>...</UDSObject>
      <UDSObject>...</UDSObject>
    </List>
  </Lists>
</UDSObject>
```

Some methods, such as `doSelect()`, return a sequence of `<UDSObject>` elements contained inside a `<UDSObjectList>` element.

The `<Lists>` section holds zero or more `<List>` nodes. A `<List>` node holds zero or more `<UDSObject>` nodes. `<List>` elements are generally returned only when a specific request for list values is made.

When you want to return a list of values related to a specific object, you should use the *`getRelatedListValues`* method.

If a request is made just for a list with no attribute name, such as `actlog`, then the entire `<UDSObject>` is returned in the `<List>` section.

Specialized methods, like `getDocument()`, can of course be different. When a request is made for an attribute, the database value is returned. For SREL attributes, this may not be so useful. Requesting the assignee attribute of a Request returns an integer because the Contact REL_ATTR (foreign key) is its ID. For Unicenter Service Desk r11.0, the return data for attributes includes elements for the DBMS and common name value of SREL references.

ITIL Methodology

By default, the Web Services fully support the ITIL methodology. CA SDM ITIL features let you take advantage of the ITIL methodology.

Incident or Problem Creation

CA SDM supports ITIL methodology so that incidents and problems can be created using the CA SDM Web Services. Both incidents and problems are held in the `cr` (Call_Req) object. Its *type* attribute distinguishes the record as an incident, problem, or request. To create an incident, problem, or request, call `createRequest` and specify the appropriate value for the *type* attribute.

The *type* attribute is a pointer (SREL) to the `crt` (Call_Req_Type) object, so you must pass a handle as the value.

The following code examples illustrate how to create an incident or problem by passing the correct `crt` object handle to the `createRequest` method. Setting the *type* attribute in the name-value pair that is passed as a parameter to `createRequest`, creates the tickets:

Example: Syntax for a Problem

```
attrVals = {"summary", "A new problem", "description", "new problem", "type",  
            "crt:181"}  
USPSD.createRequest(SID, creatorHandle, attrVals, template, new String[0], new  
String[0])
```

Example: Syntax for an Incident

```
attrVals = {"summary", "A new incident", "description", "new incident", "type",  
            "crt:182"}  
USPSD.createRequest(SID, creatorHandle, attrVals, template, new String[0], new  
String[0])
```

More information:

[Default Handles](#) (see page 565)

Query for Incidents or Problems

To retrieve incidents or problems, include the *type* attribute of the *cr* object in the where clause. The following example illustrates a where clause for retrieving all active Incidents. This where clause could be used with methods that perform queries for 'cr' objects, such as `doSelect` and `doQuery`:

```
type.id = 182 AND active = 1
```

The '182' is the ID portion of the handle representing Incident types.

Note: For more information, see the `crt (Call_Req_Type)` objects table illustrated in [Default Handles](#) (see page 565). For more information about forming proper queries, see [WHERE Clause](#) (see page 339).

Attach an Incident to a Problem

You can associate one or more incidents to a problem. The problem attribute of an incident relates the incident to a problem.

Example: Associate an Incident to a Problem

This example demonstrates how to relate a newly created incident to an existing problem.

To associate the incident to the problem, use `UpdateObject` to set the problem attribute of the incident. The following example code sets the problem attribute to the handle of an existing problem ticket:

```
attributeValues = {"problem", "cr:12346"}  
USPSD.UpdateObject(SID, incidentHandle, attributeValues, new String [0])
```

Attach a Problem to a Change Order

Incidents and problems can be linked to change orders with the `attachChangeToRequest` method. The following example code uses this method to simultaneously create a change order and attach it to a problem. In the example, "cr:12347" is the object handle of the problem—it passes a blank handle for the fourth parameter, which causes the method to create a change:

```
USPSD.attachChangeToRequest(SID, creatorHandle, "cr:12347", "", new String[0],  
"activity description")
```

Configuration Items

ITIL methodology uses the term *configuration item* (CI) to refer to hardware, software, and other IT resources. This term refers to the “nr” object stored in the CA Technologies-owned resource database table. All methods that use *asset* objects also work with CIs. This is only a difference in terminology.

Use the Web Services

The information in this section provides you with the fundamentals for using the CA SDM Web Services. Example code using the Web Services exists in the following CA SDM installation directory:

```
<NX_ROOT>/samples/sdk/websvc/java
```

The sample code is written in Java using Apache Axis for SOAP messaging.

Logins

Before any Web Services method can be used, a SID (session ID) must be obtained from one of these methods: `login()`, `loginService()`, and `loginServiceManaged()`. The first two methods require a username and password that are validated exactly the same as the CA SDM web interface; the contact’s Access Type specifies the validation method. The third method requires a public/private key pair, where login request encrypted with the private key can only be decrypted through the public key, and vice versa.

More information:

[External Specifications](#) (see page 538)

How to Perform Common Tasks

The Web Services provides a flexible and powerful API into CA SDM, but it requires some knowledge of the object structure used by the product as follows:

1. Familiarize yourself with the information about objects and attributes in the *Technical Reference Guide*.

This guide lists the attributes of each object in the system, which is essential because many of the Web Services methods require attribute names.

2. Review the Web Services methods, especially generic ones. For example, if your application must display all the activity logs for a request, first identify how the activity logs relate to the request.

The *Technical Reference Guide* shows that the request object has two lists of Activity Logs: The act_log (which shows only noninternal logs), and act_log_all (which lists all activity logs).

3. Identify which Web Services methods you require. To get lists attached to an object, use getRelatedList() or getRelatedListValues().

Default Handles

Some default data provided by the product is frequently used. Instead of looking up handles for these objects, some of the commonly used ones are listed in the following tables.

Note: While the handles do not change, the legible symbols may be edited.

Contact Type (Object name: ctp)

Handle	Note
ctp:2307	The “Analyst” type
ctp:2310	The “Customer” type
ctp:2305	The “Employee” type
ctp:2308	The “Group” type

Impact (Object name: imp)

Handle	Note
imp:1605	Impact ‘None’
imp:1600	Low impact ‘5’
imp:1601	Medium-low impact ‘4’
imp:1602	Medium impact ‘3’
imp 1603	Medium-high impact ‘2’
imp:1604	High impact ‘1’

Priority (object name: pri)

Handle	Note
pri:505	Unassigned priority 'None'
pri:500	Low priority '5'
pri:501	Medium-low priority '4'
pri:502	Medium priority '3'
pri:503	Medium-high priority '2'
pri:504	High priority '1'

Severity (object name: sev)

Handle	Note
sev:800	Low severity '1'
sev:801	Medium-low severity '2'
sev:802	Medium severity '3'
sev:803	Medium-high severity '4'
sev:804	High severity '5'

Call Request Type (object name: crt)

Handle	Note
crt:180	Request
crt:181	Problem
crt:182	Incident

Query for Requests, Issues, or Change Orders Assigned to a Contact

One of the most common operations is retrieving the active requests assigned to an analyst (assignee). You can use one of several methods, such as `doQuery()` (to get a list reference), or `doSelect()` (to get the values immediately). Assuming the assignee's handle is already known, the where clause to use is as follows:

