CA Technologies Product References

This document references the following CA Technologies products:

- CA Spectrum® Service Assurance (CA Spectrum SA)
- CA IT Process Automation Manager (CA IT PAM)
- CA Catalyst (CA Catalyst)
- CA Clarity™ Project & Portfolio Manager (CA Clarity PPM)
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Chapter 1: CA Clarity PPM Connector Overview

This section contains the following topics:

About This Guide (see page 7)
Terminology (see page 8)
CA Clarity PPM Connector (see page 9)
Integration Scenarios (see page 10)

About This Guide

This guide describes how to install and configure the CA Catalyst connector for CA Clarity PPM (CA Clarity PPM connector). CA Catalyst connectors:

■ Integrate with a common connector framework.
■ Transform product data to a common language.
■ Expose data from CA Technologies and third-party products to consuming products, such as CA Spectrum SA and CA IT PAM.

Once the data is exposed, you can visualize, manage, and analyze the data in the consuming product in a unique, heterogeneous context.

This guide contains information specific to the CA Clarity PPM connector.

See the CA Spectrum SA Connector Guide distributed with CA Spectrum SA for more information about CA Catalyst connectors and infrastructure. The guide also contains information about all and custom connector integrations.
Terminology

The following are the common concepts and terms used when integrating CA Catalyst connectors with a consuming product, such as CA Spectrum SA:

Connectors

Connectors collect data from external products, referred to in this guide as domain managers, and transmit the data to consuming products, such as CA Spectrum SA. Each connector retrieves information from its domain manager and transmits the information through the connector framework to the consuming product for visualization and analysis. Connectors can also enact inbound operations on data in the source domain manager, such as object creation. CA Catalyst connectors use a unified connector framework to enable integration with multiple consuming products.

USM

The Unified Service Model (USM) is a schema of common object types and properties to which data from all connectors is converted. The USM schema enables analysis of data from all domain managers in a common interface with identical data formatting.

Configuration Items (CIs)

Configuration items (CIs) represent IT elements managed by a domain manager. Each CI belongs to a type (defined in the USM schema) such as ComputerSystem, Database, Process, and Relationship. Services contain CIs, and you define relationships between CIs in services.

Connectors transform managed objects from domain managers to adhere to the USM schema and import the objects to the consuming products as CIs.

Services

Services represent discrete business functions that can contain configuration items managed by multiple domain managers.

Example: The payroll service contains an Active Directory database managed by Microsoft SCOM, a user store managed by a security product, batch jobs managed by a mainframe product, a router managed by a network product, and applications managed by an application management product.

You can do the following with consuming products such as CA Spectrum SA:

- Detect the root cause of service degradation quickly and navigate to the appropriate product to resolve issues.
- Model services based on imported CIs or import existing service models from integrated products to construct a comprehensive, service-centric model of your enterprise.
Alerts

Alerts are the mechanism for reporting fault conditions and service degradation. Infrastructure alerts are fault conditions originally reported by one of the domain managers (such as a CA NSM event or CA Spectrum alarm). An alert is associated with a corresponding CI, and associated alert severities determine CI condition and, ultimately, service impact. Service alerts are conditions generated by CA Spectrum SA based on analysis of a modeled service. Service alerts result when the condition of one or more CIs combines to impact the overall quality or risk level associated with the service.

Outbound from connector operations

Outbound from connector operations are operations that a connector invokes to import data from domain managers into consuming products, such as CA Spectrum SA. All connectors support outbound from connector operations.

Inbound to connector operations

Inbound to connector operations invoke changes in the domain manager data store as a result of changes to the imported data in the consuming product.

Example: CI reconciliation in CA Catalyst can change the values of CI properties. Connectors that support inbound operations can then enact that change in the source domain manager so that its data matches the reconciled data. If the connector deletes a CI in a domain manager that CA Catalyst defines as a source of truth, connectors that support inbound operations can delete the CI in other domain managers with a record of that CI.

NSQL

CA Clarity PPM's SQL-based read-only query language. The connector uses NSQL to retrieve certain information from CA Clarity PPM.

XML Open Gateway (XOG)

XOG is a web service-based interface for reading and writing data in and out of CA Clarity PPM.

See the CA Spectrum SA Administration Guide for more CA Spectrum SA concepts.

CA Clarity PPM Connector

CA Clarity PPM is a project and portfolio management solution that features integrated IT portfolio planning, demand management, project management, resource planning and time, cost and earned value management. The CA Clarity PPM connector exposes CA Clarity PPM objects as USM CIs, including support for synchronization and alerts.
Integration Scenarios

The CA Clarity PPM connector interfaces with the CA Clarity PPM server to expose CA Clarity PPM project data for use by CA Technologies and third-party products that leverage the CA Catalyst infrastructure.

