

Oracle® Communications Unified Inventory Management

API Overview



Release 7.8
G26991-01
April 2025

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Contents

Preface

| | |
|-----------------------------|----|
| Audience | vi |
| Documentation Accessibility | vi |
| Diversity and Inclusion | vi |

1 Overview

2 Working with Transactions, Exceptions, and Logging

| | |
|---|-----|
| Working with Transactions | 2-1 |
| Working with Exceptions | 2-2 |
| Working with Logging | 2-3 |
| Configuring the Logging Level | 2-3 |
| Working with the Log Interface | 2-3 |
| About UIM Log Messages | 2-4 |
| Defining Custom Log Messages | 2-4 |
| Working with the FeedbackProvider Interface | 2-4 |

3 Implementing a Generic Service Fulfillment Scenario

| | |
|---|------|
| About the Generic Service Fulfillment Scenario | 3-1 |
| Querying for the Specification | 3-4 |
| Querying for the Specification Using Finder API | 3-4 |
| Creating the Service and Service Configuration | 3-5 |
| Creating the Service | 3-6 |
| Retrieving the Service Configuration Specification | 3-8 |
| Retrieving the Service Configuration Specification Using Finder API | 3-9 |
| Creating the Service Configuration | 3-9 |
| About Alternate Flows | 3-10 |
| Changing the Service | 3-10 |
| Disconnecting the Service | 3-12 |
| Creating and Associating the Party | 3-13 |
| Creating the Party | 3-13 |

| | |
|---|------|
| Creating the Party Role | 3-14 |
| Associating the Party and Party Role with the Service | 3-15 |
| About Alternate Flows | 3-15 |
| Disassociating the Party and Party Role from the Service | 3-16 |
| Deleting the Party | 3-16 |
| Deleting the Party Role | 3-17 |
| Creating and Associating the Geographic Address with the Service | 3-17 |
| Creating the Geographic Place | 3-18 |
| Creating the Place Role | 3-19 |
| Associating the Geographic Place and Place Role with the Service | 3-19 |
| About Alternate Flows | 3-20 |
| Disassociating the Geographic Place and Place Role from the Service | 3-20 |
| Deleting the Geographic Place | 3-21 |
| Deleting the Place Role | 3-22 |
| Configuring the Resources for the Service Configuration | 3-22 |
| Finding the Service | 3-23 |
| Finding the Service by ID Using Finder API | 3-24 |
| Finding the Current Service Configuration Version | 3-25 |
| Finding the Service Configuration Item | 3-25 |
| Finding the Custom Object to Assign | 3-26 |
| Creating the Custom Object to Assign | 3-27 |
| Assigning the Resource to a Configuration Item | 3-28 |
| Referencing the Resource to a Configuration Item | 3-30 |
| About Alternate Flows | 3-32 |
| Unassigning Resources from a Configuration Item | 3-33 |
| Reserving a Custom Object | 3-34 |
| Unreserving a Custom Object | 3-37 |
| Creating a Blocked Condition for a Custom Object | 3-37 |
| Deleting a Blocked Condition for a Custom Object | 3-39 |
| Setting Characteristic Values for the Service Configuration Item | 3-41 |
| Finding Configuration Item and Setting Characteristics | 3-42 |
| About Alternate Flows | 3-46 |
| Unsetting Characteristic Values for the Service Configuration Item | 3-46 |
| Transitioning the Lifecycle Status | 3-46 |
| Creating a Property Location | 3-48 |
| Referring Property Location to a Service Configuration Item | 3-49 |
| About Undo Actions | 3-49 |

4 Implementing a Channelized Connectivity Enablement Scenario

| | |
|---|-----|
| About the Channelized Connectivity Enablement Scenario | 4-1 |
| Creating a Property Location and Associating Network Entity Codes | 4-2 |

| | |
|---|------|
| Creating a Logical Device and Associating LD Interfaces with Network Entity Codes | 4-4 |
| Creating Channelized Connectivity | 4-6 |
| Create Channelized Connectivity | 4-6 |
| Configure Capacity on the Channelized Connectivity | 4-8 |
| Configure Auto Termination on the Channelized Connectivity | 4-9 |
| Enabling Channelized Connectivity | 4-10 |
| Manually Enabling Channelized Connectivity | 4-10 |
| Performing Gap Analysis | 4-11 |
| Adding Segments To Connectivity Path Based on the Gap Analysis Results | 4-12 |

A UIM Entity Managers

B NFV Orchestration Java Managers

C Common Utility Code Examples

D Frequently Used APIs for Design and Assign Methods

| | |
|--|-----|
| Reference UIMTECHPACK Cartridge | D-1 |
| oracle.communications.inventory.api.dna.ServiceDesigner | D-1 |
| oracle.communications.inventory.api.dna.ConnectivityDesigner | D-4 |
| oracle.communications.inventory.api.dna.ConnectivityHelper | D-5 |
| oracle.communications.inventory.api.dna.ResourceHelper | D-6 |

Preface

This guide explains how to extend Oracle Communications Unified Inventory Management (UIM) through standard Java practices using Oracle Communications Service and Design Catalog - Design Studio, which is an Eclipse-based integrated development environment. This guide includes references to both applications, and often directs the reader to see the Design Studio Help and the UIM Help for instructions on how to perform specific tasks.

This guide includes information about the UIM entity managers. This guide also includes the list of Java managers which provide UIM's NFV Orchestration functionality. Similar to extending UIM and using the UIM APIs, the information in this guide applies to extending the NFV Orchestration functionality as well.

This guide should be read after reading *UIM Concepts*, because this guide assumes that the reader has a working knowledge of UIM architecture and concepts. This guide should be read from start to finish because the information presented in a chapter often builds upon information presented in a preceding chapter.

This guide includes examples of typical development code used in given situations. The guidelines and examples may not be applicable in every situation.

Audience

This guide is intended for developers who implement code to extend UIM. The developers should have a good working knowledge of XML and Java development and, in particular, JPA, standard Java practices, and J2EE principles. In working with the NFV Orchestration functionality, this guide assumes you have a working knowledge of NFV concepts.

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Because of these technical constraints, our effort to remove insensitive terms is ongoing and will take time and external cooperation.

1

Overview

This document provides information that you can use when working with the Oracle Communications Unified Inventory Management (UIM) application programming interfaces (APIs). This document also provides information that you can use when working with NFV Orchestration Java manager APIs which are also UIM APIs. The UIM APIs can be extended through custom code. The APIs, or extended APIs, can be called from various places, such as from custom rulesets, custom web services, or customized portions of the user interface (UI).

This document provides information on common tasks you need to do when working with any of the UIM APIs, such as working with transactions, handling errors, and logging messages. This information is described in [Working with Transactions, Exceptions, and Logging](#).

The bulk of this document is an overview of numerous UIM APIs, which were specifically selected to describe API usage patterns and best practices for implementing common business scenarios. Code samples are provided to show correct usage of the APIs and expectations of implementing the APIs. This information is described in [Implementing a Generic Service Fulfillment Scenario](#) and [Implementing a Channelized Connectivity Enablement Scenario](#).

This document also provides a listing of the following:

- UIM entity manager classes. See "[UIM Entity Managers](#)" for more information.
- NFV Orchestration Java managers. See "[NFV Orchestration Java Managers](#)" for more information.
- Code examples for common utility methods. See "[Common Utility Code Examples](#)" for more information.
- Frequently used APIs. See "[Frequently Used APIs for Design and Assign Methods](#)" for more information.

This document does not cover detailed Javadoc information, nor does it cover model and domain information provided in other UIM documentation. This document assumes that you are familiar with UIM functionality, and are planning to extend UIM functionality by implementing a custom solution based on information provided in *UIM Developer's Guide* or *UIM NFV Orchestration Implementation Guide*.

2

Working with Transactions, Exceptions, and Logging

This chapter describes working with transactions, exceptions, and logging. You can use this information when working with all UIM APIs because all APIs must be called from within a transaction, and the calling code must handle exceptions and log any errors.

See the UIM Javadoc for detailed information about API methods, such as the exception thrown by each method.

Working with Transactions

This section describes handling transactions when calling APIs. A standard transaction flow typically includes:

- Starting a transaction
- Calling an API
- Determining if an error occurred
- Performing a commit or rollback of the transaction based on whether an error occurred

[Example 2-1](#) shows a custom method that calls a manager API within a transaction:

Example 2-1 Call to an API from within a Transaction

```
public void sampleCallAPI()
{
    UserEnvironment ue = null;
    UserTransaction ut = null;
    try {
        // Step 1: Begin a User Environment and Transaction
        ue = startUserEnvironment(); /* see appendix */
        ut = PersistenceHelper.makePersistenceManager().getTransaction();
        ut.begin();

        // Step 2: Call the API
        PlaceManager mgr = PersistenceHelper.makePlaceManager();
        List<PlaceSpecification> list = mgr.getAllPlaceSpecs();
        // Do something with the list...
    }
    catch (Throwable t) {
        // Step 3: Handle Exception
        try {
            if (t instanceof ValidationException)
                // Do something with the Exception, such as print it.
                System.out.println("Method call returned validation exception.");
        }
        catch (Exception ignore) {}
    }
    finally {
        // Step 4: Commit or Rollback Transaction
        commitOrRollback(ut); /* see appendix */
    }
}
```

```

// Step 5: End User Environment
if (ue != null)
    endUserEnvironment(ue); /* see appendix */
}
}

```

When managing transactions and calling APIs from within a transaction, consider the following:

- A commit is usually needed between separate groups of API calls that are making updates to the database. The group of APIs is called for an atomic and complete set of operations.
- A rollback is needed when any error occurs.
- Ensure the API call is made within the correct context of **live** or **business interaction**.
- Ensure the User Environment is started before the transaction, and is ended within the **finally** block.

Working with Exceptions

This section describes the exceptions that the UIM APIs can throw. The EntityManager API methods typically throw a ValidationException when a validation error is encountered. However, other exceptions can also be thrown. [Table 2-1](#) describes all of the UIM Exceptions that can be thrown, including the ValidationException.

Table 2-1 Exception Descriptions

| Exception | Extends | Description |
|--|---------------------|---|
| ValidationException | InventoryException | This exception is widely used and represents all variations of business validation exceptional conditions. |
| TransientObjectException | ValidationException | This exception is thrown by manager methods if an object is passed into a method in a transient state. |
| ReadOnlyEntityException | RuntimeException | This exception is thrown when a read-only entity is updated or deleted. A read-only entity can be an entity that is in a queued/planned object state. |
| InventoryException | Exception | This exception is the Base Inventory Exception and other exceptions extend it. |
| InvalidBusinessInteractionException | RuntimeException | This exception is thrown when the caller attempts to perform an operation against an entity under a BusinessInteraction with an invalid status such as completed or cancelled. |
| DeletedObjectException | ValidationException | This exception is thrown by manager methods if an object is passed into a method in a deleted state. |
| BusinessInteractionDisassociationException | ValidationException | This exception is thrown when the manager method is attempting to alter a Business Interaction or Business Interaction Item and the Business Interaction validation determines it is not allowed. |
| BusinessInteractionCompleteException | ValidationException | This exception is thrown when the manager method is attempting to complete a Business Interaction and the validation determines it is not allowed. |

Working with Logging

This section describes logging messages (informational, warning, and debug messages). This section also describes detecting what messages were logged during an API call, which is helpful when trying to determine the success or failure of an API call.

See "Unified Inventory Management System Administration Overview" in *UIM System Administrator's Guide* for information on configuring UIM logging, including changing the logging level.

Configuring the Logging Level

The logging level, which is the amount of logging output to the log files from UIM API calls, is determined by the values configured in the *UIM_Home/config/loggingconfig.xml* file.

[Example 2-2](#) shows an entry from the **loggingconfig.xml** file. This entry results in any debug messages (through log.debug) existing in the code to be output to the log file when the class exists in the specified package:

Example 2-2 Entry from loggingconfig.xml

```
<Logger name="oracle.communications.inventory.extensibility" additivity="false">
  <level="debug" />
  <AppenderRef ref="stdout"/>
  <AppenderRef ref="rollingFile"/>
</Logger>
```

Working with the Log Interface

The Log interface is located in the package:

oracle.communications.inventory.api.framework.logging

The Log interface provides the ability for an API, or custom code calling an API, to log errors, throw exceptions, and log informational, warning, or debug messages.

[Table 2-2](#) lists the items that can be requested from the Log interface. See the UIM Javadoc for information regarding the specific parameters of each method.

Table 2-2 Log Interface Description

| Description | Method to Use | Throws Exception | Checked with Method on FeedbackProvider |
|-----------------------|------------------------------------|---|---|
| Fatal Exception | <code>fatal()</code> | <code>LogFatalException</code> | <code>getFataIs()</code> |
| Validation Exception | <code>validationException()</code> | <code>ValidationException</code> or the exception type provided on method input | <code>getErrors()hasMessages()</code> |
| Validation Error | <code>validationError()</code> | Currently does not throw a <code>ValidationException</code> | <code>getErrors()hasMessages()</code> |
| Warning Message | <code>warn()</code> | Not applicable | <code>getWarnings()hasMessages()</code> |
| Informational Message | <code>info()</code> | Not applicable | <code>getNotes()hasMessages()</code> |
| Debug Message | <code>debug()</code> | Not applicable | <code>getDebugs()</code> |

When calling an API method, additional errors may be thrown. For example, a custom ruleset that calls an API method may throw additional log messages that the developer wants to include in the log file. [Example 2-3](#) shows custom code that adds additional log messages to the log file by calling the Log interface to log an informational message and a debug message:

Example 2-3 Using the Log Interface

```
import oracle.communications.inventory.api.framework.logging.Log;
import oracle.communications.inventory.api.framework.logging.LogFactory;
protected Log log;

public void testLog()
{
    this.log = LogFactory.getLog(this.getClass());
    this.log.validationError("service.findServiceError", service.getId());

    if (this.log.isInfoEnabled())
        this.log.info ("", "This is an informational message");

    if (this.log.isDebugEnabled())
        this.log.debug ("", "This is a debug message.");
}
```

About UIM Log Messages

Messages logged by UIM APIs are defined in several ***.properties** files, per domain. For example, the **service.properties** file defines the messages for the service domain, and the **equipment.properties** file defines the messages for the equipment domain. All message-specific ***.properties** files are located in the *UIM_Home/config/resources/logging* directory.

Several of methods on the Log interface define an input parameter of a String key for an error message. These unique keys, along with a corresponding error message String, are defined in the message-specific ***.properties** files. [Example 2-4](#) shows a single message entry from the **service.properties** file:

Example 2-4 Message Entry from service.properties

```
service.findServiceError.id=110311
service.findServiceError=Error finding service with id {0}.
```

The numbers within the braces are parameter values passed in as arguments to the method call.

Defining Custom Log Messages

You can define custom log messages in the *UIM_Home/config/resources/logging / *.properties* files by adding a unique key and corresponding message. The key must be unique across all ***.properties** files in this directory, and across any ***.properties** files contained in any installed cartridges.

Working with the FeedbackProvider Interface

The FeedbackProvider interface is located in the package:

```
oracle.communications.inventory.api.framework.logging
```

After calling an API, the code must determine what messages have been logged. The FeedbackProvider interface provides the ability for an API, or custom code calling an API, to

interrogate what has occurred. [Example 2-5](#) shows code that checks to see if an error has been logged, and then prints the error:

Example 2-5 Using the FeedbackProvider Interface

```
public void sampleCallAPIWithFeedbackProvider()
{
    UserEnvironment ue = null;
    UserTransaction ut = null;

    try {
        // Step 1: Begin a User Environment and Transaction
        // Step 2: Call the API
        if (!hasErrors()) /* see appendix */
            ut.commit();
        else {
            ut.rollback();
            List<FeedbackMessage> errors =
                ue.getFeedbackProvider().getErrors();
            for ( java.util.Iterator iter = errors.iterator(); iter.hasNext(); )
            {
                FeedbackMessage error = (FeedbackMessage)iter.next();
                System.out.println("Error occurred: " + error.getMessage());
            }
        }
    }
    catch (Throwable t)
    {
        // Step 3: Handle Exception
    }
    finally
    {
        // Step 4: Commit or Rollback Transaction
        // Step 5: End User Environment
    }
}
```

3

Implementing a Generic Service Fulfillment Scenario

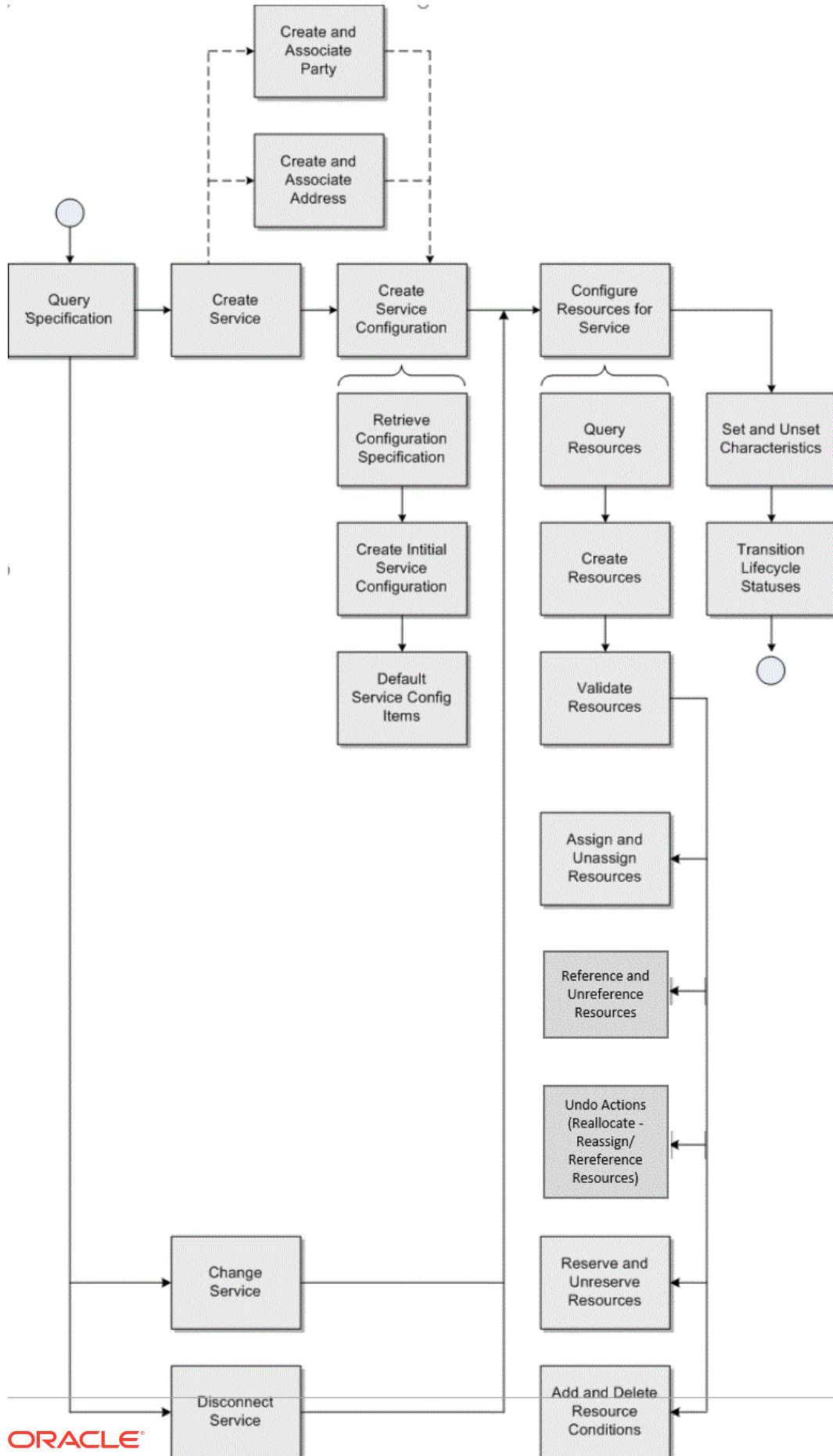
This chapter describes implementing a generic service fulfillment scenario using various Oracle Communications Unified Inventory Management (UIM) application program interfaces (APIs). You can use this information to gain a better understanding of how the UIM APIs can be used to implement any service scenario.

About the Generic Service Fulfillment Scenario

The generic service fulfillment scenario is a Service entity with a single Custom Object resource assignment. The example Service entity is simplified, but the API descriptions are applicable and extensible to other types of services with various types of resource assignments.

[Figure 3-1](#) shows the process flow for a generic service fulfillment scenario:

Figure 3-1 Process Flow of Generic Service Fulfillment Scenario



The process flow begins with querying for the service specification, which is used in subsequent steps in the process flow, such as creating the Service and searching for resources.

The process flow continues with creating the service, based upon the retrieved service specification.

Next is creating the service configuration, which involves querying for the service configuration specification, creating the service configuration based upon the retrieved service configuration specification, and creating default service configuration items.

The process flow continues with the optional steps of creating additional entities, such as Party and Geographic Address (a concrete Geographic Place entity representing a Service Address). These entities are created and associated to the Service with specific inventory roles.

Next in the process flow is configuring the resources for the service (resource management), which involves querying for resources based on specific criteria using core API searches or using custom searches. For example, you can call an API directly to search for a Custom Object by ID, or you can call a custom API to search for a Custom Object by its association to an Inventory Group or association to another Custom Object. You can also create resources for immediate assignment to the service. The main goal of resource management is to retrieve and validate the correct resources for assignment to the service. However, you can also manage the resources with alternate flows, such as creating reservations and conditions. Assignments, references, reservations, and conditions are the main consumption concepts for a given resource.

In addition to resource assignments and references, the service and service configuration also have characteristic values. These values are used to setup and configure the service instance.

After the service has been configured through resource and characteristic value assignments, the process flow continues with transitioning the lifecycle status of various entities. APIs are presented to show the transition of the statuses, and how the statuses are managed within the core API functionality.

The process flow shown in [Figure 3-1](#) shows the initial creation of the service, and also shows other scenarios, such as changing the service configuration and disconnecting the service. These additional scenarios are also described.

Now that you have a high-level understanding of the generic service fulfillment process flow, each part of the process flow is further described in the following sections. Each section includes information about the specific UIM APIs used to perform each step and possible alternate flows of each step. Example code is also included for each step.

- [Querying for the Specification](#)
- [Creating the Service and Service Configuration](#)
- [Creating and Associating the Party](#)
- [Creating and Associating the Geographic Address with the Service](#)
- [Configuring the Resources for the Service Configuration](#)
- [Setting Characteristic Values for the Service Configuration Item](#)
- [Transitioning the Lifecycle Status](#)

Querying for the Specification

This section describes the UIM API method used to query for the service specification. The retrieved service specification will later be used to create the service.

[Table 3-1](#) and example code provide information about using the API method.