```
assignee.id = U'<assigneeID>' AND active = 1
```

In this where clause, <assigneeID> is the id portion of a contact handle, value, such as "555A043EDDB36D4F97524F2496B35E75".

This where clause works for requests, change orders and issues because they all have the 'assignee' and 'active' attributes, and they mean the same thing for all three object types. The 'active = 1' portion of the where clause restricts the search to active requests.

The Active Flag

Most CA SDM objects have a field called 'active' or 'delete_flag'. This is actually an SREL pointer to the Active_Boolean_Table object or Boolean_Table object. Consider adding these fields to your queries to filter objects marked as Inactive by the system administrator. For querying purposes, search for 'delete_flag = 0' to find active records and 'delete_flag = 1' for inactive records. For example, the following pseudo-code demonstrates using doSelect() to retrieve values for all active Request Status objects:

```
doSelect(SID, "crs", "delete_flag = 0", -1, new String[0]);
```

To set an object to active or inactive, you need to pass the handle of the Boolean object representing either true or false. These handles do not change, so you can safely hard-code them. These are listed as follows:

Active_Boolean_Table	Boolean_Table
actbool:4551 = 'Active'	bool:200 = 'False'
actbool:4552 = 'Inactive'	bool:201 = 'True'

Retrieve Related List Length

When requesting attribute values from an object, such as with getObjectValues(), you can get the length of a related list by requesting the following attribute:

```
"<listName>.length"
```

For example, to get the number of Activity Logs for a certain request, pass the following to getObjectValues():