Integration Scenario: Service Demand Management

CA Clarity PPM provides various project data that contributes to the overall health of a service. CA Clarity PPM provides actual cost to a service, projected cost to a service, and project Key Performance Indicator (KPI). This type of data is essential for CA Spectrum SA to evaluate the health of the service. By exposing this type of data to CA Spectrum SA, CA Spectrum SA can build performance indicators that include the operational status of service-related applications and assets, and contributing cost and status from projects. The projects are intended to improve the service offerings and monitor planned compared to existing demand.
Chapter 2: CA Clarity PPM Connector Installation

This section contains the following topics:

- Operating Environment Support (see page 11)
- Installation Prerequisites (see page 12)
- Install the CA Clarity PPM Connector (see page 13)

Operating Environment Support

The CA Clarity PPM connector supports the following product versions of CA Spectrum SA and CA Catalyst:

- CA Spectrum Service Assurance r2.5
- CA Catalyst r2.5

The CA Clarity PPM connector supports the following product versions of CA Clarity PPM:

- CA Clarity PPM v13.0

The CA Clarity PPM connector supports installation on the following operating systems:

- Microsoft Windows Server 2003 (32-bit and 64-bit) Standard, Enterprise, and Datacenter with the latest service packs
- Microsoft Windows Server 2003 (32-bit and 64-bit) Release 2 Standard, Enterprise, and Datacenter with the latest service packs
- Microsoft Windows Server 2008 (32-bit and 64-bit) Standard, Enterprise, and Datacenter with the latest service packs
- Microsoft Windows Server 2008 (64-bit) Release 2 Standard, Enterprise, and Datacenter with the latest service packs
Installation Prerequisites

The CA Clarity PPM connector connects to any supported CA Clarity PPM instance through XOG. No special setup is required in CA Clarity PPM.

The CA Clarity PPM connector uses a CA Clarity PPM user account to read and write data to and from CA Clarity PPM.

The following item is a known issue:

You can install the CA Clarity PPM connector from a local image or DVD, or from a network share. CA Catalyst connector installers do not support the use of UNC shares.

**Best Practice:** Create a dedicated CA Clarity PPM user for the purpose of reading and writing data to and from CA Clarity PPM. Grant this dedicated user the following CA Clarity PPM global access right:

**Administration - XOG**

- Allows users to import and export information through the XML Open Gateway interface.

  **Type:** Global

Add the dedicated user to the following access groups:

- Project Author
- Resource Manager
Install the CA Clarity PPM Connector

Before starting this installation procedure, make sure that you meet all the installation prerequisites. You can install the CA Clarity PPM connector locally on the CA Clarity PPM server or on a stand-alone server.

You install the CA Clarity PPM connector on the system, which allows integration with the appropriate CA Clarity PPM and CA Spectrum SA instances. The Clarity_Install_2.5.0.1.log file is created in the SA_HOME\log\ directory. Use this log file to resolve installation issues. If the installation summary page lists installation errors, use this log file to resolve installation issues.

**Note:** The installer does not attempt to connect to CA Clarity PPM to verify the settings. If any settings are incorrect, the installation succeeds, but the connector can fail to initialize properly.

**Follow these steps:**

1. Double-click the Connector_Clarity.exe file from the CA Clarity PPM connector package.
   The installer introduction page appears.
2. Click Next.
   The license agreement page appears.
3. Scroll to the bottom of the agreement, select "I accept the terms of the License Agreement", and click Next.
   The choose install folder page appears.
   **Note:** This page does not open if CA Spectrum SA components already reside on the system.
4. Do one of the following to specify the installation folder, and click Next:
   - Accept the default.
   - Enter the name of a new installation folder.
   - Click Choose and select an installation folder.
   **Note:** The maximum installation path length is 150 characters. The installer blocks paths with more than 150 characters.

One of the following occurs:

- If another connector or the SA Manager resides on the same system, the catalyst connector configuration page opens.
- If you are installing the CA Clarity PPM connector on a system with no other CA Spectrum SA components (that is, a clean installation), the integration services configuration page opens.
5. (Clean installation only) Specify the following information to connect to the appropriate SA Manager and configure CA Clarity PPM connector preferences:

**Manager Host**
Defines the name of the SA Manager server, which is the CA Spectrum SA manager component.

**ActiveMQ Port**
Defines the specified port number for the ActiveMQ server, which is installed with the SA Manager. Retain the default of 61616 unless you changed this port number when installing CA Spectrum SA.

*Default: 61616*

**SA Admin**
Defines the name of the CA Spectrum SA administrator user. You define this user during CA Spectrum SA installation, and the default name is samuser.

*Default: samuser*

**Password**
Defines the password for the CA Spectrum SA administrator user.

**UCF Broker Port**
Defines a valid port for the UCF Broker to interface with the CA Clarity PPM connector and perform create, update, and delete operations on domain managers.

*Default: 8020*

**Verify Connection**
Defines verifying the SA Manager connection information when you click Next on the integration services configuration page.

**Use DNS for name resolution**
Specifies whether to use DNS to normalize CI server names. If a reliable DNS mechanism is not in place (for example, no DNS server on the network, or CIs not defined to the DNS), disable DNS lookups to prevent import delays. If you disable DNS, all name resolution must be handled without DNS, and you might be required to create a hosts file.

**Connector Name**
Defines the CA Clarity PPM connector name. Change the name only if you are installing multiple instances of the connector to operate in a high availability cluster environment. In this case, define this property as the virtual host name associated with the cluster. Connectors must reference the same virtual host name to perform appropriately in a failover scenario.
The catalyst connector configuration page appears.