Table 3-1 Querying for the Specification

| Topic | Information |
|-----------------------|---|
| Name | SpecManager.findSpecifications |
| Description | This method retrieves specifications based on input criteria. |
| Pre-Condition | The service specification already exists. |
| Internal Logic | The database is queried for specifications meeting the input criteria. Specifications matching the criteria are returned. |
| Post-Condition | The desired service specification has been retrieved. |
| Extensions | Not applicable |
| Tips | <p>If a list of specifications is returned, the list will need to be iterated to select the desired specification to be used to create the service.</p> <p>Set the SpecSearchCriteria.setValidSpecsOnly (true) to instruct the find method to only return active specifications.</p> <p>Set the SpecSearchCriteria.setSpecClass (ServiceSpecification.class) to instruct the find method to only return service specifications.</p> <p>Additional criteria, such as name, may also be set to further constrain the list of service specifications returned by the find method.</p> <p>This method is applicable for retrieving other types of specifications by supplying the correct Specification class as the query parameter. For example, it can be used to retrieve a CustomObject specification to be used later for resource query or creation.</p> |

Example 3-1 Querying for the Specification

```
Specification spec = null;
SpecManager specMgr = PersistenceHelper.makeSpecManager();

SpecSearchCriteria criteria = specMgr.makeSpecSearchCriteria();
CriteriaItem critSpecName = criteria.makeCriteriaItem();
critSpecName.setValue(specName);
critSpecName.setOperator(CriteriaOperator.EQUALS_IGNORE_CASE);
criteria.setName(critSpecName);
criteria.setSpecClass(ServiceSpecification.class);

List<Specification> specs = specMgr.findSpecifications(criteria);
if (Utils.isEmpty(specs))
{
    /* log error */
}
spec = specs.get(0);
```

Querying for the Specification Using Finder API

This section describes the UIM API method used to query for a service specification using a generic Finder.findByName API.

Table 3-2 and example code provide information about using this API method.

Table 3-2 Querying for the Specification Using Finder API

| Topic | Information |
|----------------|--|
| Name | Finder.findByName |
| Description | This method retrieves entity objects based on input criteria. |
| Pre-Condition | The service specification already exists. |
| Internal Logic | The database is queried for specifications meeting the input criteria. Specifications matching the criteria are returned. |
| Post-Condition | The desired service specification has been retrieved. |
| Extensions | Not applicable |
| Tips | <p>If a list of specifications is returned, the list will need to be iterated to select the desired specification to be used to create the service.</p> <p>If the specification is not found, the <i>Find</i> method returns empty collection <ServiceSpecification>.</p> <p>Note: The specification name is not a unique field, but it is recommended to have unique specification names.</p> <p>This method is applicable for retrieving other types of specifications by supplying the correct Specification class as the query parameter. For example, it can be used to retrieve a CustomObject specification or any UIM entity to be used later for resource query or creation.</p> |

Example 3-2 Querying for the Service Specification Using Finder API

```
Specification spec = null;
Finder f = null;

try{
    f = PersistenceHelper.makeFinder();

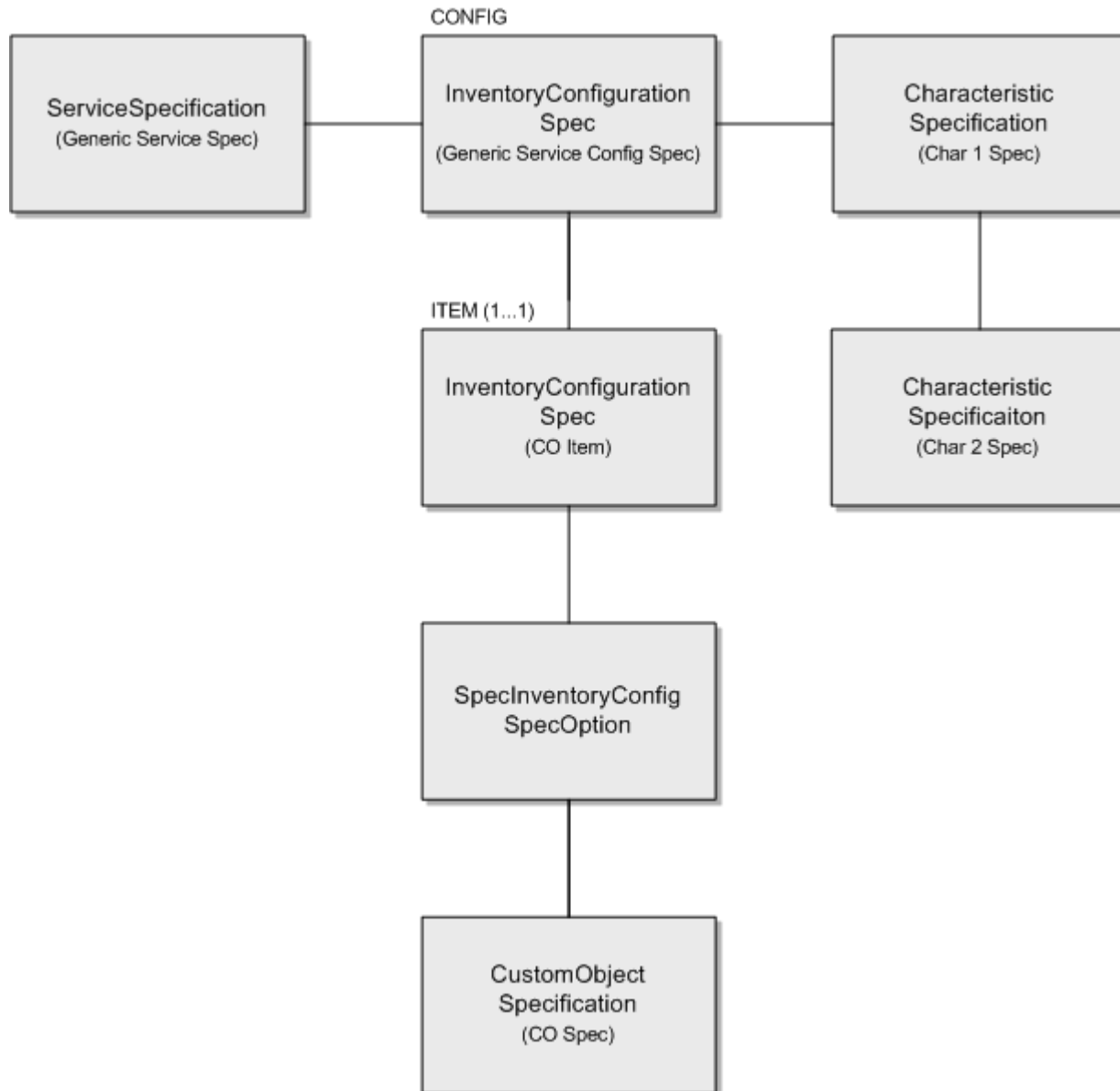
    Collection<ServiceSpecification> specs =
        f.findByName(ServiceSpecification.class, "Service_Spec_name");
    if (Utils.isEmpty(specs))
    {
        /* log error */
    }
    spec = specs.iterator().next();
}
catch(Exception e){
    /* log exception */
}
finally{
    if(f!=null){
        f.close();
    }
}
```

Creating the Service and Service Configuration

This section describes the UIM API methods used to create the service and service configuration, and to create default configuration items on the service configuration. The API methods are listed in the order in which they must be called.

Figure 3-2 shows the generic service configuration specification used in the generic service fulfillment scenario:

Figure 3-2 Generic Service Configuration Specification Example



Creating the Service

This section describes the UIM API method used to create the service, based upon the retrieved service specification.

Table 3-3 and example code provide information about using the API method.

Table 3-3 Creating the Service

| Topic | Information |
|-----------------------|---|
| Name | ServiceManager.createService |
| Description | This method creates a service instance built from the input service specification. The service will be populated with the hard facts and characteristics supplied by the caller. |
| Pre-Condition | A service specification has been selected. |
| Internal Logic | The service is created using the input service specification. |
| Post-Condition | The service has been created and is in Pending status. |
| Extensions | Not applicable |
| Tips | The Service.startDate and Service.name are required attributes. The Service.characteristics can be populated with the desired characteristics. If the service specification is defined with any required characteristics that do not have default values specified, then those characteristics must be set on the service in order for it to be created successfully. |

Example 3-3 Creating the Service with Characteristics

```

ServiceManager smgr = null;

Finder f = null;

try{
    smgr = PersistenceHelper.makeServiceManager();
    f = PersistenceHelper.makeFinder();

    Collection<ServiceSpecification> serviceSpecCollection =
        f.findByName(ServiceSpecification.class,"service_spec");
    ServiceSpecification serviceSpec = (ServiceSpecification)
        serviceSpecCollection.iterator().next();

    Service serviceModel = smgr.makeService(Service.class);
    serviceModel.setName("Service_test22");
    serviceModel.setDescription("Service_test22_desc");
    serviceModel.setId("Service_test22");
    serviceModel.setSpecification(serviceSpec);

    HashSet<CharacteristicSpecification> charSpecs =
        new HashSet<CharacteristicSpecification>();
    charSpecs =
        CharacteristicHelper.getCharacteristicSpecifications(serviceSpec);
    /*charSpecs is populated with the characteristics specifications of the serviceSpec.
    Now, we are ready to set the value for each characteristic based on its name. Below code
    has if-else condition for the same.
    */
    if (!charSpecs.isEmpty()) {
        Set<ServiceCharacteristic> servChars =
            new HashSet<ServiceCharacteristic>();
        ServiceCharacteristic servChar = null;
        for (CharacteristicSpecification charSpec : charSpecs) {

            servChar = sd.makeServiceCharacteristic();
            servChar.setName(charSpec.getName());
            if (charSpec.getName().equals ("test_CharSpec_text")) {
                servChar.setValue("service testing char");
            }
        }
    }
}

```

```

                else if
(charSpec.getName().equals("test_CharSpec_TF_Numeric")) {
                    servChar.setValue("500");
                }
                servChar.setCharacteristicSpecification(charSpec);
                servChars.add(servChar);
            }
            serviceModel.setCharacteristics(servChars);

        }

Collection<Service> services = new ArrayList<Service>();
services.add(serviceModel);

List<Service> createdServices = smgr.createService(services);
service = createdServices.get(0);
}
catch(Exception e){
    /* log exception */
}
finally{
    if(f!=null){
        f.close();
    }
}
}

```

Retrieving the Service Configuration Specification

This section describes the UIM API method used to retrieve the service configuration specification. The retrieved service configuration specification will later be used to create the service configuration.

[Table 3-4](#) and example code provide information about using the API method.

Table 3-4 Retrieving the Service Configuration Specification

| Topic | Information |
|-----------------------|--|
| Name | ConfigurationManager.getConfigSpecTypeConfig |
| Description | This method retrieves the configuration specifications related to the input service specification. |
| Pre-Condition | The service specification is associated to one or more configuration specifications. |
| Internal Logic | The configuration specifications related to the service specification are retrieved and returned. |
| Post-Condition | A configuration specification has been selected. |
| Extensions | Not applicable |
| Tips | If a list of specifications is returned, the list will need to be iterated to select the desired specification to be used to create the service configuration. |

Example 3-4 Retrieving the Service Configuration Specification

```

ConfigurationManager configurationManager =
    PersistenceHelper.makeConfigurationManager();

```

```
List< InventoryConfigurationSpec > configSpecs =
    configurationManager.getConfigSpecTypeConfig( serviceSpec, true );

return configSpecs;
```

Retrieving the Service Configuration Specification Using Finder API

You can retrieve the service configuration specification using the `finder.findByName` API. See [Table 3-2](#) for more information.

Example 3-5 Querying for the Service Configuration Specification Using Finder API

```
InventoryConfigurationSpec spec = null;
Finder f = null;

try{
    f = PersistenceHelper.makeFinder();

    Collection< InventoryConfigurationSpec > specs =
        f.findByName(InventoryConfigurationSpec.class, "Service_Configuration_Spec_name");
    if (Utils.isEmpty(specs))
    {
        /* log error */
    }
    spec = specs.iterator().next();
}
catch(Exception e){
    /* log exception */
}
finally{
    if(f!=null){
        f.close();
    }
}
```

Creating the Service Configuration

This section describes the UIM API method used to create the service configuration, based upon the retrieved service configuration specification.

[Table 3-5](#) and example code provide information about using the API method:

Table 3-5 Creating the Service Configuration

| Topic | Information |
|-----------------------|---|
| Name | <code>BaseConfigurationManager.createConfigurationVersion(Configurable configurable, InventoryConfigurationVersion configuration, InventoryConfigurationSpec configSpec)</code> |
| Description | This method creates a service configuration version and associates it to the service. |
| Pre-Condition | The service exists with no service configuration versions. |
| Internal Logic | Not applicable |
| Post-Condition | The first configuration version is created and associated to the service. This method will default the configuration items based on the input <code>configSpec</code> . |
| Extensions | Not applicable |
| Tips | The service, configuration and <code>configSpec</code> parameters are required. |

Example 3-6 Creating the Service Configuration

```
Finder f = null;
try{
f = PersistenceHelper.makeFinder();
Collection<Service> serviceCollection =
    f.findById(Service.class, servId);
Service serv = serviceCollection.iterator().next();
f.reset();
Collection<InventoryConfigurationSpec> invSpecCollection =
    f.findByName(InventoryConfigurationSpec.class, "Serv_Config");
InventoryConfigurationSpec invSpec =
    invSpecCollection.iterator().next();
BaseConfigurationManager bcd =
    PersistenceHelper.makeConfigurationManager
        (ServiceConfigurationVersion.class);
InventoryConfigurationVersion scv =
    bcd.makeConfigurationVersion(serv);
scv.setDescription(configId);
scv.setId(configId);
scv.setName(configId);
scv.setEffDate(new Date());
InventoryConfigurationVersion createdConfig =
    bcd.createConfigurationVersion(serv, scv, invSpec);
}catch(Exception e){
    /* log exception*/
}
finally{
    if(f!=null)
        f.close();
}
```

About Alternate Flows

The generic service fulfillment scenario creates a service and initial service configuration. Alternate flows to this scenario may be to change the service, or to disconnect the service.

The alternate flows described in this section are:

- [Changing the Service](#)
- [Disconnecting the Service](#)

Changing the Service

This section describes the UIM API method used to change an existing service by adding a new service configuration version. The main goal is to create an IN_PROGRESS service configuration version so additional resource or characteristic changes can be run. For example, after creating an initial service configuration version to assign a custom object to a service, a second service configuration version can be created to unassign the custom object previously allocated.

[Table 3-6](#) and example code provide information about using the API method.

Table 3-6 Changing the Service

| Topic | Information |
|-------|---|
| Name | BaseConfigurationManager.createConfigurationVersion(Configurable configurable, InventoryConfigurationVersion configuration) |

Table 3-6 (Cont.) Changing the Service

| Topic | Information |
|-----------------------|--|
| Description | This method creates new configuration version from the most recently completed previous configuration version. |
| Pre-Condition | A service with a completed service configuration version must exist. |
| Internal Logic | Not applicable |
| Post-Condition | A service configuration version is created with a status of IN_PROGRESS. |
| Extensions | Not applicable |
| Tips | The service and configuration parameters are required. |

Example 3-7 Changing the Service

```

Finder f = null;
try{
f = PersistenceHelper.makeFinder();
Collection<Service> serviceCollection = f.findById(Service.class, servId);
Service serv = serviceCollection.iterator().next();
f.reset();
Collection<InventoryConfigurationSpec> invSpecCollection =
    f.findByName(InventoryConfigurationSpec.class, "Serv_Config");
InventoryConfigurationSpec invSpec =
    invSpecCollection.iterator().next();
BaseConfigurationManager bcd =
    PersistenceHelper.makeConfigurationManager(ServiceConfigurationVersion.class);
InventoryConfigurationVersion scv =
    bcd.makeConfigurationVersion(serv);
scv.setDescription(configId);
scv.setId(configId); scv.setName(configId);
scv.setEffDate(new Date());
InventoryConfigurationVersion createdConfig =
    bcd.createConfigurationVersion(serv, scv);
}
catch(Exception e){
/*log exception */
}finally{
    if(f!=null)
        f.close();
}

```

Example 3-8 Updating the Characteristics of a Service

```

Service service = null;
Finder f = null;
BaseConfigurationManager configMgr = null;

try{

f = PersistenceHelper.makeFinder();
Collection<Service> services = f.findByName(Service.class, "service_name");
Service = Services.iterator.next();

HashSet<CharacteristicSpecification> charSpecs =
    new HashSet<CharacteristicSpecification>();
charSpecs = CharacteristicHelper.getCharacteristicSpecifications
(Service.getSpecification());
if (!charSpecs.isEmpty()) {

```



```

        Set<ServiceConfigurationItemCharacteristic> sciChars =
            new HashSet<ServiceConfigurationItemCharacteristic>();
        ServiceConfigurationItemCharacteristic sciChar = null;
        for (CharacteristicSpecification charSpec : charSpecs) {

            sciChar = configItem.makeCharacteristicInstance();
            String charName = sciChar.getName(charSpec.getName());
            if (charName.equals("char_name_1")){
                sciChar.setValue("textupdated");
            }
            sciChars.add(sciChar);
        }
    }

    service.setCharacteristics(sciChars);
}
}
catch(Exception e){
    /* log exception*/
}
finally{
    if(f!=null)
        f.close();
}
}

```

Disconnecting the Service

This section describes the UIM API method used to disconnect a service when the service is no longer needed.

[Table 3-7](#) and example code provide information about using the API method.

Table 3-7 Disconnecting the Service

| Topic | Information |
|-----------------------|--|
| Name | ServiceManager.disconnectService |
| Description | This method will transition the state of a service and invoke necessary business logic for the service and configuration version depending on the type of transition initiated. |
| Pre-Condition | The service exists and there are no configuration versions in a state other than Completed or Cancelled. |
| Internal Logic | Not applicable |
| Post-Condition | The service has a Pending Disconnect status. A new configuration version is created and any resources that are currently assigned, are unassigned. The configuration version has an In Progress status. |
| Extensions | Not applicable |
| Tips | The businessAction to be passed as input to the transition method is ServiceAction.DISCONNECT. |

Example 3-9 Disconnecting the Service

```

ServiceManager sm = PersistenceHelper.makeServiceManager();
sm.disconnectService(service);

```

Creating and Associating the Party

This section describes the UIM API methods used to create a party, create a party role, and associate the party and party role with the service. The API methods are listed in the order in which they must be called.

Note:

The associations of the party and party role with the service are optional, and can be associated before or after the creation of the initial service configuration. Typically, these types of associations do not change for the service, but alternate flows are presented to show how the associations can be changed if necessary.

Creating the Party

This section describes the UIM API method used to create the party.

[Table 3-8](#) and example code provide information about using the API method.

Table 3-8 Creating the Party

| Topic | Information |
|-----------------------|---|
| Name | PartyManager.createParties |
| Description | This method takes a collection of Party entities and persist them into the database. The Party Role and association to the Service is setup by a different API. |
| Pre-Condition | Party Specification is valid and retrieved from the database. Party has a valid and unique ID. |
| Internal Logic | Take the collection of transient Party entities and persists them into the database, and return the collection of persisted Party entities. Validate that the Parties are not duplicated by ID and they all have valid PartySpecification. |
| Post-Condition | Persistent Party entities are returned. |
| Extensions | This API is defined as an extension point to allow custom validation before or after the Parties are created. For instance, the IDs can be generated based on some custom algorithm. |
| Tips | Party is a CharacteristicExtensible entity. The characteristic values should be added when the Party instance is created. Use RoleManager APIs to manage the roles played by a given Party, and use AttachmentManager to associate the Party with specific Role to a given Service. |

Example 3-10 Creating the Party

```
Finder finder = null;
PartyManager mgr = null;
try{

    finder = PersistenceHelper.makeFinder();

    mgr = PersistenceHelper.makePartyManager();
    Party party = mgr.makeParty();
```

```

Collection<Party> parties = new ArrayList<Party>();

party.setId(partyId);
party.setName("Party_Name");
party.setDescription("Party_Description");

Collection<PartySpecification> partyspec =
    finder.findByName(PartySpecification.class, "Test_Party_Spec");

PartySpecification partySpec = partyspec.iterator().next();
party.setSpecification(partySpec);

parties.add(party);

List<Party> results = mgr.createParties(parties);
Party resulty = results.iterator().next();
}
catch(Exception e){
    /*log exception here*/
}finally{
    if(finder!=null){
        finder.close();
    }
}
}

```

Creating the Party Role

This section describes the UIM API method used to create the party role.

[Table 3-9](#) and example code provide information about using the API method.

Table 3-9 Creating the Party Role

| Topic | Information |
|-----------------------|--|
| Name | RoleManager.createInventoryRole |
| Description | This method takes a collection of InventoryRole entities and persist them into the database. The roles passed in are the concrete subclass, for instance PartyRole. |
| Pre-Condition | InvRoleSpecification is valid and retrieved from the database. The Party which has the roles is already created. |
| Internal Logic | Take the collection of transient InventoryRole entities and persists them into the database, and return the collection of persisted InventoryRole entities. Validate that the roles are not duplicated and they all have valid InvRoleSpecification. |
| Post-Condition | Persistent concrete subclass (i.e. PartyRole) entities are returned. |
| Extensions | Not applicable |
| Tips | Use RoleManager.makePartyRole() API to get a transient instance of the correct concrete subclass of role to create. InvRoleSpecification is required. |

Example 3-11 Creating the Party Role

```

Finder finder = PersistenceHelper.makeFinder();
RoleManager roleMgr = PersistenceHelper.makeRoleManager();
PartyRole role = roleMgr.makePartyRole();
/* Utility Method Call - see 3.2.1 Query Spec */
Collection<InvRoleSpecification> invrolespeclist =
    finder.findByName(InvRoleSpecification.class, ("Test_Party_Role_Spec");

```

```
InvRoleSpecification rolespec =  
    (InvRoleSpecification) invrolespeclist.iterator().next();  
role.setSpecification(roleSpec);  
List<InventoryRole> roles = new ArrayList<InventoryRole>();  
roles.add(role);  
roleMgr.createInventoryRole(roles);
```

Associating the Party and Party Role with the Service

This section describes the UIM API method used to associate the party and party role with the service. The API method must be called once per association. So, in this scenario, the API is called to associate the party with the service, and then called again to associate the party role with the service.

[Table 3-10](#) and example code provide information about using the API method. The example shows associating the party with the service; it does not show associating the party role with the service, which is accomplished by calling the same API method.

Table 3-10 Associating the Party and Party Role with the Service

| Topic | Information |
|-----------------------|--|
| Name | AttachmentManager.createRel |
| Description | This method creates an involvement (an association) between two entities. |
| Pre-Condition | Service, Party and PartyRole are already created. |
| Internal Logic | Creates an involvement entity to represent the relationship from Party to Service with a specific PartyRole. The Party is the parent of this involvement. Validates that the relationship is not duplicated. |
| Post-Condition | PartyServiceRel is created referencing the entities. |
| Extensions | Not applicable |
| Tips | Set the FROM entity to Party and TO entity to Service. Set the FROM entity role to the PartyRole. |

Example 3-12 Associating the Party to the Service

```
String roleOid = role.getOid();  
AttachmentManager involvementMgr =  
    PersistenceHelper.makeAttachmentManager();  
Involvement involvement =  
    involvementMgr.makeRel(PartyServiceRel.class);  
involvement.setToEntity(service);  
involvement.setFromEntity(party);  
involvement.setFromEntityRoleKey(roleOid);  
involvementMgr.createRel(involvement);  
PartyServiceRel partyServiceRel = (PartyServiceRel)involvement;
```

About Alternate Flows

The generic service fulfillment scenario creates a party and party role, and associates them with the service. Alternate flows to this scenario may be to disassociate the party and party role from the service, and then delete the party and party role.

The alternate flows described in this section are:

- [Disassociating the Party and Party Role from the Service](#)
- [Deleting the Party](#)

- [Deleting the Party Role](#)

Disassociating the Party and Party Role from the Service

This section describes the UIM API methods used to retrieve a party or service, and then use the retrieved data to disassociate the party from the service. The API methods are listed in the order in which they must be called.

The API methods must be each called once per disassociation. So, in this scenario, an API is called to retrieve the party or service, and another API is called to disassociate the party from the service. This process is repeated to disassociate the party role from the service: An API is called to retrieve the party role or service, and another API is called to disassociate the party role from the service.

[Table 3-11](#) and [Table 3-12](#) provide information about using the API methods.