```
"act_log_all.length"
```

Note: This is the only way you can use list names in these types of methods.

Representational State Transfer (REST) is a style of software architecture for distributed hypermedia systems such as the World Wide Web. The CA SDM REST API lets application, integration, and web developers build UIs and applications for devices such as tablet computers and smartphones. Users such as analysts, employees, and customers can then use the UI or application on these devices. For example, application developers can develop a CA SDM UI that lets analysts use devices to update tickets.

The REST API accesses resources by using a Uniform Resource Identifier (URI)—a character string that identifies a name or resource on the Internet. In CA SDM, resources can be objects such as tickets, assets, contacts, and so on. An application using the REST API makes an HTTP request to a URI and parses the response. Such identification enables interaction with representations of the resource over a network. Each client to server request contains all the information necessary to understand the request, and does not use any stored context on the server.

Developers use the REST API directly to send HTTP requests to the server for the resource they want to manipulate. Developers only need an HTTP client library, which is available with most programming languages. Because the REST API is based on open standards, you can use any Java programming language to access it.

Note: For information about REST HTTP methods, see the *Technical Reference Guide*.

REST and SOAP

CA SDM provides REST and SOAP web services APIs. The audience for the REST API is a UI client whereas the audience for the SOAP API is a program. REST services are about resources (manipulating objects, changing object states, exchanging representations, and using nouns rather than verbs). SOAP services are about services (calling methods, using verbs, and doing actions).

REST provides the following advantages over SOAP:

- REST is lightweight, HTTP-based, and stateless (for scalability).
- REST supports client bookmarking and caching.
- REST maintains data contract loosely.
- REST is easily consumed by front-end technologies such as WEB 2.0 and AJAX.
- REST supports XML and JSON data formats.
- REST improves performance.

REST Security

Security uses multiple authentication mechanisms including a custom approach that uses shared secret keys.

The product supports the following security authentication schemes:

- REST web services secret key authentication (uses SSL and HMAC for login)
- REST basic authentication (clear text encoded username/password)
- REST BOPSID authentication (validates CA SDM BOPSIDs)
- External (CA EEM) artifact authentication (CA EEM artifact token)

How Secret Key Authentication Works

The CA SDM Secret Key authentication is a process that verifies the following:

- The identity of the request sender.
- That the sender is a registered user.

Secret Key authentication requires that each request includes information about the identity of the request sender. The request must also include additional information that CA SDM can use to verify the authenticity of the user. When the request passes this verification test, the request is determined to be authentic. During authentication for an Access Key request, CA SDM secret authentication does the following:

1. Assigns an access key to a client. The access key identifies the client responsible for a request and uses the CA SDM session ID as the key value. Because an access key is sent as a request parameter, it is not secret. Anyone sending a request to CA SDM can use the request parameter, therefore, a secret key is needed.
2. Assigns a secret key. A secret key is a 40-character alphanumeric sequence dynamically generated by CA SDM during login. The product encrypts this secret key before storing it in the database.
3. Uses client-provided information (a request signature using the secret key) to identify the client and verify that the request is legitimate. This additional information protects users from impersonation and demonstrates possession of a shared secret known only to CA SDM and the sender of the request.

Web Service Options

These options control the web service session:

rest_webservice_access_duration

Specifies the number of hours that the REST Web Service Access Key remains active before expiration. The Access Key timeout is not based on inactivity time, but it is based on duration time since the Access Key creation. After the Access Key meets the specified duration, the Access Key ends regardless of whether it is being used.

Optionally, the REST client can also provide the Access Key duration time for the specific Access Key during the Access Key request. To provide the duration value, set it directly on the `expiration_date` attribute of the `rest_access` resource, as part of the POST request payload.

Valid Range: 1-8760 hours

Default: 168

rest_webservice_disable_basic_auth

Disables Basic Authentication in REST Web Services.

Default: No

rest_webservice_list_max_length

Specifies the maximum number of rows that a REST Web Service query returns.

Default: 500

rest_webservice_list_page_length

Specifies the default number of rows that a REST Web Service query returns per page.

Valid Range: 1-500

Default: 25

rest_webservice_resources_to_expose

Specifies the list of Majic factories (resources) that CA SDM exposes through REST Web Services. This option overrides the default behavior. By default, CA SDM exposes all factories through REST Web Services.

If you do not enter values in this option, the default behavior exposes any Majic factory that does not have the `REST_OPERATIONS` property set to `NONE`. By default, no Majic factory has this property set to `NONE`.

Use the `REST_OPERATIONS` property to set the specific HTTP CRUD (`CREATE`, `READ`, `UPDATE`, `DELETE`) methods for CA SDM to expose on a given Majic factory.

Default: `rest_access`

Example: `rest_access, cnt, grp, cr, crs, pri, alg, urg, imp, pcat, org`

hmac_algorithm

Specifies the algorithm that you use to compute the signature for Custom/Secret Key Authentication in REST Web Services.

Default: HmacSHA1

string_to_sign_fields

Specifies the fields that you use to compute the signature for Custom/Secret Key Authentication in REST Web Services, in addition to the default REQUEST_METHOD, REQUEST_URI, and QUERY_STRING fields.

Default: blank

webservice_domsrvr

Specifies the name of the object engine that SOAP web services use. If not installed, SOAP web services use "domsrvr".

The value of the option must be a string beginning with the characters "domsrvr:"

webservice_session_timeout

Sets the timeout value (in minutes) for SOAP Web Service sessions. When the time between successive web method calls is greater than the value specified, the session ID is marked expired. The session is then no longer valid.

To prevent sessions from expiring due to activity, set the value for this option to 0. Other methods, such as logoff routines, can still invalid sessions.

Note: These options require restarting the CA SDM server.

Chapter 13: Integrating with Other Products

You can integrate CA SDM with some CA Technologies products; however, we do not detail integrations with all CA Technologies products.

Note: For detailed information about additional integrations with CA SDM that are not described in this section, see the *CA Unicenter Service Desk Integrations Green Book* at <http://ca.com/support>.

This section contains the following topics:

[CA Workflow Integration](#) (see page 573)

[CA Portal Integration](#) (see page 577)

[Mainframe Product Integration](#) (see page 583)

[CA Business Service Insight Integration](#) (see page 586)

CA Workflow Integration

A workflow denotes the tasks, procedural steps, organizations or individuals involved, required input and output information, and the tools necessary for managing and maintaining each step in a business process. The workflow service provides a total solution to help you manage the business processes.

In general terms, *workflow* is best described as the automation of a business process, in whole or part, during which documents, information, or tasks are passed from one participant to another for action according to a set of procedural rules.

CA Workflow is a generic, high performance, and scalable workflow management system, that allows for the definition, management, and execution of workflows, and provides a generic workflow solution.

CA Workflow is integrated into CA SDM using web services.

CA Workflow Components

CA Workflow uses the following components that are delivered with the Workflow Embedding Kit:

- [Workflow Design Environment](#) (see page 574)
- [Workflow Server](#) (see page 575)
- [Worklist](#) (see page 575)

The CA Workflow Design Environment

You use the CA Workflow Design Environment to create and manage workflows. The CA Workflow Design Environment is your primary tool for creating and managing process definitions and workflow instances, and for controlling workflow participant interaction.

A company creates a business process to identify the resources, manual and automated activities, and activity relationships to realize its business goals. A workflow partially or fully automates the business process by defining the business process activities in a process definition. These workflow activities commonly include passing forms, tasks, or information from one resource to another, where the resource may be human or software.

A process definition is a representation of your business process. A process definition is comprised of nodes, events, roles, actors, work, and the criteria for process start and process end.

While process definitions represent what you want to happen in your business process, process instances represent what is actually happening. By running a process definition, you create a process instance. You can create multiple process instances of the same process definition, also called a process definition instance.

Start the CA Workflow Design Environment (Windows)

At any time, you can start the CA Workflow Design Environment to create and manage workflows. To start the CA Workflow Design Environment, select Start, All Programs, CA, Service Desk Manager, CA Workflow IDE.

Note: You can also start the CA Workflow Design Environment by double-clicking the *ide.bat* file, located in the `$NX_ROOT\site\Workflow\Client` directory. If the IDE classpath requires additions to accommodate application requirements, you must modify the APPCPATH parameter in the *ide.bat* and use the *ide.bat* to invoke the IDE.

Start the CA Workflow Design Environment (Linux)

At any time, you can start the CA Workflow Design Environment to create and manage workflows. To start the CA Workflow Design Environment, run the *ide.sh* file, located in the `$NX_ROOT/site/Workflow/Client` directory. The CA Workflow IDE is not supported on UNIX.

Note: To accommodate application requirements, the *ide.sh* file has an APPCPATH parameter which can be modified to add to the classpath.

CA Workflow IDE Parameters

When you access the CA Workflow Design Environment, a login screen displays. This login screen is pre-populated with user name, password, and URL connection. For streamlined access to the IDE, you can completely bypass the login screen by using a combination of the following command line parameters:

```
-u <username>  
-p <password>  
-url <PM URL>  
-t <eIAM Safe Session token>
```

You can invoke the IDE by providing either a user name and password (-u and -p) or by providing a token (-t). The -t token refers to an exported SafeSession (also referred to as an artifact) which is a String. This allows for parent products to re-use any existing SafeSessions they may have, rather than prompting for a user name and password again.

The -url is a required parameter that must be supplied regardless of whether you use the -u and -p userid/password method or the -t token method.

For example, [-u, -p, -url] or [-t, -url]

To use this facility to bypass the IDE logon screen, edit either the ide.bat file (for Microsoft Windows) or ide.sh (for Linux) to add these parameters to the list of parameters passed to the java command.

Note: This facility cannot be used with the ide.exe.

CA Workflow Server

The CA Workflow server exposes runtime execution and management services for workflow processes. The CA Workflow server consists of these components:

- Actor Adapters allow for expansion of workflow activity functionality
- The Process Engine executes process definition instances
- The Process Manager provides management for process definitions as well as process instances

All workflow clients, the Process Designer, the Worklist, and both the Java and Web Services API use services provided by the CA Workflow server.

Worklist

The Worklist is launched using a web browser (for example, `http://<hostname>:<port number>/wl`) or using API calls from an embedding product.

CA Workflow Access

CA SDM provides workflow management using a common Workflow engine. The workflow system provides a graphical workflow definition environment, sophisticated branching mechanisms, and the ability to interact with individuals who do not have direct access to the CA SDM application for gaining approvals. You can use CA Workflow authentication and [add users](#) (see page 576) to the CA Workflow groups.

CA EEM and CA Workflow

All logins to CA Workflow are authenticated by CA EEM. A user must have a CA EEM user record in order to access the CA Workflow IDE or Worklist application. The CA Workflow administrator, specified during CA SDM configuration, has full access to CA Workflow. By default, this administrator is used by CA SDM for the CA Workflow integration. This user account is set by the `cawf_username` and `cawf_password` Options in Options Manager. You must make sure the username and password set in these options are correct and the user has full access to CA Workflow resources within CA EEM.

Resource Classes

CA Workflow also uses CA EEM to restrict access to specific CA Workflow functions. The access is controlled by two Resource Classes:

IDE

The IDE resource has a single action named *login* for login access to the IDE. A user must have permission for this action to log in to the CA Workflow IDE application.

Process

The Process resource has the single action named *start* for the ability to start a process instance. A user must have permission for this action to start processes from within the Worklist web application. All users have access to the CA Workflow Worklist application to view and perform workitem tasks. This permission is only for starting new instances from the Worklist.

Note: These resource classes are defined with the CA SDM application instance in CA EEM. When logging in to the CA EEM Web user interface, you need to specify the CA SDM application instance in order to see the resources, policies and groups discussed here.

Add Users to CA Workflow Groups

Users who need to either log in to the IDE or start process instances need an authorization grant to the resources and the two actions. The CA SDM configuration adds two policies to CA EEM that grant access to these resources. Two user groups are also added that are granted rights to the policies: CA Workflow Administrators and CA Workflow Process Initiators. Adding users to the CA Workflow Administrators group gives them access to the IDE. Adding users to the CA Workflow Process Initiators group allows them to start processes from the Worklist application.

To add/remove users from the groups on the computer where CA EEM is installed

1. Complete one of the following steps:
 - For CA EEM r8.4 SP4 CR05, select Start, Programs, CA, Embedded Entitlements Manager, EEM UI.
 - For CA EEM r12 CR02, select Start, Programs, CA, Embedded Entitlements Manager, Admin UI.

The login window displays.

2. Select the CA SDM application and enter the CA EEM administrator name and password.

The main CA EEM window appears.

3. Select Manage Identities.
4. Select the Users Search, enter search criteria, and click Search.
5. Select a user in the result list.
6. On the user details display, add/remove group membership in the Application Group Membership section.

If this section is not displayed, click Add Application User Details.

7. Click Save.

The users are added to the groups.

CA Portal Integration

You can access CA SDM components through CA Management Portal and CA Portal.

Note: CA Management Portal and CA Portal are not shipped with CA SDM, and must be purchased and licensed separately. CA SDM provides only the most basic information for accessing CA SDM through Portal Administration. For detailed information, see the *CA Portal* and *CA Management Portal Server Administration Online Help*.

Verify CA SDM Web Interface Accessibility

After CA SDM is installed on a system, make sure that you can access the web interface through the tomcat server. For Portal Integration to work, the CA SDM Web Interface must be accessible through tomcat.

Note: For CA SDM LINUX server installation, the LD_LIBRARY_PATH must be set to \$NX_ROOT/sdk/lib.

Install and Start CA Portal

For detailed information on installing, starting, and stopping CA Portal, see the *CA Portal Getting Started Guide* that applies to your installation.

Note: You can install CA Portal on the system where CA SDM is installed, or on a separate system.

Include Portlets

You can use the product to include CA SDM portlets in the portal.

To include portlets

1. Log in to CA SDM and click Search from the Options Manager on the Administration tab.

The Options List window appears.

2. Click Portal_Safe_List.

The Portal_Safe_list Detail window appears.

3. Enter the *servername:portnumber* where the portal was installed in the Options Value Field.

Note: For more information about this option, see the *Online Help*.

4. Click Install.
5. Restart CA SDM daemon.
6. Log into CA Portal as an administrator.
7. Create a user which is valid CA SDM User. For more information about how to create a user, see the CA Portal documentation.
Note: The password used while creating this user in the portal could be different from the password used by this same user to log in to CA SDM, as CA SDM authenticates the users for this integration using a combination of the following, username, a valid CA Portal session and the CA Portal install value if it exists in the PORTAL_SAFE_LIST option.
8. Select Knowledge from the main CA Portal menu bar.
The Knowledge page appears.
9. Select Library from the left pane Knowledge bar.
The Library tree appears in the left pane.
10. Select (or create then select, if necessary) a folder in the Library tree, then select Publish File from the right pane Knowledge bar.
The Publish File form opens.

11. Type the following CA SDM portlet URL in the Content text box on the General Information tab:

`http://hostname:portnumber/CAisd/PortalServlet?USERNAME=$USER.username$&PORTALSESSION=$SESSION$&PORTALINSTALL=portalhostname:portalportnumber`

Note: Substitute *hostname:portnumber* in the URL with the name and port of the web server on which CA SDM resides. Substitute *portalhostname:portalportnumber* in the URL with the name and port of the web server on which Portal resides.

12. Enter CA SDM in the Title text box.

13. Click Advanced.

The Advanced properties page of the Publish File form displays.

14. Enter *portal/variable-url* in the Content (mime) Type field and click Publish.

The published contents appear in the selected Library folder.

15. Configure the Workplace to display this portlet.

16. Log out and log in as the newly created user. You should be automatically logged into CA SDM in the portlet you just created without logging in again.

Note: While running CA SDM in the portlet, the preference Avoid Popups is not available in the Preference page and a popup window is always used regardless of the setting of the preference.

Connect to the CA Portal Server

To connect to the CA Portal server, open a web browser, and enter the following URL in the location or address field:

`http://<servername>:<port#>/servlet/portal`

<servername>

Specifies the server name (or IP address) of the portal server.

<port#>

Specifies the port number that the CA Portal server monitors. You specified the port number during the CA Portal server installation. The default port is 8080.

Configure CA SDM to Use SSL with CA Portal

Note: For production purposes, we recommend that you obtain a certificate from a trusted certificate authority.

Before configuring CA SDM to use SSL, check to see if the CA Portal and CA SDM integration works without SSL. If the integration works without SSL, you can include portlets.

More information:

[Include Portlets](#) (see page 578)

Set Up SSL Using a Self-Signed Certificate

To set up the CA SDM Portal Integration using a self-signed certificate

1. At the command line, enter:

```
%JAVA_HOME%\bin\keytool -genkey -alias tomcat -keyalg RSA
```

Answer the prompts appropriately and enter "changeit" as the password for both password prompts.

This sets up the certificate.

2. Edit the server.xml file located in:

```
$NX_ROOT/bopcfg/www/CATALINA_BASE/conf
```

3. Uncomment the following section and save:

```
<!--  
<Connector className="org.apache.coyote.tomcat4.CoyoteConnector"  
    port="8443" minProcessors="5" maxProcessors="75" enableLookups="true"  
    acceptCount="100" debug="0" scheme="https"  
    secure="true" useURIVValidationHack="false" disableUploadTimeout="true">  
    <Factory className="org.apache.coyote.tomcat4.CoyoteServerSocketFactory"  
        clientAuth="false" protocol="TLS" /></Connector>  
-->
```

4. Add keystoreFile attribute to server.xml. (When you run the command in step 1, a .keystore file is created in the user's home directory. Add the reference to the keystoreFile attribute and Save the file. Your server.xml should appear as follows.

```
<Connector className="org.apache.coyote.tomcat4.CoyoteConnector"  
    port="8443" minProcessors="5" maxProcessors="75" enableLookups="true"  
    acceptCount="100" debug="0" scheme="https" secure="true"  
    useURIVValidationHack="false" disableUploadTimeout="true">  
    <Factory className="org.apache.coyote.tomcat4.CoyoteServerSocketFactory"  
        clientAuth="false" protocol="TLS" keystoreFile="location/.keystore" />  
    </Connector>
```

5. Restart CA SDM.
6. To check the SSL functionality, point your browser to *https://hostname:8443*. This should display a Security Alert dialogue. Click Yes.

Note: SSL uses port 8443.

7. Replace the CA SDM portlet to use HTTPS and port 8443.

```
https://hostname:8443/CAisd/PortalServlet?
```

```
USERNAME=$USER.username&&PORTALSESSION=$SESSION&&PORTALINSTALL=portalhostname  
:portalportnumber
```

Connect to CA SDM when CA Portal Uses SSL

You can import the CA Portal Server Certificate so that a trusted connection can be made between CA SDM and CA Portal (when CA Portal is configured to use SSL).

To connect to CA SDM when Portal Uses SSL

1. Verify that CA Portal is configured and works with SSL.

Note: For information about the verification process, see your CA Portal documentation.

2. Export the certificate from the computer on which CA Portal is installed by following these steps:

- a. Locate the server.xml file at the following location:

```
PORTAL_Install_Dir\jakarta-tomcat-4.1.29\conf.
```

- b. Note the keystore location and password (pwd), as illustrated in the following lines in server.xml. The default password is *changeit* (all lower case). If you used a custom password while creating the certificate during the portal setup, you will have to use the custom password. For information, see your CA Portal documentation. In the following steps and examples, *changeit* is the default password used:

```
<!-- Define a SSL Coyote HTTP/1.1 Connector on port 8443 -->  
<Connector className="org.apache.coyote.tomcat4.CoyoteConnector"  
    port="8443" minProcessors="5" maxProcessors="150"  
    enableLookups="true"  
    acceptCount="100" debug="0" scheme="https" secure="true"  
    useURIVValidationHack="false" disableUploadTimeout="true">  
    <Factory className="org.apache.coyote.tomcat4.CoyoteServerSocketFactory"  
        keystoreFile="c:\Program Files\CA\SC\Unicenter Management  
Portal\UMPkeystore"  
        keystorePass="changeit"  
        clientAuth="false" protocol="TLS" />  
    </Connector>
```

- c. Navigate to the JRE bin directory (PORTAL_Install_Dir\jre\bin) on the portal server computer to access the keytool utility that you will use for exporting the PORTAL Server certificate to a file.

- d. Access the keytool utility, using the following command:

```
keytool -export -alias tomcat -file umpserver.cer -keystore "c:\Program Files\CA\SC\Unicenter Management Portal\UMPkeystore"
```

Enter keystore password: *changeit*

Certificate stored in file <umpserver.cer>

Note: When prompted for the password, be sure to use the password obtained from step 2b. In the previous example, *changeit* is the password noted in step 2b. The keystore location is also obtained from step 2b.

3. Import the certificate obtained from the server to the computer containing the CA SDM installation by using the keytool utility, as follows:

- a. On the CA SDM computer, navigate to the JRE\bin directory directory, typically at the following location:

C:\Program Files\CA\SC\JRE\bin.

- b. The certificate should be imported into the Certification authority used by the CA SDM Java Virtual Machine.

The following is an example of an import. In this example, the location of the Certificate authority is:

C:\Program Files\CA\SC\JRE\1.4.2_06\lib\security\cacerts

When prompted for a *pwd*, enter “*changeit*”. When prompted for *Trust this certificate*, enter Yes.

```
Keytool.exe -import -alias tomcat -trustcacerts -file umpserver.cer  
-keystore "C:\Program Files\CA\SC\JRE\1.4.2_06\lib\security\cacerts"
```

Enter keystore password: *changeit*

Owner: CN=ump001.ca.com, OU=unicenter, O=ca, L=islandia, ST=ny, C=us

Issuer: CN=ump001.ca.com, OU=unicenter, O=ca, L=islandia, ST=ny, C=us

Serial number: 43ecb469

Valid from: Fri Feb 10 10:42:33 EST 2006 until: Thu May 11 11:42:33 EDT 2006

Certificate fingerprints:

MD5: A1:AF:AE:92:39:2E:53:D5:1C:6D:FE:44:68:61:DD:5C

SHA1:

66:3A:BC:77:32:81:60:89:70:B9:EF:FB:74:3D:93:74:CD:8E:E2:D2

Trust this certificate? [no]: *yes*

Certificate was added to keystore

Note: When prompted for the password, use the password obtained from step 2b. In the previous example, *changeit* is the password noted in step 2b.

4. Edit the file portal-xml-api.xml under
\$NX_ROOT\bopcfg\www\CATALINA_BASE\webapps\CAisd\WEB-INF\xml\portal-xml-api.xml by completing the following steps:

- a. Replace http in the line:

```
<!DOCTYPE PORTAL SYSTEM
```

```
"http://127.0.0.1:8080/servlet/media/xml/api/request.dtd">
```

With https:

```
<!DOCTYPE PORTAL SYSTEM  
"https://127.0.0.1:8080/servlet/media/xml/api/request.dtd">
```

- b. Save the file.
- c. If Portal_Safe_List has been installed, make sure you change the port number to 8443 and the computer name to include the domain name (for example, computername.ca.com:8443).

Important! Include the domain name in the computer name as the portal certificate contains the domain name. For more information, see your CA Portal documentation.

5. Recycle the CA SDM server.
6. From CA Portal, connect to the CA SDM Portlet using the following URL:

`http://hostname:portnumber/CAisd/PortalServlet?USERNAME=$USER.username&PORTALSESSION=$SESSION&PORTALINSTALL=servername:8443`

Note: Substitute *servername* in the URL with the name of the web server on which CA Portal resides. The server name in this URL should include the domain name, for example, *servername.ca.com:8443*. Substitute the *hostname:portnumber* in the URL with the name and port of the web server on which CA SDM resides.

More information:

[Include Portlets](#) (see page 578)

Mainframe Product Integration

CA SDM side data (.dat file) is associated with mainframe product integrations.

Load CA SDM Side Data

The CA SDM side data (.dat file) associated with mainframe product integrations is in a list that associates a .dat to the mainframe product name.

Note: The CA SDM server is configured, by default, to use ITIL methodology.

To load CA SDM side data to enable a particular integration, use *pdm_userload -f integXXX.dat*.

The data files are delivered to \$NX_ROOT\data\integrations\.

Note: For information about enabling the calling side (mainframe product side) of the integration, see the *CA Common Services for z/OS - CA Service Desk Integration Guide*.

CA Products Currently Using CAISDI

The following table lists the CA mainframe products currently using CAISDI and the associated .dat files:

CA Product	Primary Data File	ITIL Update File
CA Advantage EDBC	integEDBC.dat	
CA 1 Tape Management	integCA1.dat	itil_integCA1.dat
CA Allocate DASD Space and Placement	integAllocate.dat	itil_integAllocate.dat
CA Disk Backup and Restore	integDisk.dat	itil_integDisk.dat
CA TLMS Tape Management (CA TLMS)	integTLMS.dat	itil_integTLMS.dat
CA Vantage Storage Resource Manager (CA Vantage SRM)	integVantage.dat	itil_integVantage.dat
CA 7 Workload Automation (CA 7 WA)	integCA7.dat	itil_integCA7.dat
CA JARS Resource Accounting (CA JARS RA)	integJARS.dat	itil_integJARS.dat
	integJARSMVS.dat	itil_integJARSMVS.dat
CA MIM Resource Sharing (CA MIM RS)	integMIM.dat	itil_integMIM.dat
CA OPS/MVS Event Management and Automation (CA OPS/MVS EMA)	integOPSMVS.dat	itil_integOPSMVS.dat
CA SYSVIEW Performance Management (CA SYSVIEW)	integSysview.dat	itil_integSysview.dat
CA NetMaster Network Management for TCP/IP (CA NetMaster NM for TCP/IP)	integNetMaster.dat	itil_integNetMaster.dat
CA NetMaster Network Management for SNA (CA NetMaster NM for SNA)	integNetMaster.dat	itil_integNetMaster.dat
CA NetMaster Network Automation (CA NetMaster NA)	integNetMaster.dat	itil_integNetMaster.dat
CA NetMaster	integNetMaster.dat	itil_integNetMaster.dat
CA NetMaster Network Operations for TCP/IP (CA NetMaster NO for TCP/IP)	integNetMaster.dat	itil_integNetMaster.dat
CA NetMaster File Transfer Management (CA NetMaster FTM)	integNetMaster.dat	itil_integNetMaster.dat
CA MICS Resource Management (CA MICS)	integNeuMICS.dat	itil_integNeuMICS.dat

CA Products Planning to Use CAISDI

The following table lists the CA mainframe products that would use CAISDI and the associated .dat files:

CA Product	Primary Data File	ITIL Update File
CA 2E	integ2e.dat	
CA Enterprise Workload Automation	integAutoSys.dat	
CA Bundl	integBundl.dat	
CA 11 Enterprise Workload Automation Restart and Tracking	integCA11.dat	
CA Connect	integConnect.dat	
CA Datamacs	integDatamacs.dat	
CA Date Simulator	integDate.dat	
CA Deliver	integDeliver.dat	itil_integDeliver.dat
CA Dispatch	integDispatch.dat	itil_integDispatch.dat
CA FAVER VSAM Data Protection	integFaver.dat	
CA FileAge	integFileAge.dat	
CA File Master Plus	integFileMaster.dat	
CA Filesave RCS Automated Recovery	integFileSave.dat	
CA Gen	integGen.dat	
CA GSS (Common component)	integGSS.dat	
CA InterTest	integInterTest.dat	
CA JCLCheck Enterprise Workload Automation	integJCLCheck.dat	
CA Jobtrac Job Management	integJobtrac.dat	itil_integJobtrac.dat
CA LPD Report Convergence	integLPD.dat	
CA Optimizer	integOptimizer.dat	
CA Optimizer/II	integOptimizerII.dat	
CA Plex	integPlex.dat	
CA Scheduler Job Management	integScheduler.dat	
CA Spool Enterprise Print Management	integSpool.dat	itil_integSpool.dat
CA SymDump	integSymDump.dat	
CA Verify	integVerify.dat	

CA View

integView.dat

itil_integView.dat

CA Business Service Insight Integration

CA Business Service Insight (CA BSI) lets you manage IT service performance, such as integrating service and service level performance management, and leveraging service ratings and comparisons. CA BSI helps your organization determine how services perform against Service Level Agreements (SLAs). CA BSI provides Service Level Management (SLM) information to Service Desk Analysts in CA SDM to manage changes to various IT services in your organization. This SLM information helps ensure better decision making and improved IT delivery.

The CA BSI integration adds tabs that appear on CI detail forms in CA SDM. The Service Level Compliance and Modified Service Level by Metrics vs Target reports provide information about CA SDM Enterprise Service Family CIs. The Modified Service Level by Contract vs Target report provides information about CA SDM Contract Family CIs.

Note: These tabs only appear for CIs with Federated Asset Mappings to the CA BSI MDR.

