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Agile Product Lifecycle Management

SDK Developer Guide - Using Agile APIs

v9.3.1.2

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Preface

Oracle's Agile PLM documentation set includes Adobe® Acrobat PDF files. The [Oracle Technology Network \(OTN\) Web site](http://www.oracle.com/technetwork/documentation/agile-085940.html) <http://www.oracle.com/technetwork/documentation/agile-085940.html> contains the latest versions of the Agile PLM PDF files. You can view or download these manuals from the Web site, or you can ask your Agile administrator if there is an Agile PLM Documentation folder available on your network from which you can access the Agile PLM documentation (PDF) files.

Note To read the PDF files, you must use the free Adobe Acrobat Reader version 9.0 or later. This program can be downloaded from the [Adobe Web site](http://www.adobe.com) <http://www.adobe.com>.

The [Oracle Technology Network \(OTN\) Web site](http://www.oracle.com/technetwork/documentation/agile-085940.html) <http://www.oracle.com/technetwork/documentation/agile-085940.html> can be accessed through Help > Manuals in both Agile Web Client and Agile Java Client. If you need additional assistance or information, please contact My Oracle Support (<https://support.oracle.com>) for assistance.

Note Before calling Oracle Support about a problem with an Agile PLM manual, please have the full part number, which is located on the title page.

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Readme

Any last-minute information about Agile PLM can be found in the Readme file on the [Oracle Technology Network \(OTN\) Web site](http://www.oracle.com/technetwork/documentation/agile-085940.html) <http://www.oracle.com/technetwork/documentation/agile-085940.html>.

Agile Training Aids

Go to the [Oracle University Web page](http://www.oracle.com/education/chooser/selectcountry_new.html) http://www.oracle.com/education/chooser/selectcountry_new.html for more information on Agile Training offerings.

Accessibility of Code Examples in Documentation

Screen readers may not always correctly read the code examples in this document. The conventions for writing code require that closing braces should appear on an otherwise empty line; however, some screen readers may not always read a line of text that consists solely of a bracket or brace.

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New in Release 9.3.1.2

There are no new features or enhancements to existing features in this release of the Agile SDK APIs. Changes in this document include formatting modifications and changes made to some of the code samples.

New in Release 9.3.1.1

The following new features and enhancements are implemented in this release:

- Adding "FileFolder" to the Content Tab of a Project – This release supports adding FileFolders to the Content Tab of a Project using the IProgram API. See [Adding "FileFolder" to the Content Tab of a Project](#) on page 239.
- Adding Multiple Team members to a Project – The SDK supports using the Bulk APIs to add Multiple Team members to a Project's Team Table. See [Adding Multiple Team Members to the Team Table of a Project](#) on page 72.
- The following entry is no longer applicable and is removed from [Selecting a List from the List Library](#) on page 161.
"Cascading lists are only used for SingleList attributes and not for MultiList attributes"

New in Release 9.3.1 Rev 3

There are no new features or enhancements implemented in this release of the Agile SDK APIs. Changes listed below only apply to this document.

Missing Content

The missing entries that appeared under "The Agile PLM system provides the following redline tables" are restored in this revision of the Guide. See [Redlining](#) on page 84.

Publishing Agile APIs and PLM Extensions in Separate Books

Starting with this release, the *SDK Developer Guide* which was published as a single book in previous releases, is divided and published in two complimentary books as follows:

- SDK Developer Guide - Using Agile APIs – This book consists of the first twenty chapters of the *SDK Developer Guide Release 9.3.1 Rev 2* and applicable Appendices.
- SDK Developer Guide - Developing PLM Extensions – The contents of this book are the Process Extensions, Web Services Extensions, Dashboard Management Extensions, and Event Framework chapters of the *SDK Developer Guide Release 9.3.1 Rev 2* and applicable Appendices.

This change is necessary because the *SDK Developer Guide* which is posted on the Oracle Technology Network (OTN), has more than 500 pages, and OTN rejects submissions that exceed this page limit.

New in Release 9.3.1 Rev 2

The SDK_samples.zip file is moved from http://www.oracle.com/technology/sample_code/products/agile/9.3/index.html

to <https://codesamples.samplecode.oracle.com/servlets/tracking/id/S614>.

Note Oracle recommends using Internet Explorer to access these sites.

New in Release 9.3.1

The following new features and enhancements are implemented in this release:

- Creating Agile sessions in cluster environments – The SDK exposes three new APIs to overcome the proxy server URL issue during down time when creating an Agile session in a cluster environment. See [Creating a Session in a Cluster Environment](#) on page 13.
- Creating Criteria-based lists – The SDK supports creating, loading, and modifying Criteria-based lists which are Dynamic lists defined by the criteria selected from the Agile Criteria library when the lists are created. See [Creating a Criteria-Based List](#) on page 168.
- Creating Users and Requiring Password Modification at Login – Using the SDK you can create and configure a user with a temporary password, and require the new user to change his or her password at login. See [Creating Users and Requiring Password Modification at Login](#) on page 346.
- Checking for expired passwords – The text and example in [Managing Users](#) on page 345 that checks for Agile API errors related to expired passwords is changed in this release. See [Checking for Expired Passwords](#) on page 347.
- Approving or rejecting change without password – PLM's Java Client provides the option to approve or reject a Change with or without typing a password. The SDK exposes the necessary APIs to programmatically perform this function. See [Approving or Rejecting a Change Without Password](#) on page 218.
- Adding Items from Product Collaboration to Sourcing Projects – The Agile Web Client supports adding PC Items to Sourcing Projects by applying the BOM filter to multiple attributes with different operators from the UI. This release enhances the applicable APIs to perform this task using the SDK. See [Adding Items to Sourcing Projects Using BOM Filters](#) on page 275.
- Generating a project's Assembly Cost Report – The Agile Web Client supports generating Assembly Cost Reports using the UI. In this release, the `IProductReport.execute()` API was enhanced to perform this task using the SDK. See [Generating Assembly Cost Reports for Sourcing Projects](#) on page 282.
- Setting Start and End timestamps for PPM Date attributes – This release enables specifying the Start and End times for PPM's Schedule, Estimated, and Actual Date attributes when creating or editing scheduled PPM tasks. See [Setting Start and End Timestamps for PPM Date Attributes](#) on page 247.
- New Variant Management Interfaces – The following Variant Management specific interfaces are implemented in `com.agile.px` package:
 - `IUniqueId`
 - `IConfigurationGraph`
 - `IConfigurationOption`
 - `IModelOptionBOM`
 - `IModelOptionBOMItem`
- Working with Variant Management Events – This release provides SDK support for Variant

Management Events. You can find the necessary background and procedural information in the following sections of *SDK Developer Guide Release 9.3.1 - Developing PLM Extensions*.

- Event Information Objects – Lists the new Event Types and the corresponding Information Object Interface (`IVMEventObj`) that enable supporting Variant Management using the SDK
- Event Script Objects – Lists the new Event Types and the corresponding Script Object Interface (`IVMScriptObj`) that enable supporting Variant Management using the SDK
- Working with Variant Management Actions – Describes working with Variant Management Actions – Java PX and Variant Management Actions – Script PX
- Variant Management Configuration Graph Schema – Describes the structure of a Variant Management XML graph schema

New in Release 9.3.0.2

The following new features and enhancements were implemented in this release:

- Checking for expired passwords – The example in [Managing Users](#) on page 345 that checks for Agile API errors related to expired passwords is changed in this release. See [Checking for Expired Passwords](#) on page 347.
- Improving query performance for lists containing large number of objects – A new section that shows how to set the search criteria to improve performance for lists containing a large number of objects is added in this release. See [Setting Search Criteria for Lists Containing Large Number of Objects](#) on page 49.
- Deploying dependent/shared libraries in Weblogic server – Applicable procedures to deploy the dependent JAR files are modified in this release. See *Deploying the Dependent JAR Files in SDK Developer Guide Release 9.3.0.2 - Developing PLM Extensions*.
- Creating a Session and Logging In – A note describing JVM parameter settings when LDAP users log in to Agile PLM running on Weblogic servers. See [Creating a Session and Logging In](#) on page 11.

New in Release 9.3.0.1 Rev 2

The SiteMinder and SAP portal references that appeared in *Using Single Sign-On Cookies for Client-Server* are removed in this revision.

New in Release 9.3.0.1

New features and enhancements implemented in this release address using the SDK to create and load queries and work with tables. These changes, summarized below, are documented in Chapter 3, [Creating and Loading Queries](#) on page 35 and Chapter 4, [Working with Tables](#) on page 65.

- SDK support for workflow-related queries – This release supports using workflow attributes to prepare queries that check the status of a workflow in the PLM process. See *Specifying Workflow Queries*.
- SDK support to use the Nested Criteria to perform object list searches – This release provides an enhancement in the behavior and performance of this feature. See [Using the Nested Criteria to Search for Values in Object Lists](#) on page 43.
- SDK support for Relationships/Content queries – As a result of enhancements made to the `IQuery` interface, you can use the SDK to prepare queries listed below. For information and usage

examples, see [Using Relationships and Content in SDK Queries](#) on page 45.

- An object's Relationships attribute
 - A Program object's Content attribute
 - A Transfer Order object's Selected Content attribute
- SDK support to query using criterion selected from PLM's Criteria Library – This feature was supported in earlier releases of the SDK. In this release, the examples are modified. See [Using Criteria Selected from Criteria Library in SDK Queries](#) on page 44.
- SDK support for bulk removal of redline changes – A new interface called `IRedlinedTable` supports this operation, See [Removing Redline Changes in Bulk Mode](#) on page 86.

Note The PG&C constants and the relationships table functionality in `AgileAPI.jar` Release 9.2.2 and subsequent releases of Agile PLM are incompatible with the ones in the earlier versions of `AgileAPI.jar`.

Introduction

This chapter includes the following:

▪ About this Guide	1
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▪ Agile SDK Installation Folders	5
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▪ Agile PLM Business Objects	5

About this Guide

Oracle's Agile Software Development Kit (SDK) is a collection of Java application programming interfaces (APIs), sample applications, and documentation that enable building custom applications to access, or extend the functionalities of the Agile Application Server. Using the SDK, you can create programs that extend the functionality of the Agile product lifecycle management system (PLM) and can perform tasks against the PLM system.

The SDK enables the following operations:

- Integrate the Agile PLM system with enterprise resource planning (ERP) applications or other custom applications
- Develop applications to process product data
- Perform batch operations against the Agile Application Server
- Extend the functionality of the Agile PLM system

This release marks the partition of the SDK Developer Guide which was published as a single book prior to this release, into the following two books.

- SDK Developer Guide – Using the APIs – This component of the SDK Developer Guide provides information to develop batch operations against the PLM Server, integrate PLM with other applications, and process PLM data. This information is described and documented in this book.
- SDK Developer Guide – Developing Extensions – This component of the SDK Developer Guide provides background and procedural information to create additional PLM clients (extend Agile PLM functionalities) and work with PLM Frameworks. This information is described and documented in the *SDK Developer Guide - Developing Extensions*.

Agile APIs

This component of the SDK Developer Guide provides referential and procedural information to get started with the APIs and use the APIs to develop applications that programmatically perform batch operations against the Agile Application Server to execute tasks such as:

- Querying PLM databases
- Loading data into PLM databases
- Importing and exporting data to and from Agile PLM
- Processing product data
- Interacting with PLM modules such as Product Cost Management, Product Portfolio Management, and other modules
- Managing workflow
- Performing administrative functions

SDK Components

The Agile SDK has the following Client-side and sever-side components:

Client-Side Components

The contents of the Agile SDK Client-side components are:

Documentation

- *SDK Developer Guide* (this manual)
- API Reference files (these are the Javadoc generated HTML files that document the API methods)
- Sample applications

Note The API HTML reference files and Sample applications are in the SDK_samples.zip folder. This folder is found in the Oracle Agile PLM's Event and Web Services Samples Web site https://www.samplecode.oracle.com/tracker/tracking/linkid/prpl1004/remcurreport/true/template/IssueList.vm/action/Search?eventSubmit_doSelectquery=foo&go=224. For more information and procedures to access its contents, contact your system administrator, or refer to your PLM installation guide.

Installation

- Agile API library (AgileAPI.jar)
- Java Process Extensions API library (pxapi.jar)
- Apache Axis library (axis.jar)

Server-Side Components

Oracle's Agile Application Server contains the following SDK server-side components:

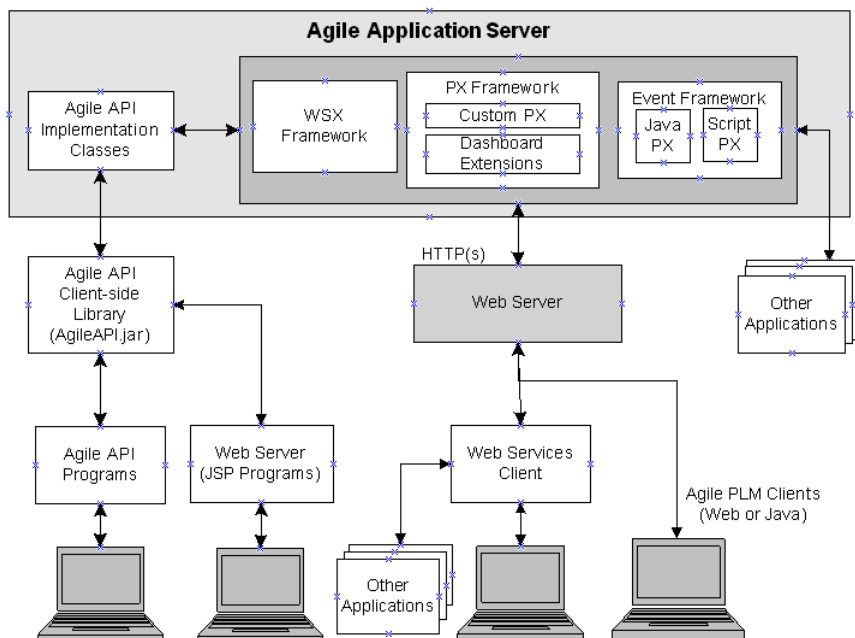
- Agile API implementation classes
- Java and Scripting process extensions framework
- Web service extensions frameworks

SDK Architecture - Using Agile APIs

The SDK facilitates developing different types of programs to connect to the Agile Application Server. If you are using only the Agile APIs, these programs connect directly to the server. If you are developing Web service extensions (WSX), you can deploy them inside the Agile Application Server container as Web Services. The Web server used for WSX is accessible from inside or outside the company's demilitarized computing zone (DMZ) or perimeter network. For information to develop Web service extensions, refer to *SDK Developer Guide - Developing PLM Extensions*.

When the Agile PLM Client initiates a custom action, it either runs a program that is deployed on the server, or connects to an external resource such as a URL or WSX. Java PX and Script PX extensions can also use the Agile APIs. You can also develop extensions using APIs that are not provided by Agile. For procedures and back ground information, refer to *SDK Developer Guide - Developing PLM Extensions*.

Figure 1: Agile SDK architecture



Note Agile API programs connect to the Agile Application Server using non-secure means. Consequently, it is recommended that you run the Agile API programs only from within the corporate firewall. Web service Clients, however, can connect to the server through the corporate *firewall* using standard HTTP(S) technology.

System Requirements

For Agile SDK system requirements, refer to *PLM Capacity Planning and Deployment Guide*.

Java Requirements

The Agile API must be compatible with the version of Java that the application server supports. To avoid problems, an Agile API Client must use the same version of Java that the connecting application server is using. Oracle Application Server 10g must use Sun Java Runtime Environment (JRE) 1.5.0_06 and Oracle WebLogic Server 10.3 must use Sun Java Runtime Environment (JRE) 1.6 for interoperability and 2007 Daylight Saving Time compliance.

The following table lists the recommended Java Runtime Environment (JRE) to use with Agile API Clients on different application servers that Agile PLM supports.

Application Server	Operating System	Required Java Version for Agile API clients
Oracle Application Server 10g	Windows 2003	Sun JRE 1.5.0
Oracle WebLogic Server 10.3	Windows 2003	Sun JRE 1.6

JVM Parameters for Preventing Out of Memory Exceptions

To prevent out of memory errors, add the following Java Virtual Memory (JVM) parameter options in the indicated locations.

Note This workaround is only applicable to single-threaded SDK programs.

- If the Client is a standalone SDK Client, add the JVM option as shown below:
`java -Ddisable.agile.sessionID.generation=true pk.sample`
- If the Client is a PX and out of memory occurs in Agile Server, add the JVM option in
`<OAS_HOME>/opmn/conf/opmn.xml`
`<category id="start-parameters">`
`<data id="java-options" value="-Xrs -server -`
`XX:MaxPermSize=256M -ms1280M -mx1280M -XX:NewSize=256M -`
`XX:MaxNewSize=256M -XX:AppendRatio=3 -`
`Doracle.xdkjava.compatibility.version=10.1.0 -`
`Djava.security.policy=$ORACLE_HOME/j2ee/home/config/java2.policy -`
`Dagile.log.dir=$ORACLE_HOME/j2ee/home/log -`
`Dcom.sun.management.jmxremote -`
`Dcom.sun.management.jmxremote.port=9899 -`
`Dcom.sun.management.jmxremote.authenticate=false -`


```
Dcom.sun.management.jmxremote.ssl=false -Djava.awt.headless=true -
Dhttp.webdir.enable=false -Duser.timezone=GMT -
Ddisable.agile.sessionID.generation=true"/>
  <data id="oc4j-options" value="-verbosity 10 -
userThreads"/>
</category>
```

- If the Client is a URL PX, add the following JVM option in the Server Start up (similar to `catalina.bat` in Tomcat):

```
-Ddisable.agile.sessionID.generation=true
```

Agile SDK Installation Folders

The Agile SDK files use the following folder structure on your computer:

`lib` – The `\agile_home\integration\sdk\lib` folder contains the following libraries:

Important Do not include the `axis.jar` file and `AgileAPI.jar` file in the same `classpath`. The SDK classpath does not support this setting and the SDK will not function properly.

- `AgileAPI.jar` – Agile API library, which contains Agile API classes and interfaces
- `axis.jar` – An Oracle-modified version of the Apache Axis library required for Web service Clients
- `pxapi.jar` – PX API library, which contains interfaces used to develop custom autonumber sources and custom actions

Checking Your Agile PLM System

Before trying to run the Agile SDK Clients on your Agile PLM system, make sure the system is configured and working properly. In particular, make sure the HTTP ports for your application server are set correctly. For more information, refer to the *Agile PLM Installation Guide*.

Agile PLM Business Objects

With any enterprise software system, you work with business objects to manage the company's data. The following table lists the Agile PLM business objects and their related Agile API interfaces.

Object	Related Agile API Interface
Changes	<code>IChange</code>
Customers	<code>ICustomer</code>
Declarations	<code>IDeclaration</code>
Design	<code>IDesign</code>
Discussions	<code>IDiscussion</code>
File Folders	<code>IFileFolder</code>

Object	Related Agile API Interface
Items	IItem
Manufacturer parts	IManufacturerPart
Manufacturers	IManufacturer
Packages	IPackage
Part Groups (Commodity or Part Family)	ICommodity
Prices	IPrice
Product Service Request	IServiceRequest
Projects	IProgram
Sourcing Project	IProject
Quality Change Request	IQualityChangeRequest
Reports	IProductReport
Requests for Quote (RFQ)	IRequestForQuote
RFQ Responses	ISupplierResponse*
Sites	IManufacturingSite
Specifications	ISpecification
Substances	ISubstance
Suppliers	ISupplier
Transfer Order	ITransferOrder
User Groups	IUserGroup
Users	IUser

* Agile does not support the API interfaces in the current release of the software.

The business objects that you can view and actions that you can perform on these objects are determined by the server components installed on your Agile Application Server and the roles, and assigned privileges. Privilege levels can vary from field to field. In addition to Users and User Groups, Agile PLM administrators work with administrative objects, such as administrative nodes and Agile PLM classes.

Note Not all Agile PLM business objects are exposed in the Agile API. For example, some Report objects are not accessible via the Agile API.

Getting Started with Agile API

This chapter includes the following:

- Agile API Overview..... 7
- Starting an Agile API Program..... 10
- Loading and Creating Agile PLM Objects..... 14

Agile API Overview

This section provides an overview of the functionality provided by the Agile API. Topics covered include:

- Types of Agile API classes and interfaces
- Loading Agile API classes
- How the Agile API is thread-safe
- Packaging your Agile API applications
- Finding the sample programs

Types of Agile API Classes and Interfaces

The Agile API contains several different classes and interfaces in the `AgileAPI.jar` library. These files are further classified into the following groups according to functions that they support:

- **Aggregate interfaces** – These interfaces aggregate the applicable functional interfaces for a particular object type. For example, the `IItem` interface extends `IDataObject`, `IRevised`, `IManufacturingSiteSelectable`, `IAttachmentContainer`, `IHistoryManager`, and `IReferenced`. Most SDK functionalities fall within these interfaces. The Agile API's underlying implementation classes, which are not exposed, implement these interfaces.
- **Functional Unit Interfaces** – These interfaces hold units of functionality that are extended to other interfaces. For example, `IAttachmentContainer` provides a convenient way to access the attachments table for any object. Other interfaces in this group such as `IChange` and `IItem` extend the `IAttachmentContainer` interface. `IRoutable` is another class that serves as a functional unit; it provides methods for any object that you can route to another Agile PLM user; `IChange`, `IPackage`, and `ITransferOrder` all extend `IRoutable`.
- **Metadata interfaces** – This group of classes defines the metadata (and meta-metadata) for the Agile Application Server. Metadata is simply data that describes other data. The metadata interfaces include classes such as `I AgileClass`, `INode`, `IRoutableDesc`, `ITableDesc`, and `IWorkflow`.

- **Factory classes** – `AgileSessionFactory` is a factory class that is used to create a session (`IAgileSession`) and access transaction management. `IAgileSession` is also a factory object allowing you to instantiate other objects. Many Agile API objects, in turn, are factory objects for tables or other referenced objects. Tables, in turn, are factories for rows.
- **Exception classes** – There's only one Exception class, `APIException`.
- **Constants** – These classes contain IDs for attributes, tables, classes, and so on. All classes containing only constants have class names that end with "Constants," for example, `ChangeConstants`, `ItemConstants`, `UserConstants`, and so on.

Network Class Loading

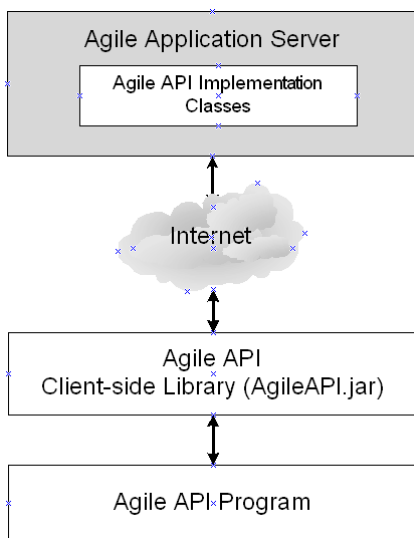
The Agile API has two main software components:

- Client-side library, `AgileAPI.jar`
- Server-side implementation classes

The server-side implementation classes are installed automatically with every instance of the Agile Application Server.

The Agile API Client-side library is composed almost entirely of interfaces; it's essentially a class loader. When you run an Agile API program, it connects to the Agile Application Server and automatically downloads whatever implementation classes it needs. For example, if your program uses methods of `IItem`, it downloads an implementation of `IItem` at run time.

Figure 2: Agile API architecture



Network class loading provides many benefits, including the ability to update client implementation classes by automatically downloading them from a server. Any Agile API classes that are downloaded from the server are automatically cached to a local disk. When an Agile API program needs to load a particular class, it retrieves it from the cache rather than downloading it again from the network. The cache results in faster loading of classes and reduced network load.

If the network class loader detects that its cache is stale, that is, its classes are older than the classes on the server, it invalidates the cache and reloads the necessary classes from the server. This allows you to update Agile SDK Clients to use the latest implementation classes without redeploying applications throughout the enterprise.

Single-Threaded versus Multi-Threaded Applications

The Agile API has been certified thread-compatible. It can be used for both Single-Threaded and Multi-Threaded application development. You can safely use Agile API calls concurrently, by surrounding each method invocation (or sequence of method invocations) with external synchronization.

Packaging an Agile API Program

After you develop a program that makes calls to the Agile API, you'll need to package its files so that you or other users can install it. Many development environments include tools for packaging and deploying applications.

You can also choose to package your program manually. If you choose to do this, you'll need to know the dependencies your project has. Again, many development environments include tools for generating dependency files. A dependency file lists the runtime components that must be distributed with your program's project files.

Distributing Agile API Files

You can freely distribute any Java applications or applets that you create that make calls to the Agile API. You can include the Agile API library, `AgileAPI.jar`, when you package your application's files.

Your development environment may require you to distribute other class files or libraries with your program. Check the documentation for your development environment to see which runtime files you must distribute with your program. Consult the applicable license agreement of the manufacturer for each of the files you plan to distribute to determine whether you are authorized to distribute the files with your application.

Sample Programs

The Agile SDK provides several sample programs that demonstrate how to use its APIs. These sample programs are in the `api`, `dx`, `px`, and `wsx` folders. You can find them in the `SDK_samples` (ZIP file). To access this file, see the Note in [Client-Side Components](#) on page 2.

Each sample program has its own `Readme.txt` file. Be sure to review the `Readme.txt` document before trying to run a sample program.

Starting an Agile API Program

When you create a program using the Agile API, follow this general approach for structuring your program:

1. At the top of each class file, add an import statement to import Agile API classes:

```
import com.agile.api.*;
```
2. Get an instance of the Agile Application Server.
3. Create an Agile session.
4. Complete one or more business processes. This is where most of your program code goes.
5. Close the Agile session.

Setting the Class Path for the Agile API Library

When Java looks for a class referenced in your source, it checks the directories specified in the CLASSPATH variable. To create Agile API programs, you must include `AgileAPI.jar` in the class path.

If you are using a Java development environment, you usually can modify the class path for each project. If you don't let your development environment know where the Agile API library is located, it is not able to build the application.

Importing Agile API Classes

The only Java package your program has access to automatically is `java.lang`. To refer to Agile API classes, you should import the `com.agile.api` package at the beginning of each class file:

```
import com.agile.api.*;
```

Rather than importing the `com.agile.api` package, you can also refer to Agile API classes by their full package name, for example:

```
com.agile.api.IItem source =  
(com.agile.api.IItem)m_session.getObject(com.agile.api.IItem.OBJECT_TYP  
E, "1000-02");
```

As you can see, if you don't import the `com.agile.api` package, it's cumbersome to type the full package name whenever you refer to one of its classes. Also, when you don't import the `com.agile.api` package, or reference the Agile API classes by full package name, the Java compiler will return an error when you try to build your program.

Creating a Session and Logging In

Note Use the JVM parameter called `disable.agile.sessionID.generation=true` to create a session when the login user is a LDAP user. This is applicable only when Agile runs on Weblogic server. If the Client is a standalone SDK Client, add the JVM option `java -Ddisable.agile.sessionID.generation=true pk.sample`. Alternatively you can set the parameter in the code as follows:

```
System.setProperty("disable.agile.sessionID.generation", "true");
HashMap params = new HashMap();
params.put(AgileSessionFactory.USERNAME, USERNAME);
params.put(AgileSessionFactory.PASSWORD, PASSWORD);
AgileSessionFactory factory =
AgileSessionFactory.getInstance(URL);
IagileSession session = factory.createSession(params);
```

To start an Agile API program, you must complete the following two tasks:

1. Get an instance of the Agile Application Server.

Use the `AgileSessionFactory.getInstance()` method to get an instance of the Agile server. You must specify a connection URL for the server. The URL you specify depends on whether you connect directly to the Agile server or through a proxy Web server.

- To connect directly to the Agile server, type this URL: <http://appserver:port/virtualPath>
- To connect to the Agile server through a proxy Web server, type this URL: `protocol://webserver:port/virtualPath`

where

- *appserver* is the name of the Agile server computer.
- *webserver* is the name of the Web server computer.
- *virtualPath* is the virtual path for your Agile PLM server. The default value is `Agile`. The virtual path is specified when the Agile PLM system is installed. For more information, refer to the *Agile PLM Installation Guide*.
- *protocol* is either HTTP or HTTPS.
- *port* is the port number used for the specified protocol. The port is needed only if a nonstandard port number is being used. Otherwise, you can omit it.

2. Create a session for the Agile PLM server instance.

Use the `AgileSessionFactory.createSession()` method to create a session. For the `params` parameter of `createSession()`, specify a `Map` object containing the login parameters (username and password).

The following example shows how an Agile API program creates a session and logs into the Agile PLM server.

Example: Creating a session and logging in

```
private IAgileSession login(String username, String password) throws
APIException {
//Create the params variable to hold login parameters
HashMap params = new HashMap();
//Put username and password values into params
```

```
    params.put(AgileSessionFactory.USERNAME, username);
    params.put(AgileSessionFactory.PASSWORD, password);
    //Get an Agile server instance. ("agileserver" is the name of the Agile
    proxy server,
    and "virtualPath" is the name of the virtual path used for the Agile
    system.)
    AgileSessionFactory instance =
    AgileSessionFactory.getInstance
    ("http://<agileserver>/<virtualPath>");
    //Create the Agile PLM session and log in
    return instance.createSession(params);
}
```

Your Oracle Agile PLM agreement determines the maximum number of concurrent open sessions to the Agile Application Server per user account. If you exceed this maximum number, the server prevents you from logging in. Therefore, it is important to use the `IAgileSession.close()` method to properly log out and close a session when your program is finished running. If the Agile PLM system is hosted on Oracle Application Servers, you are limited to only one session per thread.

Creating a Session by Accessing a Password Protected URL

To provide additional security for users accessing Agile PLM across a firewall, the proxy server may have a password-protected URL. If so, the normal method of obtaining a server instance and then creating a session will not work. Instead, you must use the `AgileSessionFactory.createSessionEx()` method to specify the username, password, and URL parameters needed to log in. The login code is simpler if you use `createSessionEx()` because you don't need to call the method `AgileSessionFactory.getInstance()` first to obtain a server instance. The `createSessionEx()` method obtains the server instance and creates the session in one call as shown in the following example.

Example: Creating a session by accessing a password-controlled URL

```
private IAgileSession securelogin(String username, String password)
throws APIException {
    //Create the params variable to hold login parameters
    HashMap params = new HashMap();
    //Put username, password, and URL values into params
    params.put(AgileSessionFactory.USERNAME, username);
    params.put(AgileSessionFactory.PASSWORD, password);
    params.put(AgileSessionFactory.URL,
    "http://agileserver.agilesoft.com/Agile");
    //Create the Agile PLM session and log in
    return AgileSessionFactory.createSessionEx(params);
}
```

The `createSessionEx()` method also works for URLs that are not password-protected, so you can use it instead of `createSession()` if you prefer.

Creating a Session from an Agile Web Service

If you developed a web service using web service extensions and deployed it in the same container as Agile PLM, you can take advantage of the Agile API to access Agile PLM server functionality from within the web service. To get an Agile PLM server instance for your web service, use the `AgileSessionFactory.getInstance()` method, but pass a `null` value for the `url` parameter.

Once you have retrieved an `AgileSessionFactory` object, you can also create a session. The web service request provides user authentication, so you don't need to specify a username or password when you create an Agile API session. Therefore, make sure you specify a `null` value for the `params` parameter of `AgileSessionFactory.createSession()`.

```
AgileSessionFactory factory = AgileSessionFactory.getInstance(null);
IAgileSession session = factory.createSession(null);
```

If you pass a `null` value for the `params` parameter of `createSession()`, the user authentication that took place when the Agile PLM server intercepted the web service request is reused for the Agile API session. You don't need to log in again. Do not attempt to close the session using `IAgileSession.close()`; the authorization handler will automatically close the session.

Specifying a `null` parameter for the `createSession()` method creates an `IAgileSession` corresponding to the session created by the authorization handler. If your web service doesn't use the authorization handler, or if you want to create a session for a different user than the one used for the authorization handler, you can still use `createSession(params)` to create a session. For the `params` parameter, specify a `Map` object containing the login parameters (username and password). If you don't use the authorization handler to create a session, you are responsible for closing it. Call the `IAgileSession.close()` method to close the session. For more information about web service extensions, see *Developing Web Service Extensions*.

Creating a Session in a Cluster Environment

The `AgileSessionFactory.getInstance()` and `AgileSessionFactory.createSession()` that you use to create an instance of the `AgileSessionFactory`, cache the Agile server properties to get the instance. Because of this caching, the `getInstance()` method retrieves the same instance of `AgileSessionFactory` anytime it is invoked.

While retrieving the same instance of `AgileSessionFactory` is not an issue in single server environments, it can be problematic in Agile cluster environments when the cached server is down. This is due to the following facts:

1. When `AgileSessionFactory` is initiated with a proxy URL, a specific server in the cluster is cached and is used to create the session.
2. When the cached server is down, `AgileSessionFactory.createSession()` will try to establish a connection with the server, but will fail because the server is down.

To overcome this issue, the Agile SDK exposes the following APIs to refresh the `AgileSessionFactory` instance for Agile cluster environments. These new APIs clear the cached server details and create a new instance of the `AgileSessionFactory`.

- `AgileSessionFactory.refreshInstance(String url)`
- `AgileSessionFactory.refreshInstanceEx(Map params)`
- `AgileSessionFactory.refreshSessionEx(Map params)`

The following examples use these APIs to create Agile sessions in cluster environments

Example: Creating a session with public static `AgileSessionFactory.refreshInstance(String url)`

```
AgileSessionFactory factory =
AgileSessionFactory.refreshInstance(URL);
HashMap params = new HashMap();
params.put(AgileSessionFactory.USERNAME, USERNAME);
params.put(AgileSessionFactory.PASSWORD, PASSWORD);
IAgileSession lsession = factory.createSession(params);
```

Example: Creating a session with public static `AgileSessionFactory.refreshInstanceEx(Map map)`

```
HashMap params = new HashMap();
params.put(AgileSessionFactory.URL, URL);
params.put(AgileSessionFactory.USERNAME, USERNAME);
params.put(AgileSessionFactory.PASSWORD, PASSWORD);
AgileSessionFactory factory =
AgileSessionFactory.refreshInstanceEx(params);
IAgileSession lsession = factory.createSession(params);
```

Example: Creating a session with public static `IAgileSession.refreshSessionEx(Map params)`

```
HashMap params = new HashMap();
params.put(AgileSessionFactory.URL, URL);
params.put(AgileSessionFactory.USERNAME, USERNAME);
params.put(AgileSessionFactory.PASSWORD, PASSWORD);
IAgileSession lsession =
AgileSessionFactory.refreshSessionEx(params);
```

Loading and Creating Agile PLM Objects

With every Agile API program, a basic requirement is the ability to get and create objects. The following interfaces map to objects that you can work with in the Agile API:

- `IChange`
- `ICommodity`
- `ICustomer`
- `IDeclaration`
- `IDesign`
- `IDiscussion`
- `IFileFolder`
- `IFolder`
- `IItem`
- `IManufacturer`
- `IManufacturerPart`
- `IManufacturingSite`
- `IPackage`
- `IPrice`
- `IProgram`
- `IProject`
- `IQualityChangeRequest`
- `IQuery`
- `IRequestForQuote`
- `IServiceRequest`
- `ISpecification`
- `ISubstance`
- `ISupplier`
- `ISupplierResponse`
- `ITransferOrder`
- `IUser`
- `IUserGroup`

To load and create these Agile PLM objects, you must first get an instance of the `AgileSessionFactory` object and then create an Agile PLM session. Then use `IAgileSession.getObject()` to load Agile PLM objects and `IAgileSession.createObject()` to create objects.

For more information about creating queries and folders, see [Creating and Loading Queries](#) on page 35 and [Working with Folders](#) on page 101.

Loading Objects

To load an Agile PLM object, use one of the `IAgileSession.getObject()` methods.

- `IAgileObject getObject(Object objectType, Object params)`
- `IAgileObject getObject(int objectType, Object params)`

Note If not specified by the user, objects will always load according to their base class which are derived from the subclass or class. Objects will also load correctly when the object's derived base class is correct. However, the SDK will load an object even if an invalid subclass is passed for that object when the derived base class of the invalid class and that of the object are both the same.

Specifying Object Types

The two `getObject()` methods let you specify the `objectType` parameter using these values:

- An `IAgileClass` instance that represents one of the Agile PLM classes.
- A class ID (for example, `ItemConstants.CLASS_PART` corresponds to the Part class). Predefined class IDs are available in the various `*Constants` files provided with the Agile API.
- An `OBJECT_TYPE` constant, such as `IItem.OBJECT_TYPE` or `IChange.OBJECT_TYPE`
- A class name (for example, "Part"). However, Oracle does not recommend using class names to instantiate objects because the class names can be modified and are not guaranteed to be unique.

Note When you use the `getObject()` method to load an object, you can specify abstract or concrete Agile PLM classes. For more information, see [Concrete and Abstract Classes](#) on page 338.

Specifying Object Parameters

The `params` parameter for the `getObject()` method can be a `Map` or `String`. If you specify a `Map` object for the `params` parameter, it must contain attributes (either attribute IDs or `IAttribute` objects) and their corresponding values. The `Map` must contain all identification related information. For example, when you load an `IManufacturerPart`, both the Manufacturer Name and Manufacturer Part Number must be specified.

If the `Map` object you specify for the `params` parameter contains additional attributes other than the identifying information, those attributes are ignored. The server uses only identifying information to retrieve an object. For a complete list of attributes used to uniquely identify Agile PLM objects, see

"Identifying Attributes for Agile PLM Classes" in *SDK Developer Guide - Developing PLM Extensions*.

This example shows how to load part 1000-02 using a `Map` parameter that specifies the attribute (`ItemConstants.ATT_TITLE_BLOCK_NUMBER`) and a value.

Example: Loading a part using a Map

```
try {
    Map params = new HashMap();
    params.put (ItemConstants.ATT_TITLE_BLOCK_NUMBER,
        "1000-02");
    IItem item = (IItem)m_session.getObject (ItemConstants.CLASS_PART,
        params);
} catch (APIException ex) {
    System.out.println(ex);
}
```

If the object you're loading has a single attribute that serves as a unique identifier, you can enter the `String` value for that attribute as the `params` parameter. For example, the unique identifier for a part is a part number. Therefore, you can enter the part number as the parameter to load the object.

Note Not all objects have one attribute that serves as a unique identifier. For example, a manufacturer part is identified by both its manufacturer name and manufacturer part number. Therefore, to load a manufacturer part you must specify values for at least those two attributes.

This example shows how to load part 1000-02 by specifying a unique `String` identifier.

Example: Loading a part using a String

```
try {
    IItem item = (IItem)m_session.getObject (ItemConstants.CLASS_PART,
        "1000-02");
} catch (APIException ex) {
    System.out.println(ex);
}
```

Loading Different Types of Objects

The following example shows how to load different types of Agile PLM objects.

```
try {
    //Load a change
    IChange change = (IChange)m_session.getObject (IChange.OBJECT_TYPE,
        "C00002");
    System.out.println("Change : " + change.getName());
    //Load a commodity
    ICommodity comm =
    (ICommodity)m_session.getObject (ICommodity.OBJECT_TYPE, "Res");
    System.out.println("Commodity : " + comm.getName());
    //Load a customer
    ICustomer cust =
    (ICustomer)m_session.getObject (ICustomer.OBJECT_TYPE,
        "CUST00006");
}
```

```

        System.out.println("Customer : " + cust.getName());
//Load a declaration
IDeclaration dec =
    (IDeclaration)m_session.getObject(IDeclaration.OBJECT_TYPE,
        "MD00001");
    System.out.println("Declaration : " + dec.getName());
//Load a discussion
IDiscussion discussion =
    (IDiscussion)m_session.getObject(IDiscussion.OBJECT_TYPE,
        "D00002");
    System.out.println("Discussion : " + discussion.getName());
//Load a file folder
IFileFolder ff =
    (IFileFolder)m_session.getObject(IFileFolder.OBJECT_TYPE,
        "FOLDER00133");
    System.out.println("File Folder : " + ff.getName());
//Load a folder
IFolder folder =
    (IFolder)m_session.getObject(IFolder.OBJECT_TYPE, "/Personal
Searches/MyTemporaryQueries");
    System.out.println("Folder : " + folder.getName());
//Load an item
IItem item = (IItem)m_session.getObject(IItem.OBJECT_TYPE, "1000-
    02");
    System.out.println("Item : " + item.getName());
//Load a manufacturer
Map params = new HashMap();
params.put(ManufacturerConstants.ATT_GENERAL_INFO_NAME, "World
    Enterprises");
IManufacturer mfr =
    (IManufacturer)m_session.getObject(IManufacturer.OBJECT_TYPE,
        params);
    System.out.println("Manufacturer : " + mfr.getName());
//Load a manufacturer part
params.clear();
params.put(ManufacturerPartConstants.ATT_GENERAL_INFO_MANUFACTURE
    R_NAME, "World Enterprises");
params.put(ManufacturerPartConstants.ATT_GENERAL_INFO_MANUFACTURE
    R_PART_NUMBER, "WE10023-45");
IManufacturerPart mfrPart =
    (IManufacturerPart)m_session.getObject(IManufacturerPart.OBJECT_T
        YPE, params); System.out.println("ManufacturerPart : " +
        mfrPart.getName());
//Load a manufacturing site
IManufacturingSite siteHK =
    (IManufacturingSite)m_session.getObject(ManufacturingSiteConstant
        s.CLASS_SITE, "Hong Kong");
    System.out.println("ManufacturingSite : " + siteHK.getName());
//Load a package
IPackage pkg =
    (IPackage)m_session.getObject(PackageConstants.CLASS_PACKAGE,
        "PKG00010");
    System.out.println("Package : " + pkg.getName());

```

```
//Load a price
IPrice price =
    (IPrice)m_session.getObject(IPrice.OBJECT_TYPE, "PRICE10008");
System.out.println("Price : " + price.getName());
//Load a program
IProgram program =
    (IProgram)m_session.getObject(IProgram.OBJECT_TYPE, "PGM10008");
System.out.println("Program : " + program.getName());
//Load a PSR
IServiceRequest psr =
    (IServiceRequest)m_session.getObject(IServiceRequest.OBJECT_TYPE,
    "NCR01562");
System.out.println("PSR : " + psr.getName());
//Load a QCR
IQualityChangeRequest qcr =
    (IQualityChangeRequest)m_session.getObject(IQualityChangeRequest.
    OBJECT_TYPE, "CAPA02021");
System.out.println("QCR : " + qcr.getName());
//Load a query
IQuery query =
    (IQuery)m_session.getObject(IQuery.OBJECT_TYPE,
    "/Personal Searches/Part Numbers Starting with P");
System.out.println("Query : " + query.getName());
//Load an RFQ
IRequestForQuote rfq =
    (IRequestForQuote)m_session.getObject(IRequestForQuote.OBJECT_TYPE,
    "RFQ01048");
System.out.println("RFQ : " + rfq.getName());
//Load an RFQ response
params.clear();
params.put(SupplierResponseConstants.ATT_COVERPAGE_RFQ_NUMBER,
"RFQ01048");
params.put(SupplierResponseConstants.ATT_COVERPAGE_SUPPLIER,
"SUP20013");
ISupplierResponse rfqResp =
    (ISupplierResponse)m_session.getObject(ISupplierResponse.OBJECT_TYPE
    , params);
System.out.println("RFQ Response : " + rfqResp.getName());
//Load Sourcing Projects
IProject prj =
    (IProject)m_session.getObject(IProject.OBJECT_TYPE, "PRJACME_110");
System.out.println("Project : " + prj.getName());
//Load a specification
ISpecification spec =
    (ISpecification)m_session.getObject(ISpecification.OBJECT_TYPE,
    "WEEE");
System.out.println("Specification : " + spec.getName());
```

```

//Load a substance
ISubstance sub =
    (ISubstance)m_session.getObject(ISubstance.OBJECT_TYPE, "Cadmium");
System.out.println("Substance : " + sub.getName());
//Load a supplier
ISupplier supplier =
    (ISupplier)m_session.getObject(ISupplier.OBJECT_TYPE, "SUP20013");
System.out.println("Supplier : " + supplier.getName());
//Load a transfer order
ITransferOrder to =
    (ITransferOrder)m_session.getObject(TransferOrderConstants.CLASS_CTO
        , "456602");
System.out.println("TransferOrder : " + to.getName());
//Load a user
params.clear();
params.put(UserConstants.ATT_GENERAL_INFO_USER_ID, "OWELLES");
IUser user =
    (IUser)m_session.getObject(IUser.OBJECT_TYPE, params);
System.out.println("User : " + user.getName());
//Load a user group
params.clear();
params.put(UserGroupConstants.ATT_GENERAL_INFO_NAME, "Designers");
IUserGroup group =
    (IUserGroup)m_session.getObject(IUserGroup.OBJECT_TYPE, params);
System.out.println("UserGroup : " + group.getName());
} catch (APIException ex) {
    System.out.println(ex);
}
}

```

Creating Objects

To create an Agile PLM object, use one of the `IAgileSession.createObject()` methods:

- `IAgileObject createObject(Object objectType, Object params)`
- `IAgileObject createObject(int objectType, Object params)`

Note The SDK does not support setting the Lifecycle Phase (LCP)/Workflow status attribute of an object while you are creating that object. The reason is that the necessary settings for LCP are not available until after the object is created. The same is also applicable in the UI. For example, `IChange` will not get Workflow status values until a Workflow is selected. However, you can use the SDK to create objects, and then set and modify the LCP/Workflow status attribute. Also, you cannot get a list of values for this field, until the object is created, and the relevant actions are performed on the object.