Table 3-11 Getting the Party and the Service

| Topic | Information |
|-----------------------|---|
| Name | Service.getParty() or Party.getService() |
| Description | These methods are used to retrieve the bidirectional relationship PartyServiceRel between Party and Service. Once retrieved, the correct instance can be deleted. |
| Pre-Condition | PartyServiceRel is already created. |
| Internal Logic | Simple relationship attribute on the entities to get list of relationships to iterate through. |
| Post-Condition | PartyServiceRel is found and passed to next method for deletion. |
| Extensions | Not applicable |
| Tips | Not applicable |

Table 3-12 Disassociating the Party from the Service

| Topic | Information |
|-----------------------|--|
| Name | AttachmentManager.deleteRel |
| Description | This method deletes an involvement (an association) between two entities. In this example, an existing relationship between the Party and Service with a specific role is deleted. |
| Pre-Condition | PartyServiceRel is already created. |
| Internal Logic | Delete the PartyServiceRel entity. |
| Post-Condition | PartyServiceRel is deleted. |
| Extensions | Not applicable |
| Tips | Delete existing PartyServiceRel and create new ones to change Party to Service relationships. |

Deleting the Party

This section describes the UIM API method used to delete a party.

[Table 3-13](#) provides information about using the API method.

Table 3-13 Deleting the Party

| Topic | Information |
|-----------------------|---|
| Name | PartyManager.deleteParty |
| Description | This method deletes an existing Party, and all its existing PartyRoles. |
| Pre-Condition | Party is already created. |
| Internal Logic | Delete the Party entity. The Party will not be deleted if it is associated with other entities, such as involvement with a Service. |
| Post-Condition | Party is deleted. |
| Extensions | The API is an extension point for adding custom validation logic, such as logging and removing any relationships before deleting. |
| Tips | Use this method to delete an incorrect or obsolete Party before creating a new Party. |

Deleting the Party Role

This section describes the UIM API method used to delete a party role.

[Table 3-14](#) provides information about using the API method.

Table 3-14 Deleting the Party Role

| Topic | Information |
|-----------------------|---|
| Name | RoleManager.deleteInventoryRoles |
| Description | This method deletes an existing InventoryRole on a given entity. In this example, a PartyRole subclass instance is deleted. |
| Pre-Condition | PartyRole is already created. |
| Internal Logic | Delete the PartyRole entity. |
| Post-Condition | PartyRole is deleted. |
| Extensions | Not applicable |
| Tips | Use this method to delete an incorrect or obsolete role before creating a new role. |

Creating and Associating the Geographic Address with the Service

This section describes the UIM API methods used to create a place, create a place role, and associate the place and place role with the service. (A place is a GeographicPlace entity, which id is a concrete entity representing a geographic address/service address.) The API methods are listed in the order in which they must be called.



Note:

The associations of the place and place role with the service are optional, and can be associated before or after the creation of the initial service configuration. Typically, these types of associations do not change for the service, but alternate flows are presented to show how the associations can be changed if necessary.

Creating the Geographic Place

This section describes the UIM API method used to create the geographic place.

[Table 3-15](#) and example code provide information about using the API method.

Table 3-15 Creating the Geographic Place

| Topic | Information |
|-----------------------|---|
| Name | PlaceManager.createGeographicPlace |
| Description | This method takes a collection of Geographic Address entities that represents the Service Address and persist them into the database. The Place Role and association to the Service is setup by a different API. For this example, create a Geographic Address, a concrete subclass of Geographic Place, as an instance of the Service Address. |
| Pre-Condition | Place Specification is valid and retrieved from the database. Geographic Address has a valid and unique ID. |
| Internal Logic | Take the collection of transient Geographic Address entities and persists them into the database, and return the collection of persisted Geographic Address entities. Validate that the Geographic Address are not duplicated by ID and they all have valid PlaceSpecification. |
| Post-Condition | Persistent Geographic Address entities are returned. |
| Extensions | This API is defined as an extension point to allow custom validation before or after the Geographic Addresses are created. For instance, the IDs can be generated based on some custom algorithm. |
| Tips | Geographic Address is a CharacteristicExtensible entity. Its characteristic values should be added as the instance is created. Use RoleManager APIs to manage the roles played by a given Geographic Address, and use AttachmentManager to associate the Geographic Address with specific Role to a given Service. (Same as Party.) |

Example 3-13 Creating the Geographic Place

```
Finder finder = PersistenceHelper.makeFinder();
PlaceManager placeMgr = PersistenceHelper.makePlaceManager();
GeographicAddress place =
    placeMgr.makeGeographicPlace(GeographicAddress.class);
place.setId("Place_ID");
place.setName("Place_Name");

Collection<PlaceSpecification> placeSpecification = finder.findByName
    (PlaceSpecification.class, (String)paramMap.get("Test_Place_Spec"));

PlaceSpecification pcspec = PlaceSpecification.iterator().next();
place.setSpecification((PlaceSpecification) placeSpec);
```

```
List places = new ArrayList<GeographicAddress>();
places.add(place);
places = placeMgr.createGeographicPlace(places);
place = (GeographicAddress) places.iterator().next();
```

Creating the Place Role

This section describes the UIM API method used to create the place role.

[Table 3-16](#) and example code provide information about using the API method.

Table 3-16 Creating the Place Role

| Topic | Information |
|-----------------------|--|
| Name | RoleManager.createInventoryRole |
| Description | This method takes a collection of InventoryRole entities and persist them into the database. The roles passed in are the concrete subclass, for instance PlaceRole. |
| Pre-Condition | InvRoleSpecification is valid and retrieved from the database. The Geographic Address which has the roles is already created. |
| Internal Logic | Take the collection of transient InventoryRole entities and persists them into the database, and return the collection of persisted InventoryRole entities. Validate that the roles are not duplicated and they all have valid InvRoleSpecification. |
| Post-Condition | Persistent concrete subclass (i.e. PlaceRole) entities are returned. |
| Extensions | Not applicable |
| Tips | Use RoleManager.makePlaceRole() API to get a transient instance of the correct concrete subclass of role to create. InvRoleSpecification is required. |

Example 3-14 Creating the Place Role

```
Finder finder = PersistenceHelper.makeFinder();
RoleManager roleMgr = PersistenceHelper.makeRoleManager();
PlaceRole role = roleMgr.makePlaceRole();

Collection<InvRoleSpecification> invrolespeclist =
    f.findByName(InvRoleSpecification.class, "Test_Place_Role_Spec");

InvRoleSpecification rolespec =
    (InvRoleSpecification) invrolespeclist.iterator().next();
role.setSpecification(rolespec);
List<InventoryRole> roles = new ArrayList<InventoryRole>();
roles.add(role);
roleMgr.createInventoryRole( roles);
```

Associating the Geographic Place and Place Role with the Service

This section describes the UIM API method used to associate the geographic place and place role with the service. The API method must be called once per association. So, in this scenario, the API is called to associate the geographic place with the service, and then called again to associate the place role with the service.

[Table 3-17](#) and example code provide information about using the API method. The example shows associating the geographic place with the service; it does not show associating the place role with the service, which is accomplished by calling the same API method.

Table 3-17 Associating the Geographic Place and Place Role with the Service

| Topic | Information |
|-----------------------|--|
| Name | AttachmentManager.createRel |
| Description | This method creates an involvement (an association) between two entities. In this example, a relationship is created between Geographic Address and Service with a specific role created earlier. |
| Pre-Condition | Service, Geographic Address and PlaceRole are already created. |
| Internal Logic | Creates an involvement entity to represent the relationship from Geographic Address to Service with a specific PartyRole. The Geographic Address is the parent of this involvement. Validates that the relationship is not duplicated. |
| Post-Condition | PlaceServiceRel is created referencing the entities. |
| Extensions | Not applicable |
| Tips | Set the FROM entity to Geographic Address and TO entity to Service. Set the FROM entity role to the PlaceRole. |

Example 3-15 Associating the Geographic Place with the Service

```
String roleOid = role.getOid();

AttachmentManager involvementMgr = PersistenceHelper.makeAttachmentManager();
Involvement involvement = involvementMgr.makeRel(PlaceServiceRel.class);
involvement.setToEntity(service);
involvement.setFromEntity(place);
involvement.setFromEntityRoleKey(roleOid);
involvementMgr.createRel(involvement);

PlaceServiceRel placeServiceRel = (PlaceServiceRel) involvement;
```

About Alternate Flows

The generic service fulfillment scenario creates a geographic place and place role, and associates them with the service. Alternate flows to this scenario may be to disassociate geographic place and place role from the service, and then delete the geographic place and place role.

The alternate flows described in this section are:

- [Disassociating the Geographic Place and Place Role from the Service](#)
- [Deleting the Geographic Place](#)
- [Deleting the Place Role](#)

Disassociating the Geographic Place and Place Role from the Service

This section describes the UIM API methods used to retrieve a place or service, and then use the retrieved data to disassociate the place from the service. The API methods are listed in the order in which they must be called.

The API methods must be each called once per disassociation. So, in this scenario, an API is called to retrieve the place or service, and another API is called to disassociate the place from the service. This process is repeated to disassociate the place role from the service: An API is called to retrieve the place role or service, and another API is called to disassociate the place role from the service.

[Table 3-18](#) and [Table 3-19](#) provide information about using the API methods.

Table 3-18 Getting the Place and Service

| Topic | Information |
|-----------------------|--|
| Name | Service.getPlace() or GeographicPlace.getPlaceservicerels () |
| Description | These methods are used to retrieve the bidirectional relationship PlaceServiceRel between Geographic Address and Service. Once retrieved, the correct instance can be deleted. |
| Pre-Condition | PlaceServiceRel is already created. |
| Internal Logic | Simple relationship attribute on the entities to get list of relationships to iterate through. |
| Post-Condition | PlaceServiceRel is found and passed to next method for deletion. |
| Extensions | Not applicable |
| Tips | Not applicable |

Table 3-19 Disassociating the Place and Place Role from the Service

| Topic | Information |
|-----------------------|---|
| Name | AttachmentManager.deleteRel |
| Description | This method deletes an involvement (an association) between two entities. In this example, an existing relationship between the Geographic Address and Service with a specific role is deleted. |
| Pre-Condition | PlaceServiceRel is already created. |
| Internal Logic | Delete the PlaceServiceRel entity. |
| Post-Condition | PlaceServiceRel is deleted. |
| Extensions | Not applicable |
| Tips | Delete existing PlaceServiceRel and create new ones to change Geographic Address to Service relationships. |

Deleting the Geographic Place

This section describes the UIM API method used to delete a geographic place.

[Table 3-20](#) provides information about the API method.

Table 3-20 Deleting the Geographic Place

| Topic | Information |
|-----------------------|--|
| Name | PlaceManager.deleteGeographicPlace |
| Description | This method deletes an existing Geographic Address, and all its existing PlaceRoles. In this example, the Service Address as in instance of a Geographic Address is deleted. |
| Pre-Condition | Geographic Address is already created. |
| Internal Logic | Delete the Geographic Address entity, and all its existing PlaceRoles. The Geographic Address will not be deleted if it is associated with other entities, such as involvement with a Service. |
| Post-Condition | Geographic Address is deleted. |

Table 3-20 (Cont.) Deleting the Geographic Place

| Topic | Information |
|-------------------|--|
| Extensions | The API is an extension point for adding custom validation logic, such as logging and removing any relationships before deleting them. |
| Tips | Use this method to delete an incorrect or obsolete Geographic Address before creating a new Geographic Address. |

Deleting the Place Role

This section describes the UIM API method used to delete a place role.

[Table 3-21](#) provides information about the API method.

Table 3-21 Deleting the Place Role

| Topic | Information |
|-----------------------|---|
| Name | RoleManager.deleteInventoryRoles |
| Description | This method deletes an existing InventoryRole on a given entity. In this example, a PlaceRole subclass instance is deleted. |
| Pre-Condition | PlaceRole is already created. |
| Internal Logic | Delete the PlaceRole entity. |
| Post-Condition | PlaceRole is deleted. |
| Extensions | Not applicable |
| Tips | Use this method to delete an incorrect or obsolete role before creating a new role. |

Configuring the Resources for the Service Configuration

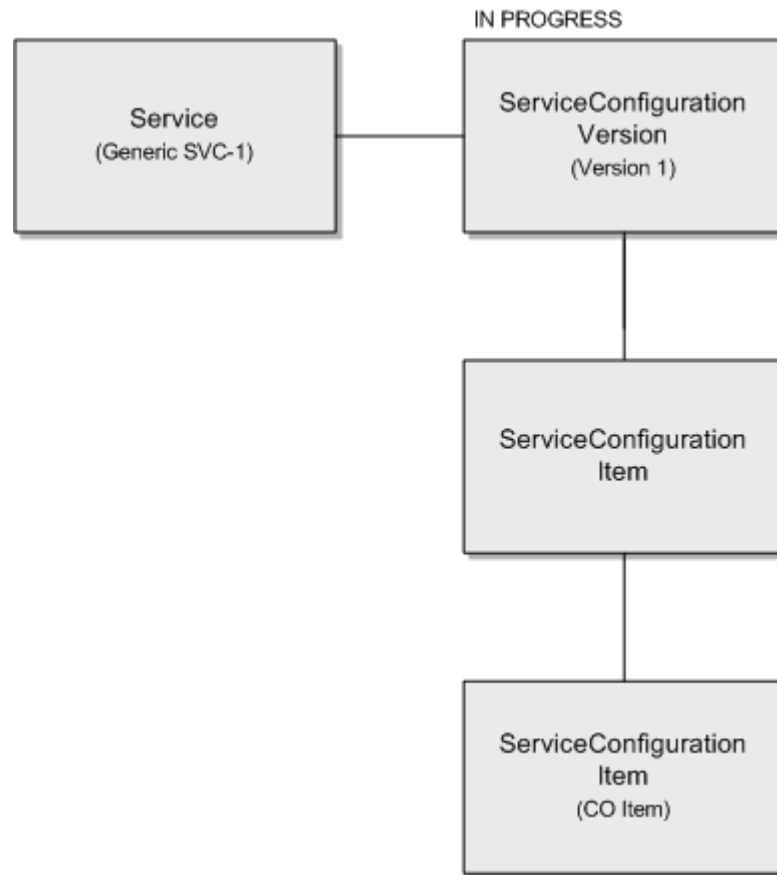
This section describes the APIs need to assign a custom object to a service configuration item. The APIs are listed in the order in which they must be called.

**Note:**

If assignment is being done as part of creating the service and service configuration (see "[Creating the Service and Service Configuration](#)"), then start at section "[Finding the Service Configuration Item](#)" because the service and service configuration are already known.

[Figure 3-3](#) shows how the service and configuration are created by calling the APIs described in [Creating the Service and Service Configuration](#).

Figure 3-3 Generic Service Example



Finding the Service

This section describes the UIM API method used to find the service. The retrieved service will be used to find the service configuration.

[Table 3-22](#) and example code provide information about using the API method.

Table 3-22 Finding the Service

| Topic | Information |
|-----------------------|---|
| Name | ServiceManager.findServices |
| Description | This method retrieves services based on input criteria. |
| Pre-Condition | The desired service already exists. |
| Internal Logic | The database is queried for services meeting the input criteria. Services matching the criteria are returned. |
| Post-Condition | The desired service has been retrieved. |
| Extensions | Not applicable |
| Tips | If a list of services is returned, the list will need to be iterated to select the desired service. |

Example 3-16 Finding the Service

```

ServiceManager mgr = PersistenceHelper.makeServiceManager();
ServiceSearchCriteria criteria = mgr.makeServiceSearchCriteria();
citem = criteria.makeCriteriaItem();
citem.setValue("Service_Test_22");
citem.setOperator(CriteriaOperator.EQUALS);
criteria.setName(citem);
List<Service> list = mgr.findServices(criteria);

```

Finding the Service by ID Using Finder API

This section describes the UIM API method that is used to find the service using the **finder.findByName** API.

[Table 3-23](#) and example code provide information about using the API method.

Table 3-23 Querying for the Service by ID using Finder API

| Topic | Information |
|-----------------------|--|
| Name | Finder.findByName |
| Description | This method retrieves services based on input criteria. |
| Pre-Condition | The desired service already exists. |
| Internal Logic | The database is queried for services meeting the input criteria. Services matching the criteria are returned. |
| Post-Condition | The desired service has been retrieved. |
| Extensions | Not applicable |
| Tips | <p>If a list of is returned, the list will need to be iterated to select the desired service.</p> <p>If the service is not found, the find method will return empty collection.</p> <p>Note: The name is not a unique field, but it is common to have unique service names.</p> <p>This method is applicable for retrieving other entities by supplying the correct class as the query parameter. For example, it can be used to retrieve a CustomObject or any UIM entity to be used later for resource query or creation.</p> |

Example 3-17 Finding the Service by ID Using Finder API

```

Service service = null;
Finder f = null;

try{

f = PersistenceHelper.makeFinder();
Collection<Service> services = f.findByName(Service.class, "service_name");
service = Services.iterator.next();
}
catch(Exception e){
/* log exception*/
}
finally{
if(f!=null)
f.close();
}
}

```

Finding the Current Service Configuration Version

To find the current service configuration version:

1. Find the service. See "[Finding the Service](#)".
2. Select the service configuration versions using `service.getConfigurations()`.
3. Process the retrieved service configuration versions, looking for one with a `configState` of `IN_PROGRESS`, `DESIGNED` or `ISSUED`.

There will only be one service configuration version in one of these states at a given point in time for a service. If a service configuration version is not found in one of these states, you cannot proceed with resource assignment.

In the generic service fulfillment scenario, **Version 1** would be selected.

Example 3-18 Finding the Current Service Configuration Version

```
InventoryConfigurationVersion invConfigVersion = null;
ServiceConfigurationManager scm =
PersistenceHelper.makeServiceConfigurationManager();
BusinessInteractionState configState = BusinessInteractionState.IN_PROGRESS;
/*similarly, other BusinessInteractionStates (COMPLETED, CANCELLED) can also be passed
as parameter*/
List<InventoryConfigurationVersion> configs =
scm.getEntityConfigurationVersions(configurable, configState);

InventoryConfigurationVersion latestConfig = null;
if (!Utils.isEmpty(configs)) {
    invConfigVersion = configs.get(0);
}
ServiceConfigurationVersion scv = (ServiceConfigurationVersion) invConfigVersion;
```

Finding the Service Configuration Item

To find the service configuration item:

1. Find the current service configuration version. See "[Finding the Current Service Configuration Version](#)".
2. Select the service configuration items using `service.getConfigItems()`.
3. Process the retrieved service configuration items, looking for one with the `configType` of `ITEM`.

In the generic service fulfillment scenario, **CO Item** would be selected.

Note:

In this simplified example, we know there is only one item level configuration item, and we know it is associated to an option for a custom object specification, which is why the following sections find or create a custom object to assign.

Example 3-19 Finding the Current Service Configuration Item

```
ServiceConfigurationVersion scv = (ServiceConfigurationVersion) invConfigVersion;
List<? extends InventoryConfigurationItem> items = scv.getConfigItems();
InventoryConfigurationItem invConfigItem = null;
```

```

        for (InventoryConfigurationItem item : items) {
            if (name.equalsIgnoreCase(item.getName())) {
                invConfigItem =item;
            }
        }
    }
}

```

Example 3-20 Finding the Current Service Configuration Item - Alternate Way Including Checks for Existing References or Assignments on the Item

```

ServiceConfigurationVersion scv = (ServiceConfigurationVersion) invConfigVersion;
boolean checkReferenceAndAssignment = true;
List<? extends InventoryConfigurationItem> items = confVersion.getConfigItems();
InventoryConfigurationItem invConfigItem = null;
    for (InventoryConfigurationItem item : items) {
        if (name.equalsIgnoreCase(item.getName())) {

            if (checkReferenceAndAssignment) {
                if (configItem.getAssignment() == null
                    && configItem.getReference() == null) {
                    invConfigItem =item;
                }
            }
        }
    }
}

```

Finding the Custom Object to Assign

This section describes the UIM API method used to find the custom object to assign to the retrieved service configuration item. When assigning a custom object to a service configuration item, you can either find an existing custom object, or you can create a new custom object to assign, as described in the following section, "[Creating the Custom Object to Assign](#)".

[Table 3-24](#) and example code provide information about using the API method.

Table 3-24 Finding the Custom Object

| Topic | Information |
|-----------------------|---|
| Name | CustomObjectManager.findCustomObjects |
| Description | This method retrieves custom objects based on input criteria. |
| Pre-Condition | The custom object to be allocated already exists. |
| Internal Logic | The database is queried for custom objects meeting the input criteria. Custom objects matching the criteria are returned. |
| Post-Condition | The desired custom object has been retrieved. |
| Extensions | Not applicable |
| Tips | <p>Set the CustomObjectSearchCriteria.setAssignmentState(AssignmentState.UNASSIGNED) to instruct the find method to only return available custom objects.</p> <p>In this example, we could choose to set the CustomObjectSearchCriteria.setCustomObjectSpecification (CustomObjectSpecification) to the CO Spec instance.</p> <p>If a list of custom objects is returned, the list will need to be iterated to select the desired custom object to be allocated to the service configuration item.</p> |

Example 3-21 Finding the Custom Object

```

Finder finder = null;
CustomObjectManager mgr = null;
try{
mgr = PersistenceHelper.makeCustomObjectManager();
CustomObjectSearchCriteria criteria =
    mgr.makeCustomObjectSearchCriteria();
criteria.setAdminState(InventoryState.INSTALLED);
finder = PersistenceHelper.makeFinder();
int quantity = 1; // any positive number to ensure the query does not go unbounded
Collection<CustomObjectSpecification> customObjectSpecs =
    finder.findByName(CustomObjectSpecification.class, "Test_Custom_Object_Spec");

criteria.setCustomObjectSpecification(customObjectSpecs.iterator().next());
criteria.setRange(0, quantity);
mgr.findCustomObjects(criteria);

/* another example */
Collection<CustomObject> custObjs = f.findById(CustomObject.class, "CO-1");
}
catch (Exception e){
    /* log exception */
}
finally{
    if(f!=null)
        f.close();
}

```

Creating the Custom Object to Assign

This section describes the UIM API method used to create a custom object to assign to the retrieved service configuration item. When assigning a custom object to a service configuration item, you can either create a new custom object, or you can find an existing custom object to assign, as described in ["Finding the Custom Object to Assign"](#).

[Table 3-25](#) and example code provide information about using the API method.

Table 3-25 Creating the Custom Object

| Topic | Information |
|-----------------------|--|
| Name | CustomObjectManager.createCustomObjects |
| Description | This method creates a custom object. The custom object will be populated with the hard facts and characteristics supplied by the caller. |
| Pre-Condition | Not applicable |
| Internal Logic | The custom object is created. |
| Post-Condition | The custom object has been created and is in Installed status. |
| Extensions | Not applicable |
| Tips | A custom object can be created with or without a specification. |

Example 3-22 Creating the Custom Object

```

Finder f = null;
CustomObjectManager custMgr = null;
try{
custMgr = PersistenceHelper.makeCustomObjectManager();
f = PersistenceHelper.makeFinder();

```



```
Collection<CustomObjectSpecification> specList =
    new ArrayList<CustomObjectSpecification>
(f.findByName(CustomObjectSpecification.class, "SPEC_CUST_001"));

if (specList != null && !specList.isEmpty())
{
    CustomObjectSpecification custObjSpec =
        specList.iterator().next();

    Collection<CustomObject> custObjects = new ArrayList<CustomObject>();
    CustomObject custObj = custMgr.makeCustomObject();
    custObj.setId("CUST_OBJ_ID");
    custObj.setName("CUST_OBJ_NAME");
    custObj.setDescription("CUST_OBJ_DESC");
    custObj.setSpecification(custObjSpec); /* optional */
    custObjects.add(custObj);

    custMgr.createCustomObjects(custObjects);}
}
catch(Exception e){
    /* log exception*/
}
finally{
    if(f!=null)
        f.close();
}
```

Assigning the Resource to a Configuration Item

This section describes the UIM API method used to assign the resource to a configuration item. In the generic service fulfillment scenario, the resource is the custom object that was either found or created when [Finding the Custom Object to Assign](#) or [Creating the Custom Object to Assign](#).