6. Complete the following fields:

**Clarity Host Name**
- Specifies the name of the server running CA Clarity PPM.

**Clarity Port**
- Specifies the port number that CA Clarity PPM is using for its standard web interface.
- **Default:** 80

**Clarity Client Port**
- Specifies the CA Clarity PPM property used (with host) to identify a unique CA Clarity PPM instance.
- **Default:** 9091

**Clarity User Name**
- The name of the CA Clarity PPM user that you defined during the installation.

**Clarity Password**
- The password of the CA Clarity PPM user that you defined during the installation.

7. Click Next.
   The service startup page appears.

8. Specify starting the services automatically after installation, and click Next.
   The pre-installation summary page appears.

9. Review your selections, and click Install.
   The install complete page appears when the installation finishes.

10. Click Done.
    The installation summary page appears.
Chapter 3: CA Clarity PPM Connector Configuration

This section contains the following topics:

Configure the CA Clarity PPM Connector (see page 17)
Configure Multiple CA Clarity PPM Connector Instances on One Server (see page 20)

Configure the CA Clarity PPM Connector

After installing the CA Clarity PPM connector, you can change the properties you defined during installation and edit other properties. Configure the CA Clarity PPM connector to refine the behavior or adjust to changes in the integrated product. Use this procedure to configure the parameters specific to CA Clarity PPM.

Connector controls are common properties that control how the connector operates.

See the CA Spectrum SA Connector Guide or click the Help button to access the Online Help for more information about the function of each connector control.

Important! Do not perform rapid start and stop operations on the CA Clarity PPM connector. Each stop and start sends the corresponding command to the CA Clarity PPM connector. Rapid start and stop operations can cause these commands to queue on the CA Clarity PPM connector and cause the connector to start and stop repeatedly until all commands in the queue are processed.

Follow these steps:

1. Open the CA Spectrum SA Administration interface, and click Administration.
   
   The administration page appears.
   
   See the Administration Guide for more information.

2. Expand Connector Configuration and the connector server name, and click the entry for the CA Clarity PPM connector.
   
   A page opens for editing the CA Clarity PPM connector.

3. (Optional) Change any properties in the Connector Controls table, and click Save.
   
   The control changes are saved.
4. In the Connection Details table, change any of the following properties:

   **RetryCount**
   
   Specifies the number of times the CA Clarity PPM connector tries to reconnect to CA Clarity PPM when the connection fails.
   
   **Default:** 20

   **RetryInterval**
   
   Specifies the interval (in seconds) between connection attempts when connection to CA Clarity PPM is lost.
   
   **Example:** You set the RetryInterval to 30 and the RetryCount to 20. When the connection to CA Clarity PPM is dropped, the CA Clarity PPM connector attempts to reconnect. If the reconnection attempt fails, the CA Clarity PPM connector waits 30 seconds before attempting another connection. The CA Clarity PPM connector repeats the process of attempting to reconnect until the connection is reestablished or until 20 unsuccessful attempts have been made. Then the process stops.
   
   **Default:** 30

   **HistoryFolder**
   
   Specifies the location of the folder where the CI synchronization change history is stored.
   
   See the "Change History Folder" section for more information.
   
   **Default:** <install folder>/clarity

   **MappingConfigFile**
   
   Specifies the location of the mapping configuration file that defines the workflow required to transform a CA Clarity PPM object to a USM CI and back to a CA Clarity PPM object.
   
   See the "Mapping Configuration Files" section for more information.
   
   **Default:** clarity/clarity_mappings.xml

   **AlertConfigFile**
   
   Specifies the location of the mapping configuration file that specifies the alerts that the CA Clarity PPM connector supports.
   
   See the "Alerts" section for more information.
   
   **Default:** clarity/clarity_alerts.xml
TemplateConfigFile

Specifies the location of the mapping configuration file that contains the scripts that are used to drive the XOG input/output and transformation to key/value pairs.

See the "Mapping Configuration Files" section for more information.

**Default:** clarity/clarity_templates.xml

**host**

Specifies the name of the server running CA Clarity PPM.

**Default:** The value entered during installation.

**hostPort**

Specifies the port number that CA Clarity PPM uses for its standard web interface.

See the *Administration Guide* for more information.

**Default:** The value entered during installation.

**clientPort**

Specifies the CA Clarity PPM clientPort property used (with host) to identify a unique CA Clarity PPM instance.

See the *Administration Guide* for more information.

**Default:** The value entered during installation.

**username**

Defines the name of the dedicated CA Clarity PPM user for the purpose of reading and writing data to and from CA Clarity PPM.

**password**

Defines the password for the dedicated CA Clarity PPM user. This property is encrypted in the CA Clarity PPM connector configuration file.

**Default:** Encrypted version of the value entered during installation.

**PollInterval**

Specifies the amount of time (in seconds) that the CA Clarity PPM connector pauses between synchronization actions. Set the value to 0 to disable data collection.

See the "CI Synchronization" section for more information.

**Default:** 60
Configure Multiple CA Clarity PPM Connector Instances on One Server

TemplateFolder

Specifies the folder containing mapping resources for the CA Clarity PPM connector. The TemplateFolder can be a fully-qualified path or one relative to the standard CA Spectrum SA resource directory.

Default: clarity/xogtemplates

**Important!** Do not change any other properties in the Connection Details table.

5. Save your changes.

   The property changes are saved.

6. (Optional) If you changed the values of the host or port properties in the Connection Details table, then change the values in the host and port properties in the Launch in Context Details table.