When you integrate CA SDM with CA BSI, users can display Metric data for Contract CIs that are associated with a CA BSI MDR. Users must specify a Contract Party (CA BSI Entity) before they submit the request. A CA BSI limitation prevents metric data from being properly displayed for Contract Parties that have certain non-alphanumeric characters within the name. We recommend that you use alphanumeric Contract Party names and avoid using any of the following characters:

reserved = gen-delims / sub-delims

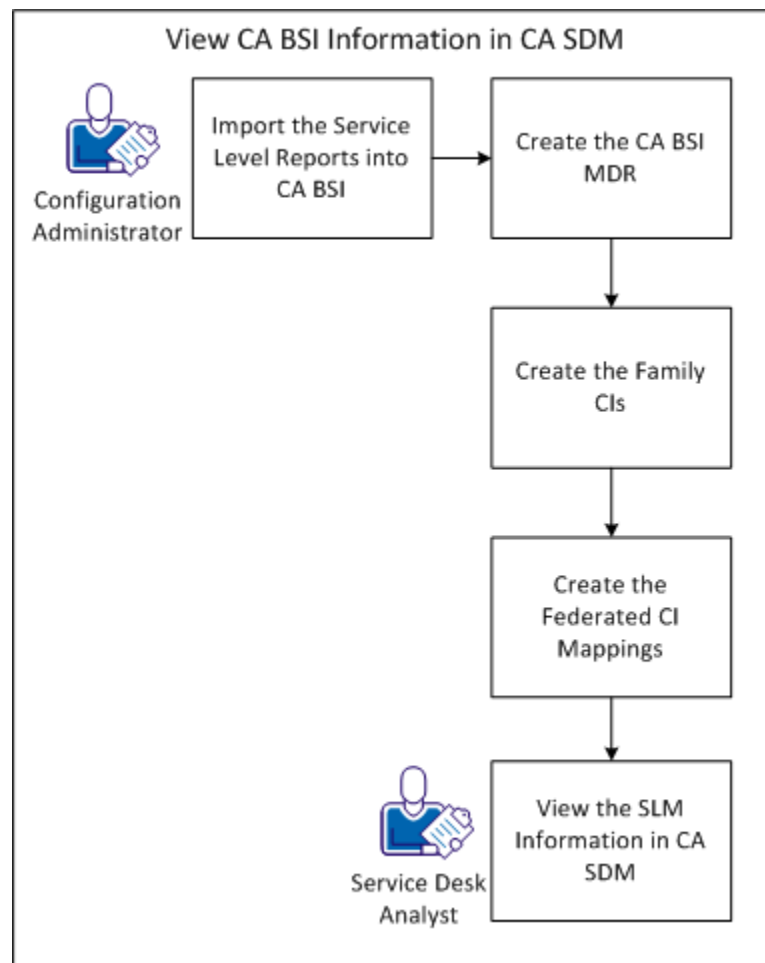
gen-delims = : / ? # [] @

sub-delims = ! \$ & ' () * + , ; =

View CA BSI Information in CA SDM

An organization wants to improve the management of changes to IT services and decides to integrate CA BSI and CA SDM. The integration lets CA BSI export Service Level Management (SLM) information into CA SDM. The Configuration Administrator imports the reports into CA BSI and configures CA SDM so that a Service Desk Analyst can view the SLM information. Service Desk Analysts work with this information to improve IT service delivery.

The following diagram explains how a Configuration Administrator enables CA BSI to export SLM data to CA SDM so that a Service Desk Analyst can view the information:



1. [Import the Service Level Reports into CA BSI](#) (see page 588).
2. [Create the CA BSI MDR](#) (see page 588).
3. [Create the Family CIs](#) (see page 589).
4. [Create the Federated CI Mappings](#) (see page 590).
5. [View the SLM Information in CA SDM](#) (see page 591).

Import the Service Level Reports into CA BSI

CA BSI provides the *Service Level Compliance* report by default. The BSI Service tab appears on CI detail pages in CA SDM and displays Exceeds and Violations counts. You import the *Modified Service Level by Metrics vs Target* and *Modified Service Level by Contract vs Target* reports into CA BSI.

Follow these steps:

1. Copy the \$NX_ROOT/samples/BSI/bsireports.sql file to the CA BSI database server.

This Oracle script contains the report definitions that are required for the integration between CA BSI and CA SDM.

2. Connect to the CA BSI Oracle instance with a user that has the SYSDBA role, or connect as the database owner.

Important! This user *must* have update rights to the database. Confirm if you have these privileges with your Oracle Database Administrator.

3. Execute the bsireports.sql script and verify that no errors occur.

The reports are available for the CA SDM integration.

Create the CA BSI MDR

The Configuration Administrator creates an MDR for CA BSI in CA SDM. This MDR provides information about the CA BSI server, such as the host name and privileged user ID.

Follow these steps:

1. On the Administration tab, click CA CMDB, MDR Management, MDR List.
2. Click Create New.
3. Complete the following example information:

- Enter **BSI** as the Class name.
- Enter labels for the button and MDR names.
For example, you enter **BSI**.
- Enter the host name of the CA BSI server.
- Enter **sadmin** as the Userid and enter **CA** as the Shared Secret.

Note: This information depends on your user name and organization. Confirm this information with your CA BSI Administrator.

- Delete all the contents of the URL to Launch in Context field.
4. Click Save and close the window.

Create the CIs in CA SDM

Create the Enterprise Service and Contract Family CIs in CA SDM. These CIs correspond to CA BSI data that you want to view in CA SDM. In this example, you create Service 1 and Contract 7.

Follow these steps:

1. On the Administration tab, click CA CMDB, CI List.
2. Click Create New.
3. Complete the following information:
 - Enter **Service 1** as the name.
 - Enter **Business Service** as the Class.
4. Click Continue.
5. Click Save and close the window.
6. Create another CI with the following information:
 - Enter **Contract 7** as the name.
 - Enter **License Agreement** as the Class.
7. Click Continue.
8. Click Save and close the window.

Create the Federated CI Mappings

Create the Federated CI Mappings to complete the integration between CA BSI and CA SDM. This mapping provides information about a CI. In this example, you map Service 1 and Contract 7 to the BSI MDR.

Follow these steps:

1. On the Administration tab, click CA CMDB, MDR Management, Federated CI Mapping.
2. Click Create New.
3. Complete the following fields:
 - Enter **Service 1** as the CI Name and Federated Asset ID.
 - Enter **BSI** as the MDR Name.

Important! Verify that you enter the same Federated Asset ID as the Service and Contract names in CA BSI.
4. Click Save and close the window.
5. Create another mapping and complete the following fields:
 - Enter **Contract 7** as the CI Name and Federated Asset ID.
 - Enter **BSI** as the MDR Name.
6. Click Save and close the window.

View the SLM Information in CA SDM

The Service Desk Analyst views the SLM information to manage changes to IT services within your organization. For example, you want to analyze the violations that appear for Service 1.

Follow these steps:

1. On the Administration tab, click CA CMDB, CI List.
2. Search for the Enterprise.Service and Contract Family CIs that you integrated with CA BSI.
3. Open an Enterprise.Service Family CI to view the BSI Service and BSI Service Metric tabs.
4. Click BSI Service to view Exceed and Violation information from *Service Level Compliance* data in CA BSI.

The Exceeds and Violations data from the CA BSI *Service Level Compliance* report appears for Service 1.

5. Click BSI Service by Metric to view the Metric, Violation, Compliant and Target report from the *Modified Service Level by Metric vs Target* data in CA BSI.
6. Open a Contract Family CI that you integrated with CA BSI and click the BSI Contract by Metric tab.