[Table 3-26](#) and example code provide information about using the API method.

Table 3-26 Assigning the Resource to a Configuration Item

| Topic | Information |
|-----------------------|--|
| Name | BaseConfigurationManager.assignResource(E item,oracle.communications.inventory.api.entity.common.ConsumableResource resource,java.lang.String reservedFor,java.lang.String reservedForType) In this example, the full signature of the method is included because there are multiple overloaded assignResource methods. |
| Description | This method assigns the input resource to the input service configuration item. In this example, a custom object is used as the consumable resource for assignment. |
| Pre-Condition | The configuration item to allocate the custom object to has been selected. |
| Internal Logic | Not applicable |
| Post-Condition | The custom object has been allocated to the service configuration item. |
| Extensions | Not applicable |

Table 3-26 (Cont.) Assigning the Resource to a Configuration Item

| Topic | Information |
|-------------|---|
| Tips | The input item is the entity configuration item to assign the resource to (ConsumableResource). In this example, ConsumableResource is set to the CustomObject for CO-1 . The reservedFor and reservedForType parameters should be populated if the resource to be assigned is reserved, so the reservation can be redeemed. |

Example 3-23 Assigning the Resource to a Configuration Item

```

Finder finder = PersistenceHelper.makeFinder();
Collection<CustomObject> custObjs =
    finder.findByName(CustomObject.class, "CO-1");
CustomObject custObj = custObjs.iterator().next();
ServiceManager mgr = PersistenceHelper.makeServiceManager();

ServiceSearchCriteria criteria = mgr.makeServiceSearchCriteria();
CriteriaItem citem = criteria.makeCriteriaItem();
citem.setValue("Service_Test_22");
citem.setOperator(CriteriaOperator.EQUALS);
criteria.setName(citem);

List<Service> list = mgr.findServices(criteria);
Service service = list.get(0);
List<ServiceConfigurationVersion> srvConfigurations =
    service.getConfigurations();
ServiceConfigurationItemAllocationData itemData =
    new ServiceConfigurationItemAllocationData();
int i = srvConfigurations.get(0).getVersionNumber();

//Write logic to get the latest ServiceConfigurationVersion of the Service.
//Process the retrieved service configuration versions,
//looking for one with a configState of IN_PROGRESS, DESIGNED or ISSUED.
ServiceConfigurationVersion latestConfiguration;

//Assign the latest ServiceConfigurationVersion
//to the variable latestConfiguration
List<ServiceConfigurationItem> configItems =
    latestConfiguration.getConfigItems();
for(ServiceConfigurationItem item : configItems)
{
    if((item.getName() != null && item.getName().equalsIgnoreCase("CO Item")))
    {
        itemData.setResource(custObj);
        itemData.setServiceConfigurationItem(item);
        String reservedFor= null; // "Service-123"
        String reservedForType= null; // "Longterm"
        BaseConfigurationManager bcd =
            PersistenceHelper.makeConfigurationManager
                (ServiceConfigurationVersion.class);
        bcd.assignResource(item, custObj,reservedFor, reservedForType);
        break;
    }
}

```

Referencing the Resource to a Configuration Item

This section describes the UIM API method used to reference the resource to a configuration item. In a generic service fulfillment scenario, the resource is a custom object that was either found or created when ["Finding the Custom Object to Assign"](#) or ["Creating the Custom Object to Assign"](#).

Table 3-24 and example code provide information about using the API method.

Table 3-27 Referencing the Resource to a Configuration Item

| Topic | Information |
|-----------------------|---|
| Name | BaseConfigurationManager. referenceEntity (E item, ConfigurationReferenceEnabled entity) |
| Description | This method refers the input resource to the input service configuration item. In this example, a custom object is used as the resource for reference. |
| Pre-Condition | The configuration item to allocate the custom object to has been selected. |
| Internal Logic | Not applicable |
| Post-Condition | The custom object has been allocated to the service configuration item. |
| Extensions | Not applicable |
| Tips | The input item is the entity configuration item to refer the resource to (referenceEnabledEntity). In this example, resource is set to the CustomObject for CO-1 . |

Example 3-24 Referencing the Resource to a Configuration Item

```
Finder finder = null;
BaseConfigurationManager configMgr = null
ServiceManager mgr = null;
try{
finder = PersistenceHelper.makeFinder();

Collection<CustomObject> custObjs =
    finder.findByName(CustomObject.class, "CO-1");
CustomObject custObj = custObjs.iterator().next();
mgr = PersistenceHelper.makeServiceManager();

ServiceSearchCriteria criteria = mgr.makeServiceSearchCriteria();
CriteriaItem citem = criteria.makeCriteriaItem();
citem.setValue("Service_Test_22");
citem.setOperator(CriteriaOperator.EQUALS);
criteria.setName(citem);

List<Service> list = mgr.findServices(criteria);
Service service = list.get(0);
List<ServiceConfigurationVersion> srvConfigurations =
    service.getConfigurations();
ServiceConfigurationItemAllocationData itemData =
    new ServiceConfigurationItemAllocationData();
int i = srvConfigurations.get(0).getVersionNumber();

//Write logic to get the latest ServiceConfigurationVersion of the Service.
//Process the retrieved service configuration versions,
//looking for one with a configState of IN_PROGRESS, DESIGNED or ISSUED.
ServiceConfigurationVersion latestConfiguration;
```

```
//Assign the latest ServiceConfigurationVersion
//to the variable latestConfiguration
List<ServiceConfigurationItem> configItems =
    latestConfiguration.getConfigItems();

ServiceConfigurationItem configItem = null;

configMgr = PersistenceHelper.makeConfigurationManager
(ServiceConfigurationItemDAO.class);

    ConfigurationItemSearchCriteria configItemCriteria =
configMgr.makeConfigurationItemSearchCriteria();

configItemCriteria.setConfigurationItemClass(ServiceConfigurationItemDAO.class);
    CriteriaItem criteriaItem = configItemCriteria.makeCriteriaItem();
    criteriaItem.setValue("item_name");
    criteriaItem.setOperator(CriteriaOperator.EQUALS);
    configItemCriteria.setConfigurationItemName(criteriaItem);

    criteriaItem = configItemCriteria.makeCriteriaItem();
    criteriaItem.setValue(version.getVersionNumber());
    criteriaItem.setOperator(CriteriaOperator.EQUALS);
    configItemCriteria.setConfigurationVersionNumber(criteriaItem);

    List<InventoryConfigurationItem> configItems =
configMgr.findConfigurationItems(configItemCriteria);

    configItem = configItems.iterator().next();
    if (configItem != null) {
BaseConfigurationManager configurationManager =
PersistenceHelper.makeConfigurationManager(configItem.getClass());
configurationManager.referenceEntity(configItem, referenceEnabledEntity);
    }
catch(Exception e){
    /* log exception*/
}
finally{
    if(finder!=null)
        finder.close();
}
}
```

Example 3-25 Unreferencing the Resource to a Configuration Item

```
Finder finder = null;
BaseConfigurationManager configMgr = null;
ServiceManager mgr = null;

try{
finder = PersistenceHelper.makeFinder();

Collection<CustomObject> custObjs =
    finder.findByName(CustomObject.class, "CO-1");
CustomObject custObj = custObjs.iterator().next();
mgr = PersistenceHelper.makeServiceManager();

ServiceSearchCriteria criteria = mgr.makeServiceSearchCriteria();
CriteriaItem citem = criteria.makeCriteriaItem();
citem.setValue("Service_Test_22");
citem.setOperator(CriteriaOperator.EQUALS);
criteria.setName(citem);
```

```

List<Service> list = mgr.findServices(criteria);
Service service = list.get(0);
List<ServiceConfigurationVersion> srvConfigurations =
    service.getConfigurations();
ServiceConfigurationItemAllocationData itemData =
    new ServiceConfigurationItemAllocationData();
int i = srvConfigurations.get(0).getVersionNumber();

//Write logic to get the latest ServiceConfigurationVersion of the Service.
//Process the retrieved service configuration versions,
//looking for one with a configState of IN_PROGRESS, DESIGNED or ISSUED.
ServiceConfigurationVersion latestConfiguration;

//Assign the latest ServiceConfigurationVersion
//to the variable latestConfiguration
List<ServiceConfigurationItem> configItems =
    latestConfiguration.getConfigItems();

ServiceConfigurationItem configItem = null;

configMgr = PersistenceHelper.makeConfigurationManager
(ServiceConfigurationItemDAO.class);

    ConfigurationItemSearchCriteria configItemCriteria =
configMgr.makeConfigurationItemSearchCriteria();

configItemCriteria.setConfigurationItemClass(ServiceConfigurationItemDAO.class);
    CriteriaItem criteriaItem = configItemCriteria.makeCriteriaItem();
    criteriaItem.setValue("item_name");
    criteriaItem.setOperator(CriteriaOperator.EQUALS);
    configItemCriteria.setConfigurationItemName(criteriaItem);

    criteriaItem = configItemCriteria.makeCriteriaItem();
    criteriaItem.setValue(version.getVersionNumber());
    criteriaItem.setOperator(CriteriaOperator.EQUALS);
    configItemCriteria.setConfigurationVersionNumber(criteriaItem);

    List<InventoryConfigurationItem> configItems =
configMgr.findConfigurationItems(configItemCriteria);

        if (!Utils.isEmpty(configItems)) {
configMgr.dereferenceInventoryConfigurationItems (configItems);
        }

    }
    catch(Exception e){
        /* log exception*/
    }
    finally{
        if(finder!=null)
            finder.close();
    }
}

```

About Alternate Flows

The generic service fulfillment scenario assigns a custom object resource to a service configuration item. An alternate flow to this scenario may be to unassign the resource from a configuration item.

Additional alternate flows may be to manage consumable resources by creating reservations and conditions. Reservations are created to prevent a given resource to be consumed by another service. The reservation can only be redeemed successfully during resource assignment when the correct token is provided. Also, a reservation can expire if not redeemed within the expiry time period. Conditions are created to add informational or blocking codes to a given resource. A blocking condition prevents a resource from being assigned.

The alternate flows described in this section are:

- [Unassigning Resources from a Configuration Item](#)
- [Reserving a Custom Object](#)
- [Unreserving a Custom Object](#)
- [Creating a Blocked Condition for a Custom Object](#)
- [Deleting a Blocked Condition for a Custom Object](#)

Unassigning Resources from a Configuration Item

This section describes the UIM API method used to unassign the resource from a configuration item.

[Table 3-28](#) and example code provide information about using the API method.

Table 3-28 Unassigning Resources from a Configuration Item

| Topic | Information |
|-----------------------|---|
| Name | BaseConfigurationManager.unallocateInventoryConfigurationItems(java.util.Collection<E> configurationItems) |
| Description | This method unassigns/deallocates resources that were previously assigned on a configuration item of a service configuration version. |
| Pre-Condition | A service configuration version exists with a custom object assigned to a configuration item of the version. |
| Internal Logic | Not applicable |
| Post-Condition | The custom object/s has been unassigned. |
| Extensions | Not applicable |
| Tips | In this example the ConsumableResource to be unassigned is custom object 'CO-1'. |

Example 3-26 Unassigning Resources from a Configuration Item

```
BaseConfigurationManager bcd =
    PersistenceHelper.makeConfigurationManager(ServiceConfigurationVersion.class);
Finder f = PersistenceHelper.makeFinder();

Collection<CustomObject> custObjs = f.findById(CustomObject.class, "CO-1");
CustomObject custObj = custObjs.iterator().next();
Collection<ServiceConfigurationVersion> scvList =
    f.findByName(ServiceConfigurationVersion.class, "Se_123_2");

ServiceConfigurationVersion scv =
    (ServiceConfigurationVersion)scvList.iterator().next();
BusinessInteractionManager biMgr =
    PersistenceHelper.makeBusinessInteractionManager();
biMgr.switchContext(scv, null);
```

```

/* Find Service Configuration Item (SCI) by: */
/* 1) Using Finder query by name, OR */
/* 2) Get Service Configuration and iterate to correct SCI */
//Collection<ServiceConfigurationItem> serviceConfigItems =
//  f.findByName(ServiceConfigurationItem.class, "CO Item");
//ServiceConfigurationItem sci = serviceConfigItems.iterator().next();

ServiceConfigurationItem unSci = null;
Collection<ServiceConfigurationItem> sciList = scv.getConfigItems();
for (ServiceConfigurationItem sci : sciList)
{
    if (sci.getName().equals("CO Item") &&
        sci.getConfigAction() == ConfigurationItemAction.ASSIGN &&
        sci.getAssignment() != null &&
        sci.getAssignment() instanceof Assignment)
    {
        Assignment assignment = (Assignment) sci.getAssignment();
        if (assignment.getResource().equals(custObj))
        {
            unSci = sci;
            break;
        }
    }
}
if (unSci != null)
{
    Collection<ServiceConfigurationItem> unSciList =
        new ArrayList<ServiceConfigurationItem>();
    unSciList.add(unSci);
    bcd.unallocateInventoryConfigurationItems(unSciList);
}

```

Reserving a Custom Object

This section describes the UIM API methods used to make a reservation and to reserve a custom object using the reservation. To find a custom object to reserve, you must find or create a custom object. See ["Finding the Custom Object to Assign"](#) or ["Creating the Custom Object to Assign"](#).

[Table 3-29](#), [Table 3-30](#), [Table 3-31](#) and example code provide information about using the API methods.

Table 3-29 Making a Reservation

| Topic | Information |
|-----------------------|---|
| Name | ReservationManager.makeReservation(ConsumableResource conRes) In this example, the full signature of the method is included because there are multiple overloaded makeReservation methods. |
| Description | This method will make an instance of the appropriate Reservation class based on the type of ConsumableResource. For example, if a CustomObject is input, then a CustomObjectReservation will be returned. |
| Pre-Condition | Not applicable |
| Internal Logic | This method will determine the appropriate Reservation class to be constructed based on the input ConsumableResource. |
| Post-Condition | The caller has an instance of the appropriate Reservation class. In this scenario, it will be a CustomObjectReservation. |
| Extensions | Not applicable |

Table 3-29 (Cont.) Making a Reservation

| Topic | Information |
|-------------|--|
| Tips | The CustomObject instance for CO-1 should be passed as input to the method. |

Table 3-30 Reserving a Resource

| Topic | Information |
|-----------------------|--|
| Name | ReservationManager.reserveResource(Collection <? extends ConsumableResource> resources, Reservation reservation) |
| Description | This method will reserve the input resources. |
| Pre-Condition | The resource exists. In this scenario the resource is Custom Object CO-1 . |
| Internal Logic | The input parameters are validated, and if no errors are detected each input resource is reserved. The system will generate a new reservation number. All the input resources will be reserved for this reservation number. |
| Post-Condition | The resource (Custom Object CO-1) is reserved. |
| Extensions | The RESERVATION_EXPIRATION ruleset can be customized to change the default behavior of setting the expiry date for a resource reservation. By default, a long term reservation will expire after 30 days and a short term reservation will expire after 10 minutes. |
| Tips | <p>At least one ConsumableResource must be input. For this scenario, it will be the CustomObject instance for CO-1.</p> <p>The Reservation passed to the method must have the following attributes set:</p> <ul style="list-style-type: none"> Reservation.reservedFor (Free form text identifying the reserver.) Reservation.reservedForType (A ReservedForType such as CUSTOMER.) Reservation.reservationType (This would be set to ReservationType.LONGTERM for this scenario.) <p>Optionally, the Reservation.reason can be set. This is free form text.</p> <p>The startDate, endDate, and expiry can also be set, but for this example we will allow them to be defaulted by the system.</p> |

You can also add a resource to an existing reservation number by calling the ReservationManager.addResourceToReservation method using this API method:

Table 3-31 Adding a Resource to a Reservation

| Topic | Information |
|----------------------|---|
| Name | ReservationManager.addResourceToReservation(Collection <? extends ConsumableResource> resources, Reservation reservation) |
| Description | This method will reserve the input resources. |
| Pre-Condition | The resource exists. In this scenario the resource is Custom Object CO-1 . |

Table 3-31 (Cont.) Adding a Resource to a Reservation

| Topic | Information |
|-----------------------|---|
| Internal Logic | The input parameters are validated, and if no errors are detected each input resource is reserved. The resources will be reserved with an existing reservation number. The reservedFor and reservedForType values will always be the same for all resource reservations for the same reservation number. Other reservation information, such as reason and expiry, can differ among resource reserved with the same reservation number. |
| Post-Condition | The resource (Custom Object CO-1) is reserved. |
| Extensions | The RESERVATION_EXPIRATION ruleset can be customized to change the default behavior of setting the expiry date for a resource reservation. By default, a long term reservation will expire after 30 days and a short term reservation will expire after 10 minutes. |
| Tips | <p>At least one ConsumableResource must be input. For this scenario, it will be the CustomObject instance for CO-1.</p> <p>The Reservation passed to the method must have the following attributes set:</p> <ul style="list-style-type: none"> Reservation.reservationNumber An existing resource reservation must already exist with this same reservation number. Reservation.reservationType In the generic service fulfillment scenario, this would be set to ReservationType.LONGTERM. <p>If Reservation.reservedForType or Reservation.ReservedFor are populated, they must match the equivalent values for existing resource reservations for the reservationNumber.</p> <p>The startDate, endDate, and expiry can also be set, but for this scenario, these dates are defaulted by the system.</p> |

Example 3-27 Reserving a Custom Object

```

ReservationManager resMgr = PersistenceHelper.makeReservationManager();
ConsumableResource cr = (ConsumableResource) custObj;
List<ConsumableResource> crList = new ArrayList<ConsumableResource>();
crList.add(cr);

Reservation reservation = resMgr.makeReservation(cr);
reservation.setReason("Future requirement");
reservation.setReservedFor("Order-333");
reservation.setReservedForType(ReservedForType.ORDER);
reservation.setReservationType(ReservationType.LONGTERM);

resMgr.reserveResource( crList, reservation);

ReservationManager resMgr = PersistenceHelper.makeReservationManager();
ConsumableResource cr = (ConsumableResource) custObj;
List<ConsumableResource> crList = new ArrayList<ConsumableResource>();
crList.add(cr);

Reservation reservation = resMgr.makeReservation(cr);
reservation.setReservationNumber("11111111"); reservation.setReservedFor("Order-333");
reservation.setReservedForType(ReservedForType.ORDER);
reservation.setReservationType(ReservationType.LONGTERM);

resMgr.addResourceToReservation( crList, reservation);

```

Unreserving a Custom Object

This section describes the UIM API methods used to unreserve a custom object. To find the custom object to unreserve, you must find the custom object. See ["Finding the Custom Object to Assign"](#).

[Table 3-32](#) and example code provide information about using the API method.

Table 3-32 Unreserving a Custom Object

| Topic | Information |
|-----------------------|---|
| Name | <code>ReservationManager.unreserveResource(Collection<? extends ConsumableResource> resources, String redeemer, ReservedForType redeemerType)</code> In this example, the full signature of the method is included because there are multiple overloaded <code>unreserveResource</code> methods. |
| Description | This method will delete the reservation for the input resources. |
| Pre-Condition | The resource exists and is reserved. |
| Internal Logic | The input parameters are validated, and if no errors are detected each input resource is unreserved. The input redeemer and redeemerType must match the persisted reservation information for each of the input resources. |
| Post-Condition | The resource (custom object CO-1) is no longer reserved. |
| Extensions | Not applicable |
| Tips | At least one <code>ConsumableResource</code> must be input. For this scenario, it will be the <code>CustomObject</code> instance for CO-1 . The redeemer and redeemerType are required. |

Example 3-28 Unreserving a Custom Object

```
ReservationManager resMgr = InventoryHelper.makeReservationManager();
ConsumableResource cr = (ConsumableResource) custObj;
List<ConsumableResource> crList = new ArrayList<ConsumableResource>();
crList.add(cr);

resMgr.unreserveResource(crList, "Order-333", ReservedForType.ORDER);
```

Creating a Blocked Condition for a Custom Object

This section describes the UIM API methods used to create a blocked condition for a custom object. To find a custom object to create the condition for, you must find or create a custom object. See ["Finding the Custom Object to Assign"](#) or ["Creating the Custom Object to Assign"](#).

[Table 3-33](#), [Table 3-34](#) and example code provide information about using the API methods.

Table 3-33 Making a Condition

| Topic | Information |
|-------------|---|
| Name | <code>ConditionManager.makeCondition(ConsumableResource conRes)</code> In this example, the full signature of the method is included because there are multiple overloaded <code>makeCondition</code> methods. |

Table 3-33 (Cont.) Making a Condition

| Topic | Information |
|-----------------------|---|
| Description | This method will make an instance of the appropriate Condition class based on the type of ConsumableResource. For example, if a CustomObject is input, then a CustomObjectCondition will be returned. |
| Pre-Condition | Not applicable |
| Internal Logic | This method will determine the appropriate Condition class to be constructed based on the input ConsumableResource. |
| Post-Condition | The caller has an instance of the appropriate Condition class. In this scenario, it will be a CustomObjectCondition. |
| Extensions | Not applicable |
| Tips | The CustomObject instance for CO-1 should be passed as input to the method. |

Table 3-34 Creating Conditions

| Topic | Information |
|-----------------------|--|
| Name | ConditionManager.createConditions |
| Description | This method will create a condition on each of the input resources. |
| Pre-Condition | The resource exists. In this scenario the resource is Custom Object CO-1 . |
| Internal Logic | The input Condition instances are validated, and if no errors are detected a condition is created for each resource specified in the input Condition collection. |
| Post-Condition | The resource (custom object CO-1) has a blocked condition. |
| Extensions | Not applicable |
| Tips | <p>The Condition passed to the method must have the following attributes set:</p> <ul style="list-style-type: none"> Condition.resource This should be set to the CustomObject instance for CO-1. Condition.reason This is free form text describing the reason for the condition. For example, Under Repair. Condition.type This should be set to ConditionType.BLOCKED. <p>Optionally, the Condition.validFor can be set with a startDate and endDate value. If startDate is not specified, it is defaulted to the current date. If endDate is not specified, it is defaulted to the java max date value of 18-Jan-2038.</p> <p>Optionally, the Condition.description can be set. This is free form text.</p> |

Example 3-29 Creating a Blocked Condition for a Custom Object

```

ConditionManager conMgr = PersistenceHelper.makeConditionManager();
Collection<Condition> inputCons = new ArrayList<Condition>();

Finder f = PersistenceHelper.makeFinder();
Collection<CustomObject> custObjs = f.findById(CustomObject.class, "CO-1");
CustomObject custObj = custObjs.iterator().next();

Condition con = conMgr.makeCondition(custObj);

```

```
con.setDescription("Test Failure");
con.setReason("Under Repair");
con.setType(ConditionType.BLOCKED);

Date now = new Date();
Date later = getEndDate(now); /* call to an utility method */
con.setValidFor(new TimePeriod(now, later));
con.setResource(custObj);
con.setMaster(true);
inputCons.add(con);

Collection <? extends Condition> cons = conMgr.createConditions(inputCons);
```

Deleting a Blocked Condition for a Custom Object

This section describes the UIM API methods used to delete a blocked condition from a custom object. To find the custom object to delete the blocked condition from, you must find the custom object. See ["Finding the Custom Object to Assign"](#). To delete the condition from the custom object, you must first find the condition to be deleted using the API method described here.