   **Important!** Do not change any other properties in the Launch in Context Details tables.

7. Click Stop.

   The connector status changes to "Offline".

8. Click Start.

   The connector status changes to "Online". The connector restarts. Depending on the type of connector, a delay can occur while the connector status displays "Online".

Configure Multiple CA Clarity PPM Connector Instances on One Server

You can configure multiple instances of the CA Clarity PPM connector to run on the same server, with each instance connected to a different CA Clarity PPM instance. If you run the installer on a system with another instance of the CA Clarity PPM connector already installed, it detects the existing connector. You can install an additional connector instance.

**Follow these steps:**

1. Double-click the Connector_Clarity.exe file from the connector package to start the installation. Open the file on a system that already contains an installation of the CA Clarity PPM connector.

   The installer introduction page opens.

2. Click Next.

   The license agreement page opens.
3. Scroll to the bottom of the agreement, select "I accept the terms of the License Agreement" and click Next.
   If the installer detects another CA Clarity PPM connector currently running on the system, the connector already installed page opens.

4. Select Configure Additional Instance, and click Next.
   **Note:** If you do not select Configure Additional Instance, the installer reinstalls the CA Clarity PPM connector on top of the existing one.
   The connector configuration page opens.

5. Enter CA Clarity PPM connection information that specifies a new CA Clarity PPM instance for an already-configured CA Clarity PPM instance, and click Next.
   The service startup page opens.

6. Specify starting the services automatically after installation, and click Next.
   The pre-installation summary page opens.

7. Review your selections, and click Install.
   The CA Clarity PPM connector is installed. An installation summary page opens when the installation finishes.

8. Verify that there are multiple instances of the CA Clarity PPM connector on the connector configuration page of the web user interface.
Chapter 4: CA Clarity PPM Connector and Domain Manager Interaction

This section contains the following topics:

- **Outbound from CA Clarity PPM Connector Operations** (see page 23)
- **Inbound to CA Clarity PPM Connector Operations** (see page 24)
- **USM Data Mapping** (see page 24)
- **CA Clarity PPM Connector Mappings Overview** (see page 26)
- **Alerts** (see page 29)
- **CI Synchronization** (see page 31)

## Outbound from CA Clarity PPM Connector Operations

The CA Clarity PPM connector can invoke outbound (get) from connector operations to import the following CA Clarity PPM data into consuming products, such as CA Spectrum SA:

### Connection to CA Clarity PPM

The CA Clarity PPM connector uses XOG for all data transfer between CA Clarity PPM and the CA Clarity PPM connector. You can think of XOG as a generic XOG-to-USM engine that connects to CA Spectrum SA Administration. The CA Clarity PPM connector installer deploys all of the files necessary to communicate with CA Clarity PPM and no special configuration steps are required on the CA Clarity PPM side.

### Automatic CI and relationship synchronization

The CA Clarity PPM connector imports CA Clarity PPM CIs and relationships, and continually synchronizes updates to CI and relationships in CA Clarity PPM.

### CI and relationship updates

The CA Clarity PPM connector uses a XOG-based monitor to detect addition, modification, and deletion of CA Clarity PPM-managed objects.

### Alerts

New CIs or changes to existing CIs triggers alerts in the CA Clarity PPM connector. Every time you create or modify a CI, its properties are evaluated against the current CA Clarity PPM connector alert settings. When an alert condition is matched, the appropriate USM alert is raised (or updated or closed, depending on the conditions).

See the "Alerts" section for more information.
CI types and classes

The CA Clarity PPM connector supports the CA Clarity PPM Project and Resource objects, including aggregated cost for selected projects and subprojects.

Inbound to CA Clarity PPM Connector Operations

The CA Clarity PPM connector supports the standard inbound connector operations (create, update, delete) to modify data in CA Clarity PPM. Each individual CI is subject to the limitations imposed by the relevant XOG operations. For example, the Resource XOG does not support the deletion of resources, consequently CA Clarity PPM connector does not support delete for the Person CI.

The following table summarizes the default connector support for inbound operations:

<table>
<thead>
<tr>
<th>Operation/CI</th>
<th>Project</th>
<th>Person</th>
</tr>
</thead>
<tbody>
<tr>
<td>Create</td>
<td>Supported</td>
<td>Supported</td>
</tr>
<tr>
<td>Update</td>
<td>Supported</td>
<td>Supported</td>
</tr>
<tr>
<td>Delete</td>
<td>Not Supported</td>
<td>Not Supported</td>
</tr>
</tbody>
</table>

USM Data Mapping

When connectors import services and CIs from domain managers, they normalize the classes, properties, relationships, and severities in the domain manager to adhere to the USM schema. This section lists the CA Clarity PPM classes, severities, and relationships and their USM mapping after the import.

See the CA Clarity PPM connector policy file located at $SA_HOME/resources/Core/Catalogpolicy$, where $SA_HOME$ denotes the CA Spectrum SA installation directory for more information about CI property mapping.

See the CA Spectrum SA Connector Guide for more information about how connector policy maps product data to adhere to the USM schema.
Type Data Mapping

Objects that are imported from CA Clarity PPM to the CA Clarity PPM connector are normalized into USM format. This section describes the property mapping for the CIs that the CA Clarity PPM connector supports out of the box.