The `objectType` and `params` parameters are identical to those used in the `IAgileSession.getObject()` methods; for more information, see [Loading Objects](#) on page 15. Except for `IFolder` and `IQuery` objects, you must specify a concrete class for the `objectType` parameter. For example, if you are creating a part, you can't specify

`ItemConstants.CLASS_PARTS_CLASS` because that class is an abstract class that can't be instantiated. However, you can specify the class ID of any predefined or user-defined concrete class, such as `ItemConstants.CLASS_PART`.

If you are creating an object of a user-defined subclass, the `objectType` parameter of `createObject()` should be an `Integer` object corresponding to the subclass ID.

In addition to a `Map` or `String` type, the `params` parameter for `I AgileSession.createObject()` can also be an `INode` object representing an autonumber source for the particular object class. The Agile Application Server queries the autonumber source for the next number in its sequence, and that number is used as the unique identifier.

Note You cannot specify an `INode` object for the `params` parameter for objects that don't have their autonumber sources available.

The following example shows how to create part 1000-02 using a `Map` parameter that specifies an attribute (`ItemConstants.ATT_TITLE_BLOCK_NUMBER`) and a value.

Example: Creating a part using a Map

```
try {
    Map params = new HashMap();
    params.put(ItemConstants.ATT_TITLE_BLOCK_NUMBER, "1000-02");
    IItem item = (IItem)m_session.createObject(ItemConstants.CLASS_PART,
        params);
} catch (APIException ex) {
    System.out.println(ex);
}
```

The following example shows how to create part 1000-02 by specifying a unique `String` identifier.

Example: Creating a part using a String

```
try {
    IItem item = (IItem)m_session.createObject(ItemConstants.CLASS_PART,
        "1000-02");
} catch (APIException ex) {
    System.out.println(ex);
}
```

Working with Agile PLM Classes

Because classes are customized for each Agile Application Server, you should avoid hard-coding references to class names, particularly if your program is going to be used on multiple Agile Application Servers or in different locales. Instead, you can retrieve the classes for each object type at run time. Your program can then provide a user interface to allow the user to select a class from the list.

The following example shows how to retrieve the list of classes for a particular object type at run time.

Example: Getting classes

```
try {
    // Get the IAdmin interface for this session
    IAdmin m_admin = session.getAdminInstance();
```



```

// Get the Item base class
IAgileClass itemClass =
    m_admin.getAgileClass(ItemConstants.CLASS_ITEM_BASE_CLASS);
// Get the Item subclass names
IAgileClass[] subclasses = itemClass.getSubclasses();
for (int i = 0; i < subclasses.length; ++i) {
    String listSubclasses = subclasses[i].getName();
    System.out.println(listSubclasses);
}
} catch (APIException ex) {
    System.out.println(ex);
}
}

```

Creating Objects of User-Defined Subclasses

User-defined subclasses are classes created specifically for your Agile PLM system. Consequently, the Agile API doesn't provide predefined class ID constants for them. To specify a user-defined subclass for the `objectType` parameter of `createObject()`, pass an Integer corresponding to the class ID. To get the class ID for a user-defined class, use the `IAgileClass.getId()` method.

The following example shows how to create a Resistor object. In this example, Resistor is a user-defined subclass of the Parts class.

Example: Creating an object of a user-defined subclass

```

try {
//Define a variable for the Resistor subclass
    Integer classResistor = null;
//Get the Resistor subclass ID
IAgileClass[] classes =
    m_admin.getAgileClasses(IAdmin.CONCRETE);
for (int i = 0; i < classes.length; i++) {
    if (classes[i].getName().equals("Resistor")) {
        classResistor = (Integer)classes[i].getId();
        break;
    }
}
//Create a Resistor object
if (classResistor != null) {
IItem resistor =
    (IItem)m_session.createObject(classResistor, "R10245");
}
} catch (APIException ex) {
    System.out.println(ex);
}
}

```

Of course, you can also reference a user-defined subclass by name, as in the following example. However, class names are not necessarily unique. If there are two subclasses with the same name, the Agile API matches the first one found, which may not be the one you intended.

```
Creating an object by referencing the subclass name //Creating an
object by referencing the subclass name try { IItem resistor =
(IItem)m_session.createObject("Resistor", "R10245");
} catch (APIException ex) {
System.out.println(ex);
}
```

Using AutoNumbers

An Agile PLM class can have one or more `AutoNumber` sources. An `AutoNumber` source is a predefined sequence of numbers that automatically number an object. `AutoNumber` sources are defined in the administrative functionality of Agile Java Client.

Note The Manufacturers and Manufacturer Parts classes, and their user-defined subclasses, do not support automatic numbering.

You must configure your Agile Application to use `AutoNumber` when you create an object of a particular class. However, the Agile API does not enforce automatic numbering of objects, even when it is required for a particular class. If your environment requires this capability, you must develop the necessary routine. Thus, if you develop a GUI program that allows users to create Agile PLM objects, make sure the user interface enforces automatic numbering when it is required. For an example of how a client program enforces automatic numbering, create a few objects using Agile Web Client and note how the user interface works.

To get the next available AutoNumber in the sequence:

Use the `IAutoNumber.getNextNumber(IAgileClass)` method to assign the next available `AutoNumber` in the sequence. This method will check to ensure the number is not used by another object. It will continue this process until it finds and returns the first available `AutoNumber` for the specified Agile subclass. This method will throw an exception if it fails to get the next available `AutoNumber`. The `IAutoNumber.getNextNumber()` method will not check and skip if the number is already used by another object.

The following example shows how to create a part using the next `AutoNumber`.

Example: Getting the next available AutoNumber

```
private void createPart(String partNumber) throw APIException {
    IAdmin admin;
    IAgileClass cls;
    IItem part;
    IAutoNumber[] numSources;
    String nextAvailableAutoNumber;

    //Get the Admin instance
    admin = session.getAdminInstance();
    //Get the Part class
    cls = admin.getAgileClass(ItemConstants.CLASS_PART);
    //Check if AutoNumber is required
    if (isAutoNumberRequired(cls)) {
    // Get AutoNumber sources for the Part class
        numSources = cls.getAutoNumberSources();
```

```

// Get the next available AutoNumber using the first autonumber source
    nextAvailableAutoNumber = numSources[0].getNextNumber(cls);
// Create the part using the available AutoNumber
part =
    (IItem)session.createObject(ItemConstants.CLASS_PART,
        nextAvailableAutoNumber);
} else {
// Create the part using the specified number
// (if AutoNumber is not required)
part = (IItem)session.createObject(ItemConstants.CLASS_PART,
    partNumber);
}
public boolean isAutoNumberRequired(IAgileClass cls) throws
APIException {
    if (cls.isAbstract()) {
        return false;
    }
    IProperty p =
    ((INode)cls).getProperty(PropertyConstants.PROP_AUTONUMBER_REQUIRED);
    if (p != null) {
        IAgileList value = (IAgileList)p.getValue();
        return ((Integer)(value.getSelection()[0]).getId()).intValue() ==
1;
    }
    return false;
}

```

Setting the Required Fields

A class can be defined with several required attributes. To make a particular attribute mandatory, the Agile PLM administrator sets the Visible and Required properties for the attribute to Yes. If you try to create an object in Agile Java Client or Agile Web Client without completing the required fields, the Client does not allow you to save the object until you set the values for all required fields.

Although the Agile PLM administrator can define whether an attribute is required for a class, the Agile API doesn't automatically enforce required fields when you set values. Consequently, you can use the API to create and save an object even if values aren't set for all required fields. If you want to enforce required fields in your Client program and make them behave the way they do in Agile Web and Java Clients, you have to write that code.

To check for required fields:

1. Call `ITable.getAttributes()` or `ITableDesc.getAttributes()` to get the list of attributes for a table.
2. For each attribute, call `IAttribute.getProperty(PropertyConstants.PROP_REQUIRED).getValue()` to get the value for the Required property.

The following example shows how to get the array of required attributes for Page One, Page Two, and Page Three for a class.

Example: Getting required attributes for a class

```
/**
 * Returns true if the specified attribute is required and visible.
 */
public boolean isRequired(IAttribute attr) throws APIException {
    boolean result = false;
    IProperty required =
attr.getProperty(PropertyConstants.PROP_REQUIRED);
    if (required != null) {
        Object value = required.getValue();
        if (value != null) {
            result = value.toString().equals("Yes");
        }
    }
    IProperty visible = attr.getProperty(PropertyConstants.PROP_VISIBLE);
    if (visible != null) {
        Object value = visible.getValue();
        if (value != null) {
            result &= value.toString().equals("Yes");
        }
    }
    return result;
}
/**
 * Returns an array containing the required attributes for the
specified class.
 */
public IAttribute[] getRequiredAttributes(IAgileClass cls) throws
APIException {
    //Create an array list for the results
    ArrayList result = new ArrayList();

    //Check if the class is abstract or concrete
    if (!cls.isAbstract()) {
        IAttribute[] attrs = null;
        //Get required attributes for Page One
        ITableDesc page1 =
cls.getTableDescriptor(TableTypeConstants.TYPE_PAGE_ONE);
        if (page1 != null) {
            attrs = page1.getAttributes();
            for (int i = 0; i < attrs.length; i++) {
                IAttribute attr = attrs[i];
                if (isRequired(attr)) {
                    result.add(attr);
                }
            }
        }
        //Get required attributes for Page Two
```

```

        ITableDesc page2 =
cls.getTableDescriptor(TableTypeConstants.TYPE_PAGE_TWO);
    if (page2 != null) {
        attrs = page1.getAttributes();
        for (int i = 0; i < attrs.length; i++) {
            IAttribute attr = attrs[i];
            if (isRequired(attr)) {
                result.add(attr);
            }
        }
    }
    //Get required attributes for Page Three
    ITableDesc page3 =
cls.getTableDescriptor(TableTypeConstants.TYPE_PAGE_THREE);
    if (page3 != null) {
        attrs = page3.getAttributes();
        for (int i = 0; i < attrs.length; i++) {
            IAttribute attr = attrs[i];
            if (isRequired(attr)) {
                result.add(attr);
            }
        }
    }
    }
    return (IAttribute[])result.toArray(new IAttribute[0]);
}

```

Note Primary key fields that are used to create an object are required regardless of the setting for the Required property. For example, for items the [Title Block.Number] field must be specified to create a new item regardless whether the field is required.

Creating Different Types of Objects

The following example shows several different ways to create various types of Agile PLM objects. To simplify the code, AutoNumbers are not used.

Example: Creating different types of objects

```

try {
    //Create a Map object to store parameters
    Map params = new HashMap();
    //Create a change
    IChange eco =
        (IChange)m_session.createObject(ChangeConstants.CLASS_ECO,
            "C00002");
    System.out.println("Change : " + eco.getName());
    //Create a commodity
    ICommodity comm =
        (ICommodity)m_session.createObject(CommodityConstants.CLASS_COMMODIT
            Y, "RES");
}

```

```
    System.out.println("Commodity : " + comm.getName());
//Create a customer
params.clear();
params.put(CustomerConstants.ATT_GENERAL_INFO_CUSTOMER_NUMBER,
"CUST00006");
params.put(CustomerConstants.ATT_GENERAL_INFO_CUSTOMER_NAME, "Western
Widgets");
ICustomer customer =
    (ICustomer)m_session.createObject(CustomerConstants.CLASS_CUSTOMER,
        params);
    System.out.println("Customer : " + customer.getName());
//Create a declaration
params.clear();
ISupplier supplier =
    (ISupplier)m_session.getObject(ISupplier.OBJECT_TYPE, "SUP20013");
params.put(DeclarationConstants.ATT_COVER_PAGE_NAME, "MD00001");
params.put(DeclarationConstants.ATT_COVER_PAGE_SUPPLIER, supplier);
IDeclaration dec = (IDeclaration)
    m_session.createObject(DeclarationConstants.CLASS_SUBSTANCE_DECLARAT
        ION, params);
    System.out.println("Declaration : " + dec.getName());
//Create a discussion
params.clear();
params.put(DiscussionConstants.ATT_COVER_PAGE_NUMBER, "D000201");
params.put(DiscussionConstants.ATT_COVER_PAGE_SUBJECT, "Packaging
issues");
IDiscussion discussion =
    (IDiscussion)m_session.createObject(DiscussionConstants.CLASS_DISCUS
        SION, params);
    System.out.println("Discussion : " + discussion.getName());
//Create a file folder
IFileFolder ff =
    (IFileFolder)m_session.createObject(FileFolderConstants.CLASS_FILE_F
        OLDER, "FOLDER00133");
    System.out.println("File Folder : " + ff.getName());
//Create a folder
params.clear();
IFolder parentFolder =
    (IFolder)m_session.getObject(IFolder.OBJECT_TYPE, "/Personal
Searches");
params.put(FolderConstants.ATT_FOLDER_NAME, "MyTemporaryQueries");
params.put(FolderConstants.ATT_PARENT_FOLDER, parentFolder);
IFolder folder = (IFolder)m_session.createObject(IFolder.OBJECT_TYPE,
params);
System.out.println("Folder : " + folder.getName());
//Create an item
IItem part =
    (IItem)m_session.createObject(ItemConstants.CLASS_PART, "1000-02");
System.out.println("Item : " + part.getName());
```

```

//Create a manufacturer
params.put(ManufacturerConstants.ATT_GENERAL_INFO_NAME, "World
Enterprises");
IManufacturer mfr =
    (IManufacturer)m_session.createObject(ManufacturerConstants.CLASS_MA
NUFACTURER, params);
    System.out.println("Manufacturer : " + mfr.getName());
//Create a manufacturer part
params.clear();
params.put(ManufacturerPartConstants.ATT_GENERAL_INFO_MANUFACTURER_NAME
, "World Enterprises");
params.put(ManufacturerPartConstants.ATT_GENERAL_INFO_MANUFACTURER_PART
_NUMBER, "WE10023-45");
IManufacturerPart mfrPart =
    (IManufacturerPart)m_session.createObject
(ManufacturerPartConstants.CLASS_MANUFACTURER_PART, params);
System.out.println("ManufacturerPart : " + mfrPart.getName());
//Create a manufacturing site
IManufacturingSite siteHK =
    (IManufacturingSite)m_session.createObject(ManufacturingSiteConstant
s.CLASS_SITE, "Hong Kong");
    System.out.println("ManufacturingSite : " + siteHK.getName());
//Create a package
IPackage pkg =
    (IPackage)m_session.createObject(PackageConstants.CLASS_PACKAGE,
"PKG00010");
System.out.println("Package : " + pkg.getName());
//Create a price
params.clear();
params.put(PriceConstants.ATT_GENERAL_INFORMATION_NUMBER,
"PRICE10008");
params.put(PriceConstants.ATT_GENERAL_INFORMATION_CUSTOMER,
"CUST00006");
params.put(PriceConstants.ATT_GENERAL_INFORMATION_ITEM_NUMBER, "1000-
02");
params.put(PriceConstants.ATT_GENERAL_INFORMATION_ITEM_REV, "B");
params.put(PriceConstants.ATT_GENERAL_INFORMATION_PROGRAM,
"PROGRAM0023");
params.put(PriceConstants.ATT_GENERAL_INFORMATION_MANUFACTURING_SITE,
"San Jose");
params.put(PriceConstants.ATT_GENERAL_INFORMATION_SUPPLIER,
"SUP20013");
IPrice price =
    (IPrice)m_session.createObject(PriceConstants.CLASS_PUBLISHED_PRICE,
params);
    System.out.println("Price : " + price.getName());
//Create a program
DateFormat df =
    new SimpleDateFormat("MM/dd/yy");
IAttribute attr =

```

```
        m_admin.getAgileClass(ProgramConstants.CLASS_PROGRAM).getAttribute(P
        rogramConstants.ATT_GENERAL_INFO_DURATION_TYPE);
IAgileList list = attr.getAvailableValues();
list.setSelection(new Object[] {"Fixed"});
params.clear();
params.put(ProgramConstants.ATT_GENERAL_INFO_NAME, "Wingspan Program");
params.put(ProgramConstants.ATT_GENERAL_INFO_SCHEDULE_START_DATE,
df.parse("06/01/05"));
params.put(ProgramConstants.ATT_GENERAL_INFO_SCHEDULE_END_DATE,
df.parse("06/30/05"));
params.put(ProgramConstants.ATT_GENERAL_INFO_DURATION_TYPE, list);
IProgram program =
(IProgram)m_session.createObject(ProgramConstants.CLASS_PROGRAM,
params);
System.out.println("Program : " + program.getName());
//Create a PSR
IServiceRequest psr =
(IServiceRequest)m_session.createObject(ServiceRequestConstants.CLAS
S_NCR, "NCR01562");
System.out.println("PSR : " + psr.getName());
//Create a QCR
IQualityChangeRequest qcr =
(IQualityChangeRequest)m_session.createObject(
QualityChangeRequestConstants.CLASS_CAPA, "CAPA02021");
System.out.println("QCR : " + qcr.getName());
//Create a query
params.clear();
IFolder parent =
(IFolder)m_session.getObject(IFolder.OBJECT_TYPE, "/Personal
Searches");
String condition =
"[Title Block.Number] starts with 'P'";
params.put(QueryConstants.ATT_CRITERIA_CLASS,
ItemConstants.CLASS_ITEM_BASE_CLASS);
params.put(QueryConstants.ATT_CRITERIA_STRING, condition);
params.put(QueryConstants.ATT_PARENT_FOLDER, parent);
params.put(QueryConstants.ATT_QUERY_NAME, "Part Numbers Starting with
P");
IQuery query =
(IQuery)m_session.createObject(IQuery.OBJECT_TYPE, params);
System.out.println("Query : " + query.getName());
//Create a specification
ISpecification spec = (ISpecification)
m_session.createObject(SpecificationConstants.CLASS_SPECIFICATION,
"WEEE");
System.out.println("Specification : " + spec.getName());
//Create a substance
ISubstance sub =
(ISubstance)m_session.createObject(SubstanceConstants.CLASS_SUBSTANC
E, "Cadmium");
```



```

    System.out.println("Substance : " + spec.getName());
//Create a transfer order
ITransferOrder to =
    (ITransferOrder)m_session.createObject(TransferOrderConstants.CLASS_
        CTO, "456602");
    System.out.println("TransferOrder : " + to.getName());
//Create a user
params.clear();
params.put(UserConstants.ATT_GENERAL_INFO_USER_ID, "OWELLES");
params.put(UserConstants.ATT_LOGIN_PASSWORD, "agile");
IUser user =
    (IUser)m_session.createObject(UserConstants.CLASS_USER, params);
    System.out.println("User : " + user.getName());
//Create a user group
params.clear();
params.put(UserGroupConstants.ATT_GENERAL_INFO_NAME, "Designers");
IUserGroup group =
    (IUserGroup)m_session.createObject(UserGroupConstants.CLASS_USER_GRO
        UP, params);
System.out.println("UserGroup : " + group.getName());
} catch (APIException ex) {
    System.out.println(ex);
}
}

```

Note You cannot use the Agile API to create a SupplierResponse.

Checking the State of Agile PLM Objects

The `IStateful` interface supports Agile objects that have either Agile Workflow status or Agile lifecycle phases. Objects that support this interface are Item and routable objects.

Routable objects are:

- `IChange`
- `IDeclaration`
- `IFileFolder`
- `IPackage`
- `IProgram`
- `IQualityChangeRequest`
- `IServiceRequest`
- `ITransferOrder`

The following example returns an array that shows all states of the object, or null when they are not defined.

Example: Getting the array that defines the different states of an object

```
public interface IStateful {
    public IStatus[] getStates()
    throws APIException;
}
```

The following example returns the current state of the object, or null if it is not defined.

Example: Getting the current state of the object

```
public interface IStateful {
    public IStatus getStatus()
    throws APIException;
}
```

Propagating Values to Related Objects

Several objects in Agile PLM have related objects. For example, problem reports and nonconformance reports have a Related PSR table. On the Related PSR table, you can specify that a Workflow event should trigger a particular result in a related object, such as another problem report or nonconformance report. The triggered result does not occur instantaneously. In fact, there may be a noticeable delay—perhaps several seconds—in the time it takes Agile PLM to propagate values to related objects.

Saving an Object to a New Object

The Agile API lets you save an existing object as a new object. For example, in addition to a Save button, a dialog box in your program may have a Save As button, which saves the data to a new object. When you use the `IDataObject.saveAs()` method, you must specify the subclass that you are using to save the object and the object number. If the subclass supports it, you can use an `AutoNumber`.

This example shows how to save the current object to a new object using the next `AutoNumber` for the specified subclass.

Example: Saving an object as a new object

```
private void saveAsObject(IDataObject obj, IAgileClass sub) {
    String nextNum;
    try {
        // Get the next autonumber for the subclass
        IAutoNumber[] numSources = sub.getAutoNumberSources();
        nextNum = numSources[0].getNextNumber();
        // Save the object
        obj.saveAs(sub, nextNum);
    } catch (APIException ex) {
        System.out.println(ex);
    }
}
```

Sharing an Object

The `IShareable` interface is implemented by every Agile PLM business object that the Agile API exposes. Therefore, every business object can be shared. Sharing lets you grant one or more of your roles to another Agile PLM user or user group for a specific object. The roles you can assign when you share an object include your assigned or permanent roles and any roles assigned to you from membership in a user group.

Users that have been shared an object can perform actions permitted by the roles for that object only. They don't acquire the roles in a global fashion.

The `IShareable` interface has only two methods, `getUsersAndRoles()` and `setUsersAndRoles()`. The `getUsersAndRoles()` method returns a `Map` object. Each user in the `Map` has an associated array of roles. The `setUsersAndRoles()` method has one parameter, a `Map` object, which, like the `Map` returned by `getUsersAndRoles()`, maps each user to an array of roles. Each user can be assigned a different selection of roles.

Example: Sharing an object

```
private void getDataForSharing() throws Exception {
    //Get item
    IItem item =
    (IItem)m_session.getObject(ItemConstants.CLASS_ITEM_BASE_CLASS,
    "P10011");
    //Get users
    IUser user1 = (IUser)m_session.getObject(UserConstants.CLASS_USER,
    "albert1");
    IUser user2 = (IUser)m_session.getObject(UserConstants.CLASS_USER,
    "peter1");
    IUser[] users = new IUser[]{user1, user2};
    //Get roles
    INode nodeRoles =
    (INode)m_session.getAdminInstance().getNode(NodeConstants.NODE_ROLES);
    IRole role1 = (IRole)nodeRoles.getChildNode("Component Engineer");
    IRole role2 = (IRole)nodeRoles.getChildNode("Incorporator");
    IRole[] roles = new IRole[]{role1, role2};
    //Share the item
    shareItem(item, users, roles);
}
private void shareItem(IItem item, IUser[] users, IRole[] roles) throws
Exception {
    Map map = new HashMap();
    for (int i = 0; i < users.length; i++) {
        map.put(users[i], roles);
    }
    IShareable shareObj = (IShareable)item;
    shareObj.setUsersAndRoles(map);
}
```

Note Each user and user group has a `Share` table that lists objects that have been shared and which roles have been granted for those objects.

Deleting and Undeleting Objects

The Agile API, like Agile Web Client, lets you delete and undelete objects. To delete and undelete an object, you must have Delete and Undelete privileges, respectively, for the particular object type.

The Agile API supports “soft” and “hard” deletes. The first time you delete an object, it is “soft-deleted.” Though it is marked “Deleted” in the database, it is not permanently removed. You can still retrieve a soft-deleted object; for example, you could use the `IAgileSession.GetObject()` method to get a deleted object. When you run a query, soft-deleted objects are not included in the query results. However, Agile provides predefined queries (such as the Deleted Items query in the Change Analyst Searches folder) that let you find deleted objects.

To remove an object permanently, you delete it a second time, which is a “hard” delete. Once you hard-delete an object, you cannot restore it using the `IDataObject.Undelete()` method.

Not all Agile PLM objects can be deleted. For example, the following objects cannot be deleted. If you attempt to delete one of these objects, the `delete()` method throws an exception.

- An item with a pending change
- An item with a revision history
- An item with a canceled change
- An item with an AML
- A released change
- A manufacturer part currently used on the Manufacturers tab of another object
- A manufacturer with one or more manufacturer parts

If you try to delete an Item that is used on the BOM tab of another item, the Agile PLM server throws an exception whose ID is `ExceptionConstants.APDM_DELETECOMPINUSE_WARNING`. The following example shows how to disable this warning and delete the item.

Example: Deleting an Item

```
private void deleteItem(IDataObject obj) {
    try {
        // Delete the Item
        obj.delete();
    } catch (APIException ex) {
        // Check for "Item is Used" warning
        if (ex.getErrorCode() ==
            ExceptionConstants.APDM_DELETECOMPINUSE_WARNING) {
            int i = JOptionPane.showConfirmDialog(null, "This Item is used by
            another Item. " +
                "Would you still like to delete it?", "Item is Used Warning",
            JOptionPane.YES_NO_OPTION);
        }
        if (i == 0) {
            try {
                // Disable "Item is Used" warning
```

```

m_session.disableWarning(ExceptionConstants.APDM_DELETECOMPINUSE_WARNING);
    // Delete the object
    obj.delete();
    // Enable "Item is Used" warning

m_session.enableWarning(ExceptionConstants.APDM_DELETECOMPINUSE_WARNING);
    } catch (APIException exc) {
        System.out.println(exc);
    }
    } else {
        System.out.println(ex);
    }
}
}
}

```

To restore an object that has been soft-deleted, use the `IDataObject.undelete()` method. Once again, to undelete an object, the user must have Undelete privileges for that object type. However, soft-deleted changes that have items on the Affected Items tab cannot be restored, regardless of the user's privileges. The following example shows how to undelete an object that has been deleted.

Example: Undeleting an object

```

private void undeleteObject(Object obj) throws APIException {
    // Make sure the object is deleted before undeleting it
    if (obj.isDeleted()) {
        // Restore the object
        obj.undelete();
    }
}
}

```

Closing a Session

Each Agile PLM user can open up to three concurrent sessions. Therefore, each session that you open using the Agile API should be closed properly. If you fail to close a session properly, you may not be able to log in with a new session until one of the concurrent sessions time out.

Example: Closing a session

```

public void disconnect(I AgileSession m_session) {
    m_session.close();
}
}

```


Creating and Loading Queries

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About Queries

An `IQuery` is an object that defines how to search for Agile PLM data. It defines a search similar to the searches that you can use in Agile Web Client. The search can have multiple search criteria (like an Advanced Search in Agile Web Client), or it can be a simple search that specifies only one criterion.

Creating a Query

To create and execute a query, you must first create an `IQuery` object. As with other Agile API objects, you create the object using the `I AgileSession.createObject()` method.

In its simplest form, the parameters that you pass with the `createObject()` method to create a query are the `IQuery` object type and the query class used in the search. In the following example, the query class is the `Item` class.

Example: Creating a query

```
try {
    IQuery query =
        (IQuery) session.createObject(IQuery.OBJECT_TYPE,
        ItemConstants.CLASS_ITEM_BASE_CLASS);
    query.setCaseSensitive(false);
    query.setCriteria("[Title Block.Number] starts with 'P'");
    ITable results = query.execute();
} catch (APIException ex) {
    System.out.println(ex);
}
```

The query class you specify with the `createObject()` method also includes objects from all of its subclasses. For example, if you search for objects in the `Item` class, the results include parts and documents. If you search for objects in the `Change` class, the results include objects from all `Change` subclasses (`Deviation`, `ECO`, `ECR`, `MCO`, `PCO`, `SCO`, and `Stop Ship`). If you want to search only a specific subclass, you should explicitly specify that class.

The following example shows how to create a query that searches for objects in a subclass named `FooBar`:

Example: Specifying the query class

```
IAdmin admin = m_session.getAdminInstance();
IAgileClass cls = admin.getAgileClass("FooBar");
IQuery query = (IQuery)m_session.createObject(IQuery.OBJECT_TYPE, cls);
```

Saving a Query to a Folder

After you name a query using the `IQuery.setName()` method, you can add it to a folder. The following example shows how to name a query and add it to the `Personal Searches` folder. You can retrieve the query from the folder later to reuse it.

Example: Naming a query and adding it to a folder

```
try {
    IQuery query =
        (IQuery)session.createObject(IQuery.OBJECT_TYPE,
            ItemConstants.CLASS_ITEM_BASE_CLASS);
    query.setCaseSensitive(false);
    query.setCriteria("[Title Block.Number] starts with 'P'");
    query.setName("Items Whose Number Starts with P");
    IFolder folder =
        (IFolder)m_session.getObject(IFolder.OBJECT_TYPE,
            "/Personal Searches");
    folder.addChild(query);
} catch (APIException ex) {
    System.out.println(ex);
}
```

You can also use the `IQuery.saveAs()` method to name a query and save it to a folder.

Example: Using `IQuery.saveAs()` to save a query to a folder

```
try {
    IQuery query = (IQuery)session.createObject(IQuery.OBJECT_TYPE,
        ItemConstants.CLASS_ITEM_BASE_CLASS);
    query.setCaseSensitive(false);
    query.setCriteria("[Title Block.Number] starts with 'P'");
    IFolder folder = (IFolder)m_session.getObject(IFolder.OBJECT_TYPE,
        "/Personal Searches");
    query.saveAs("Items Whose Number Starts with P", folder);
} catch (APIException ex) {
    System.out.println(ex);
}
```

Note Any query that you create without explicitly saving it to a folder is considered a temporary query. The Agile Application will automatically delete all temporary queries when the user session is closed.

Generating Ordered (sorted) or Unordered Query Results

As shown in examples for [Creating a Query](#) on page 35, executing `IQuery.execute()` and `IQuery.execute(Object[] params)` methods returns an ordered query result in `ITable`.

To improve query performance, the SDK provides the following methods to return results that are not sorted in the default order. However, if the query criteria has the `starts with` condition, then results are always sorted on that attribute and passing `skipOrdering` as `true` in `execute(boolean)` will not skip ordering.

Note To sort query results by other than the default order, see [Sorting Query Results](#) on page 60.

- `IQuery.execute(boolean skipOrdering)`
- `IQuery.execute(Object[] params, boolean skipOrdering)`

To skip or perform ordering, set the boolean `skipOrdering` to `true` or `false` as shown in the following example.

Example: Skip ordering in query results

```
try {
    IQuery query =
        (IQuery)session.createObject(IQuery.OBJECT_TYPE,
            ItemConstants.CLASS_ITEM_BASE_CLASS);
    query.setCaseSensitive(false);
    query.setCriteria("[Title Block.Number] starts with 'P'");
    // The boolean is set to true to skip ordering
    ITable results = query.execute(true);
} catch (APIException ex) {
    System.out.println(ex);
}
```

Specifying Query Attributes when Creating a Query

Instead of passing only the query class when you create a query, you can use a more advanced form of the `createObject()` method and pass a `Map` object containing one or more attribute values. The `QueryConstants` class contains several constants for query attributes that you can set when you create a query. These are virtual attributes that do not exist in the Agile PLM database, but that can be used to define the query at run time.

Attribute Constant	Description
ATT_CRITERIA_CLASS	Query class.
ATT_CRITERIA_PARAM	Search condition parameter value (for a parameterized search condition).
ATT_CRITERIA_STRING	Search condition string.
ATT_PARENT_FOLDER	Parent folder where the query resides.
ATT_QUERY_NAME	Query name.

The following example shows how to set the query class, search condition, parent folder, and query name when you create the query.

Example: Specifying query attributes when you create a query

```
try {
    String condition = "[Title Block.Number] starts with 'P'";
    IFolder parent = (IFolder)m_session.getObject(IFolder.OBJECT_TYPE,
        "/Personal Searches");
    HashMap map = new HashMap();
    map.put(QueryConstants.ATT_CRITERIA_CLASS,
        ItemConstants.CLASS_ITEM_BASE_CLASS);
    map.put(QueryConstants.ATT_CRITERIA_STRING, condition);
    map.put(QueryConstants.ATT_PARENT_FOLDER, parent);
    map.put(QueryConstants.ATT_QUERY_NAME, "Part Numbers Starting with
        P");
    IQuery query = (IQuery)m_session.createObject(IQuery.OBJECT_TYPE,
        map);
    ITable results = query.execute();
} catch (APIException ex) {
    System.out.println(ex);
}
```

Specifying Search Criteria

You can narrow the number of objects returned from a search by specifying search criteria. If you don't specify search criteria, the query returns references to all objects in the specified query class. It's a good idea to limit the search criteria as much as possible, as the amount of data returned may be excessively large, resulting in decreased performance.

There are three different `setCriteria()` methods you can use to specify query criteria:

- `setCriteria(ICriteria criteria)` – Sets the query criteria from data stored in the Criteria administrative node. The Criteria administrative node defines reusable criteria for the Workflow, but the nodes can also be used as ordinary search criteria.

Note Workflow query is not supported in the current Release of the SDK.

- `setCriteria(java.lang.String criteria)` – Sets the search criteria from a specified String.

- `setCriteria(java.lang.String criteria, java.lang.Object[] params)` – Sets the search criteria from a specified `String` that references one or more parameters.

Unless you use the first `setCriteria()` method, which takes an `ICriteria` object for its parameter, the Agile API parses the search criteria as a `String`.

Search Conditions

The Agile API provides a simple yet powerful query language for specifying search criteria. The query language defines the proper syntax for filters, conditions, attribute references, relational operators, logical operators, and other elements.

Search criteria consist of one or more search conditions. Each search condition contains the following elements:

1. **Left operand** – The left operand is always an attribute enclosed in brackets, such as `[Title Block.Number]`. You can specify the attribute as an attribute name (fully qualified name or short name) or attribute ID number. The attribute specifies which characteristic of the object to use in the search.
2. **Relational operator** – The relational operator defines the relationship that the attribute has to the specified value, for example, “equal to” or “not equal to.”
3. **Right operand** – The matching value for the specified attribute in the left operand. The right operand can be a constant expression or a set of constant expressions. A set of constant expressions is needed if the relational operator is “between,” “not between,” “in,” or “not in.”

Following is an example of a search condition:

```
[Title Block.Description] == 'Computer'
```

This is another example where the right operand is a set of constant expressions:

```
[Page Two.Numeric01] between ('1000', '2000')
```

Query Language Keywords

When you specify a search condition, you must use proper keywords to construct the statement. The following keywords are available:

and	does	less	or	to
asc	equal	like	order	union
between	from	minus	phrase	where
by	greater	none	select	with
contain	in	not	start	word
contains	intersect	null	starts	words
desc	is	of	than	

Query language keywords are not localized. You must use English keywords, regardless of locale. You can use the keywords in lower case or upper case. In addition to keywords, you can use Agile PLM variables such as `$USER` (for current user) and `$TODAY` (for today’s date) in Agile API queries.

Note The "in" operator does not support MultiList in (set) query criteria.

Specifying Search Attributes

Every Agile PLM object that you can search for also has an associated set of attributes, which are inherent characteristics of the object. You can use these attributes as the left operand of a search condition. The right operand of the search condition specifies the attribute's value(s).

A search attribute must be enclosed within brackets, for example, [Title Block.Number]. The brackets are needed because many attribute names have spaces. If a search attribute is not enclosed within brackets, your query will fail.

You can specify a search attribute in the following ways:

Attribute reference	Example
attribute ID number	[1001]
fully-qualified attribute name	[Title Block.Number]
short attribute name	[Number]

Note Because attribute names can be modified, Agile recommends referencing attributes by ID number or constant. However, many of the examples in this chapter reference attributes by name simply to make them more readable. If you choose to reference attributes by name, use the fully-qualified attribute name instead of the short name. Short attribute names are not guaranteed to be unique and could therefore cause your query to fail or produce unexpected results.

Attribute names, whether you use the long or short form, are case-insensitive. For example, [Title Block.Number] and [TITLE BLOCK.NUMBER] are both allowed. Attribute names are also localized. The names of Agile PLM attributes vary based on the locale of your Agile Application Server. If you are creating a query that is going to be used on servers in different locales, you should reference attributes by ID number (or the equivalent constant) instead of by name.

Note The APIName field, described in [Accessing PLM Metadata with APIName Field](#) on page 123, does not support specifying search attributes.

If the attribute name contains special characters, such as quotes or backslashes, you can type these characters using the backslash (\) as an escape character. For example, to include a quote character in your string, type \'. If you want to write a backslash, type two of them together (\\). If the attribute name contains square brackets, enclose the entire name in quotes:

```
['Page Two.Unit of Measure [g or oz]']
```

There are other less intuitive ways to specify attributes. For example, you can pass in an IAttribute reference using a parameter of the setCriteria() method. In the following example, '%0' references the attribute in the Object array parameter.

```
query.setCriteria("[%0] == 'Computer'", new Object[] { attr });
```

You can also use String concatenation to reference an attribute constant:

```
query.setCriteria "[" + ItemConstants.ATT_TITLE_BLOCK_DESCRIPTION + " == 'Computer'");
```

Retrieving Searchable Attributes

The searchable attributes for a query depend on the specified query class or subclass. However, the searchable attributes for a subclass can differ greatly from searchable attributes for its parent class.

Due to database considerations, not all attributes are searchable. Generally, a few select Page One attribute (namely: Title Page, Cover Page, and General Info attributes) are searchable for each class.

If a tab is not configured in Java Client to be visible, you can still search for an attribute on that tab in the Agile SDK. However, you must search for the Table name that corresponds to the Tab name.

Note Because you use the table name to setup `IQuery`, it does not matter if an Agile administrator changes a Tab name from the name specified in Agile Java Client. Tab name changes do not affect SDK table names.

To find the searchable attributes for a query, use the `IQuery.getSearchableAttributes()` method.

Note Even though an attribute may not be searchable, it can still be included as a column in the query results. For more information, see [Setting Result Attributes for a Query](#) on page 53.

Using Relational Operators

Table below lists relational operators that are supported by the Agile API query language.

English operator	Notation	Description
equal to	==	Finds only an exact match with the specified value.
not equal to	!=	Finds any value other than an exact match with the specified value.
greater than	>	Finds any value greater than the specified value.
greater than or equal to	>=	Finds any value greater than or equal to the specified value.
less than	<	Finds any value less than the specified value.
less than or equal to	<=	Finds any value less than or equal to the specified value.
contains, contains all		Finds any value that includes the specified value.
does not contain, does not contain all		Finds any value that does not include the specified value.
contains any		Finds any value that includes the specified value.
does not contain any		Finds any value that does not include the specified value.

English operator	Notation	Description
contains none of		Finds any value that includes none of the specified values.
does not contain none of		Behaves the same as <code>does not contain any</code> .
starts with		Finds values that begin with characters in the specified value.
does not start with		Finds values that do not begin with characters in the specified value.
is null		Finds objects where the selected attribute contains no value.
is not null		Finds objects where the selected attribute contains a value.
like		Performs a wildcard search, finding objects that match a single character or any string.
not like		Performs a wildcard search, finding objects that do not match a single character or any string.
between		Finds objects that fall between the specified values.
not between		Finds objects that do not fall between the specified values.
in		Finds objects that match any of the specified values.
not in		Finds objects that do not match any of the specified values.
contains phrase		Finds objects with files that contain the specified phrase.
contains all words		Finds objects with files that contain all of the specified words.
contains any word		Finds objects with files that contain any of the specified words.
contains none of		Finds objects with files that contain none of the specified words.

Relational operators are not localized. You must use English keywords, regardless of locale. As with other query language keywords, you can use them in lower case or upper case.

Using Unicode Escape Sequences

Agile SDK Query language supports Unicode escape sequences. The primary usage of Unicode escape sequences in a query string is to search for *nonburnable* or foreign local character sets. A Unicode character is represented with the Unicode escape sequence `\uxxxx`, where `xxxx` is a sequence of four hexadecimal digits.

For example, to search for an item with Unicode 3458, use the following query:

```
Select * from [Items] where [Description] contains '\u3458'
```

There is another query operation for 'contains' usage in the case of MultiList.

Using Between, Not Between, In, and Not In Operators

The 'between', 'not between', 'in', and 'not in' relational operators are not supported directly by Agile PLM Java and Web Clients. These relational operators provide a convenient shorthand method for specifying 'equal to', 'not equal to', 'greater than or equal to', or 'less than or equal to' operations with a set of values.

Short form	Equivalent long form
[Number] between ('1','6')	[Number] >= '1' and [Number] <= '6'
[Number] not between ('1','6')	[Number] < '1' and [Number] > '6'
[Number] in ('1','2','3','4','5','6')	[Number] == '1' or [Number] == '2' or [Number] == '3' or [Number] == '4' or [Number] == '5' or [Number] == '6'
[Number] not in ('1','2','3','4','5','6')	[Number] != '1' and [Number] != '2' and [Number] != '3' and [Number] != '4' and [Number] != '5' and [Number] != '6'

As shown in the preceding table, when you use the 'between', 'not between', 'in', and 'not in' relational operators, each value in the set of values must be enclosed in quotes and delimited by commas. Here are more criteria examples that use 'between' and 'in' relational operators:

```
[Title Block.Number] in ('1000-02', '1234-01', '4567-89')
[Title Block.Effectivity Date] between ('01/01/2001', '01/01/2002')
[Page Two.Numeric01] between ('1000', '2000')
```

Note The relational operators any , all, none of, and not all are not supported in the SDK.

Using the Nested Criteria to Search for Values in Object Lists

Several lists in Agile PLM contain business objects, such as Agile PLM users. To search for an object in such a dynamic list, you can specify nested query criteria. Nested criteria are enclosed in parentheses and separated from each other by a logical AND (&&) or OR (||) operator. A comma can also be used to separate nested criteria; it's equivalent to a logical OR.

The following criteria find a user with the first name Christopher OR the last name Nolan.

```
[Page Two.Create User] in ([General Info.First Name] == 'Christopher',
[General Info.Last Name] == 'Nolan')
```

The following criteria find a user with the first name Christopher AND the last name Nolan.

```
[Page Two.Create User] in ([General Info.First Name] == 'Christopher'
&&
[General Info.Last Name] == 'Nolan')
```

If Part.Page Three.List01 is enabled and set to Part Families list, the following criteria finds a Part Family with the name PartFamily_01

```
[Page Three.List01] in ([General Info.Name] == 'PartFamily_01')
```

The parameter query is not supported in nested queries and multiple values for one placeholder in query parameters must be specified in two dimensional arrays as shown in the example below.