[Table 3-35](#), [Table 3-36](#), [Table 3-37](#) and example code provide information about using the API methods.

Table 3-35 Making a Condition Search Criteria

| Topic | Information |
|-----------------------|---|
| Name | ConditionManager.makeConditionSearchCriteria |
| Description | This method will make an instance of ConditionSearchCriteria. |
| Pre-Condition | Not applicable |
| Internal Logic | Not applicable |
| Post-Condition | The caller has an instance of ConditionSearchCriteria. |
| Extensions | Not applicable |
| Tips | Not applicable |

Table 3-36 Finding Conditions

| Topic | Information |
|-----------------------|---|
| Name | ConditionManager.findConditions |
| Description | This method retrieves conditions based on input criteria. |
| Pre-Condition | The custom object to find conditions for has been selected. The desired condition exists. |
| Internal Logic | The database is queried for conditions meeting the input criteria. Conditions matching the criteria are returned. |
| Post-Condition | The desired condition has been retrieved. |
| Extensions | Not applicable |

Table 3-36 (Cont.) Finding Conditions

| Topic | Information |
|-------------|--|
| Tips | <p>In this scenario, the following CriteriaItems could be populated on the ConditionSearchCriteria:</p> <ul style="list-style-type: none"> resource The CustomObject instance for CO-1. type ConditionType.BLOCKED <p>If a list of conditions is returned, the list will need to be iterated to select the desired condition to be deleted.</p> |

Table 3-37 Deleting Conditions

| Topic | Information |
|-----------------------|--|
| Name | ConditionManager.deleteConditions |
| Description | This method will delete conditions on resources. |
| Pre-Condition | The condition to be deleted has been selected. |
| Internal Logic | The input Condition instances are validated, and if no errors are detected the conditions are deleted. |
| Post-Condition | The resource (Custom Object CO-1) no longer has the blocked condition. |
| Extensions | Not applicable |
| Tips | Not applicable |

Example 3-30 Deleting a Blocked Condition from a Custom Object

```

Finder f = PersistenceHelper.makeFinder();
Collection<CustomObject> custObjs = f.findById(CustomObject.class, "CO-1");
CustomObject custObj = custObjs.iterator().next();

ConditionManager conMgr = PersistenceHelper.makeConditionManager();
ConditionSearchCriteria criteria = conMgr.makeConditionSearchCriteria();

CriteriaItem res = criteria.makeCriteriaItem();
res.setValue(custObj);
res.setOperator(CriteriaOperator.EQUALS);
criteria.setResource(res);

CriteriaItem type = criteria.makeCriteriaItem();
type.setValue(ConditionType.BLOCKED);
type.setOperator(CriteriaOperator.EQUALS_IGNORE_CASE);
criteria.setType(type);

Collection <CustomObjectCondition> cons = conMgr.findConditions(criteria);
CustomObjectCondition con = cons.iterator().next();

conMgr.deleteConditions(cons);

```

Setting Characteristic Values for the Service Configuration Item

The following APIs are used to set characteristic values on a service configuration item. The set of allowable characteristic values for a given service configuration item are defined by the service configuration specification used to create the service configuration.

The following shows a configuration item hierarchy that has two characteristic values associated with the Customer Equipment (CE) Router ITEM:

ITEM - Site

- ITEM - Customer Equipment Router
 - Specification - Logical Device
 - Characteristic - Customer
 - Instructions - Characteristics
 - Additional Information

The Configuration ITEMS are used to create the Service Configuration Item instances. Characteristics will be related to the Service Configuration Item. Since Service Configuration Item is a Characteristic Extensible entity, we can use the `CharacteristicManager.init` API to initialize the set of characteristic values on the entity. In the example above, the two Characteristics under the Customer Equipment Router ITEM would create two instances on the `ServiceConfigurationItemCharacteristic`, and if there is default values defined, it is also copied.

[Table 3-38](#) and example code provide information about using the API method.

Table 3-38 Setting Characteristic Values for the Service Configuration Item

| Topic | Information |
|-----------------------|---|
| Name | <code>CharacteristicManager.init(CharacteristicExtensible<CharValue> characteristicExtensible, Specification spec)</code> |
| Description | This method initializes the <code>CharacteristicExtensible</code> entity. In this case, the <code>ServiceConfigurationItem</code>). It sets the default value for each characteristic which has one. |
| Pre-Condition | A service configuration item exists and the <code>InventoryConfigurationSpec</code> is known. |
| Internal Logic | The <code>InventoryConfigurationSpec</code> is used to get the <code>CharacteristicSpecUsage</code> , from the <code>CharacteristicSpecUsage</code> to get the <code>CharacteristicSpecification</code> , so that the default spec value can be retrieved and set to the <code>CharValue</code> . And the <code>Charvalue</code> will be set to the Service configuration item. |
| Post-Condition | <code>ServiceConfigurationItem</code> has the default characteristics set. |
| Extensions | Not applicable |
| Tips | Not applicable |

**Note:**

When creating a Service Configuration Item, call `CharacteristicManager.init (CharacteristicExtensible<CharValue> characteristicExtensible, Specification spec)` method to initiate the default characteristics value.

Example 3-31 Setting Characteristic Values for the Service Configuration Item

```
CharacteristicManager characteristicManager =
    PersistenceHelper.makeCharacteristicManager();

// Initialize the characteristics to the item
characteristicManager.init((CharacteristicExtensible)childConfigItem,
    inventoryConfigurationSpec);

// Get the characteristics from service config item
HashSet<CharValue> characteristics = serviceConfigItem.getCharacteristics();

// Loop through the HashSet of characteristics and set the value as defined
for (CharValue charValue : characteristics)
{
    charValue.setValue("myValue");
    charValue.setLabel("myLabel");
}
```

Finding Configuration Item and Setting Characteristics

Characteristics can be added to the service configuration items. The service configuration items are maintained on each service configuration version as a tree, as specified in Design Studio. This is to make sure the history of the characteristics are set or unset across the service configuration versions.

These characteristics cannot be added on service configuration version. They can be added only on the Service Configuration Items. The characteristics added directly under the Service Configuration Specification tree are added to the top-most item of the service configuration version, called CONFIG item.

Unlike other entities, characteristics cannot be added to a service configuration item when it is created, except for the default characteristics.

Example 3-32 Creating Characteristics on Top-most Service Configuration Item

```
Service service = null;
Finder f = null;

try{

    f = PersistenceHelper.makeFinder();
    Collection<Service> services = f.findByName(Service.class, "service_name");
    Service = Services.iterator.next();

    ServiceConfigurationVersion version = null;
    List<ServiceConfigurationVersion> configs = service.getConfigurations();

    for (ServiceConfigurationVersion config : configs) {
        if (config.getAdminState().equals(BusinessInteractionState.IN_PROGRESS)) {
            version = config;
        }
    }
}
```

```

if(version != null){
    ServiceConfigurationItem configItem =
    (ServiceConfigurationItem)version.getConfigItemTypeConfig();

    HashSet<CharacteristicSpecification> charSpecs =
        new HashSet<CharacteristicSpecification>();
    charSpecs =
        CharacteristicHelper.getCharacteristicSpecifications(configSpec);
    if (!charSpecs.isEmpty()) {
        Set<ServiceConfigurationItemCharacteristic> sciChars =
            new HashSet<ServiceConfigurationItemCharacteristic>();
        ServiceConfigurationItemCharacteristic sciChar = null;
        for (CharacteristicSpecification charSpec : charSpecs) {

            sciChar = configItem.makeCharacteristicInstance();
            sciChar.setName(charSpec.getName());
            if (charSpec.getControlType() == ControlType.CALENDAR) {
                sciChar.setValue("07/15/2019");
            }else if(charSpec.getControlType() == ControlType.CHECKBOX) {
                sciChar.setValue("true");
            }else if(charSpec.getControlType() == ControlType.DROPDOWN_LIST) {
                Set<CharacteristicSpecValue> values = charSpec.getValues();

            sciChar.setValue(((DiscreteCharSpecValue)values.iterator().next()).getValue());
            }else if(charSpec.getControlType() == ControlType.TEXT_FIELD){
                if(charSpec.getValueType() == ValueType.NUMERIC)
                    sciChar.setValue("500");
                else if(charSpec.getValueType() == ValueType.URL)
                    sciChar.setValue("http://oracle.com");
                else
                    sciChar.setValue("pipe testing");
            }
            sciChar.setCharacteristicSpecification(charSpec);
            sciChars.add(sciChar);
        }
        configItem.setCharacteristics(sciChars);
    }

    catch(Exception e){
        /*log exception*/
    }
    finally{
        if(f!=null)
            f.close();
    }
}

```

Example 3-33 Creating Characteristics On Any Level Service Configuration Item

```

Service service = null;
Finder f = null;
BaseConfigurationManager configMgr = null;

try{

    f = PersistenceHelper.makeFinder();
    Collection<Service> services = f.findByName(Service.class, "service_name");
    Service = Services.iterator.next();

    ServiceConfigurationVersion version = null;
    List<ServiceConfigurationVersion> configs = service.getConfigurations();
}

```



```

for (ServiceConfigurationVersion config : configs) {
    if (config.getAdminState().equals(BusinessInteractionState.IN_PROGRESS)) {
        version = config;
    }
}

if(version != null){
    ServiceConfigurationItem configItem = null;

    configMgr = PersistenceHelper.makeConfigurationManager
    (ServiceConfigurationItemDAO.class);

    ConfigurationItemSearchCriteria configItemCriteria =
    configMgr.makeConfigurationItemSearchCriteria();

    configItemCriteria.setConfigurationItemClass(ServiceConfigurationItemDAO.class);
    CriteriaItem criteriaItem = configItemCriteria.makeCriteriaItem();
    criteriaItem.setValue("item_name");
    criteriaItem.setOperator(CriteriaOperator.EQUALS);
    configItemCriteria.setConfigurationItemName(criteriaItem);

    criteriaItem = configItemCriteria.makeCriteriaItem();
    criteriaItem.setValue(version.getVersionNumber());
    criteriaItem.setOperator(CriteriaOperator.EQUALS);
    configItemCriteria.setConfigurationVersionNumber(criteriaItem);

    List<InventoryConfigurationItem> configItems =
    configMgr.findConfigurationItems(configItemCriteria);

    if(!Utils.isEmpty())
    configItem = configItems.iterator.next();
    HashSet<CharacteristicSpecification> charSpecs =
        new HashSet<CharacteristicSpecification>();
    charSpecs =
        CharacteristicHelper.getCharacteristicSpecifications(configSpec);
    if (!charSpecs.isEmpty()) {
        Set<ServiceConfigurationItemCharacteristic> sciChars =
            new HashSet<ServiceConfigurationItemCharacteristic>();
        ServiceConfigurationItemCharacteristic sciChar = null;
        for (CharacteristicSpecification charSpec : charSpecs) {

            sciChar = configItem.makeCharacteristicInstance();
            sciChar.setName(charSpec.getName());
            if (charSpec.getControlType() == ControlType.CALENDAR) {
                sciChar.setValue("07/15/2019");
            }else if(charSpec.getControlType() == ControlType.CHECKBOX) {
                sciChar.setValue("true");
            }
        }
        else if(charSpec.getControlType() == ControlType.DROPDOWN_LIST){
            Set<CharacteristicSpecValue> values = charSpec.getValues();

            sciChar.setValue(((DiscreteCharSpecValue)values.iterator().next()).getValue());
        }else if(charSpec.getControlType() == ControlType.TEXT_FIELD){
            if(charSpec.getValueType() == ValueType.NUMERIC)
                sciChar.setValue("500");
            else if(charSpec.getValueType() == ValueType.URL)
                sciChar.setValue("http://oracle.com");
            else
                sciChar.setValue("pipe testing");
        }
    }
    sciChar.setCharacteristicSpecification(charSpec);

```

```

        sciChars.add(sciChar);
    }
    configItem.setCharacteristics(sciChars);

}
catch(Exception e){
/*log exception*/
}
finally{
    if(f!=null)
        f.close();
}

```

Example 3-34 Modifying Characteristics on Service Configuration Item

```

Service service = null;
Finder f = null;
BaseConfigurationManager configMgr = null;

try{

    f = PersistenceHelper.makeFinder();
    Collection<Service> services = f.findByName(Service.class, "service_name");
    Service = Services.iterator.next();

    ServiceConfigurationVersion version = null;
    List<ServiceConfigurationVersion> configs = service.getConfigurations();

    for (ServiceConfigurationVersion config : configs) {
        if (config.getAdminState().equals(BusinessInteractionState.IN_PROGRESS)) {
            version = config;
        }
        if(version != null){
            ServiceConfigurationItem configItem = null;configMgr =
            PersistenceHelper.makeConfigurationManager
            (ServiceConfigurationItemDAO.class);
            ConfigurationItemSearchCriteria
            configItemCriteria = configMgr.makeConfigurationItemSearchCriteria();
            configItemCriteria.setConfigurationItemClass(ServiceConfigurationItemDAO.class);
            CriteriaItem criteriaItem = configItemCriteria.makeCriteriaItem();
            criteriaItem.setValue("item_name");
            criteriaItem.setOperator(CriteriaOperator.EQUALS);
            configItemCriteria.setConfigurationItemName(criteriaItem);
            criteriaItem =
            configItemCriteria.makeCriteriaItem();
            criteriaItem.setValue(version.getVersionNumber());
            criteriaItem.setOperator(CriteriaOperator.EQUALS);
            configItemCriteria.setConfigurationVersionNumber(criteriaItem);
            List<InventoryConfigurationItem> configItems =
            configMgr.findConfigurationItems(configItemCriteria);if(!Utils.isEmpty())configItem =
            configItems.iterator.next();
            HashSet<CharacteristicSpecification> charSpecs
            =
            new HashSet<CharacteristicSpecification>();
            charSpecs
            =
            CharacteristicHelper.getCharacteristicSpecifications(configSpec);
            if (!
            charSpecs.isEmpty()) {
                Set<ServiceConfigurationItemCharacteristic>
                sciChars =
                new
                HashSet<ServiceConfigurationItemCharacteristic>();
                ServiceConfigurationItemCharacteristic sciChar = null;
                for
                (CharacteristicSpecification charSpec : charSpecs) {
                    sciChar =
                    configItem.makeCharacteristicInstance();
                    String charName =
                    charSpec.getName();
                    if
                    (charName.equals("char_name_12"))
                    {
                        sciChar.setValue("updated_valued");
                    }
                    sciChar.setCharacteristicSpecification(charSpec);
                }
                sciChars.add(sciChar);
            }
        }
    }
}

```

```
configItem.setCharacteristics(sciChars);}catch(Exception e){/*log  
exception*/}finally{    if(f!=null)        f.close();}
```

About Alternate Flows

The generic service fulfillment scenario sets characteristic values for the service configuration item. An alternate flow to this scenario may be to unset characteristic values from the service configuration item.

The alternate flow described in this section is "[Unsetting Characteristic Values for the Service Configuration Item](#)".

Unsetting Characteristic Values for the Service Configuration Item

The following API is to unset characteristic values on a service configuration.

The following example code provides information about using the API method.



Note:

From `ServiceConfigurationItem`, get the characteristics and then delete the `ServiceConfigurationItemCharacteristics` to remove the characteristic values. If only one particular characteristic needs to be deleted for the `ServiceConfigurationItem`, then a name match should be compared before deleting the `ServiceConfigurationItemCharacteristic`.

Example 3-35 Unsetting Characteristic Values for the Service Configuration

```
HashSet<ServiceConfigurationItemCharacteristic> characteristics =  
    serviceConfigItem.getCharacteristics();  
  
Iterator<ServiceConfigurationItemCharacteristic> itr =  
    characteristics.iterator();  
  
while (itr.hasNext())  
{  
    ServiceConfigurationItemCharacteristic characteristic = itr.next();  
    if characteristic.getName().equals("myName")  
        itr.remove();}
```

Transitioning the Lifecycle Status

The transition APIs are used for transitioning the lifecycle status of a given entity which implements the `LifeCycleManaged` interface. The state transition rules are defined in the `*-transitions.xml` files.

[Table 3-39](#) and example code provide information about using the API method.

Table 3-39 Transitioning the Lifecycle Status

| Topic | Information |
|-------|------------------------------|
| Name | TransitionManager.transition |

Table 3-39 (Cont.) Transitioning the Lifecycle Status

| Topic | Information |
|-----------------------|--|
| Description | Transitions a LifecycleManaged entity by finding the matching transition definition which has the business action defined and the object activity defined the same as the input parameters, and which from business state matches the entity's business state. |
| Pre-Condition | TransitionManager.isValidTransition has successfully validated that the specified business action can trigger the transition of either the business state or the object state. |
| Internal Logic | <p>Finds a matching transition definition. For a version object it matches on business action and object activity only. Other objects are matched from most specific to least specific in the following order:</p> <ol style="list-style-type: none"> 1. Match businessAction, objectActivity, entity type, and the specification. 2. Match businessAction, objectActivity, entity type. 3. Match businessAction, objectActivity. <p>Switches to a Business Interaction context if applicable and updates the business or object state of the object and its dependents based on the transition definition.</p> |
| Post-Condition | The object state or business state is updated. |
| Extensions | <p>BusinessInteractionSpec_TransitionManager_validateBusinessStateTransitions</p> <p>BusinessInteractionSpec_TransitionManager_validateObjectStateTransitions</p> |
| Tips | See "Overview" in <i>UIM Developer's Guide</i> for more information. |

Example 3-36 Transitioning the Lifecycle Status

```

TransitionManager transitionManager =
    PersistenceHelper.makeTransitionManager(service);

boolean success = false;
success = transitionManager.transition(service, ServiceAction.COMPLETE);

```

Example 3-37 Performing Operations Under Business Interaction Context

To perform operations such as assign, unassign, reference, or unreferenced and set, unset, or modify characteristics, you need to make sure the business interaction context is set before running the code.

Add the following code before running the code:

```

BusinessInteraction currentBI =
    (BusinessInteraction)UserEnvironmentFactory.getBusinessInteraction();

if(currentBI == null){BusinessInteraction bi =
    (BusinessInteraction)f.findById(BusinessInteraction.class, "biId").iterator().next();
currentBI = bi;
}

BusinessInteractionManager biMgr = PersistenceHelper.makeBusinessInteractionManager();

biMgr.switchContext(currentBI, null);

```

After the operation is complete, block the switch back to the current context by entering the following code:

```
currentBI = null;
biMgr.switchContext(currentBI, null);
```

Creating a Property Location

[Example 3-38](#) provides information about creating a property location.

Example 3-38 Creating a Property Location

```
Finder finder = null;
PropertyLocation propertyLocation = null;
PropertyAddress propertyAddress = null;
FeedbackProviderImpl.getFeedbackProvider().reset();
try {

    LocationManager locationManager =
        PersistenceHelper.makeLocationManager();
    finder = PersistenceHelper.makeFinder();
    BusinessInteractionManager bimgr =
        PersistenceHelper.makeBusinessInteractionManager();
    bimgr.switchContext((String)null, null);
    String networkLocationCode = "ALLNTX";
    PropertyLocation networkLocation =
        this.findNetworkEntityLocation(networkLocationCode);
    //If PropertyLocation is not already created then only create it
    if (networkLocation == null) {
        FeedbackProviderImpl.getFeedbackProvider().reset();
        propertyAddress = locationManager.makePropertyAddress();
        propertyLocation = locationManager.makePropertyLocation();
        propertyAddress.setStreetAddress("ALLNTX_street1");
        propertyAddress.setCity("ALLN_city1");
        propertyAddress.setState("TX1");
        propertyAddress.setCountry("US");
        propertyAddress.setIsValidated(true);
        propertyAddress.setIsNonValidatedAddressAccepted(false);
        propertyAddress.setIsPrimaryAddress(true);
        Set<PropertyAddress> addressSet =
            new HashSet<PropertyAddress>(1);
        addressSet.add(propertyAddress);
        propertyLocation.setPropertyAddresses(addressSet);
        propertyLocation.setNetworkLocationCode(networkLocationCode);
        propertyLocation.setLatitude("34");
        propertyLocation.setLongitude("75");
        Collection<PropertyLocation> list =
            new ArrayList<PropertyLocation>(1);
        list.add(propertyLocation);
        List<PropertyLocation> propLocobjects =
            locationManager.createPropertyLocation(list);
        networkLocation = propLocobjects.get(0);
        networkLocation.connect();
    }
    List<NetworkEntityCode> networkEntityCodes =
        new ArrayList<NetworkEntityCode>();
    List<String> NECs = {"0,1,2,3,4"};
    if (!Utils.isEmpty(NECs)) {
        for (String necStr : NECs) {
            NetworkEntityCode existingNEC =
                this.findNetworkEntityCode(networkLocation, necStr);
            if (existingNEC == null) {
```

```

        NetworkEntityCode nec =
            locationManager.makeNetworkEntityCode();
        nec.setName(necStr);
        networkEntityCodes.add(nec);
    }
}
if (!Utils.isEmpty(networkEntityCodes)) {

locationManager.associateNetworkEntityCodeToNetworkLocation(networkEntityCodes,
networkLocation);
}

```

Referring Property Location to a Service Configuration Item

A property location can be referenced to service configuration item. It cannot be assigned to any service configuration item.

See "[Referencing the Resource to a Configuration Item](#)" for more information.

About Undo Actions

You can Undo and unassign a resource for a configuration item that is in Pending Unassign status.

This transition happens when all the following conditions are met:

- The resource is in a pending status in the current configuration.
- The current configuration is in progress.
- The resource belongs to a configuration item in an earlier configuration for the same service.
- The earlier configuration is also in progress.

Table 3-40 Reallocation a Resource on the Service Configuration Item

| Topic | Information |
|-----------------------|--|
| Name | BaseConfigurationManager.reallocateEntityConfigurationItems(Collection<E> configurationItems) |
| Description | This method reallocates the de-allocated entities on a given configuration item. The configuration version cannot be in a completed or cancelled state. |
| Pre-Condition | A service configuration item exists on which an assignment was just unassigned. |
| Internal Logic | The assignment state on the consumable resource is transitioned back to ASSIGNED state. |
| Post-Condition | The resource is assigned again. |
| Extensions | Not Applicable |
| Tips | Not Applicable |

You can undo the removal of a resource reference for a configuration item that is in Pending Un-reference status. This transition happens when all the following conditions are met:

- The resource is in a pending status in the current configuration.
- The resource is in a pending status in the current configuration.
- The resource belongs to a configuration item in an earlier configuration for the same service.
- The earlier configuration is also in progress.