The following table is the CI Property Map for USM Person CI to Resource object in CA Clarity PPM:

<table>
<thead>
<tr>
<th>USM (Person)</th>
<th>CA Clarity PPM (Resource XOG Attributes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Label</td>
<td>(determined by global connector policy)</td>
</tr>
<tr>
<td>NamedAliases</td>
<td>displayName</td>
</tr>
<tr>
<td>UserName</td>
<td>userName</td>
</tr>
<tr>
<td>EmployeeID</td>
<td>user_id (NSQL query)</td>
</tr>
<tr>
<td>MdrElementID</td>
<td>resourceId</td>
</tr>
<tr>
<td>IsActive</td>
<td>isActive</td>
</tr>
<tr>
<td>FamilyName</td>
<td>lastName</td>
</tr>
<tr>
<td>FirstName</td>
<td>firstName</td>
</tr>
<tr>
<td>EmailAddresses</td>
<td>emailAddress</td>
</tr>
<tr>
<td>JobTitle</td>
<td>jobTitle</td>
</tr>
</tbody>
</table>

The following table is the CI Property Map for USM Project CI to Project object in CA Clarity PPM:

<table>
<thead>
<tr>
<th>USM (Project)</th>
<th>CA Clarity PPM (Project XOG Attributes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Label</td>
<td>(determined by global connector policy)</td>
</tr>
<tr>
<td>Description</td>
<td>description</td>
</tr>
<tr>
<td>MdrElementID</td>
<td>projectIntId</td>
</tr>
<tr>
<td>ProjectID</td>
<td>projectId</td>
</tr>
<tr>
<td>ApprovalStatus</td>
<td>status</td>
</tr>
<tr>
<td>IsActive</td>
<td>active</td>
</tr>
<tr>
<td>Progress</td>
<td>progress</td>
</tr>
<tr>
<td>ProjectPriority</td>
<td>priority</td>
</tr>
<tr>
<td>RiskDegree</td>
<td>statusIndicator</td>
</tr>
<tr>
<td>RiskComment</td>
<td>statusComment</td>
</tr>
<tr>
<td>StartDate</td>
<td>start</td>
</tr>
</tbody>
</table>
CA Clarity PPM Connector Mappings Overview

The CA Clarity PPM connector mapping configuration files tie CA Clarity PPM objects to USM CIs. The XOG schema and the USM schema limit the extent to which you can modify a mapping.

All mappings consist of the following parts:

- An item definition in the CA Clarity PPM connector mapping configuration file.
- A policy definition (which can be minimal/pass-through).
- At least two transformation scripts.

A set of mapping configuration files controls the process of creating and modifying the mappings. Edit these mapping configuration files to change, add, or remove support for specific CIs. The files work together to describe the CA Clarity PPM connector workflow.

The CA Clarity PPM connector mapping configuration files are read once during connector initialization. Each connector configuration can point to a unique set of mapping configuration files, or they can share more than one file.

**Best Practice:** Stop the CA Clarity PPM connector before you modify the mapping configuration files.

<table>
<thead>
<tr>
<th>USM (Project)</th>
<th>CA Clarity PPM (Project XOG Attributes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>EndDate</td>
<td>finish</td>
</tr>
<tr>
<td>PlannedCost</td>
<td>plannedCostTotal</td>
</tr>
<tr>
<td>ActualToDateCost</td>
<td>(sum of ActCost segments)</td>
</tr>
<tr>
<td>Currency</td>
<td>currencyISOcode</td>
</tr>
<tr>
<td>Significance</td>
<td>defaultAllocationPercent</td>
</tr>
</tbody>
</table>

The following table is the supported USM relationships:

<table>
<thead>
<tr>
<th>USM</th>
<th>CA Clarity PPM</th>
</tr>
</thead>
<tbody>
<tr>
<td>IsComposedOf</td>
<td>Project/Subproject</td>
</tr>
<tr>
<td>IsManagerFor</td>
<td>Project/Resource</td>
</tr>
</tbody>
</table>

CA Clarity PPM Connector Mappings Overview
Mapping Configuration Files

The CA Clarity PPM connector mapping configuration files list all supported USM entities, their transformation scripts, and alerts for all USM CIs.

You can create and modify the following CA Clarity PPM connector mapping configuration files:

- **clarity_templates.xml**
  
  The clarity_templates.xml mapping configuration file contains the scripts that are used to drive the XOG input/output and transformation to key/value pairs. The scripts are Extensible Stylesheet Language Family Transformations (XSLT). The type attribute denotes the templates. The following types of templates are included:
  
  - Process. Process templates generate dynamic XOG queries based on input fields produced by the CA Clarity PPM connector.
  
  - Maps. Map templates flatten XOG query results into raw key/value pairs.

  While templates are tied to specific CA Clarity PPM objects, you can include them in any number of object mappings.

  **Example:** The person_get_userids template retrieves CA Clarity PPM user IDs. Use this template in the CA Clarity PPM Resource object to USM Person CI object mapping. And also in the Project object to CI mapping to determine project owners.

- **clarity_alerts.xml**
  
  The clarity_alerts.xml mapping configuration file specifies the alerts that the CA Clarity PPM connector supports.

  See the "Alerts" section for more information.