Note: Contract CIs contain the BSI Contract by Metric tab. This tab contains a text box where you enter the Contract Party of the Contract to retrieve information from the *Modified Service Level by Contract vs Target* report in CA BSI.

You have now successfully integrated CA BSI with CA SDM to view SLM information in CA SDM.

Chapter 14: Samples Directory

This section contains the following topics:

[Contents of the Samples Directory](#) (see page 593)

Contents of the Samples Directory

You can modify several files in the `$NX_ROOT/samples` directory for use with various external interfaces. These files are grouped into various subdirectories. None of the files in the samples directory are executable as originally shipped.

How to Modify the Message Catalog

To modify the message catalog, complete the following steps:

1. Refer to the format of `pdm.xml` that is located in `$nx_root/bin`.
2. Create a customized copy of `pdm.xml` and place it in the `$nx_root/msg_catalog` directory.
3. Add, modify, or add and modify messages in the XML message files from the previous step.

call_mgt

Contains samples for customization in request management.

gencr.frg

This file can be used in conjunction with `bop_cmd` to create requests from a command line. All notifications and activity log entries will occur, however no Request Form will display on the server when created. You must use the `-u` parameter to execute `gencr.frg` with the `bob_cmd` utility. Be sure to read the `gencr_readme.txt` file to learn the syntax, and how to modify it if necessary. The file should be placed in `$NX_ROOT/site/mods/interp`, if the directory does not exist, you should create it. Example: `bop_cmd -d domsrvr -u nsm -f gencr.frg "gencr( 'My Description' )"`

iss_site.mod

This file can be used to enable activity logging of site-adapted fields in issues. This file should be placed in `$NX_ROOT/site/mods/majic` after it has been changed for the site-adapted fields.

cr_site.mod

This file can be used to enable activity logging of site-adapted fields in requests. This file should be placed in \$NX_ROOT/site/mods/majic after it has been changed for the site-adapted fields.

chg_site.mod

This file can be used to enable activity logging of site-adapted fields in change orders. This file should be placed in \$NX_ROOT/site/mods/majic after it has been changed for the site-adapted fields.

gencr_readme.txt

This file contains instructions on how to use the gencr.frg file.

chg_site.spl

This file may be modified to change the mapping of attributes when creating a change order from a request. This file should be placed in \$NX_ROOT/site/mods/majic after the appropriate changes have been made.

audlog_site.mod

This file can be used to enable audit logging of site-adapted fields. This file should be placed in \$NX_ROOT/site/mods/majic after it has been changed for the site-adapted fields.

Notify_add.spl (UNIX only)

This file can be used to add the request's log agent, assignee and group to the request notification list. This file should be placed in \$NX_ROOT/site/mods/majic.

Notify_replace.spl (UNIX only)

This file can be used to add the request's log agent, assignee and group to the request notification list when they are changed. This file should be placed in \$NX_ROOT/site/mods/majic.

data

This directory contains files depicting the Logical Data Model for most database tables in CA SDM. This data directory also includes sample data for Knowledge Management.

macro_lock

This file contains a spel fragment that can be run using a bop_cmd to turn off locks that are being held by macros.

multi-tenancy

This directory contains sample files for administering multi-tenancy.

More information:

[How to Convert an Existing Tenant Implementation to the Tenant Object](#) (see page 299)

[How to Populate the Tenant Attributes in Your Tables](#) (see page 300)

pdmconf

web.xml.tpl

pdm_startup.tpl

pdm_edit_usage_notes.htm

alias_install.bat

web.cfg.tpl

pdm_startup.i.tpl

pdm_edit.pl

README_files

All of these files are used by `pdm_edit.pl` to create startup files for a primary server and secondary servers that are configured to run a variety of daemons.

reporting

This directory contains documentation and samples for configuring offline reporting.

More information:

[Replicated Database for Offline Reporting](#) (see page 247)

sdk

This directory contains a sample file for making CA SDM SOAP web service calls.

TableOfContents.doc further explains what is available, found in the following directory:

`$NX_ROOT\samples\sdk\websvc`

PKI_loginServiceManaged_JAVA_steps.doc and
PKI_loginServiceManaged_PERL_steps.doc explain how to configure ServiceDesk for
digital certificate logins in the following directory:

`$NX_ROOT\samples\sdk\websvc\java\test1_pki`

The following lists PERL and JAVA samples, examples, and locations:

- PERL samples

`$NX_ROOT\samples\sdk\websvc\perl\test1_pki`

Example: loginServiceManaged() web service call

- JAVA samples

`$NX_ROOT\samples\sdk\websvc\java\test1_pki`

Example: loginServiceManaged() and getBopsid() web service call

`$NX_ROOT\samples\sdk\websvc\java\test2_basic`

Example: Combined CreateRequest() and CreateChangeOrder() web service call

views

This directory contains database scripts uses for migration, multi-tenancy
administration, and other processes.

More information:

[Database Considerations](#) (see page 29)

[How to Implement Multi-Tenancy](#) (see page 280)

Chapter 15: Loading Supplemental Content

This section contains the following topics:

[sd_content.dat](#) (see page 597)

sd_content.dat

Supplemental content for CA SDM is available in sd_content.dat. This data file contains Change Category and Root Cause records. To load the data from a command window, go to \$NX_ROOT/data and run the following command:

```
pdm_load -f sd_content.dat
```