Table 3-41 Referencing a Resource on the Service Configuration Item

| Topic | Information |
|-----------------------|--|
| Name | <code>BaseConfigurationManager.rereferenceInventoryConfigurationItems(Collection<E> configurationItems)</code> |
| Description | This method reallocates the de-allocated entities on a given configuration item. The configuration version cannot be in a <i>completed</i> or <i>cancelled</i> state. |
| Pre-Condition | A service configuration item exists on which an assignment was just unreferenced. |
| Internal Logic | The assignment state on the consumable resource is transitioned back to REFERENCED state. |
| Post-Condition | The resource is referenced again. |
| Extensions | Not Applicable |
| Tips | Not Applicable |

Example 3-39 Referencing the Resource to a Configuration Item

```

Finder f = null;
BaseConfigurationManager bcd = null;

try {
    f = PersistenceHelper.makeFinder();
    PersistenceHelper.makeBusinessInteractionManager().switchContext((String)null,null);
    ServiceConfigurationVersion configuration =
f.findByName(ServiceConfigurationVersion.class, configId).iterator().next();
    InventoryConfigurationItem icToAssign = null;
    Collection<InventoryConfigurationItem> dereferenceList = new
ArrayList<InventoryConfigurationItem>();

    for (InventoryConfigurationItem ic : configuration.getConfigItems()) {
        if (ConfigurationType.CONFIG.equals(ic.getConfigType()))
            continue;

        if(ic.getReference() != null){

PersistenceHelper.makeBusinessInteractionManager().switchContext(configuration,null);

if(ConfigurationReferenceState.PENDING_UNREFERENCE.equals( ((ConfigurationReference)ic.ge
tReference()).getAdminState()) && ic.getDepChildConfigItem() == null){
    dereferenceList.add(ic);
        }
    }
    f.reset();
    CustomObject coToAssign = f.findByName(CustomObject.class,
"CO2_ASSIGN0009" ).iterator().next();

    bcd = PersistenceHelper.makeConfigurationManager(configuration.getClass());

```

```
        bcd.rereferenceInventoryConfigurationItems(dereferenceList);

    } catch (Throwable t) {
        catchThrowable(t, ut);
    } finally {
        if (f != null) {
            f.close();
        }
    }
}
```


4

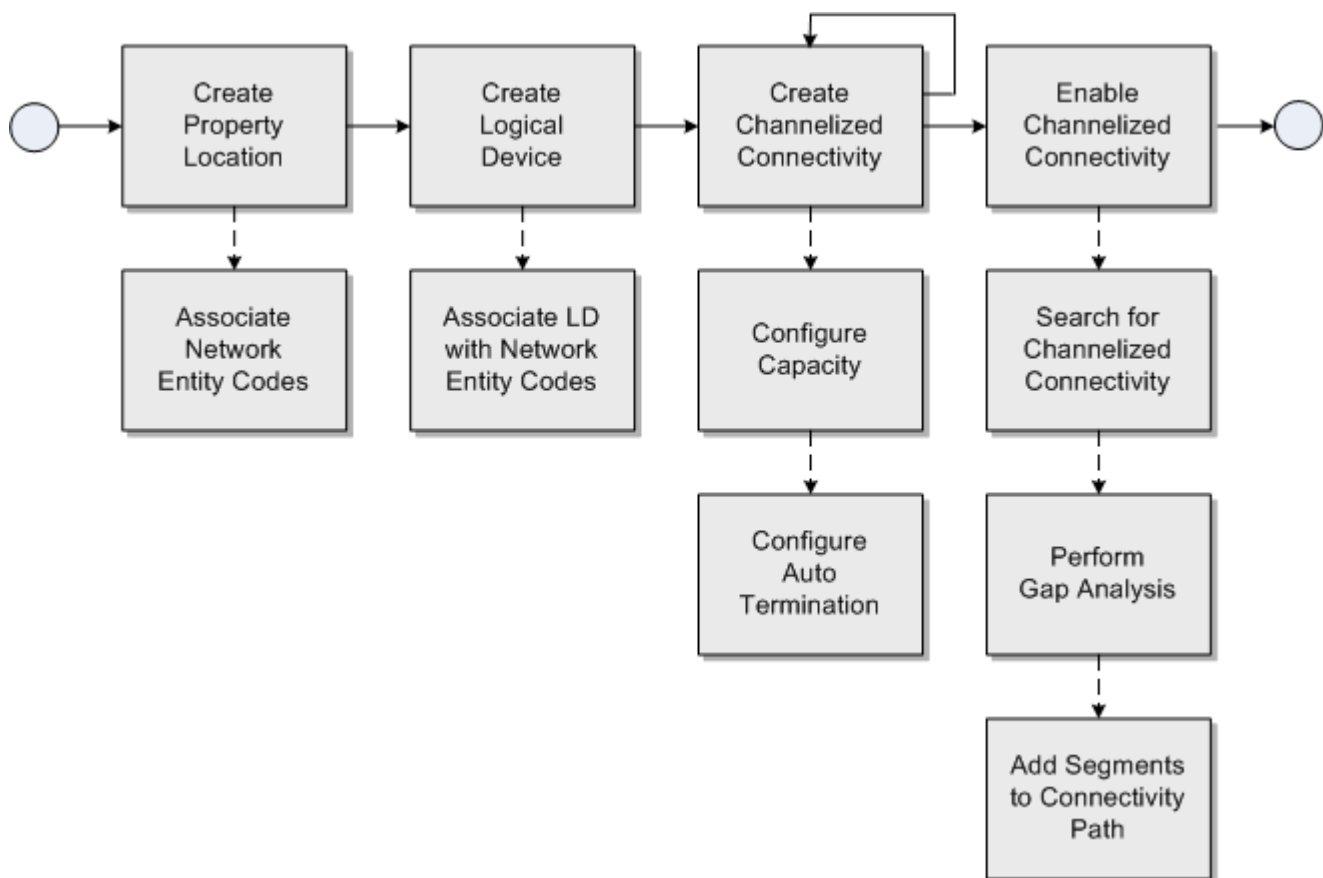
Implementing a Channelized Connectivity Enablement Scenario

This chapter describes implementing a channelized connectivity enablement scenario using various Oracle Communications Unified Inventory Management (UIM) application program interfaces (APIs). You can use this information to gain a better understanding of how the UIM APIs can be used to implement any channelized connectivity enablement scenario.

About the Channelized Connectivity Enablement Scenario

Figure 4-1 shows the process flow for a channelized connectivity enablement scenario:

Figure 4-1 Process Flow for a Generic Channelized Connectivity Scenario



This process flow begins with creating a property location and associating network entity codes with the property location. The network entity codes are used in subsequent steps in the process flow, such as associating them with logical devices.

The process flow continues with creating logical devices with device interfaces that can terminate on the bearer channelized connectivity, and associating logical devices with the network entity codes previously created. This involves creating logical device search criteria to find the required logical device specification.

Next is creating channelized connectivity, which represents bearer channelized connectivity between two network entity codes that define attributes of technology, rate code, and channelized connectivity function.

The process flow continues by configuring the capacity for the channelized connectivity to channelize it, and by optionally terminating them on the device interfaces of logical devices previously created. This is called auto termination of device interfaces because it also terminates the sub-device interfaces down the hierarchy to the channels when the channelized connectivity is terminated automatically. This represents the bearer channelized connectivity that will be used in enablement in subsequent steps of the process flow.

The process flow continues with creating channelized connectivity to represent the rider between two network entity codes that define attributes of technology, rate code, and channelized connectivity function. For a channelized connectivity entity to be enabled by a channel, its rate code must match or be compatible with the rate code of the channel.

Next is enabling channelized connectivity, which can be manually done by searching for and adding the bearer channelized connectivity's channel. This involves creating channelized connectivity search criteria to search for the bearer channelized connectivity and selecting the appropriate channel. Enablement can also be done by adding bearer channelized connectivity through gap analysis to the rider that involves creating path analysis criteria to search for the bearer channelized connectivity between a source/intermediate/target property locations or logical devices.

Now that you have a high-level understanding of the channelized connectivity enablement scenario process flow, each part of the process flow is further described in the following sections. Each section includes information about the specific UIM APIs used to perform each step. Example code is also included for each step.

- [Creating a Property Location and Associating Network Entity Codes](#)
- [Creating a Logical Device and Associating LD Interfaces with Network Entity Codes](#)
- [Creating Channelized Connectivity](#)
- [Enabling Channelized Connectivity](#)

Creating a Property Location and Associating Network Entity Codes

This section describes the UIM API methods used to create a property location and to associate network entity codes with the property location.

[Table 4-1](#), [Table 4-2](#), and example code provide information about using the API methods to create a property location and to associate network entity codes to the property location.

Table 4-1 Creating a Property Location

| Topic | Information |
|-------|---|
| Name | LocationManager.createPropertyLocation (Collection<PropertyLocation> locations) |

Table 4-1 (Cont.) Creating a Property Location

| Topic | Information |
|-----------------------|---|
| Description | Creates the Property Location instances with the given inputs. User has to specify one mandatory Primary address as input with which a property Location has to be created. Every property location also has a property address associated with it. |
| Pre-Condition | The locations parameter needs to be prepared with necessary attributes |
| Internal Logic | Not applicable |
| Post-Condition | Not applicable |
| Extensions | Not applicable |
| Tips | <ul style="list-style-type: none"> The same method is also used to create Network Location when the Network Location code is populated in the input. As part of creation of Network location, the same method also enables users to create Network entity codes corresponding to the Network Location. The Location Identifier which is a concatenated Address format is used to uniquely identify the Property Location. If horizontal/vertical coordinates are given as inputs, the latitude/longitude coordinates are automatically populated for the created Property Location and vice versa. |

Table 4-2 Associating Network Entity Codes with a Property Location

| Topic | Information |
|-----------------------|---|
| Name | LocationManager.associateNetworkEntityCodeToNetworkLocation (List<NetworkEntityCode> entitycodes, PropertyLocation location) |
| Description | This method is called during the association or creation of the network entity code in the context of property location. |
| Pre-Condition | The location parameter already exists. |
| Internal Logic | Not applicable |
| Post-Condition | Not applicable |
| Extensions | Not applicable |
| Tips | <ul style="list-style-type: none"> Check if the network entity code is unique. Check for the length of the network entity code. |

Example 4-1 Creating a Property Location and Associating Network Entity Codes with the Property Location

```

Finder finder = PersistenceHelper.makeFinder();
PropertyLocation propertyLocation = locationManager.makePropertyLocation();
PropertyAddress propertyAddress = locationManager.makePropertyAddress();
LocationManager locationManager = PersistenceHelper.makeLocationManager();

//Set all necessary attributes needed for Property Address and Property Location
propertyAddress.setStreetAddress((String)paramMap.get("streetAddress"));
propertyAddress.setCity((String)paramMap.get("city"));
propertyAddress.setState((String)paramMap.get("state"));
propertyAddress.setCountry((String)paramMap.get("country"));
propertyAddress.setIsValidated(Boolean.valueOf(
    ((String)paramMap.get("isValidated"))));
propertyAddress.setIsNonValidatedAddressAccepted(true);

```

```

propertyAddress.setIsPrimaryAddress(true);
Set<PropertyAddress> addressSet = new HashSet<PropertyAddress>(1);
addressSet.add(propertyAddress);
propertyLocation.setPropertyAddresses(addressSet);
propertyLocation.setNetworkLocationCode("PLANO");
propertyLocation.setLatitude("34");
propertyLocation.setLongitude("54");

Collection<PropertyLocation> list = new ArrayList<PropertyLocation>(1);
list.add(propertyLocation);
List<PropertyLocation> propLocobjects =
    locationManager.createPropertyLocation(list);
networkLocation = propLocobjects.get(0);
List<NetworkEntityCode> networkEntityCodes = new ArrayList<NetworkEntityCode>();
NetworkEntityCode nec = locationManager.makeNetworkEntityCode();
nec.setName(necStr);
networkEntityCodes.add(nec);
if (!Utils.isEmpty(networkEntityCodes))
{
    locationManager.associateNetworkEntityCodeToNetworkLocation
        (networkEntityCodes,networkLocation);
}

```

Creating a Logical Device and Associating LD Interfaces with Network Entity Codes

This section describes the UIM API methods used to create a logical device with default logical device interfaces and to associate the logical device interfaces with the previously created network entity codes.

[Table 4-3](#) and example code provide information about using the API method to create a logical device with default logical device interfaces.

Table 4-3 Creating a Logical Device

| Topic | Information |
|-----------------------|--|
| Name | LogicalDeviceManager.createLogicalDevice (Collection<LogicalDevice> logicalDevices) |
| Description | Creates logical device entities and their provided device interfaces and sub-device interfaces based on the specification. |
| Pre-Condition | Logical device specification with device interfaces is defined and exists already. |
| Internal Logic | <p>Device interfaces can also provide other device interfaces. The number of device interfaces to be created will be determined by the minimum value defined in the specification relationships.</p> <p>The input logical device entities should be sparsely populated with the specification, hard attributes and characteristics.</p> <p>The provided device interfaces will be derived based on the specification. Characteristics will be defaulted based on the specification. The id of the device interfaces will be generated.</p> <p>If required characteristics exist for a provided device interface that are not defaulted, then the logical device will still be created.</p> |
| Post-Condition | Not applicable |
| Extensions | Not applicable |

Table 4-3 (Cont.) Creating a Logical Device

| Topic | Information |
|-------|----------------|
| Tips | Not applicable |

Example 4-2 Creating a Logical Device with Default Logical Device Interfaces

```
Finder finder = PersistenceHelper.makeFinder();
LogicalDeviceManager ldMgr = PersistenceHelper.makeLogicalDeviceManager();

Collection<Specification> specs =
    finder.findByName(Specification.class, "ldSpecName");

LogicalDeviceSpecification ldSpec =
    (LogicalDeviceSpecification) specs.iterator().next();

LogicalDevice ld = ldMgr.makeLogicalDevice();
ld.setName("ldName");
ld.setId("ldId");
ld.setSpecification(ldSpec);
List<LogicalDevice> ldList = new ArrayList<LogicalDevice>();
ldList.add(ld);
ldMgr.createLogicalDevice(ldList);
```

The following table and example code provide information about using the API method to associate a logical device with a network entity code.

Table 4-4 Associating a Logical Device with a Network Entity Code

| Topic | Information |
|----------------|--|
| Name | LogicalDeviceManager.updateLogicalDevice (Collection<LogicalDevice> logicalDevices) |
| Description | This method is intended to update the hard attributes and characteristics of a logical device. |
| Pre-Condition | Logical device exists already. The location of a logical device can only be changed if it does not have any active consumers or interconnections on the logical device or any of its device interfaces. |
| Internal Logic | Not applicable |
| Post-Condition | Not applicable |
| Extensions | Not applicable |
| Tips | Not applicable |

Example 4-3 Associating a Logical Device with a Network Entity Code

```
Finder finder = PersistenceHelper.makeFinder();
LogicalDeviceManager ldMgr = PersistenceHelper.makeLogicalDeviceManager();
LocationManager locationManager = PersistenceHelper.makeLocationManager();

// find an existing logical device
LogicalDevice ld = finder.findById(LogicalDevice.class, "ldId").iterator().next();

// find an existing property location that has network entity code
```

```
PropertyLocation pls =
(PropertyLocation)locationManager.findNetworkEntityLocation("PLANO");
ld.setPropertyLocation(pls);

NetworkEntityCodeSearchCriteria criteria =
    locationManager.makeNetworkEntityCodeSearchCriteria();
criteria.setPropertyLocation(pls);

//find network entity code matching "001"
List<NetworkEntityCode> networkEntityCodes =
    locationManager.findNetworkEntityCodes(criteria);
NetworkEntityCode networkEntCd = null;

if (!Utils.isEmpty(networkEntityCodes))
{
    String networkEntityCod= "001";
    for (NetworkEntityCode nec : networkEntityCodes)
    {
        if ((pls.getNetworkLocationCode() + "." + networkEntityCode).equals
            nec.getNetworkLocationEntityCode()))
        {
            networkEntCd = nec;
        }
    }
}
ld.setNetworkEntityCode(networkEntCd);
networkEntCd.setLogicalDevice(ld);
List<LogicalDevice> ldList = new ArrayList<LogicalDevice>();
ldList.add(ld);
ldMgr.updateLogicalDevice(ldList);
```

Creating Channelized Connectivity

This section describes the UIM API methods used to:

- [Create Channelized Connectivity](#)
- [Configure Capacity on the Channelized Connectivity](#)
- [Configure Auto Termination on the Channelized Connectivity](#)

Create Channelized Connectivity

[Table 4-5](#) and example code provide information about using the API method to create channelized connectivity. (You use the same API method to create the bearer channelized connectivity and the rider channelized connectivity.)

Table 4-5 Creating Channelized Connectivity

| Topic | Information |
|--------------------|--|
| Name | ConnectivityManager.createConnectivity(N connectivity, String aNetworkLocationEntityCode, String zNetworkLocationEntityCode, int quantity, boolean contiguousSerialAllocation) |
| Description | This method will create channelized connectivity. Valid A Location and Z Location must be set on the channelized connectivity instance. |

Table 4-5 (Cont.) Creating Channelized Connectivity

| Topic | Information |
|-----------------------|--|
| Pre-Condition | Two property locations to represent A and Z side of the channelized connectivity already exists. ora_uim_basetechnologies is already installed. |
| Internal Logic | Not applicable |
| Post-Condition | Not applicable |
| Extensions | Not applicable |
| Tips | Not applicable |

Example 4-4 Creating Channelized Connectivity

```

String rateCode = "STM1;
String function = "SM01";
String aLocation = "DALLAS";
String zLocation = "PLANO";
String aEntityCode = "DALLAS.001";
String zEntityCode = "PLANO.001";

int qtyInt = 1;
boolean isContiguos = "true";

TDMConnectivityManager manager =
    (TDMConnectivityManager)PersistenceHelper.makeConnectivityManager
        (TDMConnectivity.class);

Finder finder = PersistenceHelper.makeFinder();

NetworkConnectivity c = manager.makeTDMFacility();
NetworkConnectivity nc = (NetworkConnectivity)c;

String technology =
    finder.findByName(Technology.class, "SDH").iterator().next();
nc.setTechnology(technology);
finder.reset();

String rateCode =
    finder.findByName(RateCode.class, "STM1").iterator().next();
nc.setRateCode(rateCode);
finder.reset();

String function =
    finder.findByName(ConnectivityFunction.class,"SM01").iterator().next();

nc.setConnectivityFunction(function);
String aLocationCode = aLocation;
if(!Utils.isEmpty(aEntityCode)){
    aLocationCode = aLocation+"."+aEntityCode;}

String zLocationCode = zLocation;
if(!Utils.isEmpty(zEntityCode)){
    zLocationCode = zLocation+"."+zEntityCode;}

int tempQty = qtyInt;
while(tempQty >0)
{

```

```

        if(tempQty > 99){
            qtyInt = 99;}
        else{
            qtyInt = tempQty;}

        Collection<TDMConnectivity> createdConnectivities =
            manager.createConnectivity(c, aLocationCode, zLocationCode,
                qtyInt, isContiguos);
    }

```

Configure Capacity on the Channelized Connectivity

[Table 4-6](#) and example code provide information about using the API method to configure capacity on the channelized connectivity.

Table 4-6 Configuring Capacity on the Channelized Connectivity

| Topic | Information |
|-----------------------|--|
| Name | SignalTerminationPointManager.applyCapacityConfiguration (MultiplexedFacility connectivity, List<RateCode> orderedRateCodes, String signalAddress) |
| Description | This method configures a connectivity to the required rate code level and also creates channels at those levels. |
| Pre-Condition | Not applicable |
| Internal Logic | Not applicable |
| Post-Condition | Not applicable |
| Extensions | Not applicable |
| Tips | Also call TDMConnectivityManager.createAndAutoTerminateChannels(M multiplexedFacility, boolean doValidation) to ensure terminations are also adjusted accordingly. |

Example 4-5 Configuring Capacity on the Channelized Connectivity

```

Finder finder = PersistenceHelper.makeFinder();

String connectivityIdentifier = "ALLNTHXC01 / FRSCNTHXC01 / STM1 / SM01 / 1";
String sourceRateCode = "OM80";
String destinationRateCode = "OM32";

RateCode sourceRC =
    finder.findByName(RateCode.class, sourceRateCode).iterator().next();

RateCode destinationRC =
    finder.findByName(RateCode.class, destinationRateCode).iterator().next();

TDMConnectivityManager mgr =
    (TDMConnectivityManager)PersistenceHelper.makeConnectivityManager
        (TDMFacility.class);

TDMConnectivitySearchCriteria criteria = mgr.makeTDMSearchCriteria();
CriteriaItem item = criteria.makeCriteriaItem();
item.setName("connectivityIdentifier");
item.setValue("connectivityIdentifier");
item.setOperator(CriteriaOperator.EQUALS);
criteria.setConnectivityIdentifier(item);
TDMFacility tdm = mgr.findTDMConnectivities(criteria).iterator().next();

```



```

SignalTerminationPointManager stpMgr =
    PersistenceHelper.makeSignalTerminationPointManager();

List<RateCode> orderedRateCodes = new ArrayList<RateCode>();
if (sourceRC != null){
    orderedRateCodes.add(sourceRC);}
if (destinationRC != null){
    orderedRateCodes.add(destinationRC);}

stpMgr.applyCapacityConfiguration(tdm, orderedRateCodes, "");
mgr.createAndAutoTerminateChannels(tdm, true);

```

Configure Auto Termination on the Channelized Connectivity

[Table 4-7](#) and example code provide information about using the API method to configure auto-termination on the channelized connectivity.

Table 4-7 Auto-terminating the Channelized Connectivity

| Topic | Information |
|-----------------------|---|
| Name | ConnectivityManager.assignDeviceInterface(E connectivity, DeviceInterface di, ConnectivityEndpoint endpoint) |
| Description | This method terminates the channelized connectivity with the device interface at the given end point. Also auto-terminates the channels on the sub-device interfaces. |
| Pre-Condition | Ensure the capacity is configured at the required level on the channelized connectivity and the sub-device interfaces are created beforehand until that level. |
| Internal Logic | Not applicable |
| Post-Condition | Not applicable |
| Extensions | Not applicable |
| Tips | Not applicable |

Example 4-6 Auto-Terminating the Channelized Connectivity

```

Finder finder = PersistenceHelper.makeFinder();
String tdmName = "DS3_TDM_Tail";
String diId = "DS3-1-1";
ConnectivityEndpoint endPoint = ConnectivityEndpoint.A_ENDPOINT;

DeviceInterface di =
    finder.findById(DeviceInterface.class, diId).iterator().next();
finder.reset();

TDMFacility tdm =
    finder.findByName(TDMFacility.class, tdmName).iterator().next();

TDMConnectivityManager manager = (TDMConnectivityManager)
    PersistenceHelper.makeConnectivityManager(TDMConnectivity.class);

tdm = (TDMFacility) manager.assignDeviceInterface(tdm, di, endPoint);

```

Enabling Channelized Connectivity

This section describes the UIM API methods used to enable channelized connectivity by:

- [Manually Enabling Channelized Connectivity](#)
- [Performing Gap Analysis](#)
- [Adding Segments To Connectivity Path Based on the Gap Analysis Results](#)

Manually Enabling Channelized Connectivity

[Table 4-8](#) and example code provide information about using the API method to manually enable channelized connectivity by manually searching for the channelized connectivity and adding segments to the connectivity path.

Table 4-8 Manually Enabling Channelized Connectivity

| Topic | Information |
|----------------|---|
| Name | ConnectivityManager.addSegmentsToConnectivityPath(E connectivityTrail, PipeConfigurationItem connectivityPath, PipeConfigurationItem gapItem, List<Pipe> bearerList) throws ValidationException |
| Description | The connectivityTrail parameter is the channelized connectivity that will be enabled. The connectivityPath parameter is the PipeConfigurationItem of the path. The gapItem parameter is the PipeConfigurationItem of the gap that will be resolved. The bearerList parameter contains other connectivities to be added for enablement. See <i>Oracle Communications Information Model Reference</i> for information on PipeConfigurationItem. |
| Pre-Condition | Not applicable |
| Internal Logic | Not applicable |
| Post-Condition | Not applicable |
| Extensions | Not applicable |
| Tips | Not applicable |

Example 4-7 Manually Enabling Channelized Connectivity by Searching for the Connectivity and Adding Segments to the Connectivity Path

```
String trailName = "EDINBURGH.002 / LONDON.001 / VC12 / VC12 / 1";

//We want to add connectivities to first path
int pathIndex = "0";

//Assuming there are other connectivities already added to this path
int gapIndex = "0";

PersistenceHelper.makeBusinessInteractionManager().switchContext
    ((String)null, null);

Finder finder = PersistenceHelper.makeFinder();

Connectivity connectivityTrail =
```

```

        finder.findByName(Connectivity.class, trailName).iterator().next();

List<String> bearers = new ArrayList<String>();
bearers.add("EDINBURGH.001 / EDINBURGH.002 / STM4 / SM04 / 139 / 1-1-1-2");
bearers.add("EDINBURGH.001 / MACHESTER.001 / STM4 / SM04 / 139 / 1-1-1-2");
bearers.add("LONDON.001 / MACHESTER.001 / STM4 / SM04 / 139 / 1-1-1-2");

List<Pipe> bearerList = new ArrayList<Pipe>(bearers.size());
for (String bearerName : bearers)
{
    finder.reset();
    Pipe connectivity = finder.findByName
        (TDMFacility.class, bearerName).iterator().next();
    bearerList.add(connectivity);
}

PipeConfigurationVersion designVersion =
    ConnectivityUtils.getInProgressDesignVersion((Pipe)connectivityTrail);

List<PipeConfigurationItem> allPaths =
    PipeHelper.getAllTransportItems(designVersion);

PipeConfigurationItem connectivityPath = allPaths.get(pathIndex);

PipeConfigurationItem gapItem =
    connectivityPath.getChildConfigItems().get(gapIndex);

ConnectivityManager manager = PersistenceHelper.makeConnectivityManager();
manager.addSegmentsToConnectivityPath
    (connectivityTrail, connectivityPath, gapItem, bearerList);

```

Performing Gap Analysis

[Table 4-9](#) and example code provide information about using the API method to perform gap analysis.