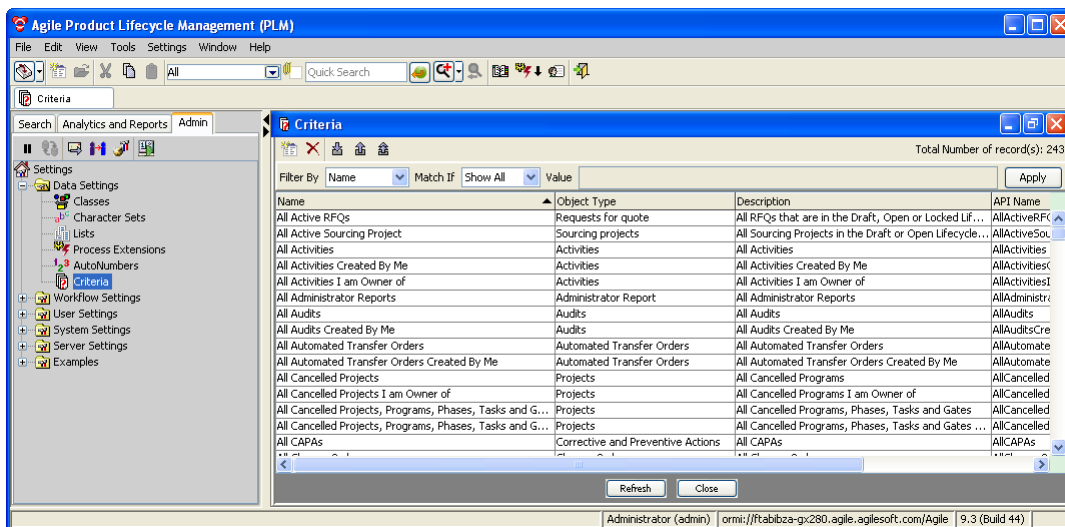
Example: Correct and incorrect parameter query in nested query criteria

- The parameter query specified in the following nested query criteria will fail to execute:
`[Page Two.User1] in ([General Info.First Name] == %0)`
- However, when it is explicitly specified as a string value, instead of the placeholder, it will succeed:
`[Page Two.User1] in ([General Info.First Name] == 'Christopher')`

Using Criteria Selected from Criteria Library in SDK Queries

Criteria nodes in Java or Web Client's Criteria library are `ICriteria` objects that you can use in SDK queries. To view a listing in Java Client as shown below, select Admin > Settings > Data Settings > Criteria.

Figure 3: Criteria nodes in Java Client's Criteria library



The following example gets a Criteria node from the Criteria library and loads and sets it as the SDK query criteria.

Example: Using criteria from the Criteria Library in SDK queries

```

IQuery query = (IQuery) session.createObject(IQuery.OBJECT_TYPE,
ItemConstants.CLASS_ITEM_BASE_CLASS);
IAdmin admin = session.getAdminInstance();
// Get the Criteria Library node
INode criteriaLibrary =
admin.getNode(NodeConstants.NODE_CRITERIA_LIBRARY);
// Load the Criteria relevant to the query class (For example it is
Items base class)
ICriteria criteria = (ICriteria) criteriaLibrary.getChild("All
Released Items");
// Set the ICriteria in SDK Query Criteria
query.setCriteria(criteria);
    
```


Using Relationships and Content in SDK Queries

Agile SDK provides APIs to perform the Relationships and Content Search using the `IQuery` interface. The query criteria can contain the attributes of both the base search class and the related class.

To search using an object's Relationships:

1. Set `searchType` to `QueryConstants.RELATIONSHIPS` using `IQuery.setSearchType(int searchType)`.
2. Set the related class using `IQuery.setRelatedContentClass(Object relatedClass)`.

Example: Using an object's Relationships as the query criteria

```
IQuery query1 = (IQuery) session.createObject(IQuery.OBJECT_TYPE,
ItemConstants.CLASS_PART);
query1.setSearchType(QueryConstants.RELATIONSHIPS);
query1.setRelatedContentClass("Substance"); // ID or API Name
query1.setCriteria("[Relationships.Name] Is Not Null and [Title
Block.Number] equals 'P00001' and [Relationships.Substance.General
Info.Name] Is Not Null");
```

To search using a Project object's Content:

1. Set `searchType` to `QueryConstants.RELATIONSHIPS` using `IQuery.setSearchType(int searchType)`.
2. Set the related class using `IQuery.setRelatedContentClass(Object relatedClass)`.

Example: Using a Project object's Content as the query criteria

```
IQuery query1 = (IQuery) session.createObject(IQuery.OBJECT_TYPE,
ProgramConstants.CLASS_ACTIVITIES_CLASS);
query1.setSearchType(QueryConstants.RELATIONSHIPS);
query1.setRelatedContentClass("ECO"); // ID or API Name
query1.setCriteria("[Content.Criteria Met] Is Not Null and
[Content.ECO.Cover Page.Originator] in ([General Info.First Name] ==
'admin')");
```

To search using a Transfer Orders object's Selected Content:

1. Set `searchType` to `QueryConstants.TRANSFER_ORDER_SELECTED_CONTENT` using `IQuery.setSearchType(int searchType)`.
2. Set the related class using `IQuery.setRelatedContentClass(Object relatedClass)`.

Example: Using a Transfer Orders object's Selected Content as the query criteria

```
IQuery query1 = (IQuery) session.createObject(IQuery.OBJECT_TYPE,
TransferOrderConstants.CLASS_CTO);
query1.setSearchType(QueryConstants.TRANSFER_ORDER_SELECTED_CONTENT)
;
query1.setRelatedContentClass("ECR"); // ID or API Name
query1.setCriteria("[Selected Content.ECR.Cover Page.Number] equal
to 'C0001'");
```

Searching for Words or Phrases Contained in Attachments

Two special attributes, [Attachments.File Document Text] and [Files.Document Text] are used to index files and search for files indexed by File Manager that reside on the Agile file management server. If you are hosting your database on Oracle, you can take advantage of a feature that lets you search for words or phrases contained in attachments, when you create search criteria that use either of these attributes.

There are four additional relational operators that you can use:

- contains phrase
- contains all words
- contains any word
- contains none of

The following table shows several search conditions that search for words or phrases in attachments.

Search Condition	Finds
[Attachments.File Document Text] contains phrase 'adding new materials'	Objects in which any of their attachments contain the phrase "adding new materials."
all [Attachments.File Document Text] contains all words 'adding new materials'	Objects in which all their attachments contain the words "adding," "new," and "materials."
none of [Attachments.File Document Text] contains any word 'containers BOM return output'	Objects in which none of their attachments contain any of the words "containers," "BOM," "return," or "output."
[Attachments.File Document Text] contains none of 'containers BOM output'	Objects in which any of their attachments do not contain the words "containers," "BOM," or "output."

Creating a Parameterized Query

When you specify criteria for a query, you can use a number preceded by a percent sign (%) to indicate a parameter placeholder. The parameter value is specified later, for example at runtime. Parameters provide a convenient way to pass values to a query, and they can save time and reduce extra coding. Parameterized queries can be saved and reused later.

Note The right hand operand query parameter supports one placeholder per each query operator, so if the query criteria have three query operators, then the query can have a total of three placeholders corresponding to the three operators. The *between* and *not between* query operations are different. For example, [2091] contains none of (%0,%1); is not allowed, but [2091] contains none of (%0); is allowed, and query.execute(new Object [] {new Object [] { "B", "C" }}); is not allowed.

Indexes for query parameters are 0-based. Parameters are numbered 0, 1, 2, and so on. Always enumerate the parameters in ascending order. The following example shows a query with three parameters whose values are specified using the IQuery.execute(Object []) method.

Example: Parameterized query using IQuery.execute(Object[])

```

public ITable runParameterizedQuery() throws Exception {
    String condition = "[Title Block.Number] starts with %0 and" +
        "[Title Block.Part Category] == %1 and" +
        "[Title Block.Description] contains %2";
    IQuery query = (IQuery)m_session.createObject(IQuery.OBJECT_TYPE,
        ItemConstants.CLASS_PART);
    query.setCriteria(condition);
    ITable table = query.execute(new Object[] {"1", "Electrical",
"Resistor"});
    return table;
}

```

You can also specify query parameters using `IQuery.setParams()` method, as shown in the following example. Make sure you set the query parameter values before calling `IQuery.execute()`. Otherwise, when you run the query it will use previous parameter values. If parameters have not been set, the query uses null values. Similarly, if you do not pass any parameters to a query, then the `IQuery.getParams()` method returns null.

Example: Parameterized query using `IQuery.setParams()`

```

public ITable runParameterizedQuery() throws Exception {
    String condition = "[Title Block.Number] starts with %0 and" +
        "[Title Block.Part Category] == %1 and" +
        "[Title Block.Description] contains %2";
    IQuery query = (IQuery) m_session.createObject(IQuery.OBJECT_TYPE,
ItemConstants.CLASS_PART);
    query.setCriteria(condition);
    query.setParams(new Object[] {"1", "Electrical", "Resistor"});
    ITable table = query.execute();
    return table;
}

```

Do not use quote characters around parameterized queries because they will create a set of values (more than one element) for the query when parameters can only refer to a given value. The following examples show the proper use of quote characters when creating parameterized queries:

Example: Correct use of quote characters in a parameterized search query

```

String criteria = "[NUMBER] == %0";
query.execute(new Object[]{"P1000-02"});
String criteria = "[P2.LIST01] in %0";
query.execute(new Object[]{new Object[]{"A1", "B2"}});

```

Formatting Dates in Query Criteria

Several types of queries require date values. To pass a date as a String, use the `IAgileSession.setDateFormats()` method to specify a date format. The `setDateFormats()` method also applies to all Agile API values that you specify with `setValue()` methods.

Note If you don't set date formats explicitly using the `setDateFormats()` method, the Agile API uses the user's date format for the Agile PLM system. To see your date format in Agile Web Client, choose Settings > User Profile and then click the Preferences tab.

Example: Setting the date format for a query

```
m_session.setDateFormats(new DateFormat[] {new
SimpleDateFormat("MM/dd/yyyy")});
query.setCriteria("[Title Block.Rev Release Date] between" +
"('9/2/2001', '9/2/2003')");
query.setCriteria("[Title Block.Rev Release Date]
between (%0,%1)", new String[] {"9/2/2001", "9/2/2003"} );
```

Alternatively, if you use the `setCriteria(String criteria, Object[] params)` method, you can pass `Date` objects as parameters to the method.

Example: Passing Date objects as parameters of setCriteria()

```
DateFormat df = new SimpleDateFormat("MM/dd/yyyy");
query.setCriteria("[Title Block.Rev Release Date] between (%0,%1)",
new Object[] { df.parse("9/2/2001"), df.parse("9/2/2003") } );
```

Using Logical Operators

You can use logical operators to combine multiple search conditions into a complex filter. When you have two or more conditions defined in a set of query criteria, the relationship between them is defined as either 'and' or 'or'.

- and narrows the search by requiring that both conditions are met. Each item in the results must match both conditions. The 'and' logical operator can also be specified using two ampersands, '&&'.
- or broadens the search by including any object that meets either condition. Each item in the results table needs to match only one of the conditions, but may match both. The 'or' logical operator can also be specified using two vertical bars, '|'.

Logical operators are case-insensitive. For example, 'and' or 'AND' are both allowed.

The following query criteria finds parts that have both a part category equal to Electrical and a lifecycle phase equal to Inactive.

```
[Title Block.Part Category] == 'Electrical' and
[Title Block.Lifecycle Phase] == 'Inactive'
```

If you replace the 'and' operator with 'or', the query locates all parts with either a part category of Electrical or a lifecycle phase of Inactive, which could be a large number of parts.

```
[Title Block.Part Category] == 'Electrical' or
[Title Block.Lifecycle Phase] == 'Inactive'
```

Note The Agile API provides three where-used set operators. For more information, see [Creating a Where-Used Query](#) on page 61. Logical operators, including the where-used set operators, are not localized. You must use English keywords, regardless of locale.

Using Wildcard Characters with the Like Operator

If you define a search condition using the 'like' operator, you can use two wildcard characters: the asterisk (*) and question mark (?). The asterisk matches any string of any length, so *at finds cat, splat, and big hat. For example, [Title Block.Description] like '*book*' returns all objects that contain the word "book," such as textbook, bookstore, books, and so on.

The question mark matches any single character, so ?at finds hat, cat, and fat, but not splat. For example, [Title Block.Description] like '?al*' matches any word containing "al" that is preceded by a single letter, such as tall, wall, mall, calendar, and so on.

Using Parentheses in Search Criteria

Where-used, set operators have higher priority than and and or logical operators, as shown by the following table.

Priority	Operator(s)
1	<ul style="list-style-type: none"> ▫ union ▫ intersection ▫ minus
2	<ul style="list-style-type: none"> ▫ and ▫ or

Therefore, search conditions joined by union, intersection, and minus operators are evaluated before conditions joined by and or or.

If you use where-used set operators ('union', 'intersect', or 'minus') in search criteria, you can use parentheses to change the order that criteria are evaluated. If only 'and' or 'or' logical operators are used in a search criteria, additional parentheses aren't needed because they don't change the result of criteria evaluation.

The following two criteria, although they contain the same search conditions, provide different results because parentheses are placed differently:

```
([Title Block.Part Category] == 'Electrical' and
 [Title Block.Description] contains 'Resistor') union
([Title Block.Description] contains '400' and
 [Title Block.Product Line(s)] contains 'Taurus')
[Title Block.Part Category] == 'Electrical' and
([Title Block.Description] contains 'Resistor' union
 [Title Block.Description] contains '400') and
 [Title Block.Product Line(s)] contains 'Taurus'
```

Setting Search Criteria for Lists Containing Large Number of Objects

When using the SDK to query lists that contain a large number of objects, you can improve performance if you use the object ID in the query criteria to set the value for the list

For example, you can replace this routine:

```
query.setCriteria("[Page Three.List25] equal to 'Administrator  
(admin) '");
```

with the following for better performance:

```
IUser user = (IUser)session.getObject(IUser.OBJECT_TYPE, "admin");  
query.setCriteria("[Page Three.List25] equal to  
"+user.getObjectId());
```

Using SQL Syntax for Search Criteria

In addition to its standard query language, the Agile API also supports SQL-like syntax for search criteria. If you're familiar with how to write SQL statements, you may find this extended query language easier to work with, more flexible, and more powerful. It combines in one operation the specification of the query result attributes, the query class, the search condition, and the sort column(s).

This is a simple example that demonstrates the syntax:

- Query result attributes: `SELECT [Title Block.Number], [Title Block.Description]`
- Query class: `FROM [Items]`
- Search condition: `WHERE [Title Block.Number] starts with 'P'`
- Sort column(s): `ORDER BY 1 asc`

To improve readability, it's recommended that SQL key words such as `SELECT` and `FROM` are all typed using capital letters and each part of the statement appears on a separate line. This is merely a convention, not a requirement. SQL key words are not case-sensitive, and you can write the entire query string on one line if you prefer.

The best way to demonstrate the advantages of SQL syntax is to compare the code for a query that uses standard Agile API query syntax for search criteria with one that uses SQL syntax. The following example shows a query created using the standard Agile API query syntax:

Example: Query using standard Agile API query syntax

```
try {  
    IQuery query = (IQuery)m_session.createObject(IQuery.OBJECT_TYPE,  
        "Items");  
    query.setCriteria("[Page Two.Numeric01] between (1000, 2000)");  
    //Set result attributes  
    String[] attrs = { "Title Block.Number", "Title Block.Description",  
        "Title Block.Lifecycle Phase" };  
    query.setResultAttributes(attrs);  
}
```

```

//Run the query
ITable results = query.execute();
} catch (APIException ex) {
    System.out.println(ex);
}

```

This example shows the same query rewritten in SQL syntax. Although the example doesn't have fewer lines of code, you may find that it's more readable than Agile API query syntax, particularly if you're familiar with SQL.

Example: Query using SQL syntax

```

try {
    IQuery query = (IQuery)m_session.createObject(IQuery.OBJECT_TYPE,
        "SELECT " +
            "[Title Block.Number],[Title Block.Description], " +
            "[Title Block.Lifecycle Phase] " +
        "FROM " +
            "[Items] " +
        "WHERE " +
            "[Title Block.Number] between (1000, 2000)"
    );
    //Run the query
    ITable results = query.execute();
} catch (APIException ex) {
    System.out.println(ex);
}

```

The following example shows a query written with SQL syntax that specifies the search criteria using the `ATT_CRITERIA_STRING` query attribute. For more information about how to use query attributes, see [Specifying Query Attributes when Creating a Query](#) on page 37.

Example: Using SQL syntax to specify query attributes

```

try {
    String statement =
        "SELECT " +
            "[Title Block.Number], [Title Block.Description] " +
        "FROM " +
            "[Items] " +
        "WHERE " +
            "[Title Block.Description] like %0";
    HashMap map = new HashMap();
    map.put(QueryConstants.ATT_CRITERIA_STRING, statement);
    map.put(QueryConstants.ATT_CRITERIA_PARAM, new Object[] { "Comp*" }
    );
    IQuery query = (IQuery)m_session.createObject(IQuery.OBJECT_TYPE,
    map);
    ITable results = query.execute();
} catch (APIException ex) {
    System.out.println(ex);
}

```

Note Remember, the FROM part of the search condition specifies the query class. If you use the `ATT_CRITERIA_CLASS` attribute to also specify a query class, the query class specified in the SQL search condition takes precedence.

Although you can use the `IQuery.setCriteria()` method to specify a search condition in SQL syntax, the `IQuery.getCriteria()` method always returns the search condition in the standard Agile API query syntax.

Using SQL Wildcards

You can use both the asterisk (*) and question mark (?) wildcards in a query that uses SQL syntax. As in standard Agile API query language, the asterisk matches any string and the question mark matches any single character. You can use wildcards in the SELECT statement (the specified query result attributes) and the WHERE statement (the search condition). For example, "SELECT *" specifies all available query result attributes.

Sorting Query Results Using SQL Syntax

If you specify search criteria using SQL syntax instead of the standard Agile API query language, you can use the ORDER BY keyword to sort the query results. You can sort the results in ascending or descending order by any attributes specified in the SELECT statement.

In the ORDER BY statement, refer to attributes by the one-based numerical order in which they appear in the SELECT statement. To specify whether to sort in ascending or descending order, type "asc" or "desc" after the attribute number. If "asc" or "desc" is omitted, ascending order is used by default.

Example	Description
ORDER BY 1	Sort by the first SELECT attribute in ascending order (the default)
ORDER BY 2 desc	Sort by the second SELECT attribute in descending order
ORDER BY 1 asc, 3 desc	Sort by the first SELECT attribute in ascending order and the third SELECT attribute in descending order

Attributes not specified in the SELECT statement cannot be used to sort query results. Also, if you use "SELECT *" to select all available result attributes, the results cannot be sorted because the attribute order is undefined.

The following example sorts results in ascending order by [Title Block.Number] and [Title Block.Sites], the first and third attributes in the SELECT statement.

Example: Using SQL syntax to sort query results

```
IQuery query = (IQuery)m_session.createObject(IQuery.OBJECT_TYPE,
    "SELECT " +
    " [Title Block.Number], [Title Block.Description], " +
    " [Title Block.Sites], [Title Block.Lifecycle Phase] " +
    "FROM " +
    " [Items] " +
    "WHERE " +
    " [Title Block.Number] between (1000, 2000) " +
```



```
"ORDER BY " +
  "1, 3"
);
```

Setting Result Attributes for a Query

When you run a query, it returns several output fields, which are also called result attributes. By default, there are only a few result attributes for each query class. You can add or remove result attributes using the `IQuery.setResultAttributes()` method.

The following table shows the default query result attributes for each predefined Agile PLM class.

Query class	Default result attributes
Changes Change Orders ECO Change Requests ECR Deviations Deviation Manufacturer Orders MCO Price Change Orders PCO Sites Change Orders SCO Stop Ships Stop Ship	Cover Page.Change Type Cover Page.Number Cover Page.Description Cover Page.Status Cover Page.Workflow
Customers Customers Customer	General Info.Customer Type General Info.Customer Number General Info.Customer Name General Info.Description General Info.Lifecycle Phase

Query class	Default result attributes
<p>Declarations</p> <ul style="list-style-type: none"> Homogeneous Material Declarations Homogeneous Material Declaration IPC 1752-1 Declarations IPC 1752-1 Declaration IPC 1752-2 Declarations IPC 1752-2 Declaration JGPSSI Declarations JGPSSI Declaration Part Declarations Part Declaration Substance Declarations Substance Declaration Supplier Declarations of Conformance Supplier Declaration of Conformance 	<ul style="list-style-type: none"> Cover Page.Name Cover Page.Description Cover Page.Supplier Cover Page.Status Cover Page.Workflow Cover Page.Compliance Manager Cover Page.Due Date Cover Page.Declaration Type
<p>Discussions</p> <ul style="list-style-type: none"> Discussions Discussion 	<ul style="list-style-type: none"> Cover Page.Subject Cover Page.Status Cover Page.Priority Cover Page.Type
<p>File Folders</p> <ul style="list-style-type: none"> File Folders File Folder 	<ul style="list-style-type: none"> Title Block.Type Title Block.Number Title Block.Description Title Block.Lifecycle Phase
<p>Items</p> <ul style="list-style-type: none"> Parts Part Documentation Document 	<ul style="list-style-type: none"> Title Block.Item Type Title Block.Number Title Block.Description Title Block.Lifecycle Phase Title Block.Rev

Query class	Default result attributes
Manufacturers Manufacturers Manufacturer	General Info.Name General Info.City General Info.State General Info.Lifecycle Phase General Info.URL
Manufacturer Parts Manufacturer Parts Manufacturer Part	General Info.Manufacturer Part Number General Info.Manufacturer Name General Info.Description General Info.Lifecycle Phase
Packages Packages Package	Cover Page.Package Number Cover Page.Description Cover Page.Assembly Number Cover Page.Status Cover Page.Workflow
Part Groups Part Groups Commodity Part Family	General Info.Name General Info.Description General Info.Lifecycle Phase General Info.Commodity Type General Info.Overall Compliance
Prices Published Prices Contracts Published Price Quote History Quote History	General Info.Price Number General Info.Description General Info.Rev General Info.Price Type General Info.Lifecycle Phase General Info.Projects General Info.Customer General Info.Supplier
Product Service Requests Non-Conformance Reports NCR Problem Reports Problem Report	Cover Page.PSR Type Cover Page.Number Cover Page.Description Cover Page.Status Cover Page.Workflow

Query class	Default result attributes
<p>Projects</p> <ul style="list-style-type: none"> Activities Phase Program Project Task Gates Gate 	<ul style="list-style-type: none"> General Info.Name General Info.Description General Info.Status General Info.Health General Info.Owner General Info.Root Parent General Info.Workflow General Info.Type
<p>Sourcing Projects</p> <ul style="list-style-type: none"> Sourcing projects Sourcing Projects 	<ul style="list-style-type: none"> General Info.Project Type General Info.Number General Info.Description General Info.Manufacturing Site General Info.Ship To Location General Info.Projects General Info.Customer General Info.Lifecycle Phase
<p>Quality Change Requests</p> <ul style="list-style-type: none"> Corrective Action/Preventive Action CAPA Audits Audit 	<ul style="list-style-type: none"> Cover Page.QCR Type Cover Page.QCR Number Cover Page.Description Cover Page.Status Cover Page.Workflow
<p>RFQ Responses</p> <ul style="list-style-type: none"> RFQ Responses RFQ Response 	<ul style="list-style-type: none"> Cover Page.RFQ Number Cover Page.RFQ Description Cover Page.Lifecycle Phase Cover Page.Requested Cover Page.Completed Cover Page.Due Date

Query class	Default result attributes
RFQs RFQs RFQ	Cover Page.RFQ Number Cover Page.RFQ Description Cover Page.MFG Site Cover Page.Ship-To Location Cover Page.Projects Cover Page.Customer Cover Page.Lifecycle Phase Cover Page.RFQ Type
Sites Sites Site	General Info.Name General Info.Contact General Info.Phone
Specifications Specifications Specification	General Info.Name General Info.Description General Info.Lifecycle Phase General Info.Jurisdictions General Info.Validation Type General Info.Specification Type
Substances Materials Material Subparts Subpart Substance Groups Substance Group Substances Substance	General Info.Name General Info.Description General Info.CAS Number General Info.Lifecycle Phase General Info.Substance Type
Suppliers Suppliers Component Manufacturer Contract Manufacturer Distributor Manufacturer Rep	General Info.Supplier Type General Info.Number General Info.Name General Info.Description General Info.Status

Query class	Default result attributes
Transfer Orders	Cover Page.Transfer Order Type (See Retrieving CTO Originator Name on page 59)
Content Transfer Orders CTO	Cover Page.Transfer Order Number
Automated Transfer Orders ATO	Cover Page.Description
	Cover Page.Status
	Cover Page.Workflow

Specifying Result Attributes

If you run a query and find that the resulting `ITable` object does not contain the attributes you expected, it's because you didn't specify result attributes. The following example shows how to specify the result attributes for a query.

Example: Setting query result attributes

```
private void setQueryResultColumns(IQuery query) throws APIException {
    // Get Admin instance
    IAdmin admin = m_session.getAdminInstance();

    // Get the Part class
    IAgileClass cls = admin.getAgileClass("Part");

    // Get some Part attributes, including Page Two and Page Three
    attributes
    IAttribute attr1 =
    cls.getAttribute(ItemConstants.ATT_TITLE_BLOCK_NUMBER);
    IAttribute attr2 =
    cls.getAttribute(ItemConstants.ATT_TITLE_BLOCK_DESCRIPTION);
    IAttribute attr3 =
    cls.getAttribute(ItemConstants.ATT_TITLE_BLOCK_LIFECYCLE_PHASE);
    IAttribute attr4 =
    cls.getAttribute(ItemConstants.ATT_PAGE_TWO_TEXT01);
    IAttribute attr5 =
    cls.getAttribute(ItemConstants.ATT_PAGE_TWO_NUMERIC01);
    IAttribute attr6 =
    cls.getAttribute(ItemConstants.ATT_PAGE_THREE_TEXT01);
    // Put the attributes into an array
    IAttribute[] attrs = {attr1, attr2, attr3, attr4, attr5, attr6};
    // Set the result attributes for the query
    query.setResultAttributes(attrs);
}
```

The `IQuery.setResultAttributes()` method takes an `Object[]` value for the `attrs` parameter, supporting `String`, `Integer`, or `IAttribute` arrays. Therefore, instead of specifying an array of `IAttribute` objects, you can also specify an array of attribute names (such as `{"Title Block.Description", "Title Block.Number"}`) or attribute ID constants.

The following example shows how to specify result attributes using ID constants.

Example: Setting query result attributes by specifying ID constants

```
private void setQueryResultColumns(IQuery query) throws APIException {
    // Put the attribute IDs into an array
    Integer[] attrs = { ItemConstants.ATT_TITLE_BLOCK_NUMBER,
                       ItemConstants.ATT_TITLE_BLOCK_DESCRIPTION,
                       ItemConstants.ATT_TITLE_BLOCK_LIFECYCLE_PHASE,
                       ItemConstants.ATT_PAGE_TWO_TEXT01,
                       ItemConstants.ATT_PAGE_TWO_NUMERIC01,
                       ItemConstants.ATT_PAGE_THREE_TEXT01 };
    // Set the result attributes for the query
    query.setResultAttributes(attrs);
}
```

When you use the `setResultAttributes()` method, make sure you specify valid result attributes. Otherwise, the `setResultAttributes()` method will fail. To get an array of available result attributes that can be used for a query, use `getResultAttributes()`, as shown in the following example.

Example: Getting the array of available result attributes

```
private IAttribute[] getAllResultAttributes(IQuery query) throws
APIException {
    IAttribute[] attrs = query.getResultAttributes(true);
    return attrs;
}
```

Retrieving CTO Originator Name

The Cover Page of the Content Transfer Order (CTO) includes the Originator field which specifies roles and site assignments of users who originate CTOs. To retrieve the user name, you can not query this field directly and need to retrieve data in `UserConstants`. For example, the following statement which attempts to retrieve the user name directly, will not work:

```
QueryString = (" [Cover Page.Originator] equal to '<Last_name>,
<First_name>'");
```

But the following statements which also specify the data in `UserConstants` will work:

```
QueryString = "[Cover Page.Originator] in
(["+UserConstants.ATT_GENERAL_INFO_USER_ID+"]=='<UserID>')";
```

Or,

```
QueryString = "[Cover Page.Originator] in
(["+UserConstants.ATT_GENERAL_INFO_LAST_NAME+"]=='<Last_name>'"+
"&&
["+UserConstants.ATT_GENERAL_INFO_FIRST_NAME+"]=='<First_name>')";
```

The query criteria for any innumerable attribute type such as `IItem`, `IChange`, and so on, must be in a nested form. This applies to the Originator attribute which points to Agile All users.

Duplicate Results for Site-Related Objects and AMLs

The manufacturing sites functionality of the Agile Application Server can have unintended results when you search for items or changes. If you search for items or changes and include a sites attribute—[Title Block.Site] for items and [Cover Page.Site(s)] for changes—in the result attributes, the query results include duplicate objects for each site associated with the object. Similarly, if you search for items and include an AML attribute—such as [Manufacturers.Mfr.Part Number]—in the result attributes, the query results include duplicate items for each manufacturer part listed on an item's Manufacturers table.

For example, a part with the number 1000-02 has five sites associated with it. If you search for that part and include Title Block.Site in the result attributes, the resulting ITable object returned by the IQuery.execute method contains five rows, not one. Each row references the same object, part number 1000-02, but the Site cell has a different value. If you use ITable.getReferentIterator to iterate through referenced objects in the search results, the duplicate objects would be more apparent; in this example, you would iterate over the same item five times.

Working with Query Results

When you run a query, the Agile API returns an ITable object, which extends java.Util.Collection. You can use the methods of ITable and of java.Util.Collection to work with the results. For example, the following code shows how to use the Collection.iterator() method.

```
Iterator it = query.execute().iterator();
```

The ITwoWayIterator interface lets you traverse the list of rows in either direction using the next() and previous() methods.

```
ITwoWayIterator it = query.execute().getTableIterator();  
ITwoWayIterator it = query.execute().getReferentIterator();
```

For more information about using ITwoWayIterator, see [Iterating Over Table Rows](#) on page 75.

Sorting Query Results

Unlike other Agile API tables, you cannot create a sorted iterator for query results using the ITable.ISortBy interface. To sort query results, use SQL syntax and specify an ORDER BY statement with the search criteria. For more information, see [Using SQL Syntax for Search Criteria](#) on page 50.

Query Result Datatypes

Values in a query results table have the same datatype as their attributes. That is, if an attribute's datatype is an Integer, its value in a query results table is also an Integer.

Important Remember that in Agile 9.0 SDK, all values in a query results table are strings. In post Agile 9.2, these values are integers.

Managing Large Query Results

Agile PLM has a system preference named Maximum Query Results Displayed that sets a limit on the maximum number of rows that can be returned from any query. However, that preference doesn't affect Agile SDK Clients. Queries that you run from an Agile SDK Client always return all results.

Although you can access the entire query result set with the returned `ITable` object, the Agile API internally manages retrieving partial results as necessary. For example, let's say a particular query returns 5000 records. You can use the `ITable` interface to access any of those 5000 rows. You don't need to worry about how many of the 5000 rows the Agile API actually loaded into memory.

Note Searches that you run from other Agile PLM Clients, such as Agile Web Client, adhere to the limit imposed by the Maximum Query Results Displayed preference.

Query Performance

The response time for running queries can be the biggest bottleneck in your Agile API program. To improve performance, you should try to construct queries that return no more than a few hundred results. A query that returns more than a 1000 results can take several minutes to finish processing. Such queries also eat up valuable processing on the Agile Application Server, potentially slowing down your server for all users.

Creating a Where-Used Query

Previous sections of this chapter described how to create queries that search for Agile PLM objects, for example, items or changes. You can also create where-used queries. In a where-used query, the search conditions define the items that appear on the BOMs of objects. You can use a where-used query to find the assemblies on which a particular part is used.

The interface for a where-used query is similar to a standard object query. With minor changes, you can turn an object query into a where-used query as long as the query class is an `Item` class.

Note Where-used queries are only defined for `Item` classes.

To define a where-used query, use the `IQuery.setSearchType()` method. You can also use the following logical operators, also called where-used set operators, to further define the relationships between grouped sets of search conditions. Only one logical operator can be used for each search condition.

Where Used set operator	Description
<code>intersect</code>	Produces records that appear in both result sets from two different groups of search conditions.
<code>minus</code>	Produces records that result from the first group of search conditions but not the second.
<code>union</code>	Produces records that are the combination of results from two groups of search conditions.

Note Where-used set operators have higher priority than other logical operators. Therefore, search conditions joined by where-used set operations are evaluated before those joined by 'and' or 'or' operators.

Example: Where-used query

```
void btnFind_actionPerformed(ActionEvent e) {
    try {
        // Create the query
        IQuery wuquery =
            (IQuery)m_session.createObject(IQuery.OBJECT_TYPE,
                ItemConstants.CLASS_ITEM_BASE_CLASS);
        // Set the where-used type

        wuquery.setSearchType(QueryConstants.WHERE_USED_ONE_LEVEL_LATEST_RELEASED);
        // Add query criteria
        wuquery.setCriteria(
            "[Title Block.Part Category] == 'Electrical'" +
            "and [Title Block.Description] contains 'Resistor'" +
            "union [Title Block.Description] contains '400'" +
            "and [Title Block.Product Line(s)] contains 'Taurus'");
        // Run the query
        ITable results = wuquery.execute();

        // Add code here to display the results
    }
    catch (APIException ex) {System.out.println(ex);}
}
```

Loading a Query

There are two ways to load a query:

- Use the `IAgileSession.getObject()` method to specify the full path of a query.
- Use the `IFolder.getChild()` method to specify the location of a query relative to a folder.

The following example shows how to load a query by specifying its full path.

Example: Loading a query using `IAgileSession.getObject()`

```
try {

    //Load the "Changes Submitted to Me" query
    IQuery query =
        (IQuery)m_session.getObject(IQuery.OBJECT_TYPE,
            "/Workflow Routings/Changes Submitted To Me");
} catch (APIException ex) {
    System.out.println(ex);
}
```

The following example shows how to load a query by specifying its path relative to a folder, in this case the user's Public In-box folder.

Example: Loading a query using IFolder.getChild()

```
try {
//Get the Workflow Routings folder
IFolder folder =
  (IFolder)m_session.getObject(IFolder.OBJECT_TYPE, "/Workflow
  Routings");
//Load the "Changes Submitted to Me" query
IQuery query =
  (IQuery)folder.getChild("Changes Submitted To Me");
} catch (APIException ex) {
  System.out.println(ex);
}
```

Deleting a Query

To delete a saved query, use the `IQuery.delete()` method. Temporary queries, that is, queries that are created but not saved to a folder are automatically deleted after the user session is closed. For lengthy sessions, you can use the `delete()` method to explicitly delete a temporary query after you're finished running it.

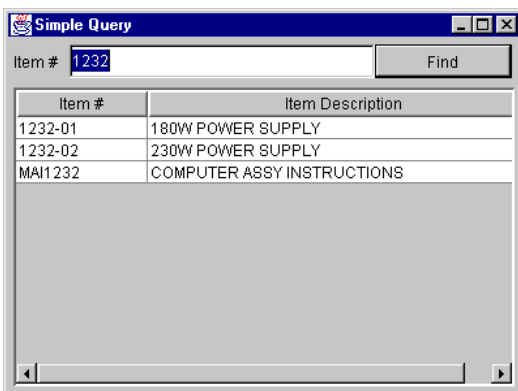
Example: Deleting a query

```
void deleteQuery(IQuery query) throws APIException {
  query.delete();
}
```

Simple Query Examples

Figure below depicts an example of dialog box that performs a simple query.

Figure 4: Simple Query dialog box



The Simple Query dialog box lets the user specify an item number to search for. When the user clicks the Find button, the program constructs a query to find all items that contain the specified text in the Item Number field. This example shows the code that runs the query when the user clicks the Find button.

Example: Simple Query code

```
void btnFind_actionPerformed(ActionEvent e) {
    try {
        // Create the query
        IQuery query = (IQuery)m_session.createObject(IQuery.OBJECT_TYPE,
            ItemConstants.CLASS_ITEM_BASE_CLASS);
        // Turn off case-sensitivity
        query.setCaseSensitive(false);
        // Specify the criteria data
        query.setCriteria("[Title Block.Number] contains (%0)",
            new String[] { this.txtItemNum.getText().toString() });
        // Run the query
        ITable queryResults = query.execute();
        Iterator i = queryResults.iterator();

        // If there are no matching items, display an error message.
        if (!i.hasNext()) {
            JOptionPane.showMessageDialog(null, "No matching items.", "Error",
                JOptionPane.ERROR_MESSAGE);
            return;
        }

        // Define arrays for the table data
        final String[] names = {"Item Number", "Item Description"};
        final Object[][] data = new Object[resultCount][names.length];
        int j = 0;
        while (i.hasNext()) {
            IRow row = (IRow)i.next();
            data[j][0] =
            row.getValue(ItemConstants.ATT_TITLE_BLOCK_NUMBER).toString();
            data[j][1] =
            row.getValue(ItemConstants.ATT_TITLE_BLOCK_DESCRITPION).toString();
            j++;
        }
        catch (APIException ex) {
            System.out.println(ex);
        }

        // Create a table model
        TableModel newDataModel = new AbstractTableModel() {
            // Add code here to implement the table model
        };

        // Populate the table with data from the table model
        myTable.setModel(newDataModel);
    }
}
```

Working with Tables

This chapter includes the following:

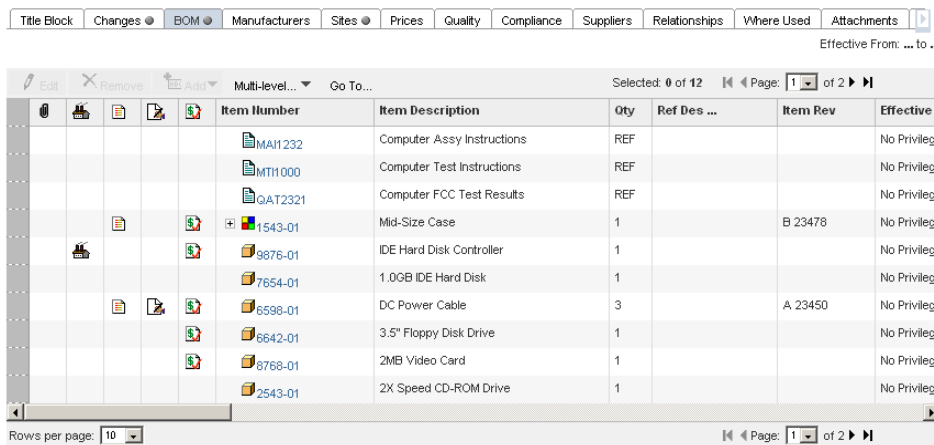
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- Retrieving a Table..... 66
- Accessing the New and Merged Relationships Tables..... 67
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About Tables

Whenever you work with an Agile PLM object in your program, you inevitably need to get and display the object’s data. The data is contained in one or more tables. In Agile Web Client, these tables are equivalent to the separate tabs in a window, such as the Manufacturers and BOM tabs.

The following figure shows the BOM tab for an item in Agile Web Client.

Figure 5: BOM tab for Item



In some cases, a tab in Agile Web Client contains multiple tables. For example, the Changes tab for an item contains the Pending Changes table and the Change History table. The tabs and the tables

that they contain is not always the same for different Agile products. Also, they are not the same for each Agile PLM Dataobject. For example, tables for Parts objects are different from tables for Manufacturers objects. See [Retrieving a Table](#) on page 66.

To work with data in an Agile PLM table, follow these basic steps:

1. Create or get an object (for example, an item or a change order).
2. Retrieve a table (for example, the BOM table).
3. Iterate through the table rows to retrieve a row.
4. Get or set one or more attribute values for the selected row.

`ITable`, like `IFolder`, extends `java.util.Collection` and supports all the methods provided by that superinterface. This means that you can work with an `ITable` object as you would any Java `Collection`.

Interface	Inherited methods
<code>java.util.Collection</code>	<code>add()</code> , <code>addAll()</code> , <code>clear()</code> , <code>contains()</code> , <code>containsAll()</code> , <code>equals()</code> , <code>hashCode()</code> , <code>isEmpty()</code> , <code>iterator()</code> , <code>remove()</code> , <code>removeAll()</code> , <code>retainAll()</code> , <code>size()</code> , <code>toArray()</code> , <code>toArray()</code>

Retrieving a Table

After you create or get an object, you can use the `IDataObject.getTable()` method to retrieve a particular Agile PLM table. `IDataObject` is a general-purpose object that represents any Agile PLM object that contains tables of data. It is a superinterface of several other objects, including `IItem`, `IChange`, and `IUser`.

Note When retrieving PG&C's Supplier Declaration of Conformance (SDOC) tables, `IDataObject.getTable()` retrieves all 14 SDOC tables belonging to this base class. However, six of these tables (Items, Manufacturer Parts, Part Groups, Item Composition, Manufacturer Part Composition, Part Group Composition) are not enabled.

Tables vary for each Agile PLM dataobject. Tables for change objects are different from tables for items. Each table for a particular dataobject is identified by a constant in the constants class for that dataobject. Item constants are contained in the `ItemConstants` class, change constants are contained in the `ChangeConstants` class, and so on.

For information to use these tables, refer to the following Agile product administration documents:

- *Getting Started with Agile PLM*
- *Agile PLM Administrator Guide*
- *Agile PLM Product Governance & Compliance User Guide*
- *Agile PLM Product Portfolio Management User Guide*

Accessing the New and Merged Relationships Tables

In Release 9.2.2, the following tables were merged into a single table called the `Relationships` table.

- `Relationships.AffectedBy`
- `Relationships.Affects`
- `Relationships.Reference`

In addition, the constants that are used by these tables (`TABLE_REFERENCES`, `TABLE_RELATIONSHIPS_AFFECTS`, and `TABLE_RELATIONSHIPS_AFFECTEDBY`) were also removed. If you need these constants, you must rewrite them in your routines.

Note For a complete list of table constants that are merged and mapped into a single constants, or mapped into a new constant, see [Migrating Release 9.2.1 and Older Table Constants to Release 9.2.2](#) on page 361.

For information to use these tables, refer to the following Agile documents:

- To use these tables in Agile PLM products, refer to *Getting Started with Agile PLM* and *Agile PLM Administrator Guide*
- To use these tables in Agile PPM products, refer to *Agile PLM Product Portfolio Management User Guide*

Accessing the Relationships Table

The `IRelationshipContainer` interface was implemented to access this table. Any Agile business object that contains the `Relationships` table implements this interface. You can access this table using `IRelationshipContainer`, or `IDataObject.getTable()` with `CommonConstants.TABLE_RELATIONSHIPS` constant.

```
IRelationshipContainer container = (IRelationshipContainer) object;
ITable relationship = container.getRelationship();
```

Accessing the Merged Tables

If you used these tables in previous releases of Agile PLM, and require the functionalities that they provided, modify your code as shown below.

Accessing the Merged Relationships.AffectedBy Table

- Code used in Release 9.2.1.x and earlier releases:


```
ITable affectedBy =
  object.getTable(ChangeConstants.TABLE_RELATIONSHIPS_AFFECTEDBY);
```
- Code recommended for this release:


```
ITable affectedBy =
  object.getTable(CommonConstants.TABLE_RELATIONSHIPS)
  .where("[2000007912] == 1", null);
```

Accessing the Merged Relationships.Affects table

- Code used in Release 9.2.1.x and earlier releases:

```
ITable affects =  
object.getTable(ChangeConstants.TABLE_RELATIONSHIPS_AFFECTS);
```

- Code recommended for this release:

```
ITable affects =  
object.getTable(CommonConstants.TABLE_RELATIONSHIPS)  
.where("[2000007912] == 2", null);
```

Accessing the Merged Relationships.References Table

- Code used in Release 9.2.1.x and earlier releases:

```
ITable references =  
object.getTable(ChangeConstants.TABLE_RELATIONSHIPS_REFERENCES);
```

- Code recommended for this release:

```
ITable references =  
object.getTable(CommonConstants.TABLE_RELATIONSHIPS)  
.where("[2000007912] == 3", null);
```

Important The `ITable.where()` method is certified for deployment with these three tables only, and it may fail if it is used to access other tables from the SDK.

The following example shows how to retrieve and print the BOM table for an item.

Example: Retrieving the BOM table

```
//Load an item  
private static IItem loadPart(String number) throws APIException {  
    IItem item = (IItem)m_session.getObject(ItemConstants.CLASS_PART,  
number);  
    return item;  
}  
//Get the BOM table  
private static void getBOM(IItem item) throws APIException {  
    IRow row;  
    ITable table = item.getTable(ItemConstants.TABLE_BOM);  
    Iterator it = table.iterator();  
    while (it.hasNext()) {  
        row = (IRow)it.next();  
        //Add code here to do something with the BOM table  
    }  
}
```


Working with Read-only Tables

Several Agile PLM tables store history information or data about related objects. These tables are read-only and as such, you cannot modify these tables. When you write code to access a table, use the `ITable.isReadOnly()` method to check if the table is read-only.