- **clarity_policy.xml and clarity_policySB.xml**
  
  The clarity_policy.xml and clarity_policySB.xml mapping configuration files contain the policy definitions that are run against the maps produced by XOG requests. Inbound policies (create, update, delete operations) are defined in the clarity_policySB.xml file. These policies reverse some of the normalization and formatting policies defined in the clarity_policy.xml file so that they are usable in XOG requests.

  See the *CA Spectrum SA Administration Guide* for details on the connector policy language.
clarity_mappings.xml

The clarity_mappings.xml mapping configuration file defines the workflow required to transform a CA Clarity PPM object to a USM CI and back to a CA Clarity PPM object. This mapping configuration file specifies the CIs and operations that are supported. Each operation consists of an ordered set of calls to one or more templates defined in the clarity_templates.xml file. A minimal outbound (get) operation requires two template calls. This first one retrieves the data using XOG, and the second converts the data to key/value pairs. A minimal inbound operation (create, update, delete) requires one template call as it is not necessary to map the XOG request results to key/value pairs.

By Example: Person CI Mapping

This example shows how to convert a CA Clarity PPM Resource object to a USM Person CI and back to a CA Clarity PPM Resource object. The Person CI mapping does the conversion. This mapping supports the get, create, and update operations.

The get operation consists of three calls:

- get_core. Invokes the person_get_core XSL template, which performs an XOG read request on the resource object.
- get_userids. Invokes the person_get_userids template, which calls the CA Clarity PPM NSQL query catalyst_get_internal_user_ids to retrieve the internal user IDs that are used to track the objects.
- map_persons. Invokes the person_map template, which combines the data from get_core and get_userids into a single set of key or value pairs produced by the map template. These maps are then fed to the policy engine to create the final USM CIs.

The update and create operations invoke the same XSL template, person_write. Because the XOG request document is the same for create and update, only the generated parameters are different.

Note: XOG requests for outbound (get) operations can contain results for multiple CA Clarity PPM objects. However, inbound (create, update, delete) operations can only handle one object at a time. Updating or deleting multiple CA Clarity PPM objects requires multiple connector calls.
Alerts

Alerts are based on alert conditions defined in the CA Clarity PPM connector. The data is evaluated in the CA Clarity PPM connector after it is flattened, but before it is sent to CA Spectrum SA. CA Clarity PPM does not directly trigger them. Alerts are based on the key or value pairs that the map template produces before the EI policy is applied.

Each alert is defined for a specific CI type, and consists of the following fields:

<table>
<thead>
<tr>
<th>ID</th>
<th>Unique Identifier for the Alert</th>
</tr>
</thead>
<tbody>
<tr>
<td>property</td>
<td>CA Clarity PPM property to check</td>
</tr>
<tr>
<td>match</td>
<td>Regular expression or static string expression that are matched against the CA Clarity PPM property</td>
</tr>
<tr>
<td>summary</td>
<td>Alert summary text</td>
</tr>
<tr>
<td>message</td>
<td>Alert message text</td>
</tr>
<tr>
<td>alertType</td>
<td>USM alert type</td>
</tr>
<tr>
<td>alertAction</td>
<td>USM alert action</td>
</tr>
<tr>
<td>severity</td>
<td>USM alert severity</td>
</tr>
</tbody>
</table>

See the CA Spectrum SA Administration Guide for specific details about USM alert properties.

The Project Status alert is included with the CA Clarity PPM connector. The following table defines the fields for the alert:

<table>
<thead>
<tr>
<th>ID</th>
<th>Normal</th>
<th>Major</th>
<th>Critical</th>
</tr>
</thead>
<tbody>
<tr>
<td>id</td>
<td>project_status</td>
<td>project_status</td>
<td>project_status</td>
</tr>
<tr>
<td>property</td>
<td>statusIndicator</td>
<td>statusIndicator</td>
<td>statusIndicator</td>
</tr>
<tr>
<td>match</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>alertType</td>
<td>Risk-Change</td>
<td>Risk-Change</td>
<td>Risk-Change</td>
</tr>
<tr>
<td>alertAction</td>
<td>Update</td>
<td>Update</td>
<td>Create</td>
</tr>
<tr>
<td>summary</td>
<td>Project status is Green</td>
<td>Project status is Yellow</td>
<td>Project Status is Red</td>
</tr>
<tr>
<td>message</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
</tbody>
</table>
The Project Status alert is a three-stage alert. When the status indicator property changes to "Yellow" in CA Clarity PPM, a Major alert is raised against the modified Project CI. A change to "Red" yields a Critical alert, and "Green" clears the alert for the given project. In this case, the "Green", "Yellow", and "Red" statuses are represented numerically by 1, 2, and 3, respectively in the XOG query results.

How to Create Alerts

Create new alerts using the following steps:

1. Identify the CA Clarity PPM object properties that trigger the alert.
2. Define all possible values for the properties.
   - See the CA Clarity PPM XML Open Gateway Developer Guide for more information.
3. Determine how the properties map to the USM alert.
4. Create an alert entry for each possible value.

By Example: Create a Resource Status Alert

In this example, Jane Melton wants to raise a USM Risk-Capacity alert when a CA Clarity PPM user account becomes inactive. The isActive mapping property represents the account status. isActive is a boolean property. When its value is False, Jane raises an alert on the associated Person CI. When isActive is True, she clears existing status_change alerts on the CI.