Table 4-9 Performing Gap Analysis

| Topic | Information |
|-----------------------|---|
| Name | List<PathResultSet> findPaths(PipeSpecification enabledPipe, PathAnalysisCriteria criteria) throws ValidationException |
| Description | The enabledPipe parameter is the channelized connectivity to be enabled. The criteria parameter is used in performing gap analysis. |
| Pre-Condition | Ensure the channelize connectivities that you are expecting the results are already created, terminated, and their capacity is configured. |
| Internal Logic | Not applicable |
| Post-Condition | Not applicable |
| Extensions | Not applicable |
| Tips | Not applicable |

Example 4-8 Performing Gap Analysis

```

String sourceLocationCode = "EDINBURGH.002";
String intermediateLocationCode = "MACHESTER.001";
String targetLocationCode = "LONDON.001";
String rateCodeName = "VC12";

```

```

LocationManager locationManager =
    PersistenceHelper.makeLocationManager();

TopologyObject sourceNode =
    (TopologyObject)locationManager.findNetworkEntityLocation(sourceLocationCode);

TopologyObject targetNode =
    (TopologyObject)locationManager.findNetworkEntityLocation(targetLocationCode);

TopologyObject intermediateNode = null;
if(!Utils.isEmpty(intermediateLocationCode)){
    intermediateNode =
        (TopologyObject)locationManager.findNetworkEntityLocation
            (intermediateLocationCode);
}
if(sourceNode == null || targetNode == null ||
    (!Utils.isEmpty(intermediateLocationCode) && intermediateNode == null)){
    throw new IllegalArgumentException("Invalid source/intermediate/target");
}
RateCode rateCode = null;
CapacityManager capacityManager = PersistenceHelper.makeCapacityManager();
RateCodeSearchCriteria rateCodeSC = capacityManager.makeRateCodeSearchCriteria();

CriteriaItem rateCodeNameItem = rateCodeSC.makeCriteriaItem();
rateCodeNameItem.setName(rateCodeName);
rateCodeNameItem.setOperator(CriteriaOperator.EQUALS);
rateCodeNameItem.setValue(rateCodeName);
rateCodeSC.setName(rateCodeNameItem);

List<RateCode> rateCodes = capacityManager.findRateCode(rateCodeSC);
if (!Utils.isEmpty(rateCodes)) {
    rateCode = rateCodes.get(0);
}
if(rateCode == null){
    throw new IllegalArgumentException("Invalid rateCode");
}
PathAnalysisCriteria criteria = new PathAnalysisCriteria();
criteria.setSourceNode(sourceNode);
criteria.setIntermediateNode(intermediateNode);
criteria.setTargetNode(targetNode);
criteria.setRateCode(rateCode);
criteria.setGapAnalysis(true);

PathAnalysisManager pathAnalysisManager =
    PersistenceHelper.makePathAnalysisManager();

List<PathResultSet> paths = pathAnalysisManager.findPaths(criteria);

```

Adding Segments To Connectivity Path Based on the Gap Analysis Results

[Table 4-10](#) and example code provide information about using the API method to add segments to the connectivity path based on the gap analysis results.

Table 4-10 Adding Segments to Connectivity Path Based on Gap Analysis Results

| Topic | Information |
|-----------------------|---|
| Name | ConnectivityManager.addSegmentsToConnectivityPath (E connectivityTrail, PipeConfigurationItem connectivityPath, PipeConfigurationItem gapItem, PathResultSet path) throws ValidationException; |
| Description | <p>The connectivityTrail parameter is the channelized connectivity that will be enabled.</p> <p>The connectivityPath parameter is the PipeConfigurationItem representing the path to which the segments have to be added.</p> <p>The gapItem parameter is the PipeConfigurationItem of the gap that will be resolved.</p> <p>The path parameter is the results returned from gap analysis. (You can pass the results retrieved in the previous example. For example, paths.get(0)).</p> <p>See <i>Oracle Communications Information Model Reference</i> for information on PipeConfigurationItem.</p> |
| Pre-Condition | Not applicable |
| Internal Logic | Not applicable |
| Post-Condition | Not applicable |
| Extensions | Not applicable |
| Tips | Not applicable |

Example 4-9 Adding Segments to Connectivity Path Based on Gap Analysis Results

```
String trailName = "EDINBURGH.002 / LONDON.001 / VC12 / VC12 / 1";

//We want to add connectivities to first path
int pathIndex = "0";

//Assuming there are other connectivities already added to this path
int gapIndex = "0";

PersistenceHelper.makeBusinessInteractionManager().switchContext
    ((String)null, null);

Finder finder = PersistenceHelper.makeFinder();

Connectivity connectivityTrail =
    finder.findByName(Connectivity.class, trailName).iterator().next();

PipeConfigurationVersion designVersion =
    ConnectivityUtils.getInProgressDesignVersion((Pipe)connectivityTrail);

List<PipeConfigurationItem> allPaths =
    PipeHelper.getAllTransportItems(designVersion);

PipeConfigurationItem connectivityPath = allPaths.get(pathIndex);

PipeConfigurationItem gapItem =
    connectivityPath.getChildConfigItems().get(gapIndex);

ConnectivityManager manager = PersistenceHelper.makeConnectivityManager();

/*Here paths are the path returned by gap analysis.
Assuming the first one is the list is selected*/
```

```
manager.addSegmentsToConnectivityPath  
    (connectivityTrail, connectivityPath, gapItem, paths.get(0));
```

A

UIM Entity Managers

This appendix provides a listing of Oracle Communications Unified Inventory Management (UIM) entity manager class names, the package in which they reside, the entities they manage, and a brief description.

These Java manager classes are found in the **uim_managers.jar** which is located in the UIM Software Development Kit (SDK). See "Overview" in *UIM Developer's Guide* for more information on the UIM SDK.



Note:

The package references in [Table A-1](#) assume the package prefix of **oracle.communications.inventory.api**.

Table A-1 List of UIM Entity Managers

| Manager Name | Package | Managed Entities | Description |
|----------------------------|---------------------|-------------------------------------|---|
| ActivityManager | project.activity | Activity ActivityItem Project | Defines the methods for managing Activity entities within a Project along with their ActivityItem entities. |
| AddressRangeManager | place | GeographicAddress | Defines a GeographicAddress being used as a range. |
| AssignmentManager | consumer | Assignment | Extends ConsumerManager, managing Assignment logic. Assignment such as PipeAssignment, EquipmentAssignment. |
| AttachmentManager | common | Involvement | Administers Attachments and Involvements, for example preconfiguring TelephoneNumber with LogicalDeviceAccount. |
| BaseInvManager | common | <Base Class> | Provides application-specific behavior to methods in the JdoBean. The JdoBean doesn't know about entities that are specific to the inventory application. |
| BOMManager | bom | Activity Inventory | Defines the methods to support retrieving Bill of Materials information as well as populating additional information on an activity or resource. |
| BusinessInteractionManager | businessinteraction | BusinessInteraction | Defines methods for managing Business Interactions. |

Table A-1 (Cont.) List of UIM Entity Managers

| Manager Name | Package | Managed Entities | Description |
|-----------------------------|----------------|---|---|
| CapacityManager | capacity | Capacity | Defines the methods for managing capacity such as PipeCapacityProvided, PipeCapacityRequired, PipeCapacityConsumption. |
| CharacteristicManager | characteristic | Characteristics | Defines the methods for managing Characteristics such as CharacteristicSpecUsage, CharacteristicSpecValue, CharacteristicSpecValueUsage. |
| ConditionManager | consumer | Condition | Extends InventoryManager, managing Condition logic. Condition such as PipeCondition, EquipmentCondition. |
| ConfigurationManager | configuration | Configuration | Administers a configuration and its subtypes such as ServiceConfiguration, PlaceConfiguration. |
| ConnectivityManager | connectivity | Connectivity Pipe DeviceInterface InterConnection CrossConnect | Defines the methods for managing the creation, updates, deletions, and retrieving of connectivity data. This manager references a large number of different entities so the primary entities are listed here as the managed entities. |
| ConsumerManager | consumer | Assignment Condition Reservation | Validates resource availability. |
| CustomNetworkAddressManager | custom | CustomNetworkAddress | Defines the methods for managing CustomNetworkAddress objects. |
| CustomObjectManager | custom | CustomObject | Defines the methods for managing CustomObject objects. |
| EquipmentManager | equipment | Equipment EquipmentHolder PhysicalPort PhysicalConnector PhysicalDevice | Defines the methods for managing equipment and provided equipment holders, physical ports and physical connectors of the equipment. This interface also defines the methods for maintaining and finding physical devices and provided physical ports and physical connectors of the physical devices. |
| FlowIdentifierManager | networkaddress | FlowIdentifier InventoryGroup | Defines the methods for managing flow identifiers and relating them to inventory groups. |
| InventoryBaseManager | inventory | InventoryConfigurationItem | Gets and validates inventory configuration item for configuration. |
| InventoryGroupManager | group | InventoryGroup InvGroupRef | Defines the methods for managing inventory groups and related entities. |
| IPAddressManager | ip | IPAddress NetworkAddressDomain | Defines the methods for managing IP Addresses. |

Table A-1 (Cont.) List of UIM Entity Managers

| Manager Name | Package | Managed Entities | Description |
|---------------------------------------|-----------------------|--|---|
| IPNetworkManager | ip | IPSubnet IPAddress NetworkAddressDomain | Defines the methods for creating, deleting, finding, and updating IP network objects. |
| LocationManager | location | PropertyLocation PropertyAddress NetworkEntityCode | Defines the methods for managing behaviors of property locations. |
| LogicalDeviceManager | logicaldevice | LogicalDevice DeviceInterface FlowInterface | Defines the methods for managing LogicalDevice, Device Interface, and Flow Interface objects. |
| LogicalDeviceAccountManager | logicaldevice.account | LogicalDeviceAccount | Defines the methods for managing LogicalDeviceAccount objects. |
| LogicalPhysicalResourceBase | resource | | Contains shared methods and variables for managing logical and physical resources. |
| MediaManager | media | Media | Defines the methods for managing Media objects. Most of the methods for creating, updating, and deleting Media objects are deprecated because the functionality was replaced in Design Studio. |
| MediaResourceManager | mediaresource | MediaStream MediaResourceLogicalDeviceRel | Defines the methods for managing MediaStream objects and its relationships to LogicalDevice objects. MediaStream is also a MediaResource which is an abstract entity for various types of media. |
| MultiplexedConnectivityManager | connectivity | MultiplexedConnectivity MultiplexedChannel MultiplexedFacility | Defines the methods for managing MultiplexedConnectivity objects as well as creating and retrieving channels for a facility. This interface also creates and removes terminations for a facility. |
| NetworkAddressBlockManager | networkaddress | NetworkAddressBlock | Defines methods for managing NetworkAddressBlock objects. |
| NetworkAddressDomainManager | networkaddress | NetworkAddressDomain NetworkAddressType | Defines methods for managing NetworkAddressDomain objects. |
| NetworkManager | network | Network NetworkNode NetworkEdge | Defines methods for managing Network, NetworkNode, and NetworkEdge objects. |
| NetworkReconfigurationActivityManager | project.activity | Network NetworkNode NetworkEdge | Defines methods for managing Network, NetworkNode, and NetworkEdge objects, and their relationships to Activities. |
| NetworkReconfigurationManager | network | Network NetworkNode NetworkEdge | Defines methods for managing Network, NetworkNode, and NetworkEdge objects for Network Configuration scenarios. |

Table A-1 (Cont.) List of UIM Entity Managers

| Manager Name | Package | Managed Entities | Description |
|-------------------------------|------------------------|---|---|
| PacketConnectivityManager | connectivity | NetworkConnectivity | Defines the methods for creating Packet Network Connectivity objects. |
| PartyManager | party | Party | Defines the methods for managing Party objects. |
| PathAnalysisManager | topology | TopologyEdge TopologyNode | Defines the methods for finding paths of interconnected TopologyEdge and TopologyNode objects. |
| PipeConfigurationManager | connectivity | PipeConfigurationVersion PipeConfigurationItem Pipe PipeTerminationPoint | Defines the methods for managing Pipe Configurations and their related entities. |
| PipeManager | connectivity | Pipe PipeTerminationPoint | Defines the methods for managing Pipe and PipeTerminationPoint objects. |
| PlaceConfigurationManager | place | PlaceConfiguration | Defines the methods for managing PlaceConfiguration objects. |
| PlaceManager | place | GeographicPlace GeographicAddress GeographicLocation GeographicSite | Defines the methods for maintaining GeographicPlace objects and their concrete subclasses. |
| ProductManager | product | Product | Defines the methods for managing Product objects. |
| ProjectManager | project | Project | Defines the methods for managing Project objects. |
| ReservationManager | consumer | Reservation | Extends ConsumerManager, managing Reservation logic. Reservation such as PipeReservation, EquipmentReservation. |
| RoleManager | role | Role | Defines methods for managing Role objects. |
| SecurityManager | admin | User Role Partition SecurityPolicy | Defines the methods for managing User, Role, Partition, and SecurityPolicy objects. |
| ServiceConfigurationManager | service | ServiceConfigurationVersion ServiceConfigurationItem | This manager is used to configure a service using configuration versions and items. |
| ServiceConnectivityManager | connectivity | ServiceConnectivity ServiceNetwork ServiceConfigurationVersion | This manager is used to create service connectivity objects with and without a ServiceConfigurationVersion. |
| ServiceManager | service | Service | Defines the methods for managing Service objects. |
| SignalTerminationPointManager | signalterminationpoint | SignalTerminationPoint TrailTerminationPoint ConnectionTerminationPoint | Defines methods for managing Signal Structure and SignalTerminationPoint. |

Table A-1 (Cont.) List of UIM Entity Managers

| Manager Name | Package | Managed Entities | Description |
|------------------------|---------------------|--|--|
| SpecManager | specification | Specification | Administers a specification and its subtypes such as PipeSpecification, EquipmentSpecification. |
| TagManager | tag | Tag | Defines the methods for managing Tag objects. |
| TDMConnectivityManager | connectivity | TDMChannel TDMFacility | Defines the methods for managing TDMChannel and TDMFacility objects. |
| TelephoneNumberManager | number | TelephoneNumber | Defines the methods for managing TelephoneNumber objects. |
| TopologyManager | topology | TopologyEdge TopologyNode | Defines the methods for managing TopologyEdge and TopologyNode objects. |
| TransitionManager | common | | Transitions an entity's business and object states by finding the matching transition definitions with business action, object activity, entity type, and specification. If the definition's from state matches the entity's state, then the entity's state is set to the definition's to state. |
| VirtualNetworkManager | network | Network NetworkNode NetworkEdge FlowInterface FlowIdentifier | Defines the methods for managing Virtual Networks, Service Networks, and Packet Virtual Network objects. |
| WorkflowManager | businessinteraction | EngineeringWorkOrder Checklist Activity | Defines the methods for managing Engineering Work Orders and Activities. This manager also updates Activity properties like duration and their checklists and, also transitioning an Activity's status. |

B

NFV Orchestration Java Managers

This appendix provides a listing of Oracle Communications Unified Inventory Management (UIM) NFV Orchestration Java manager names, the package in which they reside, and a brief description.

These Java manager classes are found in the **nso_managers.jar** which is located in the UIM Software Development Kit (SDK). See "Overview" in *UIM Developer's Guide* for more information on the UIM SDK.

[Table B-1](#) contains the list of Java managers in alphabetical order by manager name.



Note:

The package references in [Table B-1](#) assume the package prefix of **oracle.communications.inventory.nso**.

Table B-1 List of NFV Orchestration Java Managers

| Manager Name | Package | Description |
|-----------------------------|----------------|---|
| DescriptorManager | api.descriptor | Defines numerous find methods for retrieving the descriptors and specifications for Network Services, VNFs, PNFs and orchestration requests. |
| EMSManager | api.ems | Defines the methods for finding, creating, updating and deleting EMSs, which perform the typical management functionality for one or several VNFs. |
| NetworkServiceDesignManager | api.c2a | Defines the methods for creating, disconnecting and changing the configuration version for a Network Service. |
| NetworkServiceManager | api.ns | Defines various methods to instantiate, activate, terminate and update Network Service entities. This manager also includes several find methods for Network Services and methods for Design and Assign of various Network Service entities. |
| NFVIManager | nfvi | Defines the methods for managing the NFV infrastructure. This manager includes methods to create, get and delete objects such as flavors, ports, networks and virtual routers for the VIM. By default, NFV Orchestration supports integration with OpenStack, but you can implement this interface to provide integration to a custom VIM, for instance supporting VMware vCloud. |
| NSONotificationManager | api.ns | Defines the methods to process a notification. This manager provides the mechanism to extend and provide your own custom required notifications. |
| NSOResponseManager | api.ns | Defines the methods to aid in sending a response to a topic in the WebLogic server. By default, NFV Orchestration includes a response manager that publishes the status of the VNF and Network Service life-cycle operations to a topic. You can also implement this interface to provide a custom response manager. |

Table B-1 (Cont.) List of NFV Orchestration Java Managers

| Manager Name | Package | Description |
|------------------------------|--------------------|--|
| PNFManager | api.pnf | Defines the methods to find, create, update, delete, and manage PNFs. |
| PNFServiceDesignManager | api.c2a | Defines the methods to process the actions performed during a PNF addition to a Network Service or termination from a Network Service. |
| ResourceOrchestrationManager | api.ro | Defines the methods used to choose a data center based on the requirement to provision a Network Service. An instance can be obtained from the NSOHelper class. |
| SBSytemManager | api.sb | Defines the south-bound system manager providing methods to manage the VNF, such as reboot, replace, upgrade, scale and instantiate. You can implement this interface to integrate NFV Orchestration with a third-party VNF manager or Oracle's VNF Manager. |
| SDNController | nfvi | Defines the methods to create, update, and delete network forwarding paths (NFPs) for VNF forwarding graphs (VNFFGs). By default, NFV Orchestration supports integration with OpenStack Neutron Networking-SFC (Service Function Chaining) using Open vSwitch (OVS) driver, but you can also implement a custom SDN controller. |
| VNFCapabilityServiceManager | api.vnf.capability | Defines the methods to configure a VNF service. This also contains a designAndAssign() method, as well as the issueConfigurationVersion() method. |
| VNFConfigManager | nfvi | Defines the methods to return the configuration files of a VNF and generates configuration content for VNF configuration. You can implement this interface to extend the VNF manager functionality and its configuration files. |
| VNFConnectionManager | nfvi | Defined the methods to connect and configure a VNF. You can implement this interface to extend the VNF manager functionality for these methods. |
| VNFLifeCycleManager | nfvi | Defines methods to manage the life cycle of a VNF, such as instantiate, reboot and terminate. You can implement this interface to extend the VNF manager functionality for these methods. By default, NFV Orchestration manages the VNF life-cycle operations by using OpenStack Compute services (referred to as Nova), but you can also implement and use a custom VNF life-cycle manager. |
| VNFMonitoringManager | nfvi | Defines the methods to manage the monitoring of a VNF, such as create, get and update alarms. By default, NFV Orchestration supports integration with OpenStack Ceilometer, but you can also implement and use a custom monitoring engine. |
| VNFServiceDesignManager | api.c2a | Defines the methods for creating, disconnecting and changing the configuration version for a VNF. |
| VNFServiceManager | api.vnf | Defines various methods to instantiate, activate, terminate and update VNFs. This manager also includes several find methods for VNFs. |

See *UIM NFV Orchestration Implementation Guide* for more information on extending the Java managers.

C

Common Utility Code Examples

This appendix provides an example code of common utilities that are often used when working with the Oracle Communications Unified Inventory Management (UIM) application program interfaces (APIs).

Example C-1 Common Utility Code

```
public boolean hasErrors()
{
    boolean hasErrors = false;
    UserEnvironment userEnvironment = UserEnvironmentFactory.getUserEnvironment();
    if (userEnvironment != null)
    {
        FeedbackProvider feedbackProvider = userEnvironment.getFeedbackProvider();
        hasErrors = feedbackProvider.hasMessages(FeedbackLevel.ERROR);
    }
    return hasErrors;
}
```

```
public FeedbackProvider getFeedbackProvider()
{
    FeedbackProvider feedbackProvider = null;
    UserEnvironment userEnvironment = getUserEnvironment();
    if (userEnvironment != null)
    {
        feedbackProvider = userEnvironment.getFeedbackProvider();
    }
    return feedbackProvider;
}
```

```
protected static void commitOrRollback(UserTransaction ut)throws Exception
{
    FeedbackProvider feedbackProvider =
        getUserEnvironment().getFeedbackProvider();
    if (feedbackProvider.hasMessages(FeedbackLevel.ERROR))
    {
        if (ut != null && ut.getStatus() == Status.STATUS_ACTIVE)
            ut.rollback();
    }
    else
    {
        if (ut != null && ut.getStatus() == Status.STATUS_ACTIVE)
            ut.commit();
    }
}
```

```
protected static UserEnvironment startUserEnvironment()throws Exception
{
    UserEnvironment userEnvironment = null;
    try {
        UserEnvironment = getUserEnvironment();
        if (userEnvironment != null)
    }
```

```

        {
            //Reset the User Context in User Environment.
            userEnvironment.reset();
            //Begin the UserEnvironment before it is first used.
            userEnvironment.begin();
            //Reset the Feedback Provider in User Environment.
            userEnvironment.getFeedbackProvider().reset();
        }
    }
    catch (Exception e) {
        e.printStackTrace();
        throw e;
    }
    return userEnvironment;
}

protected static void endUserEnvironment(UserEnvironment userEnvironment)
{
    if (userEnvironment == null)
        return;

    userEnvironment.getFeedbackProvider().reset();
    userEnvironment.end();}

protected static UserEnvironment getUserEnvironment() throws Exception
{
    UserEnvironment userEnvironment = null;
    try {
        //Utils is oracle.communications.platform.util.Utils
        InitialContext initialContext = Utils.getInitialContext();
        String jndiContextName = "inv";
        String userEnvironmentName = "UserEnvironment";

        userEnvironment = (UserEnvironment)initialContext.lookup
            (jndiContextName + "/" + userEnvironmentName);

        initialContext.close();
    }
    catch (Exception e) {
        e.printStackTrace();
        throw e;
    }
    return userEnvironment;
}

```

Example C-2 Changing date and time to local formats

```

//When working with custom characteristics of type date or datetime, with localization
<<place import of Utility here>>
//Either date string should be set using "MM/DD/YYYY hh:mm:ss" / " MM/DD/YYYY" formats.
Char.setValue("10/20/2023");
//Or Before setting the date value a conversion should be done to change the Date to UIM
date
//format using an inbuilt utility method convertToUIMDateString for Date type
//convertToUIMDateTimeString and for datetime.
Date date = Utils.convertToUIMDateTimeString(new Date(2023 - 1900 , 9,18));
Char.setValue(date);

```

D

Frequently Used APIs for Design and Assign Methods

This appendix provides pointers to the design and assign methods of APIs that are frequently used when working with the Oracle Communications Unified Inventory Management (UIM) application programming interfaces (APIs).