Retrieving the Metadata of a Table

The `ITableDesc` is an interface that represents the metadata of a table which is the underlying data that describes a table's properties. `ITableDesc` is related to `ITable` in the same way that `I AgileClass` is related to `IDataObject`. At times you may need to identify the attributes for a particular table, its ID, or its table name without loading a dataobject. The following example shows how to use the `ITableDesc` interface to retrieve the collection of all attributes (including ones that aren't visible) for a table.

Example: Retrieving the metadata of a table

```
private IAttribute[] getBOMAttributes() throws APIException {
    IAgileClass cls = admin.getAgileClass(ItemConstants.CLASS_PART);
    ITableDesc td = cls.getTableDescriptor(ItemConstants.TABLE_BOM);
    IAttribute[] attrs = td.getAttributes();
    return attrs;
}
```

You can also use the API Name field to identify a table's name or ID. For information to use this field, see [Accessing PLM Metadata with APIName Field](#) on page 123. For information to use the Agile API to work with metadata, see [Performing Administrative Tasks](#) on page 329.

Adding Table Rows

To create a table row, use the `ITable.createRow(java.lang.Object)` method, which creates a new row and initializes it with the data specified in the `param` parameter. The `param` parameter of `createRow` is available to pass the following data:

- a set of attributes and values for the row's cells
- files or URLs to add to the Attachments table
- an Agile PLM object (such as an `IItem`) to add to the table

When you add a row to a table, it's not necessarily added at the end of the table.

Note There is also a deprecated, parameter-less version of the `createRow()` method, which creates an empty row. Avoid using that method because it may not be supported in future Agile PLM releases. You must initialize a row with data when you create it.

You can also add table rows in batch format with `ITable.createRow()`. See [Adding and Updating Multiple Table Rows](#) on page 72.

Adding an Item to the BOM Table

The following example shows how to use the `ITable.createRow()` method to add an item to a BOM table.

Example: Adding a row and setting values

```
private static void addToBOM(String number) throws APIException {
    IItem item = (IItem)m_session.getObject(ItemConstants.CLASS_PART,
number);
    ITable table = item.getTable(ItemConstants.TABLE_BOM);
    Map params = new HashMap();
    params.put(ItemConstants.ATT_BOM_ITEM_NUMBER, "1543-01");
    params.put(ItemConstants.ATT_BOM_QTY, "1");
    item.setManufacturingSite(ManufacturingSiteConstants.COMMON_SITE);
    IRow row = table.createRow(params);
}
```

Note To add a site-specific row to the BOM table, use `IManufacturerSiteSelectable.setManufacturingSite()` to select a specific site before calling `ITable.createRow()`.

Adding an Attachment to the Attachments Table

The following example shows how to use the `ITable.createRow(java.lang.Object)` method to add a row to the Attachments table. The code adds a row to the table and initializes it with the specified file. After adding the row, the code also sets the value of the File Description field.

Example: Adding a row to the Attachments table

```
private static void addAttachmentRow(String number) throws APIException
{
    File file = new File("d:/MyDocuments/1543-01.dwg");
    IItem item = (IItem)m_session.getObject(ItemConstants.CLASS_PART,
number);
    ITable table = item.getTable(ItemConstants.TABLE_ATTACHMENTS);
    IRow row = table.createRow(file);
}
```

Adding a Manufacturer Part to the Manufacturers Table

The following example shows how to use the `ITable.createRow(java.lang.Object)` method to add a row to the Manufacturers table of an item. The code adds a row to the table and initializes it with the specified `IManufacturerPart` object.

Example: Adding a row to the Manufacturers table

```
private static void addMfrPartRow(String number) throws APIException {
    HashMap info = new HashMap();

    info.put(ManufacturerPartConstants.ATT_GENERAL_INFO_MANUFACTURER_PART_N
UMBER, "TPS100-256");
```

```

info.put (ManufacturerPartConstants.ATT_GENERAL_INFO_MANUFACTURER_NAME,
"TPS_POWER");
    IManufacturerPart mfrPart = (IManufacturerPart)m_session.getObject (
        ManufacturerPartConstants.CLASS_MANUFACTURER_PART, info
    );
    IItem item = (IItem)m_session.getObject (ItemConstants.CLASS_PART,
number);
    item.setManufacturingSite (ManufacturingSiteConstants.COMMON_SITE);
    ITable table = item.getTable (ItemConstants.TABLE_MANUFACTURERS);
    IRow row = table.createRow(mfrPart);
}

```

Note To add a site-specific row to the Manufacturers table, use `IManufacturerSiteSelectable.setManufacturingSite()` to select a specific site before calling `ITable.createRow()`.

Adding an Item to the Affected Items Table

The following example shows how to use the `ITable.createRow(java.lang.Object)` method to add a row to the Affected Items table of a change order. The code adds a row to the table and initializes it with the specified `IItem` object.

Example: Adding a row to the Affected Items table

```

private static void addItemRow(String number) throws APIException {
    IItem item = (IItem)m_session.getObject (ItemConstants.CLASS_PART,
"P522-103");
    IChange change =
    (IChange)m_session.getObject (ChangeConstants.CLASS_ECO, number);
    ITable table = change.getTable (ChangeConstants.TABLE_AFFECTEDITEMS);
    IRow row = table.createRow(item);
}

```

Because the BOM table also references `IItem` objects, you can use code similar to those in Example 49 to add a row to a BOM table.

Adding a Task to the Schedule Table

The following example shows how to use the `ITable.createRow(java.lang.Object)` method to add a row to the Schedule table of a Project. The code adds a row to the table and initializes it with the specified `IProgram` object.

Example: Adding a row to the Schedule table

```

private static void addTaskRow(IProgram program, IProgram task) throws
APIException {
    // Get the Schedule table of the program
    ITable table = program.getTable (ProgramConstants.TABLE_SCHEDULE);
    // Add the task to the schedule
    IRow row = table.createRow(task);
}

```

Adding and Updating Multiple Table Rows

The `ITable` interface provides two convenient methods for adding and updating multiple table rows with one API call:

- `ITable.createRows()`
- `ITable.updateRows()`

Because these methods group multiple table rows in one API call, they can improve performance by reducing the number of Remote Procedure Calls (RPCs), particularly if you are connecting to the server across a Wide Area Network (WAN). However, these methods do not result in efficient batch operations on the Agile Application Server, which simply iterates through each row being added or updated.

Important The `ITable.createRows()` and `ITable.updateRows()` methods are supported only when you are adding or updating multiple rows on the BOM table of items, or the Affected Items table of Changes.

Adding Multiple Team Members to the Team Table of a Project

The following example shows how the `ITable.createRows()` method supports the Team Table of a Project.

Example: Adding Multiple Team members to a Program using the Bulk API

```
private static void createTeamRows(String[] addTeamMembers) throws
APIException {
    //Get the Project
    IProgram program = (IProgram)session.getObject(IProgram.OBJECT_TYPE,
programNumber);
    //Get the Team Table
    ITable teamTable = program.getTable(ProgramConstants.TABLE_TEAM);
    IAgileList attrRolesValues =
teamTable.getAvailableValues(ProgramConstants.ATT_TEAM_ROLES);
    attrRolesValues.setSelection(new Object[]{"Change
Analyst", "Program Team Member"});
    //Collect team members already on Team Table
    Set presentMembers = new HashSet();
    Iterator it = teamTable.iterator();
    while(it.hasNext()) {
        IRow row = (IRow)it.next();
        IUser user = (IUser)row.getReferent();
        presentMembers.add(user);
    }

    //Validate new team members and filter out existing members to
and to Team Table
    IUser user = null;
    IUser[] newUsers= new IUser[addTeamMembers.length];

    int usrCount = 0;

    for(int i =0; i<addTeamMembers.length; i++ ) {
```

```

        user = (IUser)session.getObject(IUser.OBJECT_TYPE,
        addTeamMembers[i]);
        if(!presentMembers.contains(user) || user==null) {
            newUsers[usrCount++]=user;
        }
    }

    //Using createRows() API to add all Team members at once
    //In this bulk approach, make sure each map in array is complete
    by it self to create a new row in Team Table.
    List<Map> newTeam=new ArrayList<Map>();
    for (int i=0; i<usrCount; i++) {
        Map teamMap = new HashMap();
        teamMap.put(ProgramConstants.ATT_TEAM_NAME, newUsers[i]);
        teamMap.put(ProgramConstants.ATT_TEAM_ROLES,
        attrRolesValues);
        teamMap.put(ProgramConstants.ATT_TEAM_ALLOCATION, 0);
        newTeam.add(teamMap);
    }

    teamTable.createRows(newTeam.toArray(new Object[0]));
}

```

Adding Multiple Items to the BOM Table

The following example shows how to use the `ITable.createRows()` method to add multiple items to a BOM table.

Example: Adding multiple rows and setting values

```

private static void createBOMRows(String partNumber) throws
APIException {
    IItem[] child = new IItem [3];
    IItem parent = null;
    ITable tab = null;

    // Get the parent item
    parent = (IItem) m_session.getObject(IItem.OBJECT_TYPE, partNumber);
    // Get the BOM table
    tab = parent.getTable(ItemConstants.TABLE_BOM);

    // Create child items
    child[0] = (IItem) m_session.createObject(ItemConstants.CLASS_PART,
partNumber + "-1");
    child[1] = (IItem) m_session.createObject(ItemConstants.CLASS_PART,
partNumber + "-2");
    child[2] = (IItem) m_session.createObject(ItemConstants.CLASS_PART,
partNumber + "-3");
    // Create a row array
    IRow[] rowArray = new IRow[3];

    // Add the items to the BOM

```

```
    rowArray = tab.createRows(new Object[]{child[0], child[1],
child[2]});
}
```

Note To add a site-specific row to the BOM table, use `IManufacturerSiteSelectable.setManufacturingSite()` to select a specific site before calling `ITable.createRow()`.

Updating Multiple BOM Rows

To update multiple rows, use the `ITable.updateRows()` method. This method batches together multiple update operations into a single call. Instead of calling `IRow.setValues()` for multiple rows in a table, this API updates an entire table in one method call.

The `rows` parameter of `updateRow()` can be used to pass a `Map` containing `IRow` instances as keys with instances for values. The value `Map` objects should have attribute IDs as keys and replacement data for values.

Example: Updating multiple BOM rows

```
private static void updateBOMRows(String partNumber) throws
APIException {
    IItem parent = null;
    ITable tab = null;
    HashMap[] mapx = new HashMap[3];
    Map rows = new HashMap();
    IRow[] rowArray = new IRow[3];

    // Get the parent item
    parent = (IItem) m_session.getObject(IItem.OBJECT_TYPE, partNumber);
    // Get the BOM table
    tab = parent.getTable(ItemConstants.TABLE_BOM);
    // Create three items
    IItem child1 = (IItem)
m_session.createObject(ItemConstants.CLASS_PART, partNumber + "-1");
    IItem child2 = (IItem)
m_session.createObject(ItemConstants.CLASS_PART, partNumber + "-2");
    IItem child3 = (IItem)
m_session.createObject(ItemConstants.CLASS_PART, partNumber + "-3");
    // Add these items to BOM table
    rowArray = tab.createRows(new Object[]{child1, child2, child3});
    // New values for child[0]
    mapx[0] = new HashMap();
    mapx[0].put(ItemConstants.ATT_BOM_FIND_NUM, new Integer(1));
    mapx[0].put(ItemConstants.ATT_BOM_QTY, new Integer(3));
    mapx[0].put(ItemConstants.ATT_BOM_REF_DES, "A1-A3");
    rows.put(rowArray[0], mapx[0]);
    // New values for child[1]
    mapx[1] = new HashMap();
    mapx[1].put(ItemConstants.ATT_BOM_FIND_NUM, new Integer(2));
    mapx[1].put(ItemConstants.ATT_BOM_QTY, new Integer(3));
    mapx[1].put(ItemConstants.ATT_BOM_REF_DES, "B1-B3");
    rows.put(rowArray[1], mapx[1]);
    // new values for child[2]
```

```

mapx[2] = new HashMap();
String strA = "BOM-Notes" + System.currentTimeMillis();
mapx[2].put(ItemConstants.ATT_BOM_BOM_NOTES, strA);
mapx[2].put(ItemConstants.ATT_BOM_FIND_NUM, new Integer(3));
rows.put(rowArray[2], mapx[2]);
// Update the BOM table rows
tab.updateRows(rows);
}

```

Iterating Over Table Rows

When you use the Agile API to get a table, such as a BOM table, your program often needs to browse the rows contained in the table. To access an individual row, you first have to get an iterator for the table. You can then iterate over each row to set cell values.

The Agile API does not support random access of rows in a table. This means that you can't retrieve a specific row by index number and then update it. When you add or remove a row, the entire table is resorted and the existing table iterator is no longer valid.

To browse the data in table, create an iterator for the table using one of these methods:

- `ITable.iterator()` – returns an `Iterator` object, allowing you to traverse the table from the first row to the last.
- `ITable.getTableIterator()` – returns an `ITwoWayIterator` object, allowing you to traverse the table rows forwards or backwards. You can also use `ITwoWayIterator` to skip a number of rows. `ITwoWayIterator` is preferred over `Iterator` if your program displays table rows in a user interface.
- `ITable.getTableIterator(ITable.ISortBy[])` – returns a sorted `ITwoWayIterator` object.
- `ITable.getReferentIterator()` – returns an `ITwoWayIterator` object for the objects referenced in the table.

When you work with an iterator for a table, you don't need to know the total number of rows in the table. Instead, you work with one row at a time. Although the `ITable` interface provides a `size()` method, which calculates the total number of rows in the table, it's considered a resource extensive operation performance-wise and as such, is not recommended for large tables, particularly if your code already uses an iterator to browse the table.

The following example demonstrates how to get an iterator for a table and use `ITwoWayIterator` to traverse forwards and backwards over the table rows.

Example: Iterating over table rows

```

try {
    // Get an item
    IItem item = (IItem)m_session.getObject(ItemConstants.CLASS_PART,
"1000-02");
    // Get the BOM table
    ITable bom = item.getTable(ItemConstants.TABLE_BOM);
    ITwoWayIterator i = bom.getTableIterator();
    // Traverse forwards through the table
    while (i.hasNext()) {

```

```
    IRow row = (IRow)i.next();
    // Add code here to do something with the row
}
// Traverse backwards through the table
while (i.hasPrevious()) {
    IRow row = (IRow)i.previous();
    // Add code here to do something with the row
}
} catch (APIException ex) {
    System.out.println(ex);
}
```

The `ITwoWayIterator` object allows a user interface to display table rows on multiple pages, which is perhaps more practical than the use of `ITwoWayIterator` shown in the preceding example. For example, instead of displaying a single scrolling page of several hundred BOM items, you can break the table into pages displaying 20 BOM items per page. To navigate from page to page, your program should provide navigation controls such as those shown in the figure below.

Figure 6: Navigation controls in the Agile Web Client



Updating Objects in Query Results with Multiple Page Tables

When you invoke `getReferentIterator` to update objects in search results tables that contain more than 200 results, `getReferentIterator` will not update all the objects that are returned by the query. For example, when you run a query to match a value in a field, and then edit the same value while iterating through the results with `getReferentIterator`, the query completes the first page with no problem. However, when it queries the remaining pages, some table rows are not updated. There are several ways to overcome this limitation. The following is one such example.

Example: Updating all table rows when iterating large query results

1. Increase the table page size for this query so that it can contain the results in a single page.
2. Run the query several times and keep updating the results until query results are empty.
3. Do not query on the same field that you are updating.

Sorting Table Rows

To sort the rows in a table by a particular attribute, use `getTableIterator(ITable.ISortBy[])` to return a sorted iterator. The `ISortBy` parameter of `getTableIterator()` is an array of `ITable.ISortBy` objects. To create an `ISortBy` object, use `createSortBy(IAttribute,ITable.ISortBy.Order)`. The `order` parameter of `createSortBy()` is one of the `ITable.ISortBy.Order` constants either `ASCENDING` or `DESCENDING`.

Note The Agile API allows you to sort a table by only one attribute. Therefore, the `ISortBy` array that you specify for the `ISortBy` parameter of `getTableIterator()` must contain only one `ISortBy` object.

The following example sorts the BOM table by the BOM | Item Number attribute.

Example: Sorting a table iterator

```
try {
    // Get an item
    IItem item = (IItem)m_session.getObject(ItemConstants.CLASS_PART,
"1000-02");
    // Get the BOM table
    ITable bom = item.getTable(ItemConstants.TABLE_BOM);
    // Get the BOM | Item Number attribute
    IAgileClass cls = item.getAgileClass();
    IAttribute attr =
cls.getAttribute(ItemConstants.ATT_BOM_ITEM_NUMBER);

    // Specify the sort attribute for the table iterator
    ITable.ISortBy sortByNumber = bom.createSortBy(attr,
ITable.ISortBy.Order.ASCENDING);
    // Create a sorted table iterator
    ITwoWayIterator i = bom.getTableIterator(new ITable.ISortBy[]
{sortByNumber});
    // Traverse forwards through the table
    while (i.hasNext()) {
        IRow row = (IRow)i.next();
        // Add code here to do something with the row
    }
} catch (APIException ex) {
    System.out.println(ex);
}
```

The following Product Sourcing and Projects Execution objects load tables a bit differently and therefore cannot be sorted using the `getTableIterator(ITable.ISortBy[])` method. For any tables of these objects, create an unsorted iterator using the `iterator()` or `getTableIterator()` methods.

- IDiscussion
- IPrice
- IProgram
- IProject
- IRequestForQuote
- ISupplier
- ISupplierResponse

The `ITable.ISortBy` interface is not supported for query result tables. To sort query results, use SQL syntax and specify an `ORDER BY` statement with the search criteria. For more information, see [Using SQL Syntax for Search Criteria](#) on page 50.

Removing Table Rows

To remove a row from a table, use the `ITable.removeRow()` method, which takes one parameter, an `IRow` object. You can retrieve a row by iterating over the table rows.

If a table is read-only, you can't remove rows from it. For more information, see [Working with Read-only Tables](#) on page 68. If you are working with a released revision of an item, you can't remove a row from the item's tables until you create a change order for a new revision.

Example: Removing a table row

```
try {
    // get an item
    IItem item = (IItem)m_session.getObject(ItemConstants.CLASS_PART,
"1000-02");
    // get the BOM table
    ITable bom = item.getTable(ItemConstants.TABLE_BOM);
    ITwoWayIterator i = bom.getTableIterator();
    // find the bom component 6642-01 and remove it
    while (i.hasNext()) {
        IRow row = (IRow)i.next();
        String bomitem =
(String)row.getValue(ItemConstants.ATT_BOM_ITEM_NUMBER);
        if (bomitem.equals("6642-01")) {
            bom.removeRow(row);
            break;
        }
    }
} catch (APIException ex) {
    System.out.println(ex);
}
```

Because `ITable` implements the `Collection` interface, you can use `Collection` methods to remove table rows. To remove all rows in a table, use `Collection.clear()`.

Example: Clearing a table

```
public void clearAML(IItem item) throws APIException {
    // Get the Manufacturers table
    ITable aml = item.getTable(ItemConstants.TABLE_MANUFACTURERS);
    // Clear the table
    aml.clear();
}
```

Retrieving the Referenced Object for a Row

Several Agile PLM tables contain rows of information that reference other Agile PLM objects. For example, the BOM table lists all items that are included in a Bill of Material. Each row of the BOM table represents an item. While working with a row on a BOM table, your program can allow the user to open the referenced item to view or modify its data.

The table below lists Agile PLM tables that reference other Agile PLM objects. All Agile PLM objects are referenced by number (for example, Item Number, Change Number, or Manufacturer Part Number).

Object	Table	Referenced Object(s)
IChange	Affected Items Affected Prices Attachments Relationships	IItem IPrice IAttachmentFile Multiple object types
ICommodity	Attachments Compositions Parts Specifications Substances Suppliers	IAttachmentFile IDeclaration IItem ISpecification ISubstance ISupplier
ICustomer	Attachments Related PSR	IAttachmentFile IServiceRequest
IDeclaration	Attachments Item Composition Items Manufacturer Part Composition Manufacturer Parts Part Group Composition Part Groups Relationships Specifications	IAttachmentFile ISubstance IItem ISubstance IManufacturerPart ISubstance ICommodity Multiple object types ISpecification
IDiscussion	Attachments Where Used	IAttachmentFile Not supported
IFileFolder	Files Relationships	IAttachmentFile Multiple object types

Object	Table	Referenced Object(s)
	Where Used	Multiple object types
IItem	Attachments BOM Change History Compositions Manufacturers Pending Change Where Used Pending Changes Prices Quality Redline BOM Redline Manufacturers Sites Specifications Substances Where Used	IAttachmentFile IItem IChange IDeclaration IManufacturerPart IItem IChange IPrice IServiceRequest or IQualityChangeRequest IItem IManufacturerPart IManufacturingSite ISpecification ISubstance IItem
IManufacturerPart	Attachments Compositions Prices Specifications Substances Suppliers Where Used	IAttachmentFile IDeclaration IPrice ISpecification ISubstance ISupplier IItem
IManufacturer	Attachments Where Used	IAttachmentFile IManufacturerPart
IManufacturingSite	Attachments	IAttachmentFile
IPackage	Attachments	IAttachmentFile
IPrice	Attachments Change History Pending Changes	IAttachmentFile IChange IChange

Object	Table	Referenced Object(s)
IProgram	Attachments Deliverables - Affected By Deliverables - Affects Dependencies - Dependent Upon Dependencies - Required For Discussion Links Schedule Team	IAttachmentFile Multiple object types Multiple object types IProgram IProgram IDiscussion Multiple object types IProgram IUser and IUserGroup
IProject	Attachments BOM Item Changes Items Manufacturer Items Pending Change Responses RFQs	IAttachmentFile IItem IChange IItem IManufacturerPart IChange ISupplierResponse IRequestForQuote
IQualityChangeRequest	Affected Items Attachments PSR Items Relationships	IItem IAttachmentFile IItem Multiple object types
IRequestForQuote	Attachments	IAttachmentFile
IServiceRequest	Affected Items Attachments Related PSR Relationships	IItem IAttachmentFile IServiceRequest Multiple object types
ISpecification	Attachments Substances	IAttachmentFile ISubstance
ISubstance	Attachments Composition Where Used	IAttachmentFile ISubstance Multiple object types
ISupplierResponse	Attachments	IAttachmentFile

Object	Table	Referenced Object(s)
ISupplier	Attachments Manufacturers PSRs	IAttachmentFile IManufacturer IServiceRequest
ITransferOrder	Attachments Selected Objects	IAttachmentFile Multiple object types
IUser	Attachments Subscription User Group	IAttachmentFile Multiple object types IUserGroup
IUserGroup	Attachments Users	IAttachmentFile IUser

The following example shows how to retrieve the referenced `IChange` object from the Pending Changes table for an item.

Example: Retrieving a referenced Change object

```
void getReferencedChangeObject(ITable changesTable) throws APIException
{
    Iterator i = changesTable.iterator();
    while (i.hasNext()) {
        IRow row = (IRow)i.next();
        IChange changeObj = (IChange)row.getReferent();
        if (changeObj != null) {
            //Add code here to do something with the IChange object
        }
    }
}
```

The following example shows how to simplify the code in the previous example by using the `ITable.getReferentIterator()` method to iterate through the table's referenced objects.

Example: Iterating through referenced objects

```
void iterateReferencedChangeObjects(ITable changesTable) throws
APIException {
    Iterator i = changesTable.getReferentIterator();
    while (i.hasNext()) {
        IChange changeObj = (IChange)i.next();
        if (changeObj != null) {
            //Add code here to do something with the IChange object
        }
    }
}
```

Checking Status Flags of a Row

Sometimes you may want to perform an action on an object only if it meets certain status criteria. For example, if the selected object is a released change order, your program may not allow the user to modify it. To check the status of an object, use the `IRow.isFlagSet()` method. The `isFlagSet()` method returns a boolean value `true` or `false`.

Status flag constants are defined in the following classes:

- `CommonConstants` – Contains status flag constants common to Agile PLM objects.
- `ChangeConstants` – Contains status flag constants for `IChange` objects.
- `ItemConstants` – Contains status flag constants for `IItem` objects.

The following example shows how to use the `isFlagSet()` method to determine whether an item has attachments.

Example: Checking the status flag of an object

```
private static void checkAttachments(IRow row) throws APIException {
    try {
        boolean b;
        b = row.isFlagSet(CommonConstants.FLAG_HAS_ATTACHMENTS);
        if (!b) {
            JOptionPane.showMessageDialog(null, "The specified row does not
            have attached files.", "Error", JOptionPane.ERROR_MESSAGE);
        }
    } catch (Exception ex) {}
}
```

Working with Page 1, Page 2, and Page 3

Page One (that is, Title Block, Cover Page, and General Info pages), Page Two, and Page Three contain a single row of data and are therefore not tabular in format. All other tables contain multiple rows. Consequently, the data on Page One, Page Two, and Page Three is directly accessible. To get and set values for these pages, you don't need to get a table and then select a row. Instead, get a specified cell, and then use the `getValue()` and `setValue()` methods to display or modify the data.

If you prefer accessing data cells in a consistent way throughout your program, you can still use the Page One, Page Two, and Page Three tables to get and set values. The following example shows two methods that edit the values for several Page Two fields for an item. The first method retrieves the Page Two table and then sets the values for several cells. The second method accesses the Page Two cells directly by calling the `IDataObject.getCell()` method. Either approach is valid, but you can see that the second approach results in fewer lines of code.

Example: Editing Page Two cells

```
// Edit Page Two cells by first getting the Page Two table
private static void editPageTwoCells(IItem item) throws Exception {
    ICell cell = null;
    DateFormat df = new SimpleDateFormat("MM/dd/yy");
```

```
ITable table = item.getTable(ItemConstants.TABLE_PAGETWO);
Iterator it = table.iterator();
IRow row = (IRow)it.next();
cell = row.getCell(ItemConstants.ATT_PAGE_TWO_TEXT01);
cell.setValue("Aluminum clips");
cell = row.getCell(ItemConstants.ATT_PAGE_TWO_MONEY01);
cell.setValue(new Money(new Double(9.95), "USD"));
cell = row.getCell(ItemConstants.ATT_PAGE_TWO_DATE01);
cell.setValue(df.parse("12/01/03"));
}
// Edit Page Two cells by calling IDataObject.getCell()
private static void editPageTwoCells2(IItem item) throws Exception {
    ICell cell = null;
    DateFormat df = new SimpleDateFormat("MM/dd/yy");
    cell = item.getCell(ItemConstants.ATT_PAGE_TWO_TEXT01);
    cell.setValue("Aluminum clips");
    cell = item.getCell(ItemConstants.ATT_PAGE_TWO_MONEY01);
    cell.setValue(new Money(new Double(9.95), "USD"));
    cell = item.getCell(ItemConstants.ATT_PAGE_TWO_DATE01);
    cell.setValue(df.parse("12/01/03"));
}
```

Redlining

When you issue a change for a released item or a price agreement, the Agile API lets you redline certain tables affected by the change. In the Agile PLM Clients, redline tables visually identify values that have been modified from the previous revision. Red underlined text—thus the term “redline”—indicates values that have been added, and red strikeout text indicates values that have been deleted. People responsible for approving the change can review the redline data.

The Agile PLM system provides the following redline tables:

- Redline BOM
- Redline Manufacturers (AML)
- Redline Price Lines
- Redline Title Block

Note The Web Client supports redlining the Item's Cover Page, Page Two, and Page Three tables together. However, in the SDK, these operations are performed separately, using different tables for each page.

To redline BOM, Manufacturers, or Price Lines tables:

1. Get a released revision of an item or price object.
2. Create a new change, such as an ECO, MCO, SCO, or PCO
 - ECOs let you modify an item's BOM or Manufacturers tables

- MCOs let you modify an item's Manufacturers table
 - SCOs let you modify an item's site-specific BOM, Manufacturers
 - PCOs let you modify a price's Price Lines table
3. Add the item or price to the Affected Items or Affected Prices table of the change.
 4. For ECOs and PCOs, specify the new revision for the change.
 5. SCOs and MCOs do not affect an item's revision.
 6. Modify a redline table, such as the Redline BOM, Redline Manufacturers (AML), Redline Price Lines.

To redline the Manufacturers table of an item:

This example shows how to redline the Manufacturers table (AML) of an item.

Example: Redlining the Manufacturers table of an item

```
private void redlineAML() throws APIException {

    IAttribute attrPrefStat = null;
    IAgileList listvalues = null;
    Map params = new HashMap();

    // Get a released item
    IItem item = (IItem)m_session.getObject("Part", "1000-02");
    // Get the Preferred status value
    IAgileClass cls = item.getAgileClass();
    attrPrefStat =
        cls.getAttribute(ItemConstants.ATT_MANUFACTURERS_PREFERRED_STATUS);
    listvalues = attrPrefStat.getAvailableValues();
    listvalues.setSelection(new Object[] { "Preferred" });
    // Create an MCO
    IChange change =
        (IChange)m_session.createObject(ChangeConstants.CLASS_MCO,
        "M000024");
    // Set the Workflow ID of the MCO
    change.setWorkflow(change.getWorkflows()[0]);
    // Get the Affected Items table
    ITable affectedItems =
        change.getTable(ChangeConstants.TABLE_AFFECTEDITEMS);
    // Add a new row to the Affected Items table
    IRow affectedItemRow = affectedItems.createRow(item);
    // Get the Redline Manufacturers table
    ITable redlineAML =
        item.getTable(ItemConstants.TABLE_REDLINEMANUFACTURERS);
    // Add a manufacturer part to the table
    params.put(ItemConstants.ATT_MANUFACTURERS_MFR_NAME, "AMD");
    params.put(ItemConstants.ATT_MANUFACTURERS_MFR_PART_NUMBER, "1234-
    009");
    params.put(ItemConstants.ATT_MANUFACTURERS_PREFERRED_STATUS,
    listvalues);
    redlineAML.createRow(params);
    // Add another manufacturer part to the table
    params.clear();
    params.put(ItemConstants.ATT_MANUFACTURERS_MFR_NAME, "DIGITAL
    POWER");
}
```

```
params.put (ItemConstants.ATT_MANUFACTURERS_MFR_PART_NUMBER,
"355355");
params.put (ItemConstants.ATT_MANUFACTURERS_PREFERRED_STATUS,
listvalues);
redlineAML.createRow (params);
}
```

To redline the Title Block table of an item:

The following is an example of redlining the Title Block table of the item. It assumes Item.Page_Two and the attribute Text01 are visible and Text01 is change controlled.

Example: Redlining the Title Block table of an item

```
ITable page2Tab = item.getTable (ItemConstants.TABLE_REDLINEPAGETWO);
Iterator it = page2Tab.getTableIterator ();
IRow redPage2Row = (IRow)it.next ();
ICell cell =
redPage2Row.getCell (CommonConstants.ATT_PAGE_TWO_TEXT01);
System.out.println ("old value, before update: " +
cell.getOldValue ());
redPage2Row.getCell (CommonConstants.ATT_PAGE_TWO_TEXT01).setValue ("u
pdated Text01")
```

Removing Redline Changes

When you make redline changes to a table such as a BOM table, you may want to undo the changes for a row and restore it to its original state. You can use the `IRedlinedRow.undoRedline()` method to undo any redline changes to a row.

If you undo the redlines for a row, any cells that are modified are restored to their original values. A redlined row can also be one that was added or deleted. If you undo the redlines for a row that was added, the entire row is removed from that revision. If you undo the redlines for a row that was deleted, the entire row is restored.

Example: Removing redline changes from the BOM table

```
private static void undoBOMRedlines (IItem item, String rev) throws
APIException {
    item.setRevision (rev);
    ITable redlineBOM = item.getTable (ItemConstants.TABLE_REDLINEBOM);
    Iterator it = redlineBOM.iterator ();
    while (it.hasNext ()) {
        IRedlinedRow row = (IRedlinedRow)it.next ();
        row.undoRedline ();
    }
}
```

Removing Redline Changes in Bulk Mode

Removing Redline Changes in Bulk Mode

Agile SDK enables removing (undoing) redlines with the aid of `IRedlinedTable`. This interface provides the API to perform bulk redline undos as shown below.

```
IRedlinedTable.undoRedline(Collection rows);
IRedlinedTable.undoAllRedline();
```

Note See [Redlining](#) on page 84.

Example: Typcasting Redline tables to `IRedlinedTable` interface

```
IItem item = (IItem) session.getObject(ItemConstants.CLASS_PART,
"PART_001");
item.setRevision("B"); // Unreleased change
ITable bomTable = item.getTable(ItemConstants.TABLE_REDLINEBOM);
Iterator it = bomTable.iterator();
List rows = new ArrayList();
while(it.hasNext()) {
    IRow row = (IRow) it.next();
    if(((IRedlined)row).isRedlineModified())
        rows.add(row);
}

// Only Redline tables can be typecasted to IRedlinedTable interface
// Case 1:
((IRedlinedTable)bomTable).undoRedline(rows);
// Case 2:
((IRedlinedTable)bomTable).undoAllRedline();
```

Identifying Redlined Rows and Redlined Cells

The `IRedlined` interface is designed to identify redlined rows and redlined cells. It is only supported on redlined tables. The interface works in conjunction with the `isRedlineModified()` method to show if objects are redlined. The interface typecasts `IRow` and `ICell` objects as follows:

- `IRow` indicates if the row is redline modified
- `ICell` indicates if the cell is redline modified.

Example: Identifying redlined rows and cells

```
public interface IRedlined {
    public boolean isRedlineModified()
    throws APIException;
}
```

The `IRedlined.isRedlineModified()` method returns a boolean value. This value is `TRUE` when cells or rows are redlined.

Note `IRedlined.isRedlineModified()` returns a `FALSE` value for all cells on redline added or redline removed rows.

Using ICell.getOldValue

With the introduction of the `IRedlined` interface, the `ICell.getOldValue()` method is no longer defined for redline added and redline removed rows. The `ICell.getOldValue()` method has a meaningful result only when `FLAG_IS_REDLINE_MODIFIED` is true for the row.

Note Do not call this method for redline added or redlined removed rows.

Working with Data Cells

This chapter includes the following:

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About Data Cells

An `ICell` object is a data field for an Agile PLM object that you have loaded or created in your program. A cell can correspond to a field on a tab in Agile Web Client or a single cell on a table. The `ICell` object consists of several properties that describe the current state of a cell. Most of the data manipulation your Agile API programs perform will involve changes to the value or properties of cells.

Data Types

The type of objects associated with the `getValue()` and `setValue()` methods depends on the cell's data type. The table below lists the object types of cell values for `getValue()` and `setValue()` methods.

DataConstants	Object type associated with <code>getValue</code> and <code>setValue</code>
<code>TYPE_DATE</code>	Date
<code>TYPE_DOUBLE</code>	Double
<code>TYPE_INTEGER</code>	Integer
<code>TYPE_MONEY</code>	Money
<code>TYPE_MULTILIST</code>	<code>I AgileList</code>
<code>TYPE_OBJECT</code>	Object
<code>TYPE_SINGLelist</code>	<code>I AgileList</code>
<code>TYPE_STRING</code>	String
<code>TYPE_TABLE</code>	Table

Note There are other Agile PLM datatypes, such as `TYPE_WORKFLOW`, but they are not used for cell values.

Checking User's Discovery Privilege

The Discovery privilege is the most basic Agile PLM privilege. It allows users to find if an object exists. If you do not have the Discovery privilege for an object, you won't be able to view that object.

For example, if a user does not have the Discovery privilege for Manufacturer Parts, your program will not allow the user to view several cells on the Manufacturers table of an item. You can use the `ICell.hasDiscoveryPrivilege()` method to check if the user has the Discovery privilege for a particular cell, as shown in the following example.

Note When you get the value for a cell for which you don't have the Discovery privilege, the Agile API returns a null string (""). This behavior is different with other Agile PLM Clients. For example, Agile Web Client displays the value "No Privilege" when you try to view a field for which you don't have the necessary viewing privileges.

Example: Checking Discovery privilege

```
Object v;
Integer attrID = ItemConstants.ATT_MANUFACTURERS_MFR_NAME;
try {
    // Get the Manufacturers table
    ITable aml =
        item.getTable(ItemConstants.TABLE_MANUFACTURERS);
    // Get the first row of the Manufacturers table
    IIterator iterator =
        aml.getTableIterator();
    if (iterator.hasNext()) {
        IRow amlRow =
            (IRow) iterator.next();
    }

    // Get the value for the Mfr. Name field.
    // If the user does not have Discovery privilege, the value is a null
    String.
    v = amlRow.getValue(attrID);
    txtMfrName.setText(v.toString());
    // If the user does not have the Discovery privilege
    // for the cell, make its text color red.
    ICell cell =
        amlRow.getCell(attrID);
    if (cell.hasDiscoveryPrivilege()==false) {
        txtMfrName.setForeground(Color.red);
    }
} catch (APIException ex) {
    System.out.println(ex);
}
```

Checking if the Cell is a Read-Only Cell

Roles and privileges assigned to a user by Agile PLM administrators, determine the level of access the user has to Agile PLM objects and their underlying data. For example, users with only `ReadOnly` privileges can view Agile PLM objects but not modify them.

Whenever your program displays a value from a cell, you should check whether the cell is read-only for the current user. If it is, your program must not allow the user to edit the value. If a user tries to set a value for a read-only cell, the Agile API throws an exception.

Example: Checking whether a field is a read-only field

```
// ID for "Title Block.Description"
Integer attrID = ItemConstants.ATT_TITLE_BLOCK_DESCRIPTION;
// Set the value for the Description text field.
try {
    txtDescription.setText(item.getValue(attrID).toString());
// Get the ICell object for "Title Block.Description"
ICell cell = item.getCell(attrID);
// If the cell is read-only, disable the cell
if (cell.isReadOnly()) {
    txtDescription.setEnabled(false);
    txtDescription.setBackground(Color.lightGray);
}
else {
    txtDescription.setEnabled(true);
    txtDescription.setBackground(Color.white);
}
} catch (APIException ex) {
    System.out.println(ex);
}
```

Getting Values

The following table lists Agile API methods for getting values for cells.

Method	Description
<code>ICell.getValue()</code>	Gets a cell value
<code>IRow.getValue()</code>	Gets a cell value contained within a row
<code>IRow.getValues()</code>	Gets all cell values contained within a row
<code>IDataObject.getValue()</code>	Gets a cell value on Page One, Page Two, or Page Three

Before working with a cell's value, you must select the cell. Agile PLM cells are instances of attributes. To specify the attribute for a cell, specify either the attribute's ID constant, its fully qualified name (such as "Title Block.Description"), or an `IAttribute` object. For more information about referencing attributes, see *Referencing Attributes in SDK Developer Guide - Developing PLM Extensions*.

Note You can use `ICell` `getAPIName()` to access Data Cell attribute values. For information to use this field, see [Accessing PLM Metadata with APIName Field](#) on page 123.

The following example shows how to reference a cell by attribute ID constant.

Example: Specifying a cell by ID

```
Object v;
Integer attrID = ItemConstants.ATT_TITLE_BLOCK_NUMBER;
try {
    v = item.getValue(attrID);
} catch (APIException ex) {
    System.out.println(ex);
}
```

The following example shows how to reference a cell by the fully qualified attribute name.

Example: Specifying a field by fully qualified name

```
Object v;
String attrName = "Title Block.Number";
try {
    v = item.getValue(attrName);
} catch (APIException ex) {
    System.out.println(ex);
}
```

The method that you use to get a cell value depends on the current object in use by your program. Use the `ICell.getValue()` method if you have already retrieved an `ICell` object and want to retrieve a value.

Example: Getting a value using `ICell.getValue()`

```
private static Object getCellVal(ICell cell) throws APIException {
    Object v;
    v = cell.getValue();
    return v;
}
```

Quite often, your program will first retrieve an object, such as an item, and then use the `IDataObject.getValue(java.lang.Object cellId)` method to retrieve values for it.

Example: Getting a value using `IDataObject.getValue(Object cellID)`

```
private static Object getDescVal(IItem item) throws APIException {
    Integer attrID = ItemConstants.ATT_TITLE_BLOCK_DESCRIPTION;
    Object v;
    v = item.getValue(attrID);
    return v;
}
```

The object returned by the `getValue()` method is of the same data type as the Agile PLM attribute. For more information about data types, see [Data Types](#) on page 89.

Note All cells in a table returned by a query contain `String` values regardless of the datatypes associated with those cells. For more information about query result tables, see [Working with Query Results](#) on page 60.

If you are iterating over rows in an Agile PLM table, you can use the `IRow.getValues()` method to retrieve a `Map` object containing all cell values for a particular row in the table. The returned `Map` object maps attribute ID keys to cell values.

Understanding SDK Date Formats and User Preferences

In SDK, date is available as a Java `Date` object and does not format the date according to *User Preferences*. However, end users can convert it to their preferred format in GUI's *User Preferences*.

Important End users must use the GMT date format for PPM dates. For more information, refer to the *Agile PLM Product Portfolio Management User Guide*.

Getting Values

The following table lists Agile API methods for getting values for cells.

Method	Description
<code>ICell.getValue()</code>	Gets a cell value
<code>IRow.getValue()</code>	Gets a cell value contained within a row
<code>IRow.getValues()</code>	Gets all cell values contained within a row
<code>IDataObject.getValue()</code>	Gets a cell value on Page One, Page Two, or Page Three

Before working with a cell's value, you must select the cell. Agile PLM cells are instances of attributes. To specify the attribute for a cell, specify either the attribute's ID constant, its fully qualified name (such as "Title Block.Description"), or an `IAttribute` object. For more information about referencing attributes, see [Referencing Attributes](#).

Note You can use `ICell.getAPIName()` to access Data Cell attribute values. For information to use this field, see [Accessing PLM Metadata with APIName Field](#) on page 123.

The following example shows how to reference a cell by attribute ID constant.

Example: Specifying a cell by ID

```
Object v;
Integer attrID = ItemConstants.ATT_TITLE_BLOCK_NUMBER;
try {
    v = item.getValue(attrID);
} catch (APIException ex) {
    System.out.println(ex);
}
```

The following example shows how to reference a cell by fully a qualified attribute name.

Example: Specifying a field by fully qualified name

```
Object v;  
String attrName = "Title Block.Number";  
try {  
    v = item.getValue(attrName);  
} catch (APIException ex) {  
    System.out.println(ex);  
}
```

The method that you use to get a cell value depends on the current object in use by your program. Use the `ICell.getValue()` method if you have already retrieved an `ICell` object and want to retrieve a value.

Example: Getting a value using `ICell.getValue()`

```
private static Object getCellVal(ICell cell) throws APIException {  
    Object v;  
    v = cell.getValue();  
    return v;  
}
```

Quite often, your program will first retrieve an object, such as an item, and then use the `IDataObject.getValue(java.lang.Object cellId)` method to retrieve values for it.

Example: Getting a value using `IDataObject.getValue(Object cellID)`

```
private static Object getDescVal(IItem item) throws APIException {  
  
    Integer attrID = ItemConstants.ATT_TITLE_BLOCK_DESCRIPTION;  
    Object v;  
    v = item.getValue(attrID);  
    return v;  
}
```

The object returned by the `getValue()` method is of the same data type as the Agile PLM attribute. For more information about data types, see [Data Types](#) on page 89.

Note All cells in a table returned by a query contain `String` values regardless of the datatypes associated with those cells. For more information about query result tables, see [Working with Query Results](#) on page 60.

If you are iterating over rows in an Agile PLM table, you can use the `IRow.getValues()` method to retrieve a `Map` object containing all cell values for a particular row in the table. The returned `Map` object maps attribute ID keys to cell values.

Setting Values

The following table lists Agile API methods for setting values for cells.

Method	Description
<code>ICell.setValue()</code>	Sets a cell value
<code>IRow.setValue()</code>	Sets a cell value contained within a row
<code>IRow.setValues()</code>	Sets multiple cell values contained within a row
<code>IDataObject.setValue()</code>	Sets a cell value on Page One, Page Two, or Page Three
<code>IDataObject.setValues()</code>	Sets multiple cell values on Page One, Page Two, or Page Three

The method you use to set a value depends on the current object in use by your program.

Use the `ICell.setValue()` method if you've already retrieved an `ICell` object and want to set its value.

Example: Setting a value using `ICell.setValue()`

```
private static void setDesc(ICell cell, String text) throws
APIException {
    cell.setValue(text);
}
```

If your program has already retrieved an object, such as a part, you can use the `IDataObject.setValue()` method to set values for it.