Creating a Resource Status alert requires the following alert entries under the Person CI:

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Entry 1</th>
<th>Entry 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>id</td>
<td>status_change</td>
<td>status_change</td>
</tr>
<tr>
<td>property</td>
<td>isActive</td>
<td>isActive</td>
</tr>
<tr>
<td>match</td>
<td>false</td>
<td>true</td>
</tr>
<tr>
<td>alertType</td>
<td>Risk-Capacity</td>
<td>Risk-Capacity</td>
</tr>
<tr>
<td>alertAction</td>
<td>Create</td>
<td>Update</td>
</tr>
<tr>
<td>summary</td>
<td>Status Inactive</td>
<td>Status Active</td>
</tr>
<tr>
<td>message</td>
<td>User status is now Inactive</td>
<td>User status is now Active</td>
</tr>
<tr>
<td>severity</td>
<td>Major</td>
<td>Normal</td>
</tr>
</tbody>
</table>
In this example, the ID attribute is the same for each alert, because each set of entry properties denotes different states for the same alert. The property attribute can be different for entries that describe two different states for the same alert. In this case, it takes more than one CA Clarity PPM property to describe the alert condition.

**CI Synchronization**

The CA Clarity PPM connector features a Change Monitor facility that polls the connected CA Clarity PPM instance at set intervals. The facility looks for changes (including creation and deletion of objects) related to all supported USM CI types. Change detection is based on the key or value pairs produced by the map template. Only changes that result in a change to a mapped property are acknowledged.

**Note:** You can only delete Project CIs.

**By Example: Synchronizing the CA Clarity PPM Object with a CI Type**

If you update the financialStatus property for a tracked project in CA Clarity PPM, the change is reflected in the project XOG query. If you do not reference the financialStatus property in the project map template, the change does not impact the resulting key or value pairs.

**Polling Interval Changes**

When the Change Monitor starts, it immediately connects to CA Clarity PPM and maintains the connection as long as it runs. The PollInterval connector configuration property determines how often the CA Clarity PPM connector checks CA Clarity PPM for changes. The setting is specified in seconds.

**Best Practice:** Set the interval to 60 seconds or longer.

Setting a shorter interval can adversely affect the performance of the CA Clarity PPM connector and that of the CA Clarity PPM instance being polled. If the connection drops for any reason, the CA Clarity PPM connector attempts to reconnect in a pattern determined by the RetryCount and RetryInterval properties.
Change History Folder

Each time the Change Monitor polls CA Clarity PPM, the results are stored locally in the change history file. This file is loaded during connector initialization to help catch changes that occurred while the Change Monitor was not running. Each connector configuration can maintain multiple history files to track different types of activity or data.

When the connector comes online, only the final state for an object that has been changed multiple times while it was offline is seen. Alert states can be missed.

**Best Practice:** When you modify a USM CI mapping, delete the change history files before restarting the CA Clarity PPM connector.
Chapter 5: Troubleshooting

This section contains the following topics:

- Enable Detailed CA Clarity PPM Connector Logging (see page 33)
- About the CA Clarity PPM Logging Levels (see page 34)
- How to Diagnose Startup Issues (see page 35)

Enable Detailed CA Clarity PPM Connector Logging

The most efficient way to resolve CA Clarity PPM connector issues is by examining the connector log files. In addition to the standard framework log files, the CA Clarity PPM connector can produce CA Clarity PPM connector-specific log entries of various detail levels and covering a wide range of status and configuration information. CA Clarity PPM-specific logging is enabled automatically when you install the CA Clarity PPM connector. This logging information is limited to warning and error messages only. Use the following procedure to provide more detailed logging.

See the CA Spectrum SA Connector Guide for more information.

Follow these steps:

1. On the connector server, browse to the folder:
   `<install folder>/resources/Configuration/log4j`
2. Locate and edit the file `clarity_log4j.xml`.
3. In the Logger Definitions section, modify the logging level value:
   ```xml
   <logger name="com.ca.clarity.connector">
   <level value="WARN"/>
   <appender-ref ref="ClarityConnector"/>
   <appender-ref ref="ClarityConnectorDebug"/>
   <appender-ref ref="ClarityConnectorTrace"/>
   </logger>
   ```
4. Save the file and exit the editor.

   Restarting the CA Clarity PPM connector is not required to enable logging.
About the CA Clarity PPM Logging Levels

Once you have enabled the detailed CA Clarity PPM connector logging, the CA Clarity PPM log files are updated in the log folder adjacent the standard CA Catalyst log files. Up to seven hierarchical logging levels exist. Each level includes all the information that the lower logging levels produce.

The following are the most useful hierarchical logging levels:

**WARN Level**

The WARN level records any warnings or errors to the standard CA Clarity PPM log file (Clarity_Connector.log). This is the standard setting, and when set to this level the log file is likely to contain information only when something is wrong.

**INFO Level**

The INFO logging level produces minimal startup and status information. Output from this level appears in the standard CA Clarity PPM connector log file (Clarity_Connector.log). The CA Clarity PPM connector can permanently run with this level without adversely affecting performance.

**Best Practice:** If you suspect issues, use the CA Clarity PPM INFO level for normal operation.

**DEBUG Level**

The DEBUG logging level produces extensive status information and some low-level operational details. Output from this level appears in the CA Clarity PPM connector Debug log file (Clarity_Connector_Debug.log).