You can download this technology pack, use the methods, and see code examples for common business solutions. You can also include this package in your custom solution to have numerous classes that are available.

Reference UIMTECHPACK Cartridge

Java package: OracleComms_UIM_DesignAndAssign_Common

oracle.communications.inventory.api.dna.ServiceDesigner

Table D-1 oracle.communications.inventory.api.dna.ServiceDesigner

| Topic | Class/Method |
|--|--|
| oracle.communications.inventory.api.dna. ServiceDesigner | ServiceDesigner.create(String serviceId, String serviceSpecificationName) Description: Creates a service with the given service ID and the specification name. |
| getParentService | ServiceDesigner.getParentService(Service service) Description: Returns the parent service in which the given service is assigned.Parent service to child service is not directly between two service entities like other entities. But it is done using assignment of child services to a configuration item of a parent service's configuration. |
| relating child service to a parent service | ServiceDesigner.addService(Service parentService, Service newService, String configItem) Description: Creates a new configuration item with the given name in the parent service active configuration and assigns the new service to it. This is how parent-child relationship is created between services. This is a typical example of relating a CFS (Customer Facing Service - parent service) and an RFS (Resource Facing Service - child service). |
| relateServiceToParty | ServiceDesigner.relateServiceToParty(ServiceConfigurationVersion scv, Party party,String roleSpec) Description: This method relates the given party to the given service. |
| getAssociatedService | ServiceDesigner.getAssociatedService (BusinessInteraction businessInteraction) Description: Returns the list of Service Entities associated to the given Business Interaction via Configuration Version. |
| getService | ServiceDesigner.getService(String serviceId, String extObjId) Description: This method gets the service using the service ID. If the service ID is not specified, the service is retrieved based on the service external object ID. |

Table D-1 (Cont.) oracle.communications.inventory.api.dna.ServiceDesigner

| Topic | Class/Method |
|---------------------------------|---|
| updateServiceCharacteristic | ServiceDesigner.updateServiceCharacteristic(Service service, String charName, String charValue); Description: Finds and creates a new characteristic on the service with the provided charName and populates the provided value. |
| getAssignedService | ServiceDesigner.getAssignedService(ConsumableResource resource) Description: Returns the assigned service for a given consumable resource. |
| getAssignedServiceConfigVersion | ServiceDesigner.getAssignedServiceConfigVersion(ConsumableResource resource) Description: Returns the current active configuration in which the given consumable resource is assigned. |
| updateConfigItemCharacteristic | ServiceDesigner.updateConfigItemCharacteristic(ServiceConfigurationItem configItem, String charName, String charValue) Description: Updates the characteristic of the Service Configuration Item. |
| assignEntity | ConfigurationDesignerImpl.assignEntity(Configurable configurable, ConsumableResource entity, String config-ItemName) Description: Assigns a given consumable resource entity to the given configurable entity (Service, Logical Device, Site, network and so on) and associates to the provided Configuration Item. |
| referenceEntity | ConfigurationDesignerImpl.referenceEntity(Configurable configurable, ConfigurationReferenceEnabled entity, String configItemName) Description: References a given entity to the given configurable entity (Service, Logical Device, Site, network and so on) and associates it to the provided Configuration Item. |
| getAssociatedVersions | ConfigurationDesignerImpl.getAssociatedVersions(String bild, String extObjId) Description: Returns the list of Inventory Configurations associated to the given Business Interaction. Either bild or extObjId are required. |
| getAssociatedConfigurableEntity | ConfigurationDesignerImpl.getAssociatedConfigurableEntity(BusinessInteraction businessInteraction) Description: Returns the list of Configurable Entities (Service, Logical Device, Device Interface, Network and so on) associated to given Business Interaction via Configuration Version. |
| getPreviousVersion | ConfigurationDesignerImpl.getPreviousVersion(InventoryConfigurationVersion version) Description: Returns the latest previous completed configuration version. |
| getBusinessInteractionItems | ConfigurationDesignerImpl.getBusinessInteractionItems(BusinessInteraction bi) Description: Returns the list of all Business Interaction Items associated to given Business Interaction. |
| getBusinessInteraction | ConfigurationDesignerImpl.getBusinessInteraction(String bild, String extObjId) Description: Returns the Business Interaction for the Business Interaction id or External Object Id. Either bild or extObjId are required. |
| getConfigurationProperty | ConfigurationDesignerImpl.getConfigurationProperty(InventoryConfigurationItem item, String name) Description: Returns the value of a characteristic associated to the configuration item. |
| getConfigurationItem | ConfigurationDesignerImpl.getConfigurationItem(InventoryConfigurationVersion ConfVersion, String name) Description: Returns a configuration item with the given name associated to the provided Configuration Version. |

Table D-1 (Cont.) oracle.communications.inventory.api.dna.ServiceDesigner

| Topic | Class/Method |
|---|--|
| isValidConfigItemCharacteristic | ConfigurationDesignerImpl.isValidConfigItemCharacteristic (InventoryConfigurationItem item, String charName) Description: Checks if the given characteristic belongs to the given configuration item. |
| addChildConfigItem to a given parentItem | ConfigurationDesignerImpl.addChildConfigItem(InventoryConfigurationVersion configVersion, InventoryConfigurationItem parentItem, String childItemName) Description: Creates the child configuration item under the parent configuration item provided. |
| getLatestConfigurationVersionForState | ConfigurationDesignerImpl.getLatestConfigurationVersionForState(Configurable configurable, BusinessInteractionState state) Description: This method gets the latest configuration version for a given configurable entity (Service, Logical Device, Network etc.) using the given state as the criteria. |
| checkItemAssignedReferenced | ConfigurationDesignerImpl.checkItemAssignedReferenced(InventoryConfigurationVersion configVersion, InventoryConfigurationItem entityConfigItem) Description: Checks if the configuration item has a assignment or reference. |
| getConfigurationVersion | ConfigurationDesignerImpl.getConfigurationVersion(Configurable configurable, String configSpecName) Description: This method determines if an in-progress version exists before creating a new one. If a completed version exists, then it uses that to create the next version. If neither an in-progress or completed version exists, it uses the configuration specification to create the first configuration version for the configurable entity such as a service. |
| getConfigurationItems of an assignment object | ConfigurationDesignerImpl.getConfigurationItems(Assignment assignment, InventoryConfigurationVersion scv) Description: Returns the configuration items based on the assignment object provided. |
| getConfigurationItems of an reference object | ConfigurationDesignerImpl.getConfigurationItems(InventoryConfigurationVersion scv, ConfigurationReference reference) Description: Returns the Configuration Items based on the reference object provided. |
| createConfigurationVersion | ConfigurationDesignerImpl.createConfigurationVersion(Configurable configurable, String configSpec) Description: This method will use the configuration specification to create the configuration version for the given configurable entity. |
| getConfigItemByNameAndParent | ConfigurationDesignerImpl.getConfigItemByNameAndParent(InventoryConfigurationVersion scv, String itemName, String parentName) Description: Returns the configuration item with the given name.If parentName is not null the method will make sure that the item is child of parent item before returning. |
| setConfigItemCharacteristics | ConfigurationDesignerImpl.setConfigItemCharacteristics (InventoryConfigurationItem configItem, String propertyName, String value) Description: If a Characteristic with this name already exists, then this method will update the value. Otherwise creates a new characteristic. |
| referenceEntityToConfiguration | ConfigurationDesignerImpl.referenceEntityToConfiguration(ConfigurationReferenceEnabled resource, InventoryConfigurationVersion config, String configItemName) Description: Reference a given resource to the configuration item in the given configuration version. |

Table D-1 (Cont.) oracle.communications.inventory.api.dna.ServiceDesigner

| Topic | Class/Method |
|--------------------------------|--|
| assignEntityToConfiguration | <p>ConfigurationDesignerImpl.assignEntityToConfiguration(InventoryConfigurationVersion configuration, ConsumableResource consumableResource, String configItemName, String parentConfigItemName, boolean switchToConfigurationContext)</p> <p>Description: Assigns a given resource to the configuration item in the given configuration version.</p> <p>switchToConfigurationContext: If set to true, ensures that the assignment is done under configuration context.</p> <p>switchToConfigurationContext: If set to false, assignment is done in whichever context is carried in the UserEnvironment at run time, which may result in wrong assignment depending on the context. Hence, always set switchToConfigurationContext to true for the right context.</p> <p>This method also makes sure to set back the context to current or live after the assignment is done.</p> |
| referenceEntityToConfiguration | <p>ConfigurationDesignerImpl.referenceEntityToConfiguration(InventoryConfigurationVersion configuration, ConfigurationReferenceEnabled entity, String configItemName, String parentConfigItemName, boolean switchToConfigurationContext)</p> <p>Description: References a given resource to the configuration item in the given configuration version.</p> |
| getConfigSpecByResourceSpec | <p>ConfigurationDesignerImpl.getConfigSpecByResourceSpec(Specification resourceSpecification, Specification configurationSpec)</p> <p>Description: Returns the Configuration Item Specification on which this resource specification can be assigned or referenced in the given Configuration specification.</p> |
| getParentConfigSpec | <p>ConfigurationDesignerImpl.getParentConfigSpec(InventoryConfigurationSpec childSpec)</p> <p>Description: Returns the parent configuration item specification for a given child configuration specification.</p> |
| getActiveConfigurationVersion | <p>ConfigurationDesignerImpl.getActiveConfigurationVersion</p> <p>Description: This method gets the latest configuration version for a given configurable Entity like Service, Logical Device, Network, etc.If there is any in progress configuration version available it returns it.Otherwise it returns the last completed configuration version.</p> |

oracle.communications.inventory.api.dna. ConnectivityDesigner

Table D-2 oracle.communications.inventory.api.dna. ConnectivityDesigner

| Topic | Class/Method |
|---------------------------|---|
| createServiceConnectivity | <p>ConnectivityDesigner.createServiceConnectivity(String connSpec, String technology,String function, ServiceNetwork serviceNetwork, int serialNumber, ServiceConfigurationVersion scv, String aLocationName, String zLocationName, BigDecimal cir, UnitOfMeasure cirUoM, BigDecimal mir, UnitOfMeasure mirUoM)</p> <p>Description: Helper method used to create Service Connectivity.</p> |

h2>oracle.communications.inventory.api.dna. ConnectivityHelper

Table D-3 oracle.communications.inventory.api.dna. ConnectivityHelper

| Topic | Class/Method |
|--------------------------------|---|
| getAssignedConnectivities | ConnectivityHelper.getAssignedConnectivities(LogicalDevice device, Specification specification, RateCode rateCode) Description: Returns the connectivities assigned to any interface on the provided logical device for the provided device interface specification and rate code. |
| getConnectivityFromTermination | ConnectivityHelper.getConnectivityFromTermination(DeviceInterface di) Description: Get the assigned connectivity given the device interface. |
| getConnectivityUniN | ConnectivityHelper.getConnectivityUniN(Pipe connectivity, String roleName) Description: Return the Device Interface based on a specific role name. Checks the Z side first for the role, then checks the A side. The UNI-N is the interface on SP's (Service Provider's) side of the UNI. Use a device role to identify it. |
| getDeviceInterfaceRole | ConnectivityHelper.getDeviceInterfaceRole(DeviceInterface di, String roleName) Description: Returns true if the device interface has a specific role. |
| getDeviceInterfaceByAssignment | ConnectivityHelper.getDeviceInterfaceByAssignment(List<Assignment> assignments, String roleName) Description: Return the device interface for a given assignment and role. |
| findTransportConnectivity | ConnectivityHelper.findTransportConnectivity(LogicalDevice logicalDevice, String specName) Description: Returns the first connectivity assigned to a logical device with a specific connectivity specification name. |
| findTransportInterface | ConnectivityHelper.findTransportInterface(LogicalDevice logicalDevice, String specName) Description: Returns the first device interface found on the logical device with a specific connectivity assigned with a specific type of connectivity specification. For example, inter-network transport to the core has a unique connectivity specification. |
| getFunction | ConnectivityHelper.getFunction(String name) Description: Return the Connectivity Function entity with a specific name. |
| getTechnology | ConnectivityHelper.getTechnology(String name) Description: Returns the technology entity for a specific name. |
| getRateCode | ConnectivityHelper.getRateCode(String name) Description: Return the Rate Code entity for a specific rate code name. |
| getConnectivityServiceLocation | ConnectivityHelper.getConnectivityServiceLocation(Connectivity connectivity) Description: Returns the service location for a given connectivity. Assumes there is only one and checks the A side location first. |
| hasValidResourceTerminations | ConnectivityHelper.hasValidResourceTerminations(Connectivity connectivity) Description: Returns true if the connectivity has any resource terminations. For example, this method can be used to determine if the connectivity has been terminated to any device interfaces. |

oracle.communications.inventory.api.dna. ResourceHelper

Table D-4 oracle.communications.inventory.api.dna. ResourceHelper

| Topic | Class/Method |
|--------------------------|--|
| findEntityByName | ResourceHelper.findEntityByName(Class<E> entityClass, String name) Description: Returns the entity object based on the name and class provided |
| makeEntityCharacteristic | ResourceHelper.makeEntityCharacteristic(CharacteristicExtensible<T> entity) Description: Returns new Characteristic Value object for the given entity |
| setCharacteristic | ResourceHelper.setCharacteristic(CharacteristicExtensible<T> entity, List<PropertyType> properties) Description: Sets the characteristic value on the given CharacteristicExtensible entity |
| getSpecification | ResourceHelper.getSpecification(Class<T> specClass, SpecificationType specType) Description: Returns the Specification object based on the Specification class and Specification Type Provided |
| getAdminState | ResourceHelper.getAdminState(InventoryStateEnum.Enum state) Description: Returns the Inventory State based on the state provided. |
| getAssignmentState | ResourceHelper.getAssignmentState(AssignmentStateEnum.Enum state) Description: Returns the AssignmentState based on the state provided |
| getSpecification | ResourceHelper.getSpecification(Class specClass, String name) Description: Returns the specification based on the name and specification class provided. |
| findFirstEntityByName | ResourceHelper.findFirstEntityByName(Class<E> klass, String name) Description: Finds and returns the first entity from the result set matching the given name.Returns null if none found. |
| findEntityById | ResourceHelper.findEntityById(Class<E> entityClass, String id) Description: Finds and returns the entity by given id and class provided. |
| findEntitiesByName | ResourceHelper.findEntitiesByName(Class<E> klass, String name) Description: Finds and returns the entity by class and name. |
| findFirstEntityById | ResourceHelper.findFirstEntityById(Class<E> klass, String id) Description: Finds and returns the first entity found by class and id. |
| findEntitiesById | ResourceHelper.findEntitiesById(Class<E> klass, String id) Description: Finds and returns a list of entities by class and id. |
| populateCharacteristics | ResourceHelper.populateCharacteristics(T entity, Set<E> characteristics) Description: Populates the set of characteristics provided on the characteristicExtensible entity. |
| populateCharacteristic | ResourceHelper.populateCharacteristic(T entity, E characteristic) Description: Populates the characteristic provided on the CharacteristicExtensible entity. |
| createCustomInvolvement | ResourceHelper.createCustomInvolvement(E fromEntity, T toEntity) Description: Creates Custom Involvement between the given from Entity and the to Entity. |
| deleteCustomInvolvement | ResourceHelper.deleteCustomInvolvement(E fromEntity, T toEntity) Description: Deletes the custom involvement between the given two entities.First it tries with the fromEntity and toEntity and find the involvement.If not found it tries other way around by setting to entity as from entity and to entity as from entity |

Table D-4 (Cont.) oracle.communications.inventory.api.dna. ResourceHelper

| Topic | Class/Method |
|---|---|
| associateToInventoryGroup | ResourceHelper.associateToInventoryGroup(InventoryGroup group, List<GroupEnabled> entities) Description: Associate the given list of entities to inventory group. |
| disassociateFromInventoryGroup | ResourceHelper.disassociateFromInventoryGroup(InventoryGroup group, List<GroupEnabled> entities) Description: Disassociates the list of entities from the inventory group. |
| associateToPlace | ResourceHelper.associateToPlace(GeographicPlace parentPlace, GeographicPlace childPlace) Description: Associates the child place to parent place. |
| associateToPlace Logical Device to Place | ResourceHelper.associateToPlace(GeographicPlace parentPlace, LogicalDevice device) Description: Associates the given Logical Device to the given place. |
| associateToPlace Logical Device Account to Place | ResourceHelper.associateToPlace(GeographicPlace parentPlace, LogicalDeviceAccount account) Description: Associates given Logical Device Account to the given place. |
| associateToPlace Physical Device to Place | ResourceHelper.associateToPlace(GeographicPlace parentPlace, PhysicalDevice device) Description: Associates the given Physical Device to the given place. |
| associateToPlace Service to Place | ResourceHelper.associateToPlace(GeographicPlace parentPlace, Service service) Description: Associates the given Service to the given place. |
| associateToPlace Inventory Group to Place | ResourceHelper.associateToPlace(GeographicPlace parentPlace, InventoryGroup group) Description: Associates the given Inventory Group to the given place. |
| associateToPlace PipeTerminationPoint to Place | ResourceHelper.associateToPlace(GeographicPlace parentPlace, PipeTerminationPoint pt) Description: Associates the given Pipe Termination Point to the given place. |
| associateToPlace NetworkNode to Place | ResourceHelper.associateToPlace(GeographicPlace parentPlace, NetworkNode node) Description: Associates the given Network Node to the given place |
| disassociateFromPlace | ResourceHelper.disassociateFromPlace(GeographicPlace parentPlace, Persistent entity) Description: Disassociates the given Persistent entity from the given place. |
| findInventoryGroup | ResourceHelper.findInventoryGroup(String inventoryGroupName, String specificationName) Description: Finds and returns Inventory Group based on the inventory group name and specification name provided. |
| findDeviceInterfaces | ResourceHelper.findDeviceInterfaces(LogicalDevice device, Specification specification, RateCode rateCode, AssignmentState state) Description: Finds the Device interfaces based on the logical device, specification, assignment state and rate code. Not all arguments are mandatory. Only non null values will be added as search criteria. |
| findAndValidateSpecification | ResourceHelper.findAndValidateSpecification(String specificationName) Description: Returns only valid specification based on the given name. |
| findAndValidateSpecification | ResourceHelper.findAndValidateSpecification(Class specClass, String specificationName) Description: Returns only valid specification based on the given name and specification class. |
| createParty | ResourceHelper.createParty(PartyType type, String partySpecName, String roleSpecName) Description: Creates Party based on the party type and specification. If the role specification is provided it creates party role too. |

Table D-4 (Cont.) oracle.communications.inventory.api.dna. ResourceHelper

| Topic | Class/Method |
|------------------------------|---|
| createPartyRole | ResourceHelper.createPartyRole(Party party, String roleSpecName) Description: Creates the party role object based on the party object and role specification name provided. |
| makeCharValue | ResourceHelper.makeCharValue(CharacteristicExtensible<CharValue> characteristicExtensible, String charSpecName, String value) Description: Creates and returns the char value object based on the provided details for any entity which is CharacteristicExtensible like inventory configuration item, logical device, Service.Network etc. |
| findOrCreateLogicalDevice | ResourceHelper.findOrCreateLogicalDevice(String logicalDeviceId, String name, String specName) Description: Finds the logical device based on the ID, name and specification provided. If not found, creates a logical device and returns. |
| createLogicalDevice | ResourceHelper.createLogicalDevice(String logicalDeviceId, String specName) Description: Creates a logical device. |
| findLogicalDevice | ResourceHelper.findLogicalDevice(String id, String name, String specName) Description: Finds the logical device based on the provided details. |
| findConnectivity | ResourceHelper.findConnectivity(String identifier) Description: Finds the connectivity object based on the provided identifier. |
| createPropertyAddress | ResourceHelper.createPropertyAddress(String streetAddress, String city, String state, String postalCode, String country) Description: Creates the property address based on the details provided. |
| createPropertyLocation | ResourceHelper.createPropertyLocation(PropertyAddress address) Description: Creates the property Location of type Service Location based on the details provided. |
| findPropertyLocations | ResourceHelper.findPropertyLocations(PropertyAddress address) Description: Finds and returns the Property Location based on the address provided. |
| findOrCreatePropertyLocation | ResourceHelper.findOrCreatePropertyLocation(PropertyAddress address) Description: Finds the property Location with the given address. If available, returns the entity. Otherwise, creates a new Property Location. |
| createCriteriaItem | ResourceHelper.createCriteriaItem(String itemName, CriteriaOperator operator, InventorySearchCriteria criteria) Description: Creates and returns the criteria Item object. |
| findCustomObjects | ResourceHelper.findCustomObjects(String specName, String customObjectName) Description: Finds and returns the custom objects with the given criteria. Either Name or SpecName is mandatory. |
| findOrCreateCustomObject | ResourceHelper.findOrCreateCustomObject(String customObjectName, String specName, Set<CustomObjectCharacteristic> chars) Description: Finds the Custom Object with the given details. If available, returns the entity. Otherwise, creates a new Custom Object. |
| createCustomObject | ResourceHelper.createCustomObject(String customObjectName, String specName, Set<CustomObjectCharacteristic> chars) Description: Create a Custom Object. |

Table D-4 (Cont.) oracle.communications.inventory.api.dna. ResourceHelper

| Topic | Class/Method |
|--|--|
| findCharacteristicByName | ResourceHelper.findCharacteristicByName(CharacteristicExtensible entity, String itemName) Description: Finds and returns the characteristic value for a specific entity and characteristic name. |
| findLogicalDevice | ResourceHelper.findLogicalDevice(String id, String name) Description: Finds a logical device by ID and name. |
| findNetworkLocation | ResourceHelper.findNetworkLocation(String networkLocationCode) Description: Finds and returns a property location using the network location code. |
| findNetworkEntityCode | ResourceHelper.findNetworkEntityCode(PropertyLocation propertyLocation, String networkEntityCode) Description: Finds and returns the Network Entity Code given a property location and network entity code name. |
| createNetworkEntityCode | ResourceHelper.createNetworkEntityCode(PropertyLocation networkLocation, String networkEntityCode, String networkEntityLocationCode) Description: Creates a Network Entity Code given a property location, network entity code and network entity location code. |
| updateBusinessInteractionCharacteristic | ResourceHelper.updateBusinessInteractionCharacteristic(BusinessInteraction bi, String charName, String charValue) Description: Updates a Business Interaction Characteristic. |
| updateNetworkCharacteristic | ResourceHelper.updateNetworkCharacteristic(Network network, String charName, String charValue) Description: Updates a Networks Characteristics. |
| getBIPParameter by BusinessInteractionItem | ResourceHelper.getBIPParameterValue(BusinessInteractionItem item, String paramName) Description: Returns the value of parameter provided. It can be used to return the value from a name/value pairs from the CaptureInteraction Payload given the Parameter name. |
| getBIPParameter by ParameterType | ResourceHelper.getBIPParameterValue(List<oracle.communications.inventory.xmlbeans.ParameterType> parameterList, String paramName) Description: Returns the value of parameter provided. It can be used to return the value from a name/value pairs from the CaptureInteraction Payload given the Parameter name. |