Example: Setting a value using `IDataObject.setValue()`

```
private void setDesc(IItem item, String text) throws APIException {
    Integer attrID = ItemConstants.ATT_TITLE_BLOCK_DESCRIPTION;
    item.setValue(attrID, text);
}
```

If you are iterating over rows in an Agile PLM table, you can use the `IRow.setValues()` method to set the cell values for an entire row. You can also use the `IDataObject.setValues()` method to set multiple cell values on Page One, Page Two, or Page Three of an object. The `Map` parameter you specify with `setValues()` maps attributes to cell values.

Example: Setting multiple values in a row using `IRow.setValues()`

```
private void setBOMRow(IRow row) throws APIException {

    Map map = new HashMap();
    map.put(ItemConstants.ATT_BOM_ITEM_NUMBER, "23-0753");
    map.put(ItemConstants.ATT_BOM_QTY, "1");
    map.put(ItemConstants.ATT_BOM_FIND_NUM, "0");
    row.setValues(map);
}
```

When you set an Agile PLM value, you must know the cell's data type. If you try to set a cell's value using an object of the wrong data type, the method fails. You may need to cast the object to another class before using it to set a value.

Note If you don't explicitly demarcate transactional boundaries in your code, every `setValue()` operation your program performs is treated as a separate transaction.

Catching Exceptions for Locked Objects

If someone else is modifying an object, it is temporarily locked by that user. If you try to set the value for a cell when another user has the object locked, your program will throw an exception. Therefore, whenever your program sets values of cells, make sure you catch the following Agile exceptions related to locked objects:

- `ExceptionConstants.APDM_ACQUIRE_DBLOCK_FAILED`
- `ExceptionConstants.APDM_RELEASE_DBLOCK_FAILED`
- `ExceptionConstants.APDM_OBJVERSION_MISMATCH`

You should also catch exception 813, which is related to locked objects.

The typical exception message that Agile PLM returns for a locked object is “Someone is working on this object. Please try again later.”

For more information about how to handle exceptions, see [Handling Exceptions](#) on page 323.

Getting and Setting List Values

There are two different datatypes for list cells. One for `SingleList` and one for `MultiList` cells. When you get the value for a `SingleList` or `MultiList` cell, the object returned is an `I AgileList` object. For that reason, list cells are slightly more complicated to work with than other cells. The `I AgileList` interface provides methods for getting and setting the current list selection. This section provides examples showing how to get and set values for different types of Agile PLM lists, including cascading lists.

When you use `ICell.getAvailableValues()` to get the available values for a list cell, the returned `I AgileList` object may include obsolete list values. Your program should not permit users to set the value for a list cell to an obsolete value. For information on how to check whether a list value is obsolete, see [Making List Values Obsolete](#) on page 170.

When a list contains `String` values, the values are case-sensitive. This means that whenever you set the value for a list cell you must ensure that the value is the right case.

Getting and Setting Values for SingleList Cells

A `SingleList` cell allows you select one value from the list. When you get the value for a `SingleList` cell, the object returned is an `I AgileList`. From that `I AgileList` object, you can determine what the currently selected value is. The following example shows how to get and set values for the “Title Block.Part Category” cell for an item.

Example: Getting and setting the value for a SingleList cell

```
private static String getPartCatValue(IItem item) throws APIException {  
  
    // Get the Part Category cell
```

```

        ICell cell =
            item.getCell(ItemConstants.ATT_TITLE_BLOCK_PART_CATEGORY);
// Get the current IAgileList object for Part Category
IAgileList cl = (IAgileList)cell.getValue();
// Get the current value from the list
String value = null;
IAgileList[] selected = cl.getSelection();
if (selected != null && selected.length > 0) {
    value = (selected[0].getValue()).toString();
}
return value;
}
private static void setPartCatValue(IItem item) throws APIException
{
// Get the Part Category cell
ICell cell =
    item.getCell(ItemConstants.ATT_TITLE_BLOCK_PART_CATEGORY);
// Get available list values for Part Category
IAgileList values = cell.getAvailableValues();
// Set the value to Electrical
values.setSelection(new Object[] { "Electrical" });
cell.setValue(values);
}
}

```

Getting and Setting Values for MultiList Cells

A MultiList cell behaves very similar to a SingleList cell except that it allows you to select multiple values. A MultiList cell cannot be a cascading list. The following example shows how to get and set values for a MultiList cell, "Title Block.Product Line(s)" for an item.

Example: Getting and setting the value for a MultiList cell

```

private static String getProdLinesValue(IItem item) throws APIException
{
String prodLines;

// Get the Product Lines cell
ICell cell =
    item.getCell(ItemConstants.ATT_TITLE_BLOCK_PRODUCT_LINES);
// Get the current IAgileList object for Product Lines
IAgileList list = (IAgileList)cell.getValue();
// Convert the current value from the list to a string
prodLines = list.toString();
return prodLines;
}

private static void setProdLinesValue(IItem item) throws APIException {
// Get the Product Lines cell
ICell cell =
    item.getCell(ItemConstants.ATT_TITLE_BLOCK_PRODUCT_LINES);
// Get available list values for Product Lines
IAgileList values = cell.getAvailableValues();
// Set the Product Lines values
}

```

```
        values.setSelection(new Object[] { "Saturn", "Titan", "Neptune" });
        cell.setValue(values);
    }
```

Getting and Setting Values for Cascading Lists

A SingleList cell can be configured to be a cascading list. A cascading list presents a list in multiple hierarchical levels, letting you drill down to a specific value in the list hierarchy. For more information about working with cascading lists, see [Working with Lists](#) on page 153.

When you get the value for a cascading list cell, a vertical bar (also called a piping character) separates each level in the cascading list. To select the value for a cascading list, use the `I AgileList.setSelection()` method. You can specify either an array of `I AgileList` leaf nodes or a `String` array containing one string delimited by vertical bars. After you select the value, save it using one of the `setValue()` methods.

The following example shows how to get and set the value for a cascading list.

Example: Getting and setting the value for a cascading list

```
private String getCascadeValue(IItem item) throws APIException {

    String value = null;
    // Get the Page Two.List01 value
    IAgileList clist =
        (IAgileList)item.getValue(ItemConstants.ATT_PAGE_TWO_LIST01);
    // Convert the current value from the list to a string
    value = clist.toString();
    return value;
}

private void setCascadeValue(IItem item) throws APIException {
    String value = null;
    // Get the Page Two List01 cell
    ICell cell = item.getCell(ItemConstants.ATT_PAGE_TWO_LIST01);
    // Get available list values for Page Two List01
    IAgileList values = cell.getAvailableValues();
    // Set the value to "North America|United States|San Jose"
    values.setSelection(new Object[] { "North America|United States|San
    Jose" });
    cell.setValue(values);
}
}
```

Although the previous example shows one way to set the value for a cascading list, there's another longer form you can use that illustrates the tree structure of the list. Instead of specifying a single `String` to represent a cascading list value, you can set the selection for each level in the list. The following example selects a value for a cascading list with three levels: continent, country, and city.

Example: Setting the value for a cascading list (long form)

```
private void setCascadeValue(IItem item) throws APIException{
    // Get the Page Two List01 cell
    ICell cell = item.getCell(CommonConstants.ATT_PAGE_TWO_LIST01);
    // Get available list values for Page Two List01
    IAgileList values = cell.getAvailableValues();
    // Set the continent to "North America"
```

```

    IAgileList continent = (IAgileList)values.getChildNode("North
    America");
// Set the country to "United States"
    IAgileList country = (IAgileList)continent.getChildNode("United
    States");
// Set the city to "San Jose"
    IAgileList city = (IAgileList)country.getChildNode("San Jose");
    values.setSelection(new Object[] {city});
// Set the cell value
    cell.setValue(values);
}

```

Using Reference Designator Cells

You can control how to use reference designator cells with Agile 9 SDK. You can make reference designator cells render collapsed or expanded depending on your system setting. The `IReferenceDesignatorCell` interface contains three public APIs that allow the end user to retrieve reference designator information in three formats:

- Collapsed—for example A1–A3; use `getCollapsedValue()`
- Expanded—A1, A2, A3; use `getExpandedValue()`
- Array of individual reference designators—[A1, A2, A3]; use `getReferenceDesignators[]`

The following table lists Agile API methods for retrieving reference designator values for cells.

Method	Description
<code>IReferenceDesignatorCell.getCollapsedValue()</code>	Gets a collapsed representation of the reference designators. For example, "A1,A2,A3" would be represented as "A1–A3". Note that the range separator, ("–") is defined as part of the system preferences.
<code>IReferenceDesignatorCell.getExpandedValue()</code>	Gets an expanded value of a reference designator. For example, for "A1–A3" the string, "A1, A2, A3" would be returned.
<code>IReferenceDesignatorCell.getReferenceDesignators()</code>	Gets the individual reference designators as an array of strings. For example, for "A1–A3" an array of these three strings, ["A1", "A2", "A3"] would be returned.

Note In previous releases of Agile SDK, the value of a reference designator was a comma-delimited list of reference designators. Because the functionality of `cell.getValue()` for a reference designator will depend on the system setting controlling reference designator presentation, the SDK user should not use `cell.getValue()` or `row.getValue()`. We recommend that you get the cell and cast it into an `IReferenceDesignatorCell`; then call the method that corresponds to your desired data structure for processing or displaying reference designator information.

Working with Folders

This chapter includes the following:

▪ About Folders	101
▪ Loading a Folder	103
▪ Creating a Folder	103
▪ Setting the Folder Type	104
▪ Adding and Removing Folder Elements	104
▪ Getting Folder Elements	105
▪ Deleting a Folder	108

About Folders

An `IFolder` is a general purpose container used to hold `IQuery` and `IFolder` objects as well as any of the main Agile PLM objects (`IChange`, `IItem`, `IManufacturer`, `IManufacturerPart`, and `IPackage`). Folders are used to organize queries, or searches.

Note A *file folder* is different from a folder. It has its own interface called the `IFileFolder`. Files in a file folder holds can be referenced from the Attachments table of other objects. For more information about file folders, see [Working with Attachments and File Folders](#) on page 175.

There are several types of Agile PLM folders:

- **Private** – Folders that are accessible only to the user that created them. Users can create or delete their own Private folders.
- **Public** – Folders that are accessible to all Agile PLM users. Only users with the `GlobalSearches` privilege can create, delete, and modify Public folders.
- **System** – Predefined folders that ship with the Agile PLM system. Most users cannot modify or delete System folders.
- **My Bookmarks (or Favorites)** – A predefined folder containing each user's bookmarks to Agile PLM objects. You cannot delete the My Bookmarks folder.
- **Home** – The predefined Agile PLM home folder. You cannot delete the Home folder.
- **Personal Searches** – The predefined parent folder for each user's personal searches. You cannot delete the Personal Searches folder.
- **Recently Visited** – A predefined folder containing links to recently visited objects. The SDK does not populate this folder. It is only populated by Client applications. If required, you specify this in your application.

Note The recently visited folder is only flushed to the database periodically. Therefore, secondary connections like process extensions with portals, or standalone SDK applications will not see the same information that the user's GUI displays.

- Report – A folder containing reports. Although you cannot use the Agile API to create, modify, or delete report folders, you can create, modify, or delete them in Agile PLM Clients.

Note `FolderConstants` also includes a constant named `TYPE_MODIFIABLE_CONTENTS`, but it is currently unused.

Each user's selection of folders may vary. However, every user has a *Home* folder. From each user's Home folder, you can construct various subfolders and browse public and private queries. To retrieve the Home folder for a user, use the `IUser.getFolder(FolderConstants.TYPE_HOME)` method.

Folders are subject to the same transactional model as other Agile API objects. If you do not set a transaction boundary for a folder, it is automatically updated as soon as you add anything to, or remove anything from the folder.

`IFolder` extends `java.util.Collection` and `ITreeNode` support all the methods that are provided by those Superinterfaces. That is, you can work with an `IFolder` object as you would any Java `Collection`. Methods of `ITreeNode` allow you to deal with the hierarchical structure of a folder by adding and removing children, getting children, and getting the parent folder.

Interface	Inherited methods
<code>java.util.Collection</code>	<code>add()</code> , <code>addAll()</code> , <code>clear()</code> , <code>contains()</code> , <code>containsAll()</code> , <code>equals()</code> , <code>hashCode()</code> , <code>isEmpty()</code> , <code>iterator()</code> , <code>remove()</code> , <code>removeAll()</code> , <code>retainAll()</code> , <code>size()</code> , <code>toArray()</code>
<code>ITreeNode</code>	<code>addChild()</code> , <code>getChildNode()</code> , <code>getChildNodes()</code> , <code>getParentNode()</code> , <code>removeChild()</code>

Using Level Separation Characters in Folder and Object Names

The SDK supports level separation characters `|` and `'` when naming `ITreeNode` objects as follows:

- `|` in `I AgileList` object names
- `'` in folder names

This feature primarily affects inherited `ITreeNode` methods shown in the table above. To use these characters, it is necessary to explicitly prefix them with the backslash character (`\`).

- `\|`
- `\'`

Note To use the backslash character in Java string constants defined in SDK applications, you must specify it twice (`\"`).

Loading a Folder

There are two ways to load a folder:

- Use the `IAgileSession.GetObject()` method to specify the full path of a folder.
- Use the `IFolder.GetChild()` method to specify the relative path of a subfolder.

Folder and query names are not case-sensitive. Therefore, you can specify a folder path using upper or lower case. For example, to load the Personal Searches folder, you can specify `/Personal Searches` or `/PERSONAL SEARCHES`.

The following example shows how to load a folder by specifying the full path to the folder.

Example: Loading a folder using `IAgileSession.GetObject()`

```
try {
    //Load the Personal Searches folder
    IFolder folder = (IFolder)m_session.GetObject(IFolder.OBJECT_TYPE,
"/Personal Searches");
} catch (APIException ex) {
    System.out.println(ex);
}
```

The following example shows how to load a folder by specifying its path relative to another folder, in this case the user's Home Folder.

Example: Loading a folder using `IFolder.GetChild()`

```
try {
    //Get the Home Folder
    IFolder homeFolder =
m_session.GetCurrentUser().getFolder(FolderConstants.TYPE_HOME);
    //Load the Personal Searches subfolder
    IFolder folder = (IFolder)homeFolder.GetChild("Personal Searches");
} catch (APIException ex) {
    System.out.println(ex);
}
```

Creating a Folder

To create a folder, use the `IAgileSession.createObject()` method. When you create a folder, you must specify the folder's name and its parent folder. The following example shows how to create a folder named "MyTemporaryQueries" in the Personal Searches folder.

Example: Creating a new folder

```
try {
    //Get an Admin instance
    IAdmin admin = m_session.getAdminInstance();

    //Load the Personal Searches folder
```

```
IFolder parentFolder =
(IFolder)m_session.getObject(IFolder.OBJECT_TYPE, "/Personal
Searches");
//Create parameters for a new folder
Map params = new HashMap();
params.put(FolderConstants.ATT_FOLDER_NAME, "MyTemporaryQueries");
params.put(FolderConstants.ATT_PARENT_FOLDER, parentFolder);
//Create a new folder
IFolder folder = (IFolder)session.createObject(IFolder.OBJECT_TYPE,
params);
} catch (APIException ex) {
System.out.println(ex);
```

Setting the Folder Type

By default, all new folders that you create are private folders unless otherwise specified. To change a private folder to a public folder, use the `IFolder.setType()` method. You must have the `GlobalSearches` privilege to be able to change a private folder to a public folder.

The two folder type constants you can use to set a folder's type are `FolderConstants.TYPE_PRIVATE` and `FolderConstants.TYPE_PUBLIC`. You cannot set a folder to any other folder type.

Example: Setting the folder type

```
try {
//Get an Admin instance
IAdmin admin = m_session.getAdminInstance();

//Load the My Cool Searches folder
IFolder folder = (IFolder)m_session.getObject(IFolder.OBJECT_TYPE,
"/Personal Searches/My Cool Searches");

//Make the folder public
folder.setFolderType(FolderConstants.TYPE_PUBLIC);
} catch (APIException ex) {
System.out.println(ex);
}
```

Adding and Removing Folder Elements

An Agile PLM folder can contain `IFolder` objects (subfolders), `IQuery` objects, and any kind of dataobject, such as `IChange`, `IItem`, `IManufacturer`, and `IManufacturerPart` objects. Use the `ITreeNode.addChild()` method to add objects to a folder.

Adding Folder Elements

The following example shows how to add objects to a table.

Example: Adding objects to a folder

```
public void addFolderItem(IFolder folder, Object obj) {
    try {
        folder.addChild(obj);
    } catch (APIException ex) {
        System.out.println(ex);
    }
}
```

Removing Folder Elements

To remove a single folder element, use the `ITreeNode.removeChild()` method. To clear all folder elements, use the `java.util.Collection.clear()` method.

Example: Removing objects from a Folder

```
void removeFolderElement(IFolder folder, Object obj) {
    try {
        folder.removeChild(obj);
    } catch (APIException ex) {
        System.out.println(ex);
    }
}

void clearFolder(IFolder folder) {
    try {
        folder.clear();
    } catch (APIException ex) {
        System.out.println(ex);
    }
}
```

Getting Folder Elements

All objects contained in a folder, including subfolders, can be loaded by name. To retrieve an object from a folder, use the `IFolder.getChild()` method. Remember, the object type for folder elements can vary. Depending on the object, you could be getting a subfolder, a query, or a dataobject, such as an `IItem`.

Example: Getting a folder element

```
public void getFolderChild(IFolder folder, String name) {
    try {
        IAgileObject object = folder.getChild(name);
        //If the object is a query, run it
        if (object.getType()==IQuery.OBJECT_TYPE) {
            IQuery query = (IQuery)object;
        }
    }
}
```

```
        ITable results = query.execute();

        //Add code here to do something with the query results
    }
} catch (APIException ex) {
    System.out.println(ex);
}
}
```

The following example shows how to use the `IFolder.getChildren()` method to return an `I AgileObject` array. In this case, the code checks the object type for each object in the array and then prints the object's name.

Example: Getting folder children

```
private void browseFolder(int level, IFolder folder) throws
APIException {
    IAdmin admin = m_session.getAdminInstance();
    Collection subObjects = folder.getChildren();

    for (Iterator it = subObjects.iterator(); it.hasNext();) {
        IAgileObject obj = (IAgileObject)it.next();
        System.out.println(indent(level * 4));

        switch (obj.getType()) {
            case IItem.OBJECT_TYPE:
                System.out.println("ITEM: " + obj.getName());
                break;
            case IFolder.OBJECT_TYPE:
                System.out.println("FOLDER: " + obj.getName());
                browseFolder(level + 1, (IFolder)obj);
                break;

            case IQuery.OBJECT_TYPE:
                System.out.println("QUERY: " + obj.getName());
                break;
            default:
                System.out.println(
                    "UNKNOWN TYPE: " + obj.getType() + ":" + obj.getName());
        }
    }
}

private String indent(int level) {
    if (level <= 0) {
        return "";
    }
    char c[] = new char[level*2];
    Arrays.fill(c, ' ');
    return new String(c);
}
```

```

}
private String indent(int level) {
    if (level <= 0) {
        return "";
    }
    char c[] = new char[level*2];
    Arrays.fill(c, ' ');
    return new String(c);
}

```

Another way to get a folder's children is to iterate over the folder elements, moving from one end of the folder to the other. To create an iterator for an `IFolder` object, use the `java.util.Collection.iterator()` method.

Note If you need to traverse the folder contents both forward and backward, use the `IFolder.getFolderIterator()` method to return an `ITwoWayIterator` object. `ITwoWayIterator` provides `previous()`, `next()`, and `skip()` methods, among others.

Example: Iterating over folder elements

```

try {
    //Load the Project X folder
    IFolder folder = (IFolder)m_session.getObject(IFolder.OBJECT_TYPE,
        "/Personal Searches/Project X");

    //Create a folder iterator
    Iterator it = folder.iterator();

    if (it.hasNext()) {
        //Get the next folder element
        Object obj = it.next();

        //Write code here to display each folder
        //element in your program's UI
    }
} catch (APIException ex) {
    System.out.println(ex);
}

```

Deleting a Folder

To delete a folder, use the `IFolder.delete()` method. You can delete folders that are empty and that are not predefined Agile PLM system folders (such as the Global Searches and My Inbox folders).

Unlike other dataobjects, folders are not “soft-deleted” the first time you delete them. When you delete a folder, it is removed permanently from the system.

Example: Deleting a folder

```
void deleteFolder(IFolder folder) throws APIException {  
    folder.delete();  
}
```


Working with Items, BOMs, and AMLs

This chapter includes the following:

- Working with Items 109
- Working with BOMs 112
- Working with AMLs 119

Working with Items

An item is an object that helps define a product. Parts and documents are examples of types of items. A part is shipped as part of a product and has costs associated with it. A part can also be an assembly. A bill of material, or BOM, lists the separate components that make up the assembly. A document generally is an internal document, drawing, or procedure that references a part.

Items are different from other Agile PLM objects because they:

- Have a revision history, with a set of data for each revision.
- Can be incorporated, or locked from future changes.
- Can have site-specific BOMs or approved manufacturers lists (AMLs).

Getting and Setting the Revision of an Item

The revision for an item is a special type of Agile PLM attribute. The revision is always paired with another value, the number of its associated change object (such as an ECO). When you load an item, it's always loaded with the latest released revision.

Unlike other attributes, the "Title Block.Rev" field (whose ID constant is `ItemConstants.ATT_TITLE_BLOCK_REV`) for an item is not directly accessible. This means that you can't retrieve or set a revision value using `getValue()` and `setValue()` methods. For example, the `revValue` variable in the following code is always a null `String`.

Example: Failing to get a revision by accessing the `Title Block.Rev` field

```

IItem item = (IItem)m_session.getObject(IItem.OBJECT_TYPE, "1000-02");
IAgileList listRevValue =
    (IAgileList)item.getValue(ItemConstants.ATT_TITLE_BLOCK_REV);
String revValue = listRevValue.toString();
if (revValue==null) {
    System.out.println("Failed to get the revision.");
}

```

The correct way to get and set the revision for an item is to use methods of the `IRevised` interface, as shown in the following example, which loads an item and then iterates through the item's revisions.

Example: Getting and setting the revision of an item

```
try {  
  
    // Get an item  
    IItem item = (IItem)m_session.getObject(IItem.OBJECT_TYPE, "1000-  
02");  
    // Print the item's current revision  
    System.out.println("current rev : " + item.getRevision());  
    // Get all revisions for the item  
    Map revisions = item.getRevisions();  
  
    // Get the set view of the map  
    Set set = revisions.entrySet();  
  
    // Get an iterator for the set  
    Iterator it = set.iterator();  
  
    // Iterate through the revisions and set each revision value  
    while (it.hasNext()) {  
        Map.Entry entry = (Map.Entry)it.next();  
        String rev = (String)entry.getValue();  
        System.out.println("Setting rev : " + rev + "....");  
        item.setRevision(rev);  
        System.out.println("current rev : " + item.getRevision());  
    }  
  
    catch (APIException ex) {  
        System.out.println(ex);  
    }  
}
```

The `IRevised.setRevision()` method accommodates several different ways to specify a revision. The change parameter of the `setRevision()` method can be any of the following types of objects:

- a null object to specify an Introductory revision:
`item.setRevision(null);`
- an `IChange` object associated with a particular revision:
`item.setRevision(changeObject);`
a change number (a `String`) associated with a particular revision:
`item.setRevision("C00450");`
revision identifier (a `String` such as "Introductory", "A", "B", "C", and so on): `item.setRevision("A");`
- a `String` containing both a revision identifier and a change number separated by eight spaces ("A 23450"):
`item.setRevision("A C00450");`

The last type of `String` object that you can specify for the change parameter allows you to pass the same value used in other Rev cells in Agile PLM tables. For example, the "BOM.Item Rev" cell,

unlike "Title Block.Rev," is directly accessible. If you get the value for the cell, it returns a `String` containing the revision identifier and a change number separated by eight spaces.

Example: Setting the revision using "BOM.Item Rev"

```
try {
    // Get an item
    IItem item = (IItem)m_session.getObject(IItem.OBJECT_TYPE, "1000-02");
    // Get the BOM table
    ITable bomTable = item.getTable(ItemConstants.TABLE_BOM);
    // Get part 1543-01 in the BOM
    ITwoWayIterator it = bomTable.getTableIterator();
    while (it.hasNext()) {
        IRow row = (IRow)it.next();
        String num =
        (String)row.getValue(ItemConstants.ATT_BOM_ITEM_NUMBER);
        if (num.equals("1543-01")) {
            // Get the revision for this BOM item
            // (bomRev = revID + 8 spaces + changeNumber)
            String bomRev =
            (String)row.getValue(ItemConstants.ATT_BOM_ITEM_REV);
            // Load the referenced part
            IItem bomItem = (IItem)row.getReferent();

            // Set the revision
            System.out.println("Setting rev : " + bomRev + "....");
            bomItem.setRevision(bomRev);
            System.out.println("current rev : " + bomItem.getRevision());
            break;
        }
    }
} catch (APIException ex) {
    System.out.println(ex);
}
```

Note If an item has no released revisions and no pending changes, the `IRevised.getRevision()` method returns a null `String` and the `IRevised.getRevisions()` method returns an empty `Map` object.

Changing the Incorporated Status of a Revision

Each revision of an item can be incorporated. When you incorporate the revision of an item, all attachments for that revision are locked and cannot be checked out. After an item is incorporated, you can still use Agile Web Client to view the item's attachments, but you cannot modify them unless you submit a new Change.

To incorporate or unincorporate an item, use the `IAttachmentContainer.setIncorporated()` method. Special Agile PLM privileges are required to incorporate and unincorporate Items. If a user does not have the appropriate privileges,

the `setIncorporated()` method throws an exception.

Only items that have revision numbers can be incorporated. Therefore, a preliminary item that has not been released cannot be incorporated. Once an ECO is submitted for that item and a pending revision number is specified, the revision can then be incorporated. Example 7-4 shows how to change the incorporated status of an item.

Example: Changing the incorporated status of an Item

```
try {
    // Get an item
    IItem item = (IItem)m_session.getObject(IItem.OBJECT_TYPE, "1000-02");
    // Incorporate the item, or unincorporate it,
    // depending on its current state
    item.setIncorporated(!item.isIncorporated());
} catch (APIException ex) {
    System.out.println(ex);
}
```

Working with BOMs

A bill of material, or BOM, shows the components that make up a product. Each item that is listed on a BOM can be a single item or an assembly of several items.

The BOM table, like other Agile PLM tables, consists of columns, or fields, of data. Each column represents an Agile PLM attribute, such as “BOM.Item Number.” Each row of the BOM table represents a separate item, either a part, a document, or a user-defined subclass.

In addition to the BOM table, there is also a redline BOM, which records redline changes to a BOM. When you load a BOM table using the `DataObject.getTable()` method, make sure you specify the correct table ID constant.

BOM Table	ID Constant
Current BOM table	<code>ItemConstants.TABLE_BOM</code>
Redline BOM table	<code>ItemConstants.TABLE_REDLINEBOM</code>

For an example showing how to retrieve a BOM table, see [Retrieving a Table](#) on page 66.

Adding an Item to a BOM

Before adding an item to the BOM table, specify the manufacturing site. A BOM item is either site-specific or common to all sites. Use the

`IManufacturingSiteSelectable.setManufacturingSite()` method to specify the site. To add an item to the common BOM, use `ManufacturingSiteConstants.COMMON_SITE`. Otherwise, specify a specific site, such as the user’s default site.

Note You can’t add rows to a BOM if the parent item is currently set to display all sites. Before adding a row to a BOM, make sure the item’s site is not set to `ManufacturingSiteConstants.ALL_SITES`. Otherwise, the API throws an exception.

Example: Adding items to a BOM

```
//Add an item to the common BOM
public void addCommonBOMItem(IItem item, String bomnumber) throws
APIException {
    HashMap map = new HashMap();
    map.put(ItemConstants.ATT_BOM_ITEM_NUMBER, bomnumber);
    item.setManufacturingSite(ManufacturingSiteConstants.COMMON_SITE)
;
    item.getTable(ItemConstants.TABLE_BOM).createRow(map);
}

//Add a site-specific item to the BOM using the user's default site
public void addSiteBOMItem(IItem item, String bomnumber) throws
APIException {
    HashMap map = new HashMap();
    map.put(ItemConstants.ATT_BOM_ITEM_NUMBER, bomnumber);
    item.setManufacturingSite(((IAgileList)m_session.getCurrentUser()
.getValue()
UserConstants.ATT_GENERAL_INFO_DEFAULT_SITE)).getSelection()[0].g
etValue());
    item.getTable(ItemConstants.TABLE_BOM).createRow(map);
}
}
```

For more information about manufacturing sites, see [Managing Manufacturing Sites](#) on page 147.

Expanding a BOM

The BOM table can be viewed as a table containing multiple levels even though the API doesn't present it that way. By default, the BOM table contains only top-level items. To expand a BOM to show its hierarchy, you need to recursively load each BOM item and its subassemblies. The following example shows how to print multiple levels of a BOM.

Example: Printing multiple levels of a BOM

```
private void printBOM(IItem item, int level) throws APIException {
    ITable bom = item.getTable(ItemConstants.TABLE_BOM);
    Iterator i = bom.getReferentIterator();
    while (i.hasNext()) {
        IItem bomItem = (IItem)i.next();
        System.out.print(indent(level));
        System.out.println(bomItem.getName());
        printBOM(bomItem, level + 1);
    }
}

private String indent(int level) {
    if (level <= 0) {
        return "";
    }
    char c[] = new char[level*2];
    Arrays.fill(c, ' ');
    return new String(c);
}
}
```

Copying one BOM into another BOM

Quite often the BOMs of two items will be very similar. Instead of creating a BOM from scratch, it is often easier to copy a BOM from one item to another and then make slight changes. The `Collection.addAll()` method can be used to copy the contents of one table into a target table. The `addAll()` method does not set a new revision for the item.

Note If you copy a BOM from one item to another, the target item must have the same associated manufacturing sites as the source item.

Example: Copying a BOM using `Collection.addAll()`

```
private static void copyBOM(IItem source, IItem target) throws
APIException {
    // Get the source BOM
    ITable sourceBOM = source.getTable(ItemConstants.TABLE_BOM);
    // Get the target BOM
    ITable targetBOM = target.getTable(ItemConstants.TABLE_BOM);
    // Add all rows from the source BOM to the target BOM
    targetBOM.addAll(sourceBOM);
}
```

Another way to copy a BOM is to iterate through the rows of a source BOM and copy each row to a target BOM.

Example: Copying a BOM by iteration

```
private static void copyBOM1(IItem source, IItem target) throws
APIException {
    // Get the source BOM
    ITable sourceBOM = source.getTable(ItemConstants.TABLE_BOM);
    // Get an iterator for the source BOM
    Iterator i = sourceBOM.iterator();

    // Get the target BOM
    ITable targetBOM = target.getTable(ItemConstants.TABLE_BOM);
    // Copy each source BOM row to the target BOM
    while (i.hasNext()) {
        targetBOM.createRow(i.next());
    }
}
```

Creating BOM-Related Product Reports

The SDK provides the `IProductReport` API with constants defined in `ProductReportConstants` to prepare the following BOM-related product reports. These reports are produced in the XML format.

- BOM Explosion reports – The BOM Explosion report displays the items that are in the bill of Material(BOM) for the one or more specified assembly, up to the desired number of levels.
- BOM Comparison reports – The BOM Comparison XML reports is the result of comparing two

different BOMs up to the specified number of levels.

For example, when a base BOM compared with the target BOM the comparison will show:

- d shown in BOM node – indicates only base assembly has the BOM
- a shown in BOM node – indicates only target assembly has the BOM
- u shown in BOM node – indicates both root assemblies have the same BOM
- m shown in BOM node – indicates both root assemblies have the BOM but with some differences

All first level BOMs of both base and target assembly are categorized into another node BOMs. BOM nodes under BOMs are first sorted by `FindNum` and then by `ItemNumber`.

There are several use cases for these reports. For example, archiving or comparative analysis with outputs of ERP systems.

To create a product report, you must use the `IAgileSession` object. The following examples show how to use `IAgileSession` and `ProductReportConstants` to prepare BOM Explosion and BOM Comparison reports.

Example: Creating an Agile Session

```
IAgileSessionFactory factory =
    AgileSessionFactory.getInstance("http://agileServer/virtualPath");
Map params = new HashMap();
params.put(AgileSessionFactory.USERNAME, "username");
params.put(AgileSessionFactory.PASSWORD, "pwd");

IAgileSession session = factory.createSession(params);
```

Example: Preparing a BOM Comparison report

```
Map param = new HashMap();
param.put(ProductReportConstants.REPORTPARAM_REPORT_TYPE,
    ProductReportConstants.REPORT_BOM_COMPARISON);
param.put(ProductReportConstants.REPORTPARAM_ITEMREVSITE,
    "item1;item2");
param.put(ProductReportConstants.BOMCOMP_BOM_ATTRS,
    ProductReportConstants.BOM_ATT_ITEM_NUM +";" +
    ProductReportConstants.BOM_ATT_FIND_NUM);
param.put(ProductReportConstants.BOMCOMP_BOMLEVEL, "4");
IProductReport report = (IProductReport)
    session.createObject(IProductReport.OBJECT_TYPE, "My BOM Comparison
    Report");
String xmlReport = report.execute(param);
```

If the value for `ProductReportConstants.BOMCOMP_BOM_ATTRS` is not specified, then it is assumed to be `"Find Num;Item Number;Sites"`.

Example: Preparing a BOM Explosion report

```
Map param = new HashMap();
param.put(ProductReportConstants.REPORTPARAM_REPORT_TYPE,
    ProductReportConstants.REPORT_BOM_EXPLOSION);
param.put(ProductReportConstants.BOMEXP_OBJTYPE, "Document;Part;");
param.put(ProductReportConstants.REPORTPARAM_ITEMREVSITE, "MM75-
    01|23450|India;");
param.put(ProductReportConstants.BOMEXP_MAXLEVEL, "5");
IProductReport report = (IProductReport)
    session.createObject(IProductReport.OBJECT_TYPE, "My BOM Explosion
    Report");
```

```
String xmlReport = report.execute(param);
```

In BOM Explosion reports, the value for

`ProductReportConstants.REPORTPARAM_ITEMREVSITE` can be as follows:

- `<Item_number>|<Change_number>|<Site_number>` where `<Change_Number>` and `<Site_number>` are optional if:
 - `<Change_number>` is not specified it is assumed to be the Latest revision
 - `<Site_number>` is not specified it is assumed as Common Sites
- The value can have one or more Items delimited by semicolon
- `Item1;Item2;Item3` are the Latest revision of `Item1`, `Item2` and `Item3` for Common Sites
- `Item1|ECO1;Item2;Item3` (`Item1` with ECO1 revision and latest revision of `Item2`, `Item3`)
- `Item1|ECO1|Site1;Item2|ECO2` (`Item1` with ECO1 revision with Site1 Specific BOM and `Item2` with ECO2 revision)
- `Item1|Site1;Item2` (`Item1` with Site1 Specific BOM and Latest revision of `Item2` with Common Sites)

In BOM Comparison reports, the value for

`ProductReportConstants.REPORTPARAM_ITEMREVSITE` can be as follows:

- `<Item_number>|<Change_number>|<Site_number>` where `<Change_Number>` and `<Site_number>` are optional when:
 - `<Change_number>` is not specified, then it is assumed as Latest revision.
 - `<Site_number>` is not specified, it is assumed as Common Sites.
- The value must have two Items delimited by a semicolon
- `Item1;Item2` (Latest revision of `Item1` and `Item2` and all Sites)
- `Item1|ECO1;Item2` (`Item1` with ECO1 revision and Latest revision of `Item2`)
- `Item1|ECO1|Site1;Item2|ECO2` (`Item1` with ECO1 revision with Site1 Specific BOM and `Item2` with ECO2 revision)
- `Item1|Site1;Item2` (`Item1` with Site1 Specific BOM and Latest revision of `Item2` with Common Sites)

Redlining a BOM

To redline a BOM table, follow these steps:

1. Get a released assembly item.
2. Create a new Change Order, such as an ECO, for the item.
3. Add the item to the Affected Items table of the ECO. Also, specify the new revision in the change and set the item's revision to the associated change.
4. Modify the item's Redline BOM table.

In the following sections, there are code examples for each of these steps.

Note You can remove redlines from a row of the BOM table. See [Removing Redline Changes](#) on page 86.

Getting a Released Assembly Item

The following example shows how to load an assembly item from the Part subclass. Make sure the Part you specify is released and has a BOM.

Example: Getting a released assembly

```
// Load a released assembly item
private static IItem loadItem(IAgileSession myServer, Integer
ITEM_NUMBER) throws APIException {
    IItem item = (IItem)myServer.getObject("Part", ITEM_NUMBER);
    if (item != null) {
        //Check if the item is released and has a BOM
        if (item.getRevision().equals("Introductory") ||
            !item.isFlagSet(ItemConstants.FLAG_HAS_BOM)) {
            System.out.println("Item must be released and have a BOM.");
            item = null;
        }
    }
    return item;
}
```

Creating a Change Order

To redline a BOM, you must create a Change Order, such as an ECO. Example below shows how to create an ECO and select a Workflow for the selected ECO.

Example: Creating an ECO

```
private static IChange createChange(IAgileSession myServer, Integer
ECO_NUMBER)
    throws APIException {
    IChange change =
    (IChange)myServer.createObject(ChangeConstants.CLASS_ECO, ECO_NUMBER);
    // Set the Workflow ID
    change.setWorkflow(change.getWorkflows()[0]);
    return change;
}
```

Adding an Item to the Affected Items tab of a Change Order

After you create an ECO, you can add the Part you loaded to the Affected Items table of the ECO. Every ECO is associated with a revision. The following example shows how to specify the new revision in the ECO, and then set the revision for the Part to the one associated with the ECO.

Example: Adding an item to the Affected Items table of a change order

```
private static void addAffectedItems(IAgileSession myServer, IItem
item, IChange change)
    throws APIException {
    // Get the Affected Items table
```

```
        ITable affectedItems =
            change.getTable(ChangeConstants.TABLE_AFFECTEDITEMS);
// Create a Map object to store parameters
    Map params = new HashMap();
// Set the value of the item number by specifying the item object
    params.put(ChangeConstants.ATT_AFFECTED_ITEMS_ITEM_NUMBER, item);
// Specify the revision for the change
    params.put(ChangeConstants.ATT_AFFECTED_ITEMS_NEW_REV, "B");
// Add a new row to the Affected Items table
    IRow affectedItemRow = affectedItems.createRow(params);
// Select the new revision for the part
    item.setRevision(change);
}
```

Modifying the Redline BOM Table

After the Part has been added to the Affected Items table of an ECO and a revision has been specified, you can begin to modify the Part's Redline BOM table. The following example shows how to get the Redline BOM table, add and remove rows, and set specific cell values.

Example: Modifying the Redline BOM table

```
private static void modifyRedlineBOM(IAgileSession myServer, IItem
item) throws APIException {
    // Get the Redline BOM table
    ITable redlineBOM = item.getTable(ItemConstants.TABLE_REDLINEBOM);
    // Create two new items, 1000-002 and 1000-003
    IItem item1 = (IItem) myServer.createObject(ItemConstants.CLASS_PART,
"1000-002");
    IItem item2 = (IItem) myServer.createObject(ItemConstants.CLASS_PART,
"1000-003");
    // Add item 1000-002 to the table
    IRow redlineRow = redlineBOM.createRow(item1);
    redlineRow.setValue(ItemConstants.ATT_BOM_QTY, new Integer(50));
    redlineRow.setValue(ItemConstants.ATT_BOM_FIND_NUM, new
Integer(777));
    // Add item 1000-003 to the table
    redlineRow = redlineBOM.createRow(item2);
    redlineRow.setValue(ItemConstants.ATT_BOM_QTY, new Integer(50));
    redlineRow.setValue(ItemConstants.ATT_BOM_FIND_NUM, new
Integer(778));
    // Remove item 1000-003 from the table
    IRow delRow;
    String itemNumber;
    Iterator it = redlineBOM.iterator();
    while (it.hasNext()) {
        delRow = (IRow)it.next();
        itemNumber =
(String)delRow.getValue(ItemConstants.ATT_BOM_ITEM_NUMBER);
        if (itemNumber.equals("1000-003")) {
            redlineBOM.removeRow(delRow);
            break;
        }
    }
}
```

```

    }
}

// Change the Qty value for item 1000-002
IRow modRow;
it = redlineBOM.iterator();
while (it.hasNext()) {
    modRow      = (IRow)it.next();
    itemNumber =
(String)modRow.getValue(ItemConstants.ATT_BOM_ITEM_NUMBER);
    if (itemNumber.equals("1000-002")) {
        modRow.setValue(ItemConstants.ATT_BOM_QTY, new Integer(123));
    }
}
}
}

```

Working with AMLs

The Manufacturers table for an item is also called the approved manufacturers list, or AML. It lists manufacturers that have been approved to supply a particular item. The list identifies the manufacturer part for that item. The Manufacturers table consists of columns, or fields, of data. Each column represents an Agile PLM attribute, such as “Manufacturers.MfrName.” Each row of the Manufacturers table references a separate manufacturer part.

In addition to the Manufacturers table, there is also a redline Manufacturers table, which records redline changes. When you load a Manufacturers table using the `DataObject.getTable()` method, make sure you specify the correct table ID constant.

BOM Table	ID Constant
Current Manufacturers table	<code>ItemConstants.TABLE_MANUFACTURERS</code>
Redline Manufacturers table	<code>ItemConstants.TABLE_REDLINEMANUFACTURERS</code>

Adding an Approved Manufacturer to the Manufacturers Table

Similar to the BOM Table, the Manufacturers Table requires that you specify the manufacturing site before adding a new row to the table. An approved manufacturer is either site-specific or common to all sites. Use the `IManufacturingSiteSelectable.setManufacturingSite()` method to specify the site. To add an approved manufacturer to the common Manufacturers table, use `ManufacturingSiteConstants.COMMON_SITE`. Otherwise, select a specific site, such as the user’s default site.

Note You can’t add rows to an AML if the parent item is currently set to display all sites. Before adding a row to an AML, make sure the item’s site is not set to `ManufacturingSiteConstants.ALL_SITES`. Otherwise, the API throws an exception.

Example: Adding approved manufacturers to an AML

```
//Add a MfrPart to the common AML
public void addCommonApprMfr(IItem item, String mfrName, String
mfrPartNum) throws APIException {
    HashMap map = new HashMap();

    map.put (ManufacturerPartConstants.ATT_GENERAL_INFO_MANUFACTURER_PART_NUMBER, mfrPartNum);
    map.put (ManufacturerPartConstants.ATT_GENERAL_INFO_MANUFACTURER_NAME, mfrName);
    IManufacturerPart mfrPart = (IManufacturerPart)m_session.getObject(
        ManufacturerPartConstants.CLASS_MANUFACTURER_PART, map
    );
    item.setManufacturingSite(ManufacturingSiteConstants.COMMON_SITE);
    item.getTable(ItemConstants.TABLE_MANUFACTURERS).createRow(mfrPart);
}

//Add a site-specific MfrPart to the AML using the user's default site
public void addSiteApprMfr(IItem item, String mfrName, String
mfrPartNum) throws APIException {
    HashMap map = new HashMap();

    map.put (ManufacturerPartConstants.ATT_GENERAL_INFO_MANUFACTURER_PART_NUMBER, mfrPartNum);
    map.put (ManufacturerPartConstants.ATT_GENERAL_INFO_MANUFACTURER_NAME, mfrName);
    IManufacturerPart mfrPart = (IManufacturerPart)m_session.getObject(
        ManufacturerPartConstants.CLASS_MANUFACTURER_PART, map
    );

    item.setManufacturingSite(((I AgileList)m_session.getCurrentUser().getValue(
        UserConstants.ATT_GENERAL_INFO_DEFAULT_SITE)).getSelection()[0]
    );
    item.getTable(ItemConstants.TABLE_MANUFACTURERS).createRow(mfrPart);
}
```

For more information about manufacturing sites, see [Managing Manufacturing Sites](#) on page 147.

Redlining an AML

Once an item is released, you can change the Manufacturers table only by issuing a new change order. The change order allows you to redline the Manufacturers table.