**Best Practice:** The CA Clarity PPM DEBUG Level setting takes extra processing and can degrade overall CA Clarity PPM connector performance. Only use this setting temporarily to resolve issues.

**TRACE Level**

The TRACE logging level produces detailed log entries, including extensive low-level operational details. Output from this level appears in the CA Clarity PPM connector Trace log file (Clarity_Connector_Trace.log).

**Best Practice:** The CA Clarity PPM TRACE level setting severely degrades CA Clarity PPM connector performance. Only use this setting when all other options have failed.
How to Diagnose Startup Issues

You can view the status and settings for all connectors installed on the system using the CA Spectrum SA Administration interface. To determine if the CA Clarity PPM connector has started correctly after you have installed it, open the connector configuration page and examine the Status property.

Offline Status/No logs created

If the connector configuration is “Offline” and no CA Clarity PPM-specific log files are present after you have attempted to start the CA Clarity PPM connector, then the CA Clarity PPM connector is failing to initialize. This failure is due to a framework-level issue, indicating that it is not a host configuration issue.

Usually the failure to initialize applies to all CA Clarity PPM connector configurations. In this case, check the framework logs for error conditions related to CA Clarity PPM connector initialization problems. The following are common issues:

- The CA Clarity PPM connector configuration file is missing, corrupt, or otherwise unreadable.
  Example: security restrictions and invalid XML.
- The CA Clarity PPM connector could not locate or load the mapping configuration file (specified by the ClarityConfig configuration property), or the file is invalid.

Offline Status/Logs are created

If the CA Clarity PPM connector-specific logs are created, then the issue is likely related to the host settings. The INFO log indicates whether the CA Clarity PPM connector attempted to log in to CA Clarity PPM or not, and the result. If no login attempt is evident, check for configuration warnings or errors, including a failure to load one or more mapping templates. If multiple warnings appear, then verify the TemplateFolder configuration property.

A successful startup with INFO logging enabled produces a few lines of information, including the CA Clarity PPM connection information and version, and the initial data retrieval results. After startup, INFO log entries will only be created when conditions change (for example, connection to CA Clarity PPM is lost or a CI change is detected).
Log Format

Log entries contain certain context information with the message to help identify the origin and significance of the entry. The following sample entry identifies the various context fields:

2010-01-01 01:01:01,000 INFO [Clarity Change Monitor [interval=60, host: mytenant\myuser\myhost:80]] connector.ClarityChangeMonitor - Changes: [added=0, removed=0, modified=1, alerts pending=0]

**Date (2010-01-01 01:01:01,000)**

Identifies the local date/time (down to the millisecond) that the event took place.

**Level (INFO)**

Identifies the severity level of the entry.

**Process Information (Clarity Change Monitor...)**

The name of the program thread that produced the message. The name can include the host information related to the event.

**Message Content (Changes: [added...,])**

The event details. Often the event details include summary information or a comma-delimited list of properties related to the current operation.

CA Clarity PPM Server Logging

If you encounter a server-side error while using the CA Clarity PPM connector, the error details are returned to the CA Clarity PPM connector and recorded in the CA Clarity PPM connector log files. If, however, the local log files do not provide sufficient information to diagnose and resolve an issue, consult the standard CA Clarity PPM log files. CA Clarity PPM connector actions appear as XOG requests on the server. Follow the installation prerequisites to identify XOG request errors originating from the CA Clarity PPM connector through the unique login ID.

See the Administration Guide for more information.
Chapter 6: Uninstall the CA Clarity PPM Connector

This section contains the following topics:

How to Uninstall the CA Clarity PPM Connector (see page 37)
Uninstall the Connector (see page 37)
Remove the CA Clarity PPM Connector (see page 38)

How to Uninstall the CA Clarity PPM Connector

The following process details how to uninstall the CA Clarity PPM connector:

1. Uninstall the CA Clarity PPM connector.
2. Stop the CA SAM Integration Services service on the system running the CA Clarity PPM connector.
3. Remove the CA Clarity PPM connector from the CA Spectrum SA Administration interface.

Uninstall the Connector

Uninstall the CA Clarity PPM connector when you do not require it. If you are running multiple instances of the CA Clarity PPM connector on the same system, uninstall the CA Clarity PPM connector once.

The uninstall complete page lists the result of the uninstall process, including any errors occurred.

Follow these steps:

1. Click Start, Programs, CA, Service Assurance Manager, Uninstall CA Clarity PPM Connector on the computer where the CA Clarity PPM connector is installed.
   The connector uninstall page opens.
2. Click Uninstall.
   The uninstall complete page appears. The CA Clarity PPM connector uninstalls.
Remove the CA Clarity PPM Connector

After you uninstall the CA Clarity PPM connector, remove the CA Clarity PPM connector from the Administration user interface to remove it from the database and all interfaces.

Removing the CA Clarity PPM connector removes the registration from the CA Spectrum SA database, from the tree in Administration, and from all other interfaces.

**Follow these steps:**

1. Open CA Spectrum SA Administration, and click Administration.
   
   The administration page appears.

2. Expand Connector Configuration and the connector server name, and click the entry for the CA Clarity PPM connectors.
   
   The connector configuration page appears.

3. Verify that the connector status and integration framework status is "Offline". If the status is "Online", click Stop.

4. Click Remove Connector.
   
   The confirmation page appears.

5. Click OK.