Note You can remove redlines from a row of the Manufacturers table. See [Removing Redline Changes](#) on page 86.

To redline a Manufacturers table:

1. Get a released revision of an item.
2. Create a new ECO, MCO, or SCO.

- ECOs lets you modify an item's BOM or Manufacturers tables.
 - MCOs lets you modify an item's Manufacturers table.
 - SCOs let you modify an item's site-specific BOM or Manufacturers tables.
3. Add the item to the Affected Items table of the change.
 4. For ECOs, specify the new revision in the change. SCOs and MCOs do not affect an item's revision.
 5. Modify the Redline Manufacturers table.

Accessing PLM Metadata with APIName Field

This chapter includes the following:

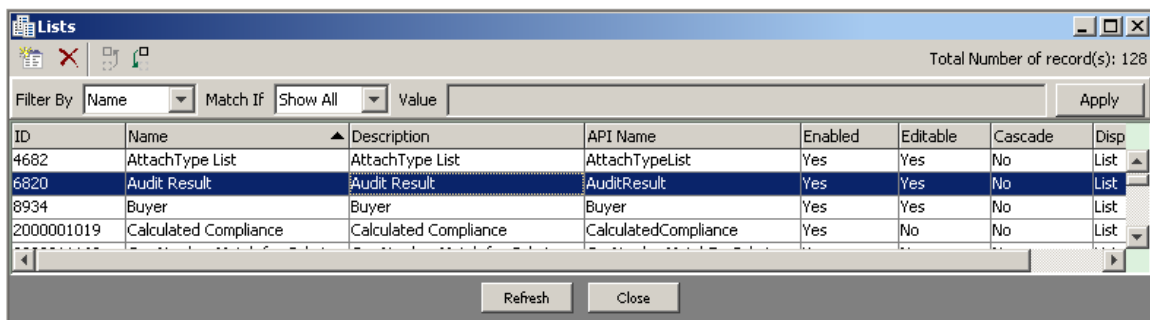
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About APIName Field

The primary purpose of the APIName field is to facilitate SDK developers' access to internal Agile metadata when developing SDK applications. Prior to introduction of this field, display names or numeric IDs defined in the SDK Constants file were used to access Agile internal/metadata of objects in Classes, Tables, Attributes, Lists, and so on. The negative aspect of this approach is that numbers are difficult to remember and display names can change. However, an object's APIName is unique, it is easier to remember, and unlike DisplayName it is not subject to change which can break your code.

For example, your SDK application can use "AuditResult" which is the APIName of the *List* instead of its ID which is 6820, or its display name which is "Audit Result" to look up its internal value.

Figure 7: Accessing attribute value via API Name field



The following paragraphs describe the rules that assign a name to APIName fields and SDK interfaces that you can use in your SDK applications to access internal data with the APIName field.

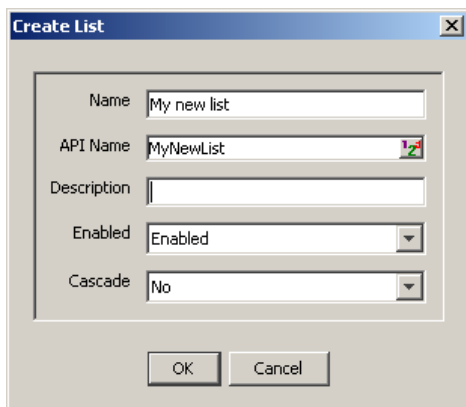
Note When upgrading to Release 9.3, it is possible to have duplicate APINames assigned to previously user defined fields. For example, if you have the user defined field "Foo" on P2 and P3, the upgrade tool will assign the APIName Foo to both fields. To avoid these duplications, change the APIName for one of these fields in the Java Client.

Assigning Names to APIName Fields

Names are automatically assigned to APIName fields by the PLM application when authorized users create new data objects in Java Client. Objects that support APIName have the additional "API Name" field in their *Create* dialog boxes which PLM immediately populates once a name is typed in the object's "Name" field.

The PLM assigned APIName converts the contents of the "Name" field using the *CamelCase* naming convention. The *CamelCase* convention is adhered to by Java JDK for all core APIs and closely resembles the name of the API. For example, the class "Manufacturer Parts" is converted to "ManufacturerParts" and the list "My new list" is converted to "MyNewList".

Figure 8: API name field



APIName Validation Rules

The APIName naming convention must adhere to the following rules:

- It can contain only characters
- It must be a valid Java/XML identifier
 - Allowed characters are a-z, A-Z, 0-9, and _ (underscore)
- It must be between 1 and 255 characters long
- It is case-sensitive
- It must be unique within a context, for example:
 - The attribute "Number" can exist in the cover page table for classes "Parts" as well as "Changes" (Different context, Parts & Changes)
 - Two attributes with APIName "Number" cannot exist in the cover page table of "Parts" (Same context, Parts cover page)
 - Two attributes with APIName "Number" cannot exist in Cover Page, Page Two and Page Three (Cover Page, Page Two and Page Three are a single context)

Accessing Metadata Using the APIName Field

You can use the API name of the Agile Metadata to:

- Access the metadata of Agile PLM (Node, Class, Attribute)
- Access/manipulate the value of the metadata (attributes and table attributes) of a data object

You can view the API name of Nodes, Classes, and Attributes in Java Client. SDK interfaces that support the APIName field are listed in the following tables.

APIs that Support the APIName Field

API	Example
IAdmin	
<code>getAgileClass(Object id)</code>	<code>getAgileClass("Parts")</code>
<code>getNode(Object id)</code>	<code>getNode ("Part.TitleBlock")</code>
IAgileClass	
<code>getAttribute (Object key)</code>	<code>getAttribute("TitleBlock.number")</code> or, <code>getAttribute("number")</code>
<code>getTableAttributes(Object tableId)</code>	<code>getTableAttributes("TitleBlock")</code>
<code>getTableDescriptor (Object id)</code>	<code>getTableDescriptor("TitleBlock")</code>
<code>isSubclassOf(Object cls)</code>	<code>isSubclassOf("Parts")</code>
IAgileList	
<code>getChild(Object child)</code>	<code>getChild("UNITED_STATES")</code> UNITED_STATES is the APIName for entry 'United States' in 'Country' list
<code>getChildNode(Object child)</code>	<code>getChildNode("UNITED_STATES")</code>
<code>setSelection (Object[] childNodes)</code>	<code>setSelection(new Object[] {"UNITED_STATES" , "INDIA"})</code>
IAgileSession	
<code>createObject(Object objectType, Object params)</code>	<code>Map map = new HashMap();</code> <code>String partNumber = "P00001"</code> <code>map.put("TitleBlock.number",</code>

	<pre>partNumber); IDataObject dObj = (IDataObject) (m_session.createObject("Part", map));</pre>
<pre>createObject(int objectType, Object params)</pre>	<pre>Map map = new HashMap(); String partNumber = "P00001" map.put("number", partNumber); IDataObject dObj = (IDataObject) (m_session.createObject("Part", map));</pre>
<pre>getObject(Object objectType, Object params)</pre>	<pre>Map map = new HashMap(); map.put("TitleBlock.number", "1000- 01"); IDataObject dObj = (IDataObject) (m_session.getObject("Part", map));</pre>
<pre>getObject(int objectType, Object params)</pre>	<pre>Map map = new HashMap(); map.put("TitleBlock.number", "1000- 01"); IDataObject dObj = (IDataObject)(m_session.getObject(II tem.OBJECT_TYPE, map));</pre>
IDataObject	
<pre>getCell(Object key)</pre>	<pre>getCell("PageTwo.list11") or getCell("list11")</pre>
<pre>getTable(Object tableId)</pre>	<pre>getTable("AffectedItems")</pre>
<pre>getValue(Object attribute)</pre>	<pre>getValue ("PageTwo.list11") or getValue ("list11")</pre>
<pre>setValue(Object key, Object value)</pre>	<pre>setValue("PageTwo.text01", "test")</pre>
<pre>saveAs(Object type, Object params)</pre>	<pre>Map params = new HashMap(); params.put("number", number); IItem part2 = (IItem) part.saveAs("Document", params);</pre>
<pre>setValues(Map map)</pre>	<pre>Map map = new HashMap(); map.put("TitleBlock.number", "1000- 01"); part.setValues(map);</pre>
ILibrary	
<pre>getAdminList(Object listId)</pre>	<pre>getAdminList("ActionStatus")</pre>
<pre>createAdminList(Map map)</pre>	<pre>map.put(IAdminList.ATT_NAME, "My</pre>

	<pre>List"); map.put(IAdminList.ATT_APINAME, "MyList"); map.put(IAdminList.ATT_DESCRIPTION, "My desc"); map.put(IAdminList.ATT_ENABLED, new Boolean(false)); map.put(IAdminList.ATT_CASCADED, new Boolean(false)); IAdmin admin = m_session.getAdminInstance(); IListLibrary listLibrary = admin.getListLibrary(); IAdminList newList = listLibrary.createAdminList(map);</pre>
INode	
getChild(Object child)	<pre>IAdmin admin = m_session.getAdminInstance(); INode node = admin.getNode(NodeConstants.NODE_AGI LE_CLASSES); INode partsClass = node.getChild("Parts");</pre>
getChildNode(Object child)	<pre>IAdmin admin = m_session.getAdminInstance(); INode node = admin.getNode("AgileClasses"); INode partsClass = node.getChildNode("Parts");</pre>
IProgram	
saveAs (Object type, Object[] tablesToCopy, Object params)	<pre>HashMap map = new HashMap(); map.put("name", new_number); map.put("scheduleStartDate", new Date()); Object [] objects = new Object [] {"PageTwo", "PageThree", "Team"}; IProgram program2 = (IProgram)program.saveAs("Program", objects, map);</pre>
saveAs(Object type, Object[] tablesToCopy, Object	<pre>HashMap map = new HashMap();</pre>

params, boolean applyToChildren)	<pre>map.put("name", new_number); map.put("scheduleStartDate", new Date()); Object[] objects = new Object[]{"PageTwo", "PageThree", "Team"}; IProgram program2 = (IProgram)program.saveAs("Program", objects, map, true);</pre>
IProject	
assignSupplier(Object supplierParams)	<pre>HashMap map = new HashMap(); map.put("Responses.itemNumber", item.getName()); map.put("Responses.supplier", supplier.getName()); rfq.assignSupplier(map);</pre>
IQuery	
setResultAttributes (Object[] attrs)	<pre>String[] attrs = new String[3]; attrs[0] = "TitleBlock.number"; attrs[1] = "TitleBlock.description"; attrs[2] = "TitleBlock.lifecyclePhase"; query.setResultAttributes(attrs);</pre>
IRequestForQuote	
assignSupplier (Object supplierParams)	<pre>HashMap map = new HashMap(); map.put("Responses.itemNumber", item.getName()); map.put("Responses.supplier", supplier.getName()); rfq.assignSupplier(map);</pre>
ITable	
createRow(Object param)	<pre>HashMap params = new HashMap(); params.put("itemNumber", "P0001"); params.put("newRev", "A"); ITable affectedItems =</pre>

	<pre>change.getTable("AffectedItems"); IRow affectedItemRow = affectedItems.createRow(params);</pre>
<code>createRows (Object [] rows)</code>	
<code>getAvailableValues (Object attr)</code>	<code>getAvailableValues ("PageTwo.list01")</code>
<code>updateRows (Map rows)</code>	<pre>HashMap [] mapx = new HashMap [5]; Map rows = new HashMap (); mapx [0] = new HashMap (); mapx [0] .put ("newRev", "A"); mapx [0] .put ("text01", "sdk test1"); rows .put (rowArray [0], mapx [0]); mapx [1] = new HashMap (); mapx [1] .put ("newRev", "A"); mapx [1] .put ("text01", "sdk test2"); rows .put (rowArray [1], mapx [1]); tab .updateRows (rows);</pre>
ITableDesc	
<code>getAttribute (Object key)</code>	<code>getAttribute ("number")</code>

SDK APIs that Get the APIName Field

Interface	Method
IAdminList	<code>getAPIName ()</code>
IAgileClass	<code>getAPIName ()</code>
IAgileList	<code>getAPIName ()</code> <code>addChild (Object child, String apiName)</code>
IAttribute	<code>getAPIName ()</code>
ICell	<code>getAPIName ()</code>
INode	<code>getAPIName ()</code>
IProperty	<code>getAPIName ()</code>
ITableDesc	<code>getAPIName ()</code>

API Names of Root Administrator Nodes

The following table lists the API names of the top level Administrator nodes which are not exposed in Agile Java Client. Top Level Admin Nodes are Admin Nodes that exist on their own. That is, no other Admin Node must exist in order for these Admin nodes to exist. For example, Class and Roles are top level nodes, but Life Cycle Phases and Attributes are not because they belong to another Admin Node. Similarly, Workflow Statuses are not top level nodes because they belong to Workflow.

Root Node	API Name
ACS Responses	ACSResponses
Account Policy	AccountPolicy
Activity Statuses	ActivityStatuses
ActivityHealths	ActivityHealths
Agile Classes	AgileClasses
Agile Workflows	AgileWorkflows
Agile eHubs	AgileEHubs
Attachment Purge Setting	AttachmentPurgeSetting
AutoNumbers	AutoNumbers
Catchers	Catchers
Character Set	CharacterSet
Cluster	Cluster
Company Profile	CompanyProfile
Criteria Library	CriteriaLibrary
Dashboard Management	DashboardManagement
Default Role Settings	DefaultRoleSettings
Destinations	Destinations
Event Handler Types	EventHandlerTypes
Event Handlers	EventHandlers
Event Subscribers	EventSubscribers
Event Types	EventTypes
Events	Events
Example Role/Privilege	ExampleRolePrivilege
Filters	Filters
Full Text Search Settings	FullTextSearchSettings
Import Preference Setting	ImportPreferenceSetting

LDAPConfig	LDAPConfig
LifeCycle Phases	LifeCyclePhases
My Assignments	MyAssignments
Notification Templates	NotificationTemplates
PGC SmartRules	PGCSmartRules
Package File Types	PackageFileTypes
Portals	Portals
Preferences	Preferences
Privileges	Privileges
Process eXtension Library	ProcessEXTensionLibrary
Query Cleanup	QueryCleanup
RFQ Terms and Conditions	RFQTermsAndConditions
Reports	Reports
Roles	Roles
Server Location	ServerLocation
Sign Off Message	SignOffMessage
SmartRules	SmartRules
Subscribers	Subscribers
Task Configuration	TaskConfiguration
UOM Families	UOMFamilies
Viewer and Files	ViewerAndFiles
wCM Servers	WCMServers

API Name Examples

The following example shows how to log in to an Agile PLM server, create two parts, enable Page Two text 01 and List 20, set values for them, and then add the second part to the BOM Table of the first part.

Example: Using the APIName field to access metadata

```
import com.agile.api.*;

import java.util.*;

/**
 * This sample code shows how to use the API name.
 * It uses some of the SDK APIs with the API name.
```

```

* For a list of API names for attributes and classes,
* refer to Agile Java Client.
* Some API names in Agile Java Client may differ from the ones
* in this example. This is because a duplicate conflict
* was detected in the API name in the same context.
* If you detect this conflict, be sure to change the API name
* in this sample before compiling and executing the code.
*/

public class APIName
{
    public static final String      USERNAME = "admin";
    public static final String      PASSWORD = "agile";
    public static final String      URL      =
        "http://localhost:<>/Agile";

    public static IAgileSession     session     = null;
    public static IAdmin             admin       = null;
    public static AgileSessionFactory factory    = null;
    public static IListLibrary       listLibrary = null;

    /**
     * @param args
     */
    public static void main(String[] args) {
        try {
            // Create an IAgileSession instance
            session = connect(session);
            admin   = session.getAdminInstance();
            listLibrary = admin.getListLibrary();

            // Create two parts
            IItem itemParent = createItem(getAutonumber());
            IItem itemChild  = createItem(getAutonumber());
            // enable Page Two tab for Part
            enableP2();

            // enable Page Two Text 01 and set value
            setP2Text(itemParent);
            // create a new AdminList
            createAdminList();

            // enable Page Two List 20 and set value
            setP2List(itemParent);
            // Add the child part to the BOM table of the parent part
            ITable bomTable = addBOM(itemParent, itemChild);
        }
        catch (Exception e) {
            e.printStackTrace();
        }
        finally {
            session.close();
        }
    }

    /**

```



```

    * @throws APIException
    */
private static void createAdminList() throws APIException {
    Map listParams = new HashMap();
    listParams.put(IAdminList.ATT_APINAME, "MY_LIST"); // Specify
    the API name of the List
    listParams.put(IAdminList.ATT_NAME, "My List");
    listParams.put(IAdminList.ATT_ENABLED, new Boolean(true));
    IAdminList myList = listLibrary.createAdminList(listParams);
    IAgileList values = myList.getValues();
    values.addChild("Value A", "VAL_A"); // Specify the API name
    along with the value
    values.addChild("Value B", "VAL_B");
    values.addChild("Value C", "VAL_C");
    myList.setValues(values);
    System.out.println("Created Admin List " + myList.getName());
}

/**
 * @throws APIException
 */
private static void enableP2() throws APIException {
    INode p2 = admin.getNode("Part.PageTwo"); // Fully qualified
    API name
    IProperty visible =
    p2.getProperty(PropertyConstants.PROP_VISIBLE);
    IAgileList values = visible.getAvailableValues();
    values.setSelection(new Object[] { "Yes" });
    visible.setValue(values);
    System.out.println("Page two enabled for Part class");
}

/**
 * @param itemParent
 * @throws APIException
 */
private static void setP2Text(IItem itemParent) throws APIException
{
    IAgileClass clazz = itemParent.getAgileClass();
    ITableDesc p2TableDesc = clazz.getTableDescriptor("PageTwo");
    // 'PageTwo' is the API name of the Page Two tab
    IAttribute text01 = p2TableDesc.getAttribute("text01"); //
    'text01' is the API name of the Text01 field
    IProperty visible =
    text01.getProperty(PropertyConstants.PROP_VISIBLE);
    IAgileList values = visible.getAvailableValues();
    values.setSelection(new Object[] { "Yes" });
    visible.setValue(values);
    itemParent.setValue("PageTwo.text01", "SDK test"); //
    'PageTwo.text01' is the fully qualified APINAME for
    ItemConstants.ATT_PAGE_TWO_TEXT01
    System.out.println("Set P2 Text01 " +
    itemParent.getValue("PageTwo.text01") + " for Part " +
    itemParent.getName());
}

/**
 * @param itemParent
 * @throws APIException

```

```

*/
private static void setP2List(IItem itemParent) throws APIException
{
    IAgileClass clazz = itemParent.getAgileClass();
    ITableDesc p2TableDesc = clazz.getTableDescriptor("PageTwo");
    // 'PageTwo' is the API name of the Page Two tab
    IAttribute text01 = p2TableDesc.getAttribute("list20"); //
    'list20' is the API name of the List20 field
    IProperty visible =
    text01.getProperty(PropertyConstants.PROP_VISIBLE);
    IAgileList values = visible.getAvailableValues();
    values.setSelection(new Object[]{ "Yes" });
    visible.setValue(values);
    IAdminList myList = listLibrary.getAdminList("MY_LIST"); //
    MY_LIST is the API name of the List 'My List'
    IAgileList listValues = myList.getValues();
    listValues.setSelection(new Object[] { "VAL_B" } ); // VAL_B
    is the API name of the list value 'Value B'
    itemParent.setValue("PageTwo.list20", listValues); //
    'PageTwo.list20' is the fully qualified APIName for
    ItemConstants.ATT_PAGE_TWO_TEXT01
    System.out.println("Set P2 List20 " +
    listValues.getSelection()[0].getValue() + " for Part " +
    itemParent.getName());
}

/**
 * <p> Create an IAgileSession instance </p>
 * @param session
 * @return IAgileSession
 * @throws APIException
 */
private static IAgileSession connect(IAgileSession session)
    throws APIException {
    factory = AgileSessionFactory.getInstance(URL);
    HashMap params = new HashMap();
    params.put(AgileSessionFactory.USERNAME, USERNAME);
    params.put(AgileSessionFactory.PASSWORD, PASSWORD);
    session = factory.createSession(params);
    return session;
}

/**
 * <p> Create a part </p>
 * @param parent
 * @return IItem
 * @throws APIException
 */
private static IItem createItem(String number) throws APIException {
    HashMap map = new HashMap();
    map.put("TitleBlock.number", number); // 'number' or
    'TitleBlock.number' is the APIName for
    ItemConstants.ATT_TITLE_BLOCK_NUMBER
    map.put("description", "test"); // 'description'
    or 'TitleBlock.description' is the APIName for
    ItemConstants.ATT_TITLE_BLOCK_DESCRIPTION
    String p = "P" + System.currentTimeMillis();
    IItem item = (IItem)session.createObject("Part",map); //
    'Part' is the API name of the Part class
    System.out.println("Created Part " + number);
}

```

```

        return item;
    }

    /**
     * <p> Add the child parts to the BOM table of the parent part </p>
     * @param itemParent
     * @param itemChild1
     * @param itemChild2
     * @return ITable
     * @throws APIException
     */
    private static ITable addBOM(IItem itemParent, IItem itemChild)
    throws APIException {
        ITable table = itemParent.getTable("BOM");
        // 'BOM' is APIName for ItemConstants.TABLE_BOM
        IRow row1 = table.createRow();
        String number =
            (String)itemChild.getValue("TitleBlock.number");
        row1.setValue("itemNumber", number);
        // 'itemNumber' is APIName for 'Item Number' on BOM Table
        System.out.println("Added Part " + itemChild.getName() + " to
            BOM of the Part " + itemParent.getName());
        return table;
    }

    /**
     * @return
     * @throws APIException
     */
    private static String getAutonumber() throws APIException{
        IAgileClass cls = admin.getAgileClass("Part");
        // 'Part' is the API name of the Part class
        IAutoNumber auto[] = cls.getAutoNumberSources();
        String number = null;
        if(auto != null && auto.length > 0)
            number = auto[0].getNextNumber();
        else
            number = "PART" + System.currentTimeMillis();
        return number;
    }
}

```


Subscribing to Agile PLM Objects

This chapter includes the following:

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- Getting Subscriptions for an Object 139
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- Working with Subscription Tables..... 143

About User Subscriptions

When you load an Agile PLM business object, such as an item or change, you can then subscribe to that object. Once you subscribe to the object, you will receive a Notification whenever a triggering event occurs for that object. You can specify which events trigger a Notification. Subscription events can be a lifecycle change, a change to attachment files, or a change to the value of any cell that is made available for subscription.

You can subscribe to both routable and nonroutable objects. The Agile API provides an interface called `ISubscribable`, which enables retrieving and modifying all subscriptions for an object. All objects that a user has subscribed to are listed on the user's Subscription table.

Subscription Events

Subscription events vary per object class. The full set of events you can subscribe to are listed in the following table.

Subscription Event	SubscriptionConstants
Status Change (for routable objects)	EVENT_STATUS_CHANGE
Lifecycle Phase Change (for nonroutable objects)	EVENT_LIFECYCLE_CHANGE
Field Change	EVENT_FIELD_CHANGE
Add File	EVENT_ADD_FILE
Delete File	EVENT_DELETE_FILE
Checkin File	EVENT_CHECKIN_FILE
Checkout File	EVENT_CHECKOUT_FILE
Cancel Checkout File	EVENT_CANCELCHECKOUT_FILE

Note There are additional subscription events for Projects Execution objects that are not supported by the Agile API.

Although most routable and nonroutable objects support the subscription events listed in the table

above, there are some exceptions:

- User objects do not support the Lifecycle Change subscription event.
- File Folder objects do not support the Add File and Cancel Checkout File subscription events.

The Field Change subscription event is related to any attribute whose Available To Subscribe property has been set to "Yes." Consequently, each class and subclass can have a different set of subscribable attributes.

Subscribe Privilege

To subscribe to an object, you must have the Subscribe privilege for that class. Many predefined Agile PLM roles, such as Creator, already have the Subscribe privilege for several object classes. To change your roles and privileges, see the administrator of your Agile PLM system.

Subscription Notifications

Subscription events trigger two types of Agile PLM Notifications:

- Email – Email Notifications are sent only if the user's Receive Email Notification preference is set to Yes. For information on user and system preferences, refer to *Agile PLM Administrator Guide*.
- Inbox – Inbox Notifications occur automatically regardless of user preferences

A user with Administrator privileges can create and configure these Notifications in Java Client which provides two very similar dialogs for this purpose. The reason for the two dialogs is due to the fact that there are two sets of Email and Inbox Notifications:

- Those that the "To" field is grayed out
- Those that the administrator user can select recipients who are notified when the subscription event is triggered

Sending Notifications with SDK

Notifications are briefly described in the SDK Guide under Event Notifications. SDK exposes the following API to send Notifications to designated notifiers with the specified template for Agile PLM objects. For information about Notifications, refer to *Agile PLM Administrator Guide*.

```

sendNotification      (IDataObject  object           Object the Notification is issued for
                     String         template        Name of Notification template
                     Collection     notifiers       List of notifiers
                     boolean       urgent         True for urgent
                     String        comments      Comments about the Notification
                     )
                                     throws APIException
    
```

These parameters are defined as follows:

- **object** – object on which Notification is to be issued
- **template** – name of the Notification template

- **notifiers** – collection containing a list of users as individual `IDataObjects` such as `IUser` and `IUserGroup`
- **urgent** – value of true indicates send urgently, set to false otherwise
- **comments** – comments about the Notification

For more information about these parameters and the API, refer to Javadoc generated HTML files that document the SDK code. You can find them in the HTML folder in SDK_samples (ZIP file). To access this file, see the Note in [Client-Side Components](#) on page 2.

The following example uses `sendNotification` to send a Notification from ECO C0001 to user1 and user2 with Notification Comment and template

Example: Sending a Notification with Agile SDK

```

IAgileSession session =
    AgileSessionFactory.createSessionEx(loginParams);
List notifyList =
    new ArrayList();
IDataObject user =
    (IDataObject)session.getObject(com.agile.api.IUser.OBJECT_TYPE, "John
    Doe");
notifyList.add(user);
user =
    (IDataObject)session.getObject(com.agile.api.IUser.OBJECT_TYPE, "Jane
    Doe");
notifyList.add(user);
IDataObject agileObject =
    (IDataObject)session.getObject(com.agile.api.IChange.OBJECT_TYPE, "C0
    001");
boolean urgent = true;
String comment =
    "Add ECO approver, Notify CA";
String template =
    "Automated SDK process added ECO approver";
session.sendNotification(agileObject, template, notifyList, urgent, comment
);

```

Deleting Subscribed Objects

You can delete any Agile PLM business object using the `IDataObject.delete()` method. However, you can't delete an object until its subscriptions are removed. Users can remove their own subscriptions, but not the subscriptions of other users.

Getting Subscriptions for an Object

To retrieve the current subscriptions for an object, use `ISubscribable.getSubscriptions()`, which returns an array of all `ISubscription` objects, both enabled and disabled. The following example shows how to get subscriptions for an object.

Example: Getting subscriptions for an object

```
public void getSubscriptionStatus(IAgileObject obj) throws APIException
{
    ISubscription[] subs =
        ((ISubscribable)obj).getSubscriptions();
    for (int i = 0; i < subs.length; ++i) {
        if (subs[i].getId().equals(SubscriptionConstants.EVENT_ADD_FILE)) {
            if (subs[i].isEnabled()) {
                System.out.println("Add File subscription is enabled");
            }
        }
        else if
            (subs[i].getId().equals(SubscriptionConstants.EVENT_CANCELCHECKOUT_F
            ILE)) {
            if (subs[i].isEnabled()) {
                System.out.println("Cancel Checkout File subscription is enabled");
            }
        }
        else if
            (subs[i].getId().equals(SubscriptionConstants.EVENT_CHECKIN_FILE)) {
            if (subs[i].isEnabled()) {
                System.out.println("Checkin File subscription is enabled");
            }
        }
        else if
            (subs[i].getId().equals(SubscriptionConstants.EVENT_CHECKOUT_FILE))
        {
            if (subs[i].isEnabled()) {
                System.out.println("Checkout File subscription is enabled");
            }
        }
        else if
            (subs[i].getId().equals(SubscriptionConstants.EVENT_DELETE_FILE)) {
            if (subs[i].isEnabled()) {
                System.out.println("Delete File subscription is enabled");
            }
        }
        else if
            (subs[i].getId().equals(SubscriptionConstants.EVENT_FIELD_CHANGE)) {
            if (subs[i].isEnabled()) {
                IAttribute attr = subs[i].getAttribute();
                if (attr != null) {
                    String attrName = attr.getFullName();
                    System.out.println("Field Change subscription
```



```

        is enabled for " + attrName);
    }
}
}
else if
(subs[i].getId().equals(SubscriptionConstants.EVENT_LIFECYCLE_CHANGE))
{
    if (subs[i].isEnabled())
        System.out.println("Lifecycle Change subscription is enabled");
    }
    else if
    (subs[i].getId().equals(SubscriptionConstants.EVENT_STATUS_CHANGE))
    {
        if (subs[i].isEnabled())
            System.out.println
            ("Status Change subscription is enabled");
        }
    }
else
    System.out.println("Unrecognized subscription event: " +
        subs[i].getId());
}
}
}

```

Modifying the Subscriptions for an Object

You can use the Agile API to modify subscriptions for the current user only. If you change your subscriptions for a particular business object, other users' subscriptions for that object remain unaffected.

The list of subscription events for any object is set at the server and cannot be modified by the Agile API. However, you can select the fields (attributes) you want subscribed. If you have Administrator privileges, you can also modify classes to define which fields are available for subscription. For more information, see the next section.

To work with a subscription, use the following `ISubscription` methods:

- `enable(boolean)` – Enables or disables the subscription
- `getAttribute()` – Returns the `IAttribute` object associated with a subscription. Only Field Change subscriptions have associated attributes
- `isEnabled()` – Returns true if the subscription is enabled, false otherwise
- `getId()` – Returns the subscription ID, which is equivalent to one of the `SubscriptionConstants`

`ISubscription` is a value object interface. Consequently, when you make changes to a subscription (for example, by enabling it), it's not changed in the Agile PLM system until you call `ISubscribable.modifySubscriptions()`.

The following example shows how to enable the Lifecycle Change and Field Change subscription events and subscribe to two Page Two fields. All other subscription events are disabled.

Example: Enabling and disabling subscriptions for an object

```
public void setSubscriptions(I AgileObject obj) throws APIException {
    ISubscription[] subs = ((ISubscribable)obj).getSubscriptions();
    for (int i = 0; i < subs.length; ++i) {
        // Enable the Status Change subscription event
        if (subs[i].getId().equals(SubscriptionConstants.EVENT_STATUS_CHANGE)) {
            subs[i].enable(true);
        }
        // Enable the Field Change subscription event for Page Two.Text01
        and Page Two.List01
        else if
        (subs[i].getId().equals(SubscriptionConstants.EVENT_FIELD_CHANGE)) {
            if (subs[i].getAttribute() != null)
                System.out.println(subs[i].getAttribute().getFullName() + ": " +
                subs[i].getAttribute().getId());
            if ((subs[i].getAttribute() != null) &&
                ((subs[i].getAttribute().getId().equals(CommonConstants.ATT_PAGE_TWO_
                LIST01)) ||
                (subs[i].getAttribute().getId().equals(CommonConstants.ATT_PAGE_TWO_
                TEXT01))))
                subs[i].enable(true);
            else
                subs[i].enable(false);
        }
        // Disable all other subscription events
        else
            subs[i].enable(false);
    }
    ((ISubscribable)obj).modifySubscriptions(subs);
}
```

Making Attributes Available for Subscription

The attributes that are subscribable vary per Agile PLM class. In general, most Page One (Title Page, Cover Page, and General Info) attributes are subscribable and can therefore be made available for subscription. All Page Two attributes, except for `ATT_PAGE_TWO_CREATE_USER`, and all Page Three attributes are also subscribable.

When an attribute's Available To Subscribe property is set to Yes, users can subscribe to the attribute. When you call `ISubscribable.getSubscriptions()` for an object, the returned `ISubscription[]` array includes an `ISubscription` object for each subscription event. Although there is only one Field Change event—whose constant is `SubscriptionConstants.EVENT_FIELD_CHANGE`—each subscribed attribute is treated as a separate event that can trigger a subscription Notification. Depending on how your Agile PLM system has been configured, there could be dozens of attributes available for subscription for a particular object.

If an attribute isn't visible, it also isn't subscribable even if its Available To Subscribe property has been set to Yes. Therefore, before setting the Available To Subscribe property to Yes, make sure the Visible property is also set to Yes. The following example shows how to make all Page Two

attributes for ECOs available for subscription.

Example: Making Page Two attributes available for subscription

```
try {
    // Get the ECO subclass
    IAgileClass classECO = m_admin.getAgileClass("ECO");
    // Get Page Two attributes
    IAttribute[] attr =
        classECO.getTableAttributes(ChangeConstants.TABLE_PAGETWO);
    // Make all visible Page Two attributes subscribable
    for (int i = 0; i < attr.length; ++i) {
        IProperty prop = null;
        IAgileList listValues = null;
        String strVal = "";

        // Check if the attribute is visible
        prop = attr[i].getProperty(PropertyConstants.PROP_VISIBLE);
        listValues = (IAgileList)prop.getValue();
        strVal = listValues.toString();

        // If the attribute is visible, make it subscribable
        if (strVal.equals("Yes")) {
            prop =
attr[i].getProperty(PropertyConstants.PROP_AVAILABLE_FOR_SUBSCRIBE);
            if (prop != null) {
                listValues = prop.getAvailableValues();
                listValues.setSelection(new Object[] { "Yes" });
                prop.setValue(listValues);
            }
        }
    }
} catch (APIException ex) {
    System.out.println(ex);
}
```

Parent and Child Attributes

Several read-only attributes have a child relationship with a parent attribute. Child attributes derive values from their parent attribute. Consequently, parent attributes are available for subscription, but child attributes are not. Examples of child attributes include BOM table attributes like BOM.Item List02 and BOM.Item Text01.

Working with Subscription Tables

A user's Subscription table lists all subscriptions the user has made. The Subscription table offers limited editing capabilities. For example, you can't add new rows to the table; the only way to add subscriptions using the Agile API is to call `ISubscribable.modifySubscriptions()` for a dataobject. However, you can remove subscriptions from the table.

The following example shows how to retrieve the Subscription table for the current user. It also shows how to remove a subscription for a part with the number 1000-02.

Example: Removing a subscription

```
try {
    // Get the current user
    IUser user = m_session.getCurrentUser();
    // Get the Subscription table
    ITable tblSubscriptions =
        user.getTable(UserConstants.TABLE_SUBSCRIPTION);
    Iterator i = tblSubscriptions.iterator();
    // Stop subscribing to part 1000-02
    while (i.hasNext()) {
        IRow row = (IRow)i.next();
        String n =
            (String)row.getValue(UserConstants.ATT_SUBSCRIPTION_NUMBER);
        if (n.equals("1000-02")) {
            tblSubscriptions.removeRow(row);
            break;
        }
    }
} catch (APIException ex) {
    System.out.println(ex);
}
```

In addition to removing individual rows from the Subscription table, you can also use the `Collection.clear()` method to clear the table.

Example: Clearing the Subscription table

```
public void clearSubscriptionTable(IUser user) throws APIException {
    // Get the Subscription table
    ITable tblSubscriptions =
        user.getTable(UserConstants.TABLE_SUBSCRIPTION);
    // Clear the table
    tblSubscriptions.clear();
}
```

The Subscription table doesn't list the events you've subscribed to for each object. To find that information, you need to open each referenced object. The following example shows how to use `ITable.getReferentIterator()` to iterate through the referenced objects in the table.

Example: Getting objects referenced in the Subscription table

```
try {
    // Get the current user
    IUser user = m_session.getCurrentUser();
    // Get the Subscription table
    ITable tblSubscriptions =
        user.getTable(UserConstants.TABLE_SUBSCRIPTION);
    Iterator i = tblSubscriptions.getReferentIterator();
    // Get each object referenced in the table
    while (i.hasNext()) {
        IAgileObject obj = (IAgileObject)i.next();
        if (obj instanceof ISubscribable) {
            ISubscription[] subscriptions =
                ((ISubscribable)obj).getSubscriptions();
            for (int j = 0; j < subscriptions.length; j++) {
                ISubscription subscription =
                    subscriptions[j];
                System.out.println(subscription.getName());
                // Add code here to handle each subscription
            }
            System.out.println(obj.getName());
        }
    }
} catch (APIException ex) {
    System.out.println(ex);
}
```


Managing Manufacturing Sites

This chapter includes the following:

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▪ Controlling Access to Sites.....	147
▪ Creating a Manufacturing Site.....	148
▪ Loading a Manufacturing Site.....	148
▪ Retrieving the Sites Table for an Item.....	149
▪ Adding a Manufacturing Site to the Sites Table.....	149
▪ Selecting the Current Manufacturing Site for an Item.....	150
▪ Disabling a Site.....	151

About Manufacturing Sites

Companies that practice distributed manufacturing use several different manufacturing sites for their products. Agile PLM site objects allow companies to maintain site-specific information for a product's parts. For example, the various manufacturing locations may have different effectivity dates for new revisions, different manufacturing instructions due to location, or different manufacturers from whom they buy components, due to location.

Changes can affect all manufacturing sites of an item or a specific site. The Affected Items table for a change lets you select the manufacturing sites that are affected. Items may have different effectivity dates and dispositions at each site. You specify effectivity dates and dispositions on the Affected Items tab of an ECO or SCO. To create a new revision when you assign the new effectivity date or disposition, use an ECO. To assign site-specific effectivity dates and dispositions without incrementing the revision, use an SCO.

For a more detailed overview of Agile PLM's manufacturing sites functionality, refer to the Agile PLM *Product Collaboration Guide*.

Controlling Access to Sites

In order to use manufacturing sites in your organization, the Sites module must be enabled in Agile Administrator. Your organization's agreement with Oracle determines the modules that are enabled in Agile PLM.

A user's access to manufacturing sites is controlled by his/her assigned roles and privileges and the Sites property in the user's profile. Your organization can create an unlimited number of manufacturing sites, however a user will not have access to every site unless all sites are specified in his user profile Sites property. Your organization may have implemented the Agile PLM system in such a way that users can access only the information pertaining to certain sites, as determined by their user profile Sites property.

To create a site-specific BOM for an item, the item's subclass must have the Site-specific BOM

property set to Allow. Otherwise, items of that subclass have BOMs that are common to all sites. For information on Sites and enabling sites, refer to the *Agile PLM Administrator Guide*.

Creating a Manufacturing Site

Manufacturing sites are identified uniquely by name. To create a manufacturing site, use the `IAgileSession.createObject` method, specifying both the class and the site name.

All users cannot create manufacturing sites. Only users who have the Create privilege for manufacturing site objects can create manufacturing sites.

Note When you create a manufacturing site, its Lifecycle Phase is set to Disabled by default. To use the site, make sure you enable it.

Example: Creating and enabling a manufacturing site

```
try {
    // Create a manufacturing site
    HashMap params = new HashMap();
    params.put(ManufacturingSiteConstants.ATT_GENERAL_INFO_NAME,
        "Taipei");
    IManufacturingSite mfrSite =
        (IManufacturingSite)m_session.createObject(
            ManufacturingSiteConstants.CLASS_SITE,
            params);
    // Enable the manufacturing site
    ICell cell = mfrSite.getCell(
        ManufacturingSiteConstants.ATT_GENERAL_INFO_LIFECYCLE_PHASE);
    IAgileList values = cell.getAvailableValues();
    values.setSelection(new Object[] { "Enabled" });
    cell.setValue(values);
} catch (APIException ex) {
    System.out.println(ex);
}
```

Loading a Manufacturing Site

To load an `IManufacturingSite` object, use one of the `IAgileSession.getObject()` methods. The following example shows three different ways to specify the object type for a manufacturing site.

Example: Loading a manufacturing site

```
try {
    // Load the Hong Kong site
    IManufacturingSite siteHK =
        (IManufacturingSite)m_session.getObject(ManufacturingSiteConstants.C
        LASS_SITE, "Hong Kong");
    // Load the Taipei site
    IManufacturingSite siteTaipei =
```



```

        (IManufacturingSite)m_session.getObject(IManufacturingSite.OBJECT_TY
        PE, "Taipei");
    // Load the San Francisco site
    IManufacturingSite siteSF =
        (IManufacturingSite)m_session.getObject("Site", "San Francisco");
} catch (APIException ex) {
    System.out.println(ex);
}

```

Retrieving the Sites Table for an Item

Each item has a Sites table that lists the manufacturing sites where that item can be used. To retrieve the Sites table for an item, use the `DataObject.getTable()` method.

Example: Retrieving the Sites table

```

//Get the Sites table
private static void getSites(IItem item) throws APIException {
    IRow row;
    ITable table = item.getTable(ItemConstants.TABLE_SITES);
    ITwoWayIterator it = table.getTableIterator();
    while (it.hasNext()) {
        row = (IRow)it.next();
        //Add code here to do something with the Sites table
    }
}

```

To determine the manufacturing sites associated with an item, use the `IManufacturingSiteSelectable.getManufacturingSites()` method. Of course, you can also iterate over the Sites table to get the same information, but using the `getManufacturingSites()` method is easier and faster. See [Selecting the Current Manufacturing Site for an Item](#) on page 150 for an example that uses `getManufacturingSites()`.

Adding a Manufacturing Site to the Sites Table

Each row of the Sites table references a different `IManufacturingSite` object. To add a manufacturing site to the Sites table, use the `ITable.createRow()` method.

If a manufacturing site is not listed on an item's Sites table, then that item cannot be included in a parent item's BOM specific to that manufacturing site. For example, to add item P1001 to another item's Taipei-specific BOM, P1001 must have the Taipei site listed on its Sites table.

Example: Adding a row to the Sites table

```

private static void addSite(String itemNumber, IManufacturingSite site)
    throws APIException {
    //Load the item
    IItem item = (IItem)session.getObject(IItem.OBJECT_TYPE,
    itemNumber);
    //Get the Sites table
    ITable table = item.getTable(ItemConstants.TABLE_SITES);
}

```

```
        //Add the manufacturing site to the table
        IRow row = table.createRow(site);
    }
```

Selecting the Current Manufacturing Site for an Item

BOM and Manufacturers tables (or AMLs) can be different for each manufacturing site used for an assembly. When you retrieve a BOM or Manufacturers table for an item, you can display information for all sites or for a specific site. If you choose a specific site, only that site's information is included in the table.

The `IManufacturingSiteSelectable` interface provides methods for getting and setting the manufacturing site for an item. To get the current manufacturing site selected for an item, use the `IManufacturingSiteSelectable.getManufacturingSite()` method.

Example: Getting the currently selected manufacturing site for an item

```
private static IManufacturingSite getCurrentSite(IItem item)
    throws APIException {
    IManufacturingSite site = item.getManufacturingSite();
    return site;
}
```

The `IManufacturingSiteSelectable.getManufacturingSites()` method retrieves all available manufacturing sites that have been added to an item's Sites table.

Example: Getting all manufacturing sites associated with an item

```
private static void getItemSites(IItem item)
    throws APIException {
    IManufacturingSite[] sites = item.getManufacturingSites();
    //Print the name of each site
    for (int i = 0; i < sites.length; ++i) {
        String siteName = (String)sites[i].getValue(
            ManufacturingSiteConstants.ATT_GENERAL_INFO_NAME
        );
        System.out.println(siteName);
    }
}
```

The `IManufacturingSiteSelectable.setManufacturingSite()` method sets the current manufacturing site for an item. You can specify that an item has a specific manufacturing site, is not site-specific, or uses All Sites. To specify that an item is not site-specific, use `ManufacturingSiteConstants.COMMON_SITE`. To specify All Sites, pass the `ManufacturingSiteConstants.ALL_SITES` value.

When you set the manufacturing site for an item, the item is updated to reflect site-specific information. Consequently, your program should update the BOM and Manufacturers tables by iterating over the rows again to refresh them.

Example: Setting the current manufacturing site for an item

```
try {
    // Load sites
```

```

    IManufacturingSite siteSF =
(IManufacturingSite)m_session.getObject("Site", "San Francisco");
    IManufacturingSite siteHK =
(IManufacturingSite)m_session.getObject("Site", "Hong Kong");
    // Load an item
    IItem item = (IItem)m_session.getObject("Part", "1000-02");
    // Set the Hong Kong site
    item.setManufacturingSite(siteHK);
    String desc =
(String)item.getValue(ItemConstants.ATT_TITLE_BLOCK_DESCRIPTION);
    System.out.println("Hong Kong description = " + desc);
    // Set the San Francisco site
    item.setManufacturingSite(siteSF);
    desc =
(String)item.getValue(ItemConstants.ATT_TITLE_BLOCK_DESCRIPTION);
    System.out.println("San Francisco description = " + desc);
    // Set the item to use all sites
    item.setManufacturingSite(ManufacturingSiteConstants.ALL_SITES);
    desc =
(String)item.getValue(ItemConstants.ATT_TITLE_BLOCK_DESCRIPTION);
    System.out.println("All Sites description = " + desc);
    // Set the item to be common site (the item is not site-specific)
    item.setManufacturingSite(ManufacturingSiteConstants.COMMON_SITE);
    desc =
(String)item.getValue(ItemConstants.ATT_TITLE_BLOCK_DESCRIPTION);
    System.out.println("Global description = " + desc);
    // Set the item to use the user's default site

item.setManufacturingSite(((I AgileList)m_session.getCurrentUser().getVa
lue(
UserConstants.ATT_GENERAL_INFO_DEFAULT_SITE)).getSelection()[0].getValu
e());
    desc =
(String)item.getValue(ItemConstants.ATT_TITLE_BLOCK_DESCRIPTION);
    System.out.println("User's Default Site description = " + desc);
} catch (APIException ex) {
    System.out.println(ex);
}
}

```

Disabling a Site

A manufacturing site can have one of two lifecycle phases, enabled or disabled. If a site is disabled, it can no longer be used to create site-specific BOMs, AMLs, and changes.

To disable a manufacturing site, set the value for the Lifecycle Phase attribute to Disabled.

Example: Disabling a manufacturing site

```
private static void disableSite(IManufacturingSite site)
```

```
throws APIException {
// Get the Lifecycle Phase cell
ICell cell = site.getCell(
    ManufacturingSiteConstants.ATT_GENERAL_INFO_LIFECYCLE_PHASE
);

// Get available list values for Lifecycle Phase
IAgileList values = cell.getAvailableValues();
// Set the value to Disabled
values.setSelection(new Object[] { "Disabled" });
cell.setValue(values);
}
```

Working with Lists

This chapter includes the following:

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▪ Selecting a List Value	157
▪ Selecting a List from the List Library.....	161
▪ Creating Custom Lists	163
▪ Checking the Data Type of a List.....	169
▪ Modifying a List.....	169
▪ Printing Contents of IAgileList Objects	173

About Lists

Many attributes in the Agile PLM system are configured as lists. Agile provides two datatypes to support list fields:

- `SingleList` – a list in which only one value can be selected.
- `MultiList` – a list in which multiple values can be selected.

Attributes, properties, and cells can all be lists. The Agile API provides methods for working with lists in the `IAgileList` interface, a generalized data structure used for all Agile lists. Because `IAgileList` represents a tree structure of available list values, it extends the `ITreeNode` interface.

You can use `ITreeNode.addChild()` to add values to a list. All list values must be unique. After adding a list value, you can prevent its selection by making it obsolete.

List Library

In Agile Java Client, administrators can define custom lists that can be used for Page Two and Page Three list attributes. You can also use the Agile API to define custom lists. The `IListLibrary` interface provides functionality equivalent to the list library in Agile Java Client. You can use the `IAdminList` interface to modify the values or properties of a list.

To retrieve the list library, use the `IAdmin.getListLibrary()` method. You can then use the `IListLibrary` interface to create new custom lists and work with existing lists. `AdminListConstants` provide IDs for each list in the list library.

Note The Agile API provides support for several internal Agile lists that are not exposed in the list library in Agile Java Client.

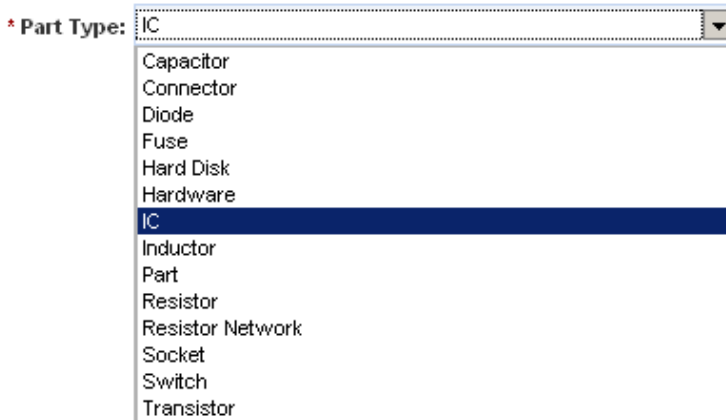
Figure 9: List Library

ID	Name	Description	API Name	Enabled	Editable	Cascade	Display Type
18414	Action Status	Action Status	ActionStatus	Yes	No	No	List
2000008548	Agile Script Log Leve...		AgileScriptL...	Yes	Yes	No	List
2249	AML Preferred Status	AML Preferred Status	AMLPreferre...	Yes	Yes	No	List
4682	AttachType List	AttachType List	AttachTypeList	Yes	Yes	No	List
6820	Audit Result	Audit Result	AuditResult	Yes	Yes	No	List
8934	Buyer	Buyer	Buyer	Yes	Yes	No	List
2000001019	Calculated Compliance	Calculated Compliance	CalculatedC...	Yes	No	No	List
2000011160	Cas Number Match f...	Cas Number Match f...	CasNumber...	Yes	No	No	List
2624820	Cascade1	Cascade1	Cascade1	Yes	Yes	Yes	List
2000000192	Category 10 List	Category 10 List	Category10...	Yes	Yes	No	List
2000000189	Category 7 List	Category 7 List	Category7List	Yes	Yes	No	List

SingleList Lists

A SingleList attribute or cell presents a list from which only one value can be selected. The following figure shows a SingleList cell for Part Types in Agile Web Client.

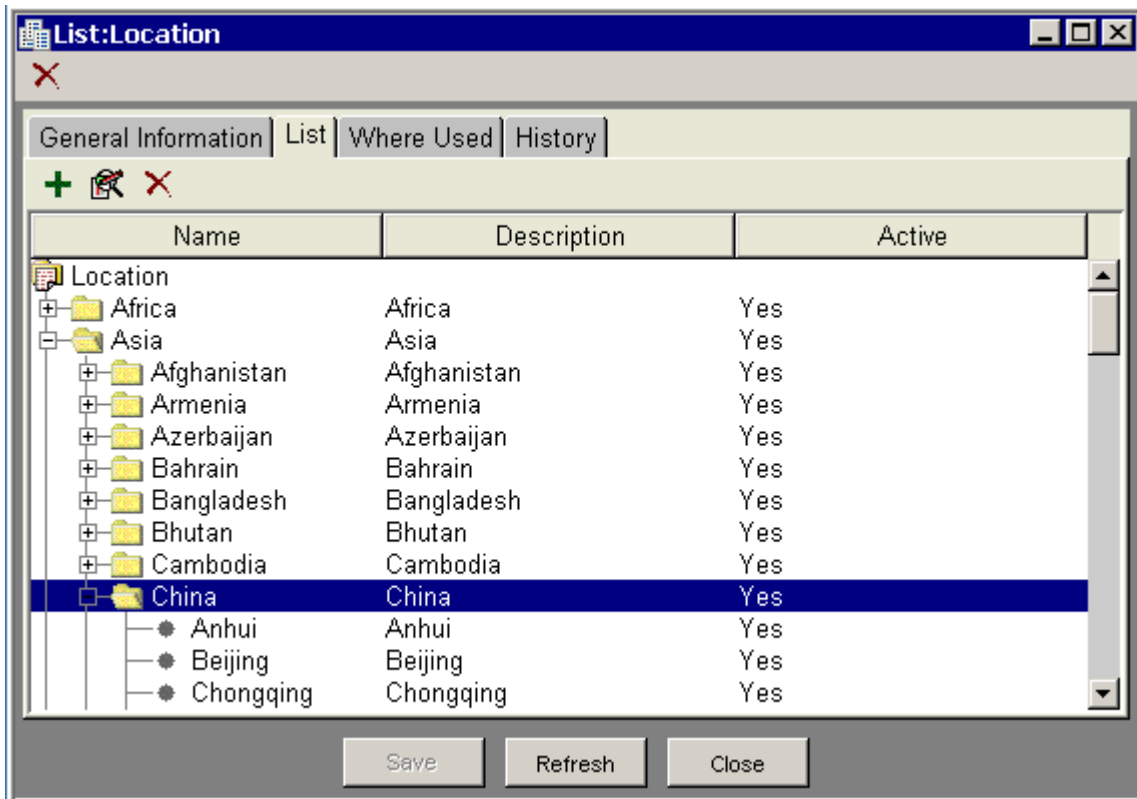
Figure 10: SingleList cell in the Agile Web Client



Cascading Lists

In Agile Java Client, you can configure a SingleList attribute to have multiple hierarchical levels. A list with multiple hierarchical levels is called a cascading list. The following figure shows the Location list, a cascading list, being configured in Agile Java Client. The list has separate levels for continent, country, and city.

Figure 11: Configuring a cascading list in the Agile Java Client

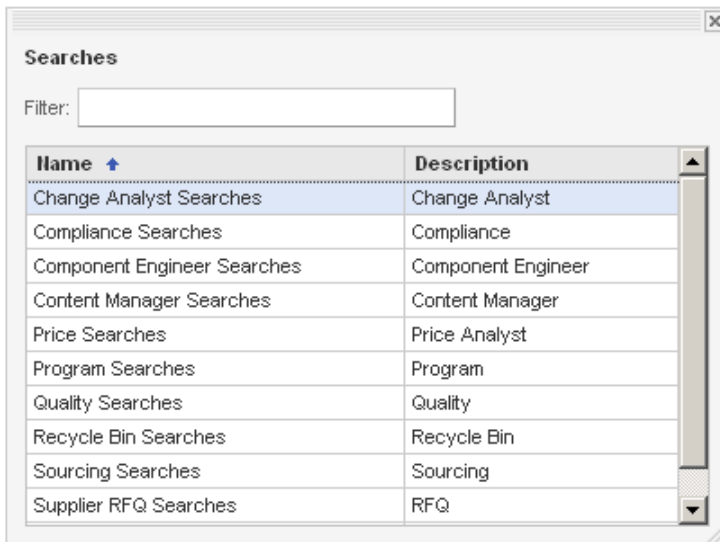


Note The Location list is the only cascading list that ships with Agile PLM. However, you can define your own cascading lists.

MultiList Lists

A MultiList attribute or cell presents a list from which multiple values can be selected. In Agile Web Client, you can select values for a MultiList cell using the Multiple Value Selection dialog, shown in the following figure.

Figure 12: Multiple Value Selection window in the Agile Web Client



Methods that Use IAgileList

The IAgileList interface provides the necessary methods to get and set the selected value(s) of a list. The IAgileList interface represents a value object with a tree structure, which is why the interface extends ITreeNode.

The following Agile API methods return an IAgileList object (or an array of IAgileList objects):

- `IAdminList.getValues()`
- `IAdminList.setValues(IAgileList)`
- `IAttribute.getAvailableValues()`
- `IAttribute.setAvailableValues(IAgileList)`
- `IAgileList.getSelection()`
- `ICell.getAvailableValues()`
- `IListLibrary.createAdminList(java.util.Map)`
- `IListLibrary.getAdminList(java.lang.Object)`
- `IListLibrary.getAdminLists()`
- `IProperty.getAvailableValues()`

The following methods either return an `IAgileList` or require an `IAgileList` parameter when the related attribute, cell, or property is a list (the datatype is `SingleList` or `MultiList`):

- `ICell.getValue()` – For `SingleList` and `MultiList` cells, the returned `Object` is an `IAgileList`.
- `ICell.setValue(java.lang.Object value)` – For `SingleList` and `MultiList` cells, `value` is an `IAgileList`.
- `IProperty.getValue()` – For `SingleList` and `MultiList` properties, the returned `Object` is an `IAgileList`.
- `IProperty.setValue(java.lang.Object value)` – For `SingleList` and `MultiList` properties, `value` is an `IAgileList`.
- `IRow.getValue(java.lang.Object cellId)` – For `SingleList` and `MultiList` cells, the returned `Object` is an `IAgileList`.
- `IRow.getValues()` – For each `SingleList` or `MultiList` cell in the row, the returned `Map` object contains an `IAgileList`.
- `IRow.setValue(java.lang.Object cellId, java.lang.Object value)` – If `cellID` specifies a `SingleList` or `MultiList` cell, `value` is an `IAgileList`.
- `IRow.setValues(java.util.Map map)` – For each `SingleList` or `MultiList` cell in the row, `map` contains an `IAgileList`.

Selecting a List Value

To select a list value, whether it is a `SingleList` or `MultiList` list, you must first get the available values for the list. You can then set the selected value. After selecting the list value, save the selection by setting the value for the cell or property.

The following example shows how to change the value of the `Visible` property of an attribute. The `Visible` property is a `SingleList` property with two possible values, `No` and `Yes` (or 0 and 1).

Note You can use `IAgileList.getAPIName()` to get the available values of a list. For information, see [Accessing PLM Metadata with APIName Field](#) on page 123.

Example: Changing the Visible property of an attribute

```
try {
    // Get the Admin instance
    IAdmin admin = m_session.getAdminInstance();
    // Get part sub-class
    IAgileClass partClass =
        admin.getAgileClass(ItemConstants.CLASS_PART);
    // Get the "Page Two.List03" attribute
    IAttribute attr =
        partClass.getAttribute(ItemConstants.ATT_PAGE_TWO_LIST03);
    // Get the Visible property
    IProperty propVisible =
        attr.getProperty(PropertyConstants.PROP_VISIBLE);
    // Get all available values for the Visible property
    IAgileList values = propVisible.getAvailableValues();
```

```
// Set the selected list value to "Yes"
    values.setSelection(new Object[] { "Yes" });
// Instead of setting the selection to "Yes", you could also
// specify the corresponding list value ID, as in the following line:
// values.setSelection(new Object[] { new Integer(1)});
// Set the value of the property
propVisible.setValue(values);
} catch (APIException ex) {
    System.out.println(ex);
}
```

When you use the `IAgileList.setSelection()` method, you can specify `String[]`, `Integer[]`, or `IAgileList[]` values for the `childNodes` parameter. When you select a value from the `IAgileList` object, you can use its `String` representation or its `Integer` ID.

To get the currently selected value for a list, use the `IAgileList.getSelection()` method. For a `SingleList` cell or property, `getSelection()` returns an array containing one `IAgileList` object. For a `MultiList` cell or property, `getSelection()` returns an array containing one or more `IAgileList` objects.

The following example demonstrates how to use several `IAgileList` methods, including `getSelection()`.

Example: Getting the current list value for the Visible property

```
try {
// Get the Admin instance
    IAdmin admin = m_session.getAdminInstance();
// Get the Parts class
    IAgileClass partClass =
        admin.getAgileClass(ItemConstants.CLASS_PARTS_CLASS);
// Get the "Page Two.List03" attribute
    IAttribute attr =
        partClass.getAttribute(ItemConstants.ATT_PAGE_TWO_LIST03);
// Get the Visible property
    IProperty propVisible =
        attr.getProperty(PropertyConstants.PROP_VISIBLE);
// Get the current value of the Visible property
    IAgileList value = (IAgileList)propVisible.getValue();
// Print the current value
    System.out.println(value); // Prints "Yes"
// Print the list value ID
    System.out.println(value.getSelection()[0].getId()); // Prints 1
// Print the list value
    System.out.println(value.getSelection()[0].getValue()); // Prints
    "Yes"
} catch (APIException ex) {
    System.out.println(ex);
}
```

Lists can be reused for several attributes, even for attributes of different classes. The following example reuses the list of available values for a Page Two attribute to set the list of available values for a Page Three list attribute.

Example: Reusing list values for different attributes

```
try {
    // Get the Admin instance
    IAdmin admin = m_session.getAdminInstance();

    // Get the Parts class
    IAgileClass partClass =
admin.getAgileClass(ItemConstants.CLASS_PARTS_CLASS);
    // Get the "Page Two.List01" attribute
    IAttribute attr1 =
partClass.getAttribute(ItemConstants.ATT_PAGE_TWO_LIST01);
    // Get the "Page Three.List01" attribute
    IAttribute attr2 =
partClass.getAttribute(ItemConstants.ATT_PAGE_THREE_LIST01);
    // Set the available values for the list, using values from "Page
Two.List01"
    attr2.setAvailableValues(attr1.getAvailableValues());
} catch (APIException ex) {
    System.out.println(ex);
}
```

Working with Lifecycle Phase Cells

The Lifecycle Phase attribute is a SingleList datatype. Each subclass in the Agile PLM system can be defined with different lifecycle phases. Therefore, you must get a Lifecycle Phase cell for a subclass before you can retrieve the available values for its list. If you use `IAttribute.getAvailableValues()` to retrieve the available values for a Lifecycle Phase attribute instead of a subclass-specific cell, the method returns an empty `IAgileList` object. The following example highlights how to work with Lifecycle Phase cells.

Example: Working with Lifecycle Phase cells

```
private static void setLifecyclePhase(IItem item) throws APIException {
    // Get the Lifecycle Phase cell
    ICell cell =
item.getCell(ItemConstants.ATT_TITLE_BLOCK_LIFECYCLE_PHASE);
    // Get available list values for Lifecycle Phase
    IAgileList values = cell.getAvailableValues();
    // Set the value to the second phase
values.setSelection(new Object[] { new Integer(1)});
    cell.setValue(values);
}
```

Working with Dynamic Lists

The Agile server has both static lists and dynamic lists. Static lists contain a selection of values that do not change at run time. Dynamic lists contain a selection of values that are updated at run time. Users with administrator privileges can modify static lists and add new values and make current values obsolete. Dynamic lists cannot be modified; consequently, the Editable property of dynamic lists is set to No.

Several dynamic lists are capable of containing thousands of value objects. Items, Changes, and Users lists are examples of such lists. Although you can use these lists for Page Two and Page Three fields, you can not enumerate values for these lists.

Enumerable and Non-Enumerable Lists

As such, Agile SDK object lists are either enumerable, or non-enumerable. If a specific list is enumerable, you can read the contents of that list. If it is non-enumerable, you cannot access the list directly. For non-enumerable lists, query the Agile class that the object list uses to get the objects that are referenced by the list. The enumeration property for an object is hard coded on the server and cannot be changed.

To determine if the values for a dynamic list can be enumerated, use `IAgileList.GetChildNodes()` as shown in the following example. If `getChildNodes()` returns null, the list values cannot be enumerated. However, this does not prevent you from selecting a value for the list.

Example: Checking whether values for a dynamic list are enumerable

```
private void setPageTwoListValue(IItem item) throws APIException {
    // Get the "Page Two.List01" cell
    ICell cell = item.getCell(CommonConstants.ATT_PAGE_TWO_LIST01);
    // Get available values for the list
    IAgileList values = cell.getAvailableValues();
    // If the list cannot be enumerated, set the selection to the current
    user
    if (values.GetChildNodes() == null) {
        values.setSelection(new Object[]{m_session.getCurrentUser()});
        cell.setValue(values);
    }
}

private void setPageTwoMultilistValue(IItem item) throws
APIException {
    // Get the "Page Two.Multilist01" cell
    ICell cell = item.getCell(CommonConstants.ATT_PAGE_TWO_MULTILIST01);
    // Get available values for the list
    IAgileList values = cell.getAvailableValues();
    // If the list cannot be enumerated, set the selection to an array of
    users
    if (values.GetChildNodes() == null) {
        IAgileClass cls = cell.getAttribute().getListAgileClass();
        if (cls != null) {
            IUser user1 = (IUser)m_session.getObject(cls, "hhawkes");
            IUser user2 = (IUser)m_session.getObject(cls, "ahitchcock");
            IUser user3 = (IUser)m_session.getObject(cls, "jhuston");
            Object[] users = new Object[] {user1, user2, user3};
        }
    }
}
```

```

        values.setSelection(users);
        cell.setValue(values);
    }
}

```

Non-Enumerable PG&C Lists

The following PG&C lists that were enumerable in earlier releases of the SDK, are no longer enumerable in this release.

- Declarations
- Substances
- Specifications
- Part Families
- Part Families Commodities

Selecting a List from the List Library

The `IListLibrary` interface enables working with the library of Agile lists. You can load an existing list, or create a new one. To load an existing list, use `IListLibrary.getAdminList()`. You can specify the string name of a list, such as "Disposition." You can also specify a list, by its ID, or by an `AdminListConstants`, such as `LIST_DISPOSITION_SELECTION`. Before you attempt to use a list from the list library, make sure the list is enabled.

The following example shows how to configure a Page Two list attribute to use a list called Users.

Example: Configuring an attribute to use an Agile list

```

try {
    IAgileList values = null;
    // Get the Admin instance
    IAdmin admin = m_session.getAdminInstance();
    // Get the List Library
    IListLibrary listLib = admin.getListLibrary();
    // Get the Parts class
    IAgileClass partClass =
    admin.getAgileClass(ItemConstants.CLASS_PARTS_CLASS);
    // Get the "Page Two.List01" attribute
    IAttribute attr =
    partClass.getAttribute(ItemConstants.ATT_PAGE_TWO_LIST01);
    // Make the list visible
    IProperty propVisible =
    attr.getProperty(PropertyConstants.PROP_VISIBLE);
    values = propVisible.getAvailableValues();
    values.setSelection(new Object[] { "Yes" });
    propVisible.setValue(values);

    // Change the name of the attribute to "Project Manager"

```

```
IProperty propName = attr.getProperty(PropertyConstants.PROP_NAME);
propName.setValue("Project Manager");
// Get the list property
IProperty propList = attr.getProperty(PropertyConstants.PROP_LIST);
// Use the Users list from the list library.
IAdminList users =
listLib.getAdminList(AdminListConstants.LIST_USER_OBJECTS);
if (users != null ) {
    if (users.isEnabled()) {
        propList.setValue(users);
    } else {
        System.out.println("Users list is not enabled.");
    }
}

// Specify the Default Value to the current user
IProperty propDefValue =
attr.getProperty(PropertyConstants.PROP_DEFAULTVALUE);
values = propDefValue.getAvailableValues();
values.setSelection(new Object[]{m_session.getCurrentUser()});
propDefValue.setValue(values);
} catch (APIException ex) {
    System.out.println(ex);
}
```

When you select a user-defined list using `IListLibrary.getAdminList()`, you can specify the list by name or ID. All list names must be unique. The following example shows how to select an Agile list called Colors.

Example: Selecting a list named Colors

```
private void selectColorsList(IAttribute attr, IListLibrary
m_listLibrary) throws APIException {
    // Get the List property
    IProperty propList = attr.getProperty(PropertyConstants.PROP_LIST);
    // Use the Colors list
    IAdminList listColors = m_listLibrary.getAdminList("Colors");
    if (listColors != null ) {
        if (listColors.isEnabled()) {
            propList.setValue(listColors);
        } else {
            System.out.println("Colors list is not enabled.");
        }
    }
}
```

Creating Custom Lists

The Agile API lets you modify list attributes for different classes and configure custom list attributes for Page Two and Page Three. You can customize these list attributes to create simple lists or multilists. You can also configure a list to be cascading, that is, have multiple levels.

In Agile Java Client, administrators can configure a library of custom lists by choosing Admin > Data Settings > Lists. In the Agile API, the `IListLibrary` interface provides functionality equivalent to Admin > Data Settings > Lists. The `IAdminList` interface provides functionality for configuring and customizing each list.

Creating a Simple List

To create a new list, use the `IListLibrary.createAdminList()` method, which takes a `map` parameter. The `map` that you pass with `createAdminList()` must contain values for the following `IAdminList` fields:

- `ATT_NAME` – the String name of the list. This is a required field. The list name must be unique.
- `ATT_DESCRIPTION` – the String description of the list. This is an optional field; the default value is an empty string.
- `ATT_ENABLED` – a Boolean value specifying whether the list is enabled. This is an optional field; the default value is `false`.
- `ATT_CASCADED` – a Boolean value specifying whether the list contains multiple levels. This is an optional field; the default value is `false`. The `ATT_CASCADED` value cannot be changed after the list is created.

Once the list is created, you can use the `IAdminList` interface to enable or disable the list and set values for it.

The following example shows how to create a new list called Colors. This list is a simple list with only one level.

Example: Creating a simple list

```
try {
    // Get the Admin instance
    IAdmin admin = m_session.getAdminInstance();
    // Get the List Library
    IListLibrary listLib = admin.getListLibrary();
    // Create a new Admin list
    HashMap map = new HashMap();
    String name = "Colors";
    map.put(IAdminList.ATT_NAME, name);
    map.put(IAdminList.ATT_DESCRIPTION, name);
    map.put(IAdminList.ATT_ENABLED, new Boolean(true));
    map.put(IAdminList.ATT_CASCADED, new Boolean(false));
    IAdminList listColors = listLib.createAdminList(map);
    // Add values to the list
```

```
IAgileList list = listColors.getValues(); //The list is empty at this
point.
list.addChild("Black");
list.addChild("Blue");
list.addChild("Green");
list.addChild("Purple");
list.addChild("Red");
list.addChild("White");
listColors.setValues(list);
} catch (APIException ex) {
    System.out.println(ex);
}
```

Lists that contain String values are case-sensitive. This means that a list can contain uppercase, lowercase, and mixed-case variations of the same value, which may not be desirable. For example, the following code snippet adds three variations of each color value to the Colors list.

Example: Adding case-sensitive values to a list

```
IAgileList list = listColors.getValues(); //The list is empty at this
point.
list.addChild("Black");
list.addChild("BLACK");
list.addChild("black");
list.addChild("Blue");
list.addChild("BLUE");
list.addChild("blue");
list.addChild("Green");
list.addChild("GREEN");
list.addChild("green");
list.addChild("Purple");
list.addChild("PURPLE");
list.addChild("purple");
list.addChild("Red");
list.addChild("RED");
list.addChild("red");
list.addChild("White");
list.addChild("WHITE");
list.addChild("white");
```

Automatically Creating New Lists by Modifying Existing Lists

Each list attribute must reference an Agile list for its values. If you retrieve an Agile list and modify its values without saving the list and then use those values for a list attribute, the Agile API automatically creates a new list. In the following example, the Colors list is retrieved, but before it is used to populate the values for a list field a new value, "Violet," is added to the list. When `IAttribute.setAvailableValues()` is called, a new list is created.

Note Lists that are created automatically by the Agile API have a prefix “SDK” followed by a random number. You can rename such lists, if you prefer.

Example: Creating a new list automatically by modifying an existing list

```
try {
    // Get the Colors list
    IAdminList listColors = m_listLibrary.getAdminList("Colors");
    // Get the Parts class
    IAgileClass partsClass =
admin.getAgileClass(ItemConstants.CLASS_PARTS_CLASS);
    // Get the "Page Two.List01" attribute
    IAttribute attr =
partsClass.getAttribute(ItemConstants.ATT_PAGE_TWO_LIST01);
    // Get the color values
    IAgileList values = listColors.getValues();

    // Add a new color
    values.addChild("Violet");

    // Set the available list values for "Page Two.List01". Because the
list
// was modified, a new AdminList is created automatically.
    attr.setAvailableValues(values);
} catch (APIException ex) {
    System.out.println(ex);
}
```

Creating a Cascading List

A cascading list is a list with multiple levels. You can configure SingleList attributes and cells using a cascading list instead of a simple list.

Note Once you set a list to be cascading, you can't change it to a simple list. You cannot change the value of `IAdminList.ATT_CASCADED` after the list is created.

The following example shows how to create a new cascading list called “Field Office.” The list has two levels.

Important When setting level names for cascading lists, always start with the index 0 for the first level and increment the index subsequent levels as shown in the following two examples below.

Example: Creating a cascading list

```
try {
    // Get the Admin instance
    IAdmin admin = m_session.getAdminInstance();

    // Get the List Library
    IListLibrary listLib = admin.getListLibrary();

    // Create a new Admin list
    HashMap map = new HashMap();
    String name = "Field Office";
    map.put(IAdminList.ATT_NAME, name);
    map.put(IAdminList.ATT_DESCRIPTION, name);
    map.put(IAdminList.ATT_ENABLED, new Boolean(true));
    map.put(IAdminList.ATT_CASCADED, new Boolean(true));
    IAdminList listFO = listLib.createAdminList(map);
    // Get the empty list
    IAgileList list = listFO.getValues();

    // Add the list of countries
    IAgileList india = (IAgileList)list.addChild("India");
    IAgileList china = (IAgileList)list.addChild("China");
    IAgileList usa = (IAgileList)list.addChild("USA");
    IAgileList australia = (IAgileList)list.addChild("Australia");
    // Add the list of cities
    india.addChild("Bangalore");
    china.addChild("Hong Kong");
    china.addChild("Shanghai");
    china.addChild("Suzhou");
    usa.addChild("San Jose");
    usa.addChild("Milpitas");
    usa.addChild("Seattle");
    usa.addChild("Jersey City");
    australia.addChild("Sidney");

    // Save the list values
    listFO.setValues(list);
}
```

```
// Set level names starting with index 0 for level 1.
list.setLevelName(0, "Field Office Country");
list.setLevelName(1, "Field Office City");

} catch (APIException ex) {
    System.out.println(ex);
}
```

In cascading lists, level names used by the list must be unique and you cannot share them between lists. The level names are stored internally, but Agile Java Client and Web Client currently don't display them. The level names are needed only if you want to show them in a cascading list UI that you created.

After you call the `IAdminList.setValues()` method, a valid ID is assigned to each list value. Only leaf nodes, that is, nodes on the lowest level of a cascading list, have valid IDs. In the previous example, the city nodes are leaf nodes. All other nodes have a null ID. You can use the ID to set the selection of the `IAgileList` object.

You can add a list value and its parent nodes in one statement instead of adding the parent node and then its subnodes. Use the `|` character to separate nodes, which represent levels, in the string. The following example replaces a portion of the code in the previous example; it shows how to add the same list values as in the previous example, but using fewer lines of code.

Example: Adding parent nodes and subnodes to a cascading list

```
// Get the list values
IAgileList list = listFO.getValues(); // The list is empty at this
point.
// Add nodes
list.addChild("India|Bangalore");
list.addChild("Hong Kong|Hong Kong");
list.addChild("China|Suzhou");
list.addChild("USA|San Jose");
list.addChild("USA|Milpitas");
list.addChild("USA|Jersey City");
list.addChild("Australia|Sidney");

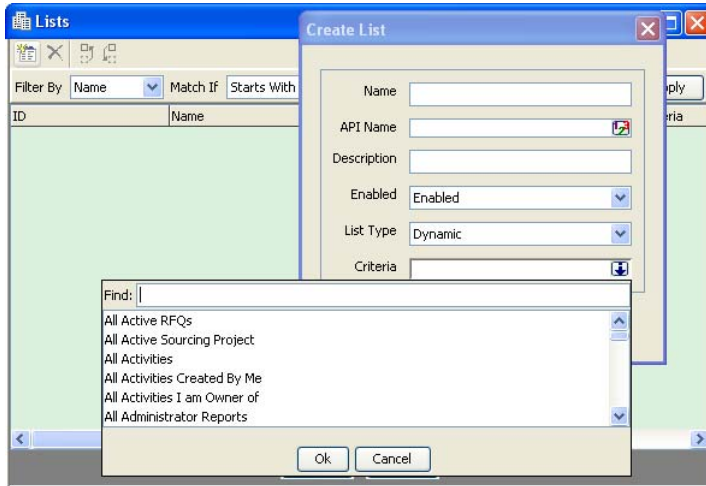
// Save the list values
listFO.setValues(list);

// Set level names
list.setLevelName(0, "Field Office Country");
list.setLevelName(1, "Field Office City");
```

Creating a Criteria-Based List

Criteria-based lists are dynamic lists whose values are defined by the criteria selected from the Agile Criteria library. These lists are created in Java Client's Create List dialog by selecting the "Dynamic" List Type in the drop-down list which opens the Agile Criteria library to select the applicable Criteria.

Figure 13: Creating criteria-based lists in Java Client



Agile SDK supports creating, loading, and modifying Criteria-based lists by exposing the necessary APIs to:

1. Get the Criteria
2. Create the Criteria-based list
3. Load the Criteria-based list
4. Replace the Criteria-based list

The following examples use the respective APIs to perform these tasks.

Example: Getting the Criteria from the Agile Criteria library

```
IListLibrary library = m_admin.getListLibrary();
INode lib = m_admin.getNode(NodeConstants.NODE_CRITERIA_LIBRARY);
ICriteria criteria = (ICriteria)lib.getChild("All Change Orders");
```

Example: Creating the Criteria-based list

```
HashMap params = new HashMap();
String name = "SDKlist" + System.currentTimeMillis();
params.put(IAdminList.ATT_API_NAME, name.toUpperCase());
params.put(IAdminList.ATT_NAME, name.toUpperCase());
params.put(IAdminList.ATT_DESCRIPTION, name.toLowerCase());
params.put(IAdminList.ATT_ENABLED, true);
params.put(IAdminList.ATT_CRITERIA, criteria);
ICriteriaBasedList list =
(ICriteriaBasedList)library.createDynamicAdminList(params);
System.out.println("Created list: "+list.getName());
System.out.println("Criteria:
"+((ICriteriaBasedList)list).getCriteria().toString());
```

Example: Loading the Criteria-based list

```

ICriteriaBasedList list =
(ICriteriaBasedList)m_admin.getListLibrary().getAdminList(name.toUpperCase());
System.out.println("Loaded list: "+list.getName());

```

Example: Replacing the Criteria - Modifying the Criteria-based list

```

ICriteria criteria = (ICriteria)lib.getChild("All Designs");
list.setCriteria(criteria);
System.out.println("New Criteria:
"+((ICriteriaBasedList)list).getCriteria().toString());

```

Checking the Data Type of a List

A list can contain objects of any Agile datatype. Therefore, before getting or setting a list value, you should determine the data type of objects in the list. If you are working with a cascading list, the data type can vary with each level. There are several ways to determine the data type of a list:

- For predefined lists in the List Library, use `IAdminList.getListDataType()` to get the data type.
- For `SingleList` and `MultiList` attributes that have only one list level, use the `IAttribute.getListDataType()` method to get the data type for the entire list.
- For a level within a cascading list, use the `IAgileList.getLevelType()` method to get the data type for a particular level.

Example: Checking the data type of a list

```

public void setDefaultValue() throws APIException {
    // Get the Parts class
    IAgileClass partClass =
m_admin.getAgileClass(ItemConstants.CLASS_PARTS_CLASS);
    // Get the "Page Two.List01" attribute
    IAttribute attr =
partClass.getAttribute(ItemConstants.ATT_PAGE_TWO_LIST01);
    switch (attr.getListDataType()) {
        case DataTypeConstants.TYPE_OBJECT:
            //Add code here to handle Object values
            break;

        case DataTypeConstants.TYPE_STRING:
            //Add code here to handle String values
            break;
        default:
            //Add code here to handle other datatypes
    }
}

```

Modifying a List

Once a list has been created, you can modify it in the following ways:

- Add values to a list
- Make list values obsolete
- Set the list name and description
- Set level names for a cascading list
- Enable or disable a list
- Delete a list
- Modify or remove values added to a list

Adding a Value to a List

The following example shows how to add several values to a list. Before adding a value to a list, use the `ITreeNode.GetChildNode()` method to make sure the value doesn't already exist.

Example: Adding values to a list

```
private static void updateProductLinesList() throws APIException {
    // Get the Admin instance
    IAdmin admin = m_session.getAdminInstance();

    // Get the List Library
    IListLibrary listLib = admin.getListLibrary();

    // Get the Product Lines list
    IAdminList listProdLine = listLib.getAdminList("Product Line");
    // Add values to the list
    IAgileList listValues = listProdLine.getValues();
    addToList(listValues, "Saturn");
    addToList(listValues, "Titan");
    addToList(listValues, "Neptune");
    listProdLine.setValues(listValues);
}
```

Making List Values Obsolete

You can prevent the selection of a list value by making the list entry obsolete. However, when you invoke the `IProperty.getAvailableValues()` method, the returned `IAgileList` object can include obsolete list values. This is due to the fact that when the list value is marked obsolete, the server continues to maintain the value in its obsolete list values for existing objects that use these values.

The following example shows how to check whether a list value is obsolete and how to make it obsolete.

Example: Making a list value obsolete

```
public void checkIfObsolete(IAgileList list) throws APIException {
    if (list != null ) {
        if (list.isObsolete() == false) {
            System.out.println(list.getValue());
        }
    }
}

public void setObsolete(IAgileList list, String value) throws
APIException {
    if (list != null ) {
        list.setObsolete(true);
        System.out.println(list.getValue() + " is now obsolete.");
    }
}
```

Setting the List Name and Description

To create a list, you must specify a unique name for it. Therefore, when you use `IListLibrary.createAdminList()`, you must pass a value for the `IAdminList.ATT_NAME` field. Other `IAdminList` fields, such as `ATT_DESCRIPTION`, are optional. After the list is created, you can modify its name and description. The following example shows how to set the name and description of a list.

Example: Setting the list name and description

```
try {
    IAdminList list = m_listLibrary.getAdminList("Packaging Styles");
    list.setName("Packaging Color Codes");
    list.setDescription("Color codes for product packaging");
} catch (APIException ex) {
    System.out.println(ex);
}
```

Setting Level Names for a Cascading List

Like list names, the level names for a list must be unique. You can't reuse the level name used by another cascading list. To check if the list with a given name already exists, use `IListLibrary.getAdminList()`. Use one of the following methods to set the level name of a cascading list:

- `IAgileList.setLevelName(int, String)` – Sets the level name for a specified level.
- `IAgileList.setLevelName(String)` – Sets the level name of the current level.

For an example showing how to set the level names of a cascading list, see [Creating a Cascading List](#) on page 165.

Note Level names for cascading lists are not displayed in Agile Java Client or Web Client. However, you can choose to display them in Clients you create with the Agile SDK.

Enabling or Disabling a List

When you create a custom list, you can use the `IAdminList.ATT_ENABLED` field to specify whether it's enabled. If you omit this field, the list is disabled by default. The following example shows how to enable and disable a list after it has been created.

Example: Enabling and disabling a list

```
public void enableList(IAdminList list) throws APIException {
    list.enable(true);
    System.out.println("List " + list.getName() + " enabled.");
}
public void disableList(IAdminList list) throws APIException {
    list.enable(false);
    System.out.println("List " + list.getName() + " disabled.");
}
```

Deleting a List

If a list is not read-only and is not currently being used by an Agile dataobject, you can delete it. Otherwise, the `IAdminList.delete()` method throws an exception. Once you delete a list, it is removed permanently. You cannot undo the deletion.

The following example shows how to delete a list.

Example: Deleting a list

```
public void deleteList(IAdminList list) throws APIException {
    // Make sure the list is not read-only
    if (!list.isReadOnly()) {
        // Delete the list
        list.delete();
        System.out.println("List " + list.getName() + " deleted.");
    } else {
        System.out.println("List " + list.getName() + " is read-only.");
    }
}
```

Modifying and Removing List Values

The SDK provides the following methods to modify String element entries, or remove an entry in an Agile list:

- The `I AgileList.setValue(Object)` method to modify String list element entries in an Agile Admin list.

Note This method only applies to String values. You can only use this method to modify String entries and not object entries.

- The `IAgileList.clear()` and `ITree.removeChild(Object)` methods to remove any Agile list entry that is not restricted by the applicable business rules.

The following example uses these methods to modify and clear values in an Agile list.

Example: Renaming and removing Admin list entries

```
public void exampleClearList() throws Exception {
    IAdmin admin = m_session.getAdminInstance();
    IListLibrary listLibrary = admin.getListLibrary();
    HashMap map = new HashMap();
    String name = "Color";
    String desc = "Example";
    map.put(IAdminList.ATT_NAME, name);
    map.put(IAdminList.ATT_DESCRIPTION, desc);
    map.put(IAdminList.ATT_ENABLED, new Boolean(true));
    map.put(IAdminList.ATT_CASCADE, new Boolean(false));
    IAdminList newList = listLibrary.createAdminList(map);
    IAgileList list = newList.getValues();
    list.addChild("RED");
    list.addChild("GREEN");
    list.addChild("BLUE");
    newList.setValues(list);
    list = newList.getValues();

    // Removing the selection
    IAgileList agList = (IAgileList)list.getChild("BLUE");
    Object errorCode = null;
    try {
        list.removeChild(agList);
    } catch (APIException e) {
        errorCode = e.getErrorCode();
    }

    // Clear the list
    list = newList.getValues();
    list.clear();
    newList.setValues(list);

    // Clean up
    newList.delete();
}
```

Printing Contents of IAgileList Objects

When working with an `IAgileList` object, particularly one with several levels, it's helpful to print the entire hierarchy of the list. The following code prints the list nodes contained within an `IAgileList` object.

Example: Printing list nodes in an IAgileList object

```
private void printList(IAgileList list, int level) throws APIException
{
    if (list != null ) {
        System.out.println(indent(level*4) + list.getLevelName() + ":" +
            list.getValue() + ":" + list.getId());
        Object[] children = list.getChildren();
        if (children != null) {
            for (int i = 0; i < children.length; ++i) {
                printList((IAgileList)children[i], level + 1);
            }
        }
    }
}

private String indent(int level) {
    if (level <= 0) {
        return "";
    }
    char c[] = new char[level*2];
    Arrays.fill(c, ' ');
    return new String(c);
}
```

Working with Attachments and File Folder Objects

This chapter includes the following:

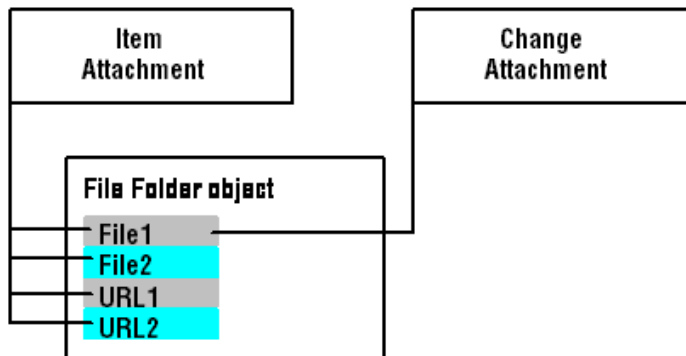
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About Attachments and File Folders

Attachments to objects contain information about the object or a manufacturing process. You can attach files and URLs by referencing them in a *File Folder* object. The File Folder object holds pertinent content, or *Attachments*. Most primary Agile API objects, such as *IItem*, *IChange*, *IManufacturer*, *IManufacturerPart*, *IPackage*, *ITransferOrder*, *IUser*, and *IUserGroup*, have an *Attachments* table (or tab in the Java Client) that lists indirect references to the files or URLs that are in separate file folders. Each row in an Attachments table can refer to one file or to all files from a referenced file folder.

The following figure is an example of the way files or URLs contained in a file folder are referenced indirectly from the Attachments table of multiple business objects, in this case an item and a change.

Figure 14: How Attachments table rows refer indirectly to File Folder files or URLs



The Agile API does not provide support for viewing or printing an attachment. However, after you download a file, you can use another application to view, edit, or print the attachment.

A File Folder is a business object that specifies one or more files or URLs that are stored in the file server vault. In addition, a file folder has its own set of tables. This means that you can create and load an independent file folder and add one or more files to its Files table. You can also search for a file folder, just as you would search for an Item or Change.

Important Before you try to add Agile PLM attachments and work with file folders, make sure the File Manager Internal Locator property is set in Agile Java Client. Choose Admin > Settings > Server Settings > Locations > File Manager > Advanced > File Manager Internal Locator. The *format* for the value is `<protocol>://<machinename>:<port>/<virtualPath>/services/FileServer`. For example, <http://agileserver.agile.agilesoft.com:8080/Filemgr/services/FileServer> is a valid value. For more information about Agile PLM server settings, refer to the *Agile PLM Administrator Guide*.

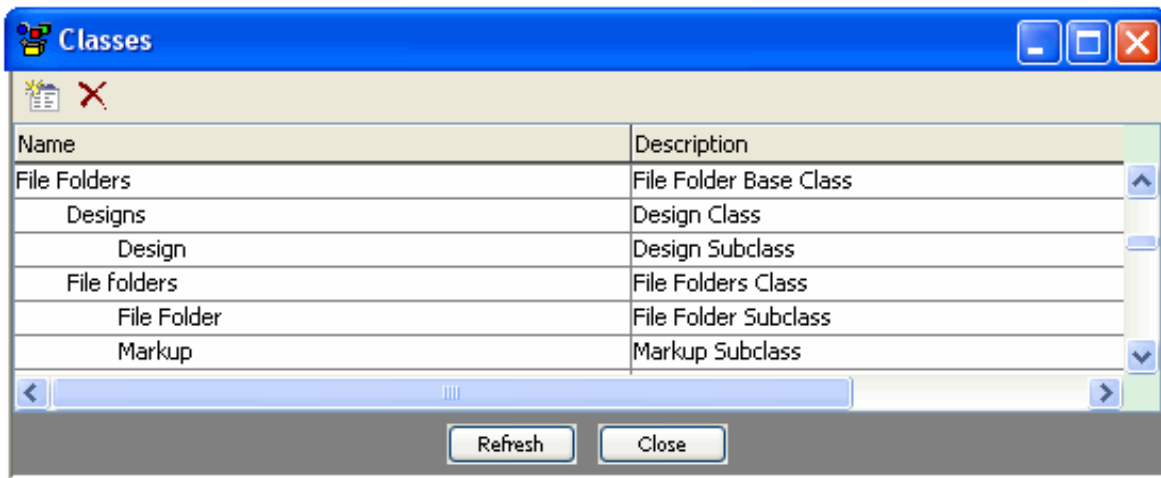
Working with File Folders

Similar to Attachments, the SDK exposes APIs to perform File Folders-related tasks such as checking-in and checking-out files associated with objects in the rows of an Attachments table, adding files and URLs to an Attachments table, and deleting attachments. This section lists and describes these features, and provides the necessary procedures to use the SDK to perform these tasks.

File Folder Classes and Subclasses

The *File Folder Base Class* has two Classes and each of these classes have their own respective Subclasses. The figure below lists the *File Folders Base Class*, *Classes*, and *Subclasses*. The Agile PLM administrator can define new file folder subclasses.

Figure 15: File Folders Classes and Subclasses



A description of these classes and objects appears in the table below.

Base Class	Class	Subclass	Description
File Folders	Designs	Design	Objects that permit building model structures in CAD
	File folders	File Folder Markup	Objects that include files or URLs; this class includes all file folder objects except historical report file folders.

For information about routing these objects, see [Checking the State of Agile PLM Objects](#) on page 29.

File Folder Tables and Constants

The File Folder object supports the following tables and corresponding constants:

Table	Constant	Read/Write Mode
Title Block	TABLE_TITLEBLOCK	Read/Write
Page Two	TABLE_PAGETWO	Read/Write
Page Three	TABLE_PAGETHREE	Read/Write
Files	TABLE_FILES	Read/Write
Structure	TABLE_STRUCTURE	Read/Write
Routing Slip/Workflow	TABLE_WORKFLOW	Read/Write
Relationships	TABLE_RELATIONSHIPS	Read-only
History	TABLE_HISTORY	Read-only
Where Used	TABLE_WHEREUSED	Read/Write
Where Used Design	TABLE_WHEREUSEDDESIGN	Read-only

Creating File Folder Objects

`IFileFolder` is the interface that corresponds to the file folder business object. The following example shows how to create a file folder.

Example: Creating a file folder

```
public void createFileFolder() throws Exception {
    IAgileClass attClass =
        m_admin.getAgileClass(FileFolderConstants.CLASS_FILE_FOLDER);
    IAutoNumber an = cls.getAutoNumberSources()[0];
    String attNumber = an.getNextNumber();
    IFileFolder ff = (
        IFileFolder)m_session.createObject(attClass, attNumber);
    ff.checkOutEx();
}
```

Note When you add a file or a URL to the row of the Attachments table of a business object, you will automatically create automatically a new file folder object that contains the associated file or URL. See [Creating File Folder Objects by Adding Rows to Attachments Table](#) on page 180.

The File Folders Design class is similar to the File folder class with the additional Structures table (Tab in the Java Client UI) for CAD objects. The following examples show how to create a Design object, adding a Design object to a the Structure tree, and loading a structure table.

Example: Creating a Design object

```
// autoNum is autoNumber as usual
IFileFolder obj = (IFileFolder) m_session.createObject(
    FileFolderConstants.CLASS_DESIGN, autoNum);
```

Example: Adding Design objects to a Structure tree

```
IFileFolder obj = // some Design object
IFileFolder childObj1 = // some Design object
IFileFolder childObj2 = // some Design object
obj.checkOutEx();
ITable table = obj.getTable(FileFolderConstants.TABLE_STRUCTURE);
// add row
Object[] vers = childObj1.getVersions();
IRow row = table.createRow(childObj1);
row.setValue(FileFolderConstants.ATT_STRUCTURE_LABEL,
    "label modified by creating row 1");
row = table.createRow(childObj2);
row.setValue(FileFolderConstants.ATT_STRUCTURE_LABEL,
    "label modified by creating row 2");
obj.checkIn();
```

Example: Loading a Structure table

```
public void testLoadingDesignStructureTable() throws Exception {
    addCaseInfo("Design Object", "load Structure table", "");
    // assuming Design object Design00004 existed with some data in
    Structure
    IFileFolder obj = (IFileFolder) m_session.getObject(
        FileFolderConstants.CLASS_DESIGN, "Design00004");
    IAgileClass agileClass = obj.getAgileClass();
    // load Structure table
    ITable table = obj.getTable(FileFolderConstants.TABLE_STRUCTURE);
    Integer tableId = (Integer) table.getTableDescriptor().getId();
    // ITable performs related tasks
}
```

Example: Loading a Structure table as a tree

```
public void testLoadingDesignStructureTree()
throws Exception
{addCaseInfo("Design Object", "load Structure tree", "");
// assuming Design object Design00004 existed with some data in
Structure
IFileFolder obj = (IFileFolder) m_session.getObject(
    FileFolderConstants.CLASS_DESIGN, "Design00004");
IAgileClass agileClass = obj.getAgileClass();
// load Structure table
```

```

ITable table = obj.getTable(FileFolderConstants.TABLE_STRUCTURE);
Integer tableId = (Integer) table.getTableDescriptor().getId();
ITreeNode root = (ITreeNode) table;
Collection topLevelChildren = root.getChildNodes();
Iterator it;
ITreeNode row;
if (topLevelChildren != null) {
    it = topLevelChildren.iterator();
    int level = 0;
    while (it.hasNext()) {
        row = (ITreeNode) it.next();
        if(row instanceof IRow) {
            IRow aRow = (IRow) row;
            IDataObject referent =
                aRow.getReferent();
            if(referent != null) {
                System.out.println(
                    "Row Referent Object ID/row:
                    "+ referent.getObjectId()+ " / "
                    + referent.getName());
            }
        }
        iterateTreeNode(agileClass, true,
            tableId, (ITreeNode) row);
        count++;
    }
}

System.out.println("The number of rows in top level is " + count);
}

private void iterateTreeNode(IAgileClass agileClass, boolean print,
Integer tableId, ITreeNode node) throws APIException {
    Collection childNodes = node.getChildNodes();
    printRow(agileClass, print, tableId, (IRow) node);
    if (childNodes == null || childNodes.size() <= 0) {
        return;
    }

    Iterator it = childNodes.iterator();
    ITreeNode childNode;
    IRow row;

    while (it.hasNext()) {
        childNode = (ITreeNode) it.next();
        if (childNode instanceof IRow) {
            row = (IRow) childNode;
            if(row instanceof IRow) {
                IDataObject referent =
                    row.getReferent();
                if(referent != null) {
                    System.out.println

```

```
        ("Row Referent Object ID/row:
        "+ referent.getObjectId()+ " / "
        + referent.getName());
    }
}
iterateTreeNode(agileClass, print, tableId, (ITreeNode) childNode);
}
}
}
```

Creating File Folder Objects by Adding Rows to Attachments Table

When you add a file or a URL to the row of the Attachments table of a business object, you automatically create a new file folder that contains the associated file or URL. You can load the referenced file folder using the `IRow.getReferent()` method, as shown in the following example.

Example: Creating a file folder by adding a row to the Attachments table

```
public IFileFolder addRowToItemAttachments
    (IItem item, File file) throws Exception
    {ITable attTable = item.getTable(ItemConstants.TABLE_ATTACHMENTS);
    IRow row = attTable.createRow(file);
    IFileFolder ff = (IFileFolder)row.getReferent();
    return ff;
}
```

Working with the Files Table of a File Folder

The Files table of a file folder lists the files and URLs associated with the object. To edit the table, you must first check out the file folder. You cannot add files or URLs to the Files table or delete them unless the file folder is checked out.

The following example shows how to check out a file folder and then add files and URLs to the Files table.

Example: Adding files and URLs to the Files table of a file folder

```
public void addFiles(IFileFolder ff, File[] files, URL[] urls) throws
Exception {
    // Check out the file folder
    ff.checkOutEx();

    // Get the Files table
    ITable filesTable = ff.getTable(FileFolderConstants.TABLE_FILES);
    // Add files to the Files table
    for (int i = 0; i < files.length; ++i) {
        filesTable.createRow(files[i]);
    }
    // Add URLs to the Files table
    for (int i = 0; i < urls.length; ++i) {
        filesTable.createRow(urls[i]);
    }
}
```



```
// Check in the file folder
ff.checkIn();
}
```

Accessing Files in Agile PLM File Vault with IAttachmentFile

IAttachmentFile is the interface that provides generalized access to files stored in the Agile PLM file vault. This interface is supported by the following Agile API objects:

- File folder – you can class cast IFileFolder to IAttachmentFile.
- A row of the Files table of a file folder – you can class cast IRow from the Files table to IAttachmentFile.
- A row of the Attachments table of a business object – you can class cast IRow from the Attachments table to IAttachmentFile.

IAttachmentFile provides the following methods for working with attachments:

- getFile()
- isSecure()

Note IAttachmentFile also has a setFile() method that lets you change the file(s) for an attachment, but it is supported only for rows of the Attachments table.

The results returned from IAttachmentFile methods vary depending on the object you're working with, as shown in the following table.

Calling object	getFile() return value	isSecure() return value
Row from the Attachments table of any business object	Returns either a single file InputStream if the row refers to a specific file from the file folder or a zipped InputStream with all the files from the file folder.	true if the referenced file is not URL, or all the files are not URLs.
FileFolder object	Returns a zipped InputStream with all files from the file folder.	true if all the files contained in the file folder are not URLs.
Row from the Files table of a file folder	Returns a single file InputStream that refers to a specific file from the file folder.	true if the referenced file is not a URL.

Note To read files in a zipped InputStream, use methods of the java.util.zip.ZipInputStream class.

The following example shows how to use IAttachmentFile.isSecure() and IAttachmentFile.getFile() from the row of an Attachments table for an item.

Example: Using isSecure() and getFile()

```
public InputStream getItemAttachment(IItem item) throws Exception {
    InputStream content = null;
    ITable attachments = item.getTable(ItemConstants.TABLE_ATTACHMENTS);
    IRow row = (IRow)attachments.iterator().next();
```

```
    if (((IAttachmentFile) row).isSecure())
        content = ((IAttachmentFile) row).getFile();
    return content;
}
```

Working with Attachments Table of an Object

To work with the Attachments table of an object, follow this sequence.

1. Get the object that has the attachment you want.

For example, you can use the `I AgileSession.getObject()` method to get a particular object, or you can create a query to return objects.

2. Get the Attachments table. Use the `IDataObject.getTable()` or `IAttachmentContainer.getAttachments()` methods to get the table.
3. Select a row in the Attachments table.

Create an iterator for the table, and then select a particular row. You can use the `ITable.getTableIterator()` method to get a bidirectional iterator for the table.

The following example below shows how to retrieve an item, get the Attachments table for the item, and then select the first attachment.

Example: Getting an attachment for an item

```
try {
    // Get Item P1000
    Map params = new HashMap();
    params.put(ItemConstants.ATT_TITLE_BLOCK_NUMBER, "P1000");
    IItem item = (IItem)m_session.getObject(IItem.OBJECT_TYPE, params);
    // Get the attachment table for file attachments
    ITable attTable = item.getAttachments();
    // Get a table iterator
    ITwoWayIterator it = attTable.getTableIterator();
    // Get the first attachment in the table
    if (it.hasNext()) {
        IRow row = (IRow)it.next();
        // Read the contents of the stream
        InputStream stream = ((IAttachmentFile)row).getFile();
    }
    else {
        JOptionPane.showMessageDialog(null, "There are no files listed.",
            "Error", JOptionPane.ERROR_MESSAGE);
    }
} catch (APIException ex) {
    System.out.println(ex);
}
```

Checking In and Checking Out Files with ICheckoutable

ICheckoutable is an interface that you can use to check in and check out files that are associated with an object. This applies only to rows of the Attachments table. You can class cast IRow from the Attachments table to ICheckoutable.

ICheckoutable provides the following methods for working with attachments:

- cancelCheckout()
- checkIn()
- checkOutEx()
- isCheckedOut()

This example shows how to use the ICheckoutable interface to check out and check in a file from a row of the Attachments table.

Example: Using ICheckoutable methods to check out and check in an attached file

```
public InputStream checkOutRow(IRow row) throws APIException {

    // Check out the attachment
    ((ICheckoutable)row).checkOutEx();

    // Read the contents of the stream
    InputStream stream = ((IAttachmentFile)row).getFile();
    return stream;
}

public checkInRow(IRow row, String filePath) throws APIException {
    if (row.isCheckedOut()) {
        // Set the new file
        ((IAttachmentFile)row).setFile(new File(filePath));
        // Check in the file
        ((ICheckoutable)row).checkIn();
    }
    else {
        JOptionPane.showMessageDialog(null, "The attachment is not checked
out.",
        "Error", JOptionPane.ERROR_MESSAGE);
    }
}
}
```

Specifying the Revision of the Item

When you are working with items, each revision can have different attachments. If an item has multiple revisions, your program should allow the user to select a revision. For information about specifying the revision, see [Getting and Setting the Revision of an Item](#) on page 109.

Checking whether the Revision Is Incorporated

When the revision for an item is released, it is possible the revision is also incorporated. The attachments for an incorporated item are locked and cannot be checked out.

However, you can still view incorporated attachments, but you cannot modify them. To modify an incorporated attachment, you must either un-incorporate the attachment, or submit a new change order to create a new revision as shown in the examples below. These two examples are Process Extensions. For information on Process Extensions, refer to *SDK Developer Guide - Developing PLM Extensions* and for information about checking if a revision is incorporated, see [Changing the Incorporated Status of a Revision](#) on page 111.

Example: Incorporating Attachments

```
class IncorporateItem implements ICustomAction {
    public ActionResult doAction(IAgileSession session, INode
        actionNode,
        IDataObject affectedObject)    {
        try {
            System.out.println("Workflow action kicked off....");
            IItem object = (IItem)affectedObject;
            System.out.println("Incorporating...");
            IItem loItem = (IItem) session.getObject(IItem.OBJECT_TYPE,
                object.getName());
            //this will get the latest version. Make sure the latest is against
            a MCO
            loItem.setIncorporated(true);
            //incorporate the attachment
            System.out.println("Attachment added.");
            String message = ("Incorporated "+object);
            return new ActionResult(ActionResult.STRING, message);
        } catch (APIException ae) {
            ae.printStackTrace();
            return new ActionResult(ActionResult.EXCEPTION, ae);
        }
    }
}
```

Example: Un-incorporating Attachments

```
class IncorporateItem implements ICustomAction {
    public ActionResult doAction(IAgileSession session, INode
        actionNode,
        IDataObject affectedObject)    {
        try {
            System.out.println("Workflow action kicked off....");
            IItem object = (IItem)affectedObject;
            System.out.println("Un-incorporating...");
            IItem loItem = (IItem) session.getObject(IItem.OBJECT_TYPE,
                object.getName());
            //this will get the latest released version
            loItem.setIncorporated(false);
            System.out.println("Attachment added.");
            String message = ("Un-incorporated "+object);
            return new ActionResult(ActionResult.STRING, message);
        } catch (APIException ae) {
            ae.printStackTrace();
        }
    }
}
```

```
        return new ActionResult(ActionResult.EXCEPTION, ae);
    }
}
```

Checking Out a File Folder

Before you can add, delete, or modify the files contained in a file folder, you must check out the file folder. With the appropriate privileges, you can check out a file folder as long as it is not already checked out by another user. Once a file folder is checked out, no one else can check it out or modify it.

The user who checked out a file folder, as well as other users who are change analysts or component engineers, can check it in. If the file folder was checked out to a location on the network, or to a shared drive or directory, anyone who has access to that network location or to that shared directory can check in the file folder.

The following example shows how to check out a file folder.

Example: Checking out a file folder

```
void checkOutFileFolder(IFileFolder ff) throws Exception {
    ff.checkOutEx();
}
```

Note You can also use `ICheckoutable.checkOutEx()` to check out a row of the Attachments table. See [Checking In and Checking Out Files](#) on page 183.

Canceling a File Folder Checkout

If you check out a file folder and then decide that you don't want to modify it, or you want to discard your changes and revert to the original file folder, you can cancel the checkout. When you cancel a checkout, you also make the file folder available for other users to check out.

Note Only the user who checked out a file folder can cancel the checkout.

This example shows how to cancel a checkout of a file folder.

Example: Canceling checkout of a file folder

```
void cancelCheckOut(IFileFolder ff) {
    // Show a confirmation dialog box
    int i = JOptionPane.showConfirmDialog(null,
        "Are you sure you want to cancel checkout?",
        "Cancel Checkout", JOptionPane.YES_NO_OPTION);

    // If the user clicks Yes, cancel checkout
    try {
        if (i == 0) {
            ff.cancelCheckout();
        }
    }
}
```

```
    } catch (APIException ex) {  
        System.out.println(ex);  
    }  
}
```

Note You can also use `ICheckoutable.cancelCheckout()` to cancel checkout of a row of the Attachments table. See [Checking In and Checking Out Files](#) on page 183.

Adding Files and URLs to the Attachments Table

The Agile API lets you add files and URLs to the Attachments table of many types of objects, such as `IItem`, `IChange`, `IManufacturerPart`, and `IManufacturer`. An attachment is one or more physical files or an Internet address (URL). A file is considered a secured attachment because it is physically stored in the Agile PLM file vault. A URL, on the other hand, is an unsecured attachment.

When you add a file or a URL to the Attachments table of a business object, the server automatically creates a new file folder containing the associated file or URL. The new row on the Attachments table references the new file folder.

When you add a URL attachment, the server stores a reference to the Internet location but does not upload a file. Therefore, you cannot download a URL attachment. The Agile API validates URL strings that you attempt to check in as an attachment. If a URL is invalid, the Agile API considers the string a filename instead of a URL.

You cannot add a file or URL to the Attachments table of an item if

- The current revision has a pending or released MCO.
- The current revision is incorporated.

When you use the `ITable.createRow(java.lang.Object)` method to add a row to the Attachments table, the `param` method can be any of the following object types:

- `String` – adds one file attachment specified by a local path.
- `String[]` – adds multiple file attachments specified by an array of local paths.
- `File` – adds one file attachment.
- `File[]` – adds multiple file attachments.
- `InputStream` – adds one file attachment.
- `InputStream[]` – adds multiple file attachments.
- `URL` – adds one URL attachment.
- `URL[]` – adds multiple URL attachments.
- `IRow` (of the Attachments or Files tables) – adds a file or URL attachment.
- `IFileFolder` – adds all files and URLs for the specified file folder.
- `Map` – adds one or more files specified by a hash table containing Attachment parameters.

Note The `File` object type performs best when adding attachments.

When you add a file or a URL to the row of the Attachments table of a business object, you automatically create a new file folder that contains the associated file or URL. You can load the referenced file folder using the `IRow.getReferent()` method, as shown in the following example.

Example: Creating a file folder by adding a row to the Attachments table

```
public IFileFolder addRowToItemAttachments
    (IItem item, File file) throws Exception
    {ITable attTable = item.getTable(ItemConstants.TABLE_ATTACHMENTS);
    IRow row = attTable.createRow(file);
    IFileFolder ff = (IFileFolder)row.getReferent();
    return ff;
}
```

This example uses several instances of the `addAttachment()` methods to illustrate the different ways you can add rows to an Attachments table.

Example: Adding files to the Attachments table

```
// Add a single file to the Attachments table row by specifying a file
path
public static IRow addAttachment(ITable attTable, String path) throws
APIException {
    IRow row = attTable.createRow(path);
    return row;
}
// Add a single file to the Attachments table
public static IRow addAttachment(ITable attTable, File file) throws
APIException {
    IRow row = attTable.createRow(file);
    return row;
}
// Add multiple files to the Attachments table
public static IRow addAttachment(ITable attTable, File[] files) throws
APIException {
    IRow row = attTable.createRow(files);
    return row;
}
// Add a URL attachment to the Attachments table
public static IRow addAttachment(ITable attTable, URL url) throws
APIException {
    IRow row = attTable.createRow(url);
    return row;
}
// Add a file folder to the Attachments table
public static IRow addAttachment(ITable attTable, IFileFolder ff)
throws APIException {
    IRow row = attTable.createRow(ff);
    return row;
}
```

```
}
// Add an FileFolder.Files row object or a [BusinessObject].Attachments
row object
// to the Attachments table. The Agile API validates the row object at
run time to
// determine if it is from a valid table (Files or Attachments).
public static IRow addAttachment(ITable attTable, IRow filesRow) throws
APIException {
    IRow row = attTable.createRow(filesRow);
    return row;
}
// Add a file folder to the Attachments table and specify the version
for all files
public static IRow addAttachmentWithVersion(ITable attTable,
IFileFolder ff) throws APIException {
    ff.setCurrentVersion(new Integer(1));
    IRow row = attTable.createRow(ff);
    return row;
}
```

Deep Cloning Attachments and Files from One Object to Another

To simplify copying file attachments from one object to another, use the `CommonConstants.MAKE_DEEP_COPY` virtual attribute as a Boolean parameter of `ITable.createRow(Object)`. This parameter allows your program to create a new copy of the file in the Agile File Manager vault instead of referencing the old file.

Example: Deep cloning an Attachments table row

```
// Clone an attachment table row and its file from one item to another
public static cloneAttachment(IItem item1, IItem item2, File file)
throws APIException {
    // Get the attachments tables of item1 and item2
    ITable tblAttach1 = item1.getAttachments();
    ITable tblAttach2 = item2.getAttachments();
    // Prepare params for the first row
    HashMap params = new HashMap();
    params.put(CommonConstants.ATT_ATTACHMENTS_CONTENT, file);
    // Add the file to the attachments table of item1
    IRow row1 = tblAttach1.createRow(params);
    // Prepare params for the second row
    params.clear();
    params.put(CommonConstants.ATT_ATTACHMENTS_CONTENT, row1);
    params.put(CommonConstants.MAKE_DEEP_COPY, Boolean.TRUE);
    // Add the same file to the attachments table of item2
    IRow row2 = tblAttach2.createRow(params);
}
```

Example: Deep cloning the Files table row of a File Folder

```
// Clone a Files table row and its file from one File Folder to another
public static cloneFilesRow(IFileFolder folder1, IFileFolder folder2,
File file) throws APIException {
    // Check out folder1 and folder2
```



```

    folder1.checkOutEx();
    folder2.checkOutEx();

    // Get the Files tables of folder1 and folder2
    ITable tblFiles1 =
    folder1.getTable(FileFolderConstants.TABLE_FILES);
    ITable tblFiles2 =
    folder2.getTable(FileFolderConstants.TABLE_FILES);
    // Prepare params for the first row
    HashMap params = new HashMap();
    params.put(CommonConstants.ATT_ATTACHMENTS_CONTENT, file);
    // Add the file to the attachments table of folder1
    IRow row1 = tblFiles1.createRow(params);
    // Prepare params for the second row
    params.clear();
    params.put(CommonConstants.ATT_ATTACHMENTS_CONTENT, row1);
    params.put(CommonConstants.MAKE_DEEP_COPY, Boolean.TRUE);
    // Add the same file to the Files table of folder2
    IRow row2 = tblFiles2.createRow(params);
    // Check in folder1 and folder2
    folder1.checkIn();
    folder2.checkIn();
}

```

Specifying the File Folder Subclass When Adding Attachments

You can set up your Agile PLM system with multiple file folder subclasses. If so, when you add a file folder to the Attachments table of a business object, you may want to specify which file folder subclass to use. If you don't specify a subclass, the Agile API uses the default File Folder subclass. The virtual attribute `CommonConstants.ATT_ATTACHMENTS_FOLDERCLASS` makes it easier to specify the required file folder subclass. It enables you to set the attribute to any file folder subclass.

The following example shows how to use the `ATT_ATTACHMENTS_FOLDERCLASS` attribute to specify a subclass when you add a file folder to the Attachments table.

Example: Specifying the file folder subclass when adding attachments

```

IAgileClass ffclass = m_admin.getAgileClass("MyFileFolder");
// init item
IItem item = (IItem)session.createObject(ItemConstants.CLASS_PART,
"P0001");
// get attachments table
ITable tab_attachment = item.getAttachments();

// prepare map
HashMap map = new HashMap();
map.put(CommonConstants.ATT_ATTACHMENTS_CONTENT, new
File("files/file.txt"));
map.put(CommonConstants.ATT_ATTACHMENTS_FOLDERCLASS, ffclass);
// add file
IRow row = tab_attachment.createRow(map);

```

Retrieving Attachment Files

If a file folder is checked out by another user, you can still retrieve a copy of the file folder file(s) and save it to your local machine. The `IAttachmentFile.getFile()` method returns the file stream associated with a row of the Attachments table. The file stream can be for one file or it can be a zipped file stream for multiple files, depending on how many files the associated file folder has. You can also use `IAttachmentFile.getFile()` to get one or more files directly from a file folder instead of accessing the Attachments table of another business object. If you call `getFile()` from the file folder object, you return the zipped file stream for all files listed on the Files table. If you call `getFile()` from a row of the Files table of a file folder, you return a file stream for the specific file associated with that row.

Note When you use `IAttachmentFile.getFile()`, only file attachments are included in the returned file stream. URL attachments don't have files associated with them.

This example shows how to retrieve a copy of an attached file.

Example: Getting attachment files

```
// Get one or more files associated with the row of an Attachments
// table or a Files table
public InputStream getAttachmentFile(IRow row) throws APIException {
    InputStream content = ((IAttachmentFile)row).getFile();
    return content;
}

// Get all files associated with a file folder
public InputStream getAttachmentFiles(IFileFolder ff) throws
APIException {
    InputStream content = ((IAttachmentFile)ff).getFile();
    return content;
}
```

If you use `IFileFolder.getFile()` to return a zipped file stream for all files contained in a file folder, you can extract files from the zipped `InputStream` using methods of the `java.util.zip.ZipInputStream` class, as shown in the following example.

Example: Extracting files from a zipped file stream

```
static void unpack(InputStream zippedStream) throws IOException {
    ZipInputStream izs = new ZipInputStream(zippedStream);
    ZipEntry e = null;
    while ((e = izs.getNextEntry()) != null) {
        if (!e.isDirectory()) {
            FileOutputStream ofs = new FileOutputStream(e.getName());
            byte[] buf = new byte[1024];
            int amt;
            while ((amt = izs.read(buf)) != -1) {
                ofs.write(buf, 0, amt);
            }
            ofs.close();
        }
    }
}
```

```
        zippedStream.close();  
    }
```

The Agile API provides no direct method for opening an attachment file. However, you can retrieve a file and then have your program open it in a separate application or display it in a browser window.

Deleting Attachments and File Folders

To delete a file folder, which may contain multiple files, use the `IDataObject.delete()` method. You must have the Delete privilege for file folders to be able to delete them. For more information about deleting objects, see [Deleting and Undeleting Objects](#) on page 32.

Note Deleting a file folder does not automatically remove its associated files from the file server. The Agile PLM administrator is responsible for purging deleted files.

To delete a row from the Attachments table of a business object, use the `ITable.removeRow()` method. For more information, see [Removing Table Rows](#) on page 78. Removing a row from the Attachments table does not delete the associated file folder. You cannot delete a row from the Attachments table in the following situations:

- The parent object is an Item whose revision is incorporated.
- The selected attachment is currently checked out.

Working with Thumbnails

Agile PLM supports adding small static graphical images (thumbnails) to key objects which either represent graphical objects or require images. For example, documents attached as files such as Excel worksheets, text files, PDF files, CAD files and so on, can have associated thumbnail images.. Thumbnails display scaled down versions of these files and, in the case of Part objects, show how they relate to each other.

The SDK supports the following Thumbnail-related functions:

- Regenerating Thumbnails
- Sequencing Thumbnails
- Setting Master Thumbnails
- Generating Thumbnails while adding Files to Attachments tab

Accessing Thumbnails

Agile SDK provides the `IThumbnailContainer` interface for generalized access to thumbnail-related operations for file folder and business objects. This interface is supported by the following API objects:

- `IFileFolder` object
- `IItem` object
- `IManufacturerPart` object

For `IFileFolder` objects, set the applicable version using `IFileFolder.setCurrentVersion` before calling the above APIs. The default version is `LATEST_VERSION`. For `IItem` or `IManufacturerPart` objects, use the revision that is already set on these objects.

The following example gets thumbnail details from `TitleBlock` of an `IItem` or `IFileFolder` object.

Example: Getting thumbnail details from TitleBlock of IItem or IFileFolder objects

```
IItem dataObj =
    (IItem)session.getObject(IItem.OBJECT_TYPE, "P00015");
ITable titleBlockTable =
    dataObj.getTable(TableTypeConstants.TYPE_PAGE_ONE);
Iterator i =
    titleBlockTable.getTableIterator();
while (i.hasNext()) {
    IRow row = (IRow)i.next();
    Object thumbnailIDDetails =
        row.getValue(ThumbnailConstants.ATT_THUMBNAIL_ATTACHMENT_TAB)
        ;
    IAgileList[] nodes =
        ((IAgileList)thumbnailIDDetails).getSelection();
    for(int ii=0; ii<nodes.length; ii++) {
        IAgileList childNode = nodes[ii];
        IThumbnailID thumbnailID = (IThumbnailID)childNode.getValue();
    }
}
```

Regenerating Thumbnails

Regenerating a thumbnail means generating a thumbnail for an existing (generated) thumbnail for file folder and item objects. This feature is of particular interest in assembly structures where a change in the child of the assembly structure is reflected in the thumbnail after the thumbnail is regenerated.

Agile SDK provides the `IThumbnailContainer.generateThumbnail(IThumbnailID)` API for this purpose. When invoked, it will generate and return a new thumbnail. In case of `IFileFolder` objects, API will use the current *version* of the object. For `IItem` or `IManufacturerPart` objects, it will use the current *revision* of the object. An `APIException` is thrown when the API fails to regenerate the thumbnail for the specified `thumbnailID` parameter.

Example: Regenerating a thumbnail for an IFileFolder object

```
IFileFolder ff =
    (IFileFolder)session.getObject(IFileFolder.OBJECT_TYPE,
    "FOLDER00037");
ff.setCurrentVersion(new Integer(1));
IThumbnailID oldThumbnailID = "";
//get this id from row of supported tables like Title Block
ff.generateThumbnail(oldThumbnailID);
```

Example: Regenerating a thumbnail for an IItem object

```

IItem itemObj =
    (IItem)session.getObject(IItem.OBJECT_TYPE, "P00015");
IThumbnailID oldThumbnailID = "";
//get this id from row of supported tables like Title Block
itemObj.generateThumbnail(oldThumbnailID);

```

Setting Master Thumbnails

In Agile PLM, a file folder object is represented by a thumbnail file which can contain several files in its Files tab. Using `setMasterThumbnail`, a user can decide which row in the Files tab will represent the selected thumbnail's file folder.

SDK provides the `setMasterThumbnail` API to set master thumbnails on file folder objects. An exception is thrown if the function fails to set the master thumbnail represented by the parameter `masterRow`.

Example: Setting a master thumbnail

```

IFileFolder ff =
    (IFileFolder)session.getObject(IFileFolder.OBJECT_TYPE,
    "FOLDER00037");
ff.setCurrentVersion(new Integer(1));
ITable attachmentTable =
    ff.getTable(FileFolderConstants.TABLE_FILES);
Iterator i =
    attachmentTable.getTableIterator();
while (i.hasNext()) {
    IRow row = (IRow)i.next();
    IRow masterRow = null;
    //set one of the rows as the master row
}

ff.setMasterThumbnail(masterRow);

```

Replacing Thumbnails

You can replace an Agile PLM generated thumbnail with a user provided image for file folder and item objects. The SDK provides the following API for this purpose.

```

IThumbnailID replaceThumbnail (IThumbnailID oldThumbnailID, byte[] bytes)
throws APIException

```

This API will replace the thumbnail referred to in `oldThumbnailID` with the image file referred to in the input stream. That is, it will return the `thumbnailID` of the replaced thumbnail.

For `IFileFolder` objects, the API will use the *version* that is already set on the object. For `IItem` or `IManufacturerPart` objects, it will use the *revision* that is already set on the object. An `APIException` is thrown if it fails to replace the thumbnail specified in the `oldThumbnailID` parameter.

Example: Replacing a thumbnail for an IFileFolder object

```

IFileFolder ff =
    (IFileFolder)session.getObject(IFileFolder.OBJECT_TYPE,
    "FOLDER00037");

```

```
ff.setCurrentVersion(new Integer(1));
IThumbnailID oldThumbnailID = "";
//get this id from row of supported tables like Title Block
String filePath = "C:\\Earth.bmp";
File file1_tmp = new File(filePath);
byte[] b1 = new byte[(int)file1_tmp.length()];
FileInputStream fileInputStream = new FileInputStream(file1_tmp);
fileInputStream.read(b1);
IThumbnailID newThumbnailID = ff.replaceThumbnail(oldThumbnailID, b1);
```

Example: Replacing a thumbnail for an IItem object

```
IItem itemObj =
    (IItem)session.getObject(IItem.OBJECT_TYPE, "P00015");
IThumbnailID oldThumbnailID = "";
//get this id from row of supported tables like Title Block
String filePath = "C:\\Earth.bmp";
File file1_tmp = new File(filePath);
byte[] b1 = new byte[(int)file1_tmp.length()];
FileInputStream fileInputStream = new FileInputStream(file1_tmp);
fileInputStream.read(b1);
IThumbnailID newThumbnailID = itemObj.replaceThumbnail(oldThumbnailID,
b1);
```

Sequencing Thumbnails

When Web Client users add attachment files to business objects, they can also set the order (sequence) of their appearance in the Thumbnail Navigator. Agile PLM provides the `setThumbnailSequence` API to enable this feature in the SDK. For `IItem` or `IManufacturerPart` objects, the API will use the revision that is already set on the object. The API will sort (sequence) the order of appearance using the `thumbnailIDs` parameter. An exception is thrown if the function fails to set the master thumbnail.

Example: Sequencing thumbnails

```
IItem itemObj =
    (IItem)session.getObject(IItem.OBJECT_TYPE, "P00015");
IThumbnailID[] thumbnailIDs = null;
//get this id from row of Title Block table
IThumbnailID[] newSeqOfThumbnailIDs = null;
//generate new order using thumbnail IDs
itemObj.setThumbnailSequence(newSeqOfThumbnailIDs);
```

Generating Thumbnails while Adding Files to Attachments Tab

There are no APIs specifically for this purpose. When you add a file to the Attachments tab of an Item, a thumbnail is generated for that file provided thumbnail support is enabled in the Web Client.

Working with Design Objects

A *Design* object is a business object that specifies one or more URLs or files stored in Agile PLM's File Management Server. It contains information about the binary files attached to it. Similar to other Agile PLM business objects, Design objects appear in Agile PLM's class hierarchy as a separate base class.

Design class objects are used with Agile PLM's Engineering Collaboration (EC) module which is used to manage CAD data in Agile PLM. Objects created in this class have many of the same properties and behaviors of File folders. In Java Client, users with administrator privileges can enable other users to open and work with Design objects. Agile PLM users can then access and work exclusively with these objects in Web Client.

Agile SDK supports the following Design object-related functions:

- Managing (adding, removing, getting, and editing) version specific Relationships between two Design objects
- Using where-used queries for Design object deployments in Agile PLM Class structures. For information about where-used queries, see [Creating a Where-Used Query](#) on page 61.

Adding and Loading Design Objects

To create or get an `IDesign` object, you can use `IAgileSession.createObject()` or `IAgileSession.getObject()`. The following examples show the different methods provided by the SDK to create and get Design objects.

Example: Creating a Design by class name

```
IDesign des = (IDesign)
    m_session.createObject("Design", "DESIGN00133");
```

Example: Creating a Design by class ID

```
IDesign des = (IDesign)
    m_session.createObject(FileFolderConstants.CLASS_DESIGN,
    "DESIGN00133");
```

Example: Creating a Design by IAgileClass reference:

```
IDesign des = (IDesign)
    m_session.createObject(desClass, "DESIGN00133");
```

Example: Loading a Design object

```
IDesign des = (IDesign)
    m_session.getObject(IDesign.OBJECT_TYPE, "DESIGN00133");
```

Managing Version Specific Relationships between Design Objects

Agile SDK supports the following version specific Relationships functions between Design objects:

Note These version specific functions only apply to Design objects.

- Adding version specific relationships between Design objects
- Removing version specific relationships between Design objects
- Getting version specific relationships for specific versions of Design objects

- Editing version specific relationships for Design objects

Adding Relationships for Specific Versions of Design Objects

The SDK provides the following API to add relationships between two specific versions of Design objects:

```
IDesign.addVersionSpecificRelationship(Object versionNum, IDesign relatedDesign, Object relatedVersionNum)
```

The parameters are:

- **versionNum** – This an integer showing the version number of this Design object.
- **relatedDesign** – The Design object you are creating the Relationships for.
- **relatedVersionNum** – This an integer showing the version number of the Design object you are creating the Relationship for.

An APIException is thrown if the version specific relationship between the two Design objects was not created.

Alternatively, you can load the object's RelationshipsTable and call createRow(Object params) with the following params:

```
HashMap params = new HashMap();  
params.put(DesignConstants.ATT_RELATIONSHIPS_REV_VERSION, versionNum);  
params.put(DesignConstants.ATT_RELATIONSHIPS_NAME, relatedDesign);  
params.put(DesignConstants.ATT_DESIGN_VERSION, relatedVersionNum);
```

Removing Relationships for Specific Versions of Design Objects

To remove Version Specific Relationships for IDesign:

```
IDesign des1 = (IDesign)session.getObject(IFileFolder.OBJECT_TYPE,  
"DESIGN00001");  
des1.setCurrentVersion(new Integer(4));  
ITable relationshipTable = des1.getRelationship();  
relationshipTable.removeRow(row);
```

Getting Relationships for Specific Versions of Design Objects

To get the Relationships for a specific version of IDesign:

```
IDesign des1 = (IDesign)session.getObject(IFileFolder.OBJECT_TYPE,  
"DESIGN00001");  
des1.setCurrentVersion(new Integer(4)); //set desired version  
ITable relationshipTable = des1.getRelationship();
```


Editing Relationships for Specific Versions of Design Objects

To edit the Relationships for a specific version of the `IDesign` object.

```
IDesign des1 = (IDesign)session.getObject(IFileFolder.OBJECT_TYPE,
    "DESIGN00001");
des1.setCurrentVersion(new Integer(4));
ITable relationshipTable = des1.getRelationship();
HashMap mapForUpdate=new HashMap();
HashMap rowUpdateMap = new HashMap();
rowUpdateMap.put(DesignConstants.ATT_DESIGN_VERSION, new Integer(1));
mapForUpdate.put(row1, rowUpdateMap);
relationshipTable.updateRows(mapForUpdate);
```

Purging Specific Versions of Design Objects

The SDK provides the `IDesign.purgeVersions(Object[] versions)` API for purging specific versions of Design objects and relevant versions of its child objects. The `versions` parameter, an integer value, specifies the version number you want purged. An exception is thrown if the API fails to purge the object.

Searching Design Object Deployments with Where-Used Queries

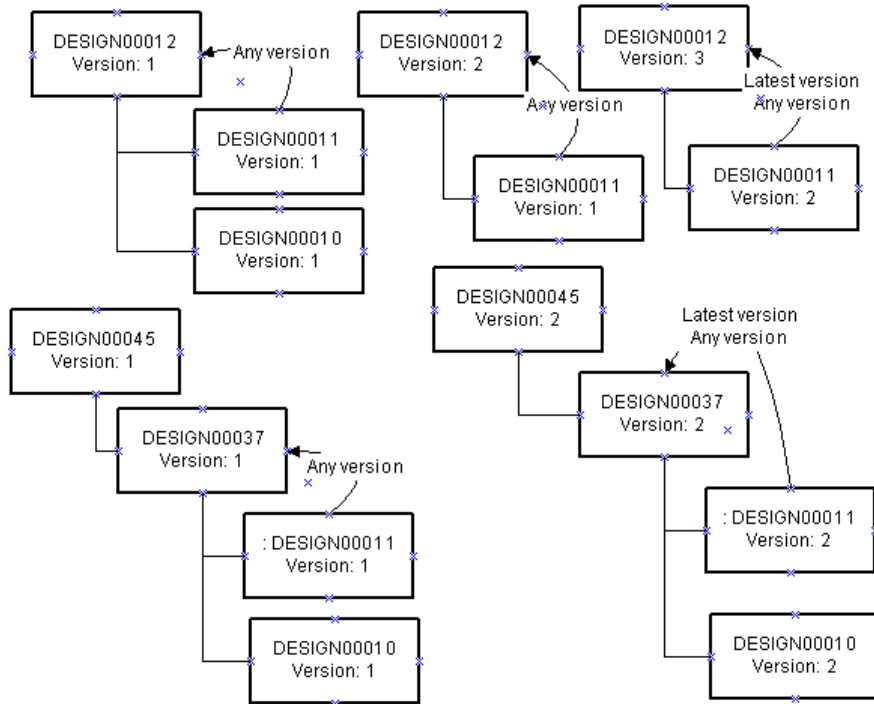
The Structure tab for Design objects enables users to create structures of different Design objects having different versions. The SDK supports searching for Design object usage in Agile PLM Class Structures for the *latest* checked in versions and *all* checked in versions with the following queries and query constants:

- `WHERE_USED_IN_STRUCTURE_ONE_LEVEL_LATEST_CHECKEDIN` – This `WHERE_USED` query *returns* the *LATEST* version of the immediate parent of the Design object which uses the input Design object as a child in the design structure. The constant `QueryConstants.WHERE_USED_IN_STRUCTURE_ONE_LEVEL_LATEST_CHECKEDIN` supports this search.
- `WHERE_USED_IN_STRUCTURE_ALL_LEVEL_LATEST_CHECKEDIN` – This `WHERE_USED` query *returns ALL* versions of the immediate parent of the Design object which uses the input Design object as a child in the design structure. The constant `QueryConstants.WHERE_USED_IN_STRUCTURE_ONE_LEVEL_ALL_CHECKEDIN` supports this search.

You can find code samples using `QueryConstants` in `SDK_samples.zip` folder. To access this file, see the Note in [Client-Side Components](#) on page 2. These are the Javadoc generated HTML files in the documentation folder.

The two searches and their respective results are explained with the aid of the following illustration. It shows the Design objects and level one structures. The search parameter `Title Block.Number` includes the number 11.

Figure 16: Design objects and search results



Search Objectives and settings	
Search for:	Designs
Search type:	Where-used in structure one level for the latest checked in version only
Search type:	Where-used in structure one level for the all checked in version only
Search parameters:	Title Block.Number contains 11
Search results	
LATEST checked in versions	
<u>Object found</u>	<u>Version</u>
DESIGN00012	3
DESIGN00037	2
Search results	
ALL checked in versions	
<u>Object found</u>	<u>Version</u>
DESIGN00012	1
DESIGN00012	2
DESIGN00012	3
DESIGN00037	1
DESIGN00037	2

Importing and Exporting Data with SDK

This chapter includes the following:

- About Importing and Exporting Data..... 199
- Validating Import Data and Importing Data..... 199
- Exporting Data from the SDK 202

About Importing and Exporting Data

You can use the SDK to import and export data from external databases into the PLM system. The source can be an Agile database, a third party Product Data Management (PDM) system, or an Enterprise Resource Planning (ERP) system. The following paragraphs provide background information, procedures, and examples to perform these tasks using the agile SDK.

Validating Import Data and Importing Data

When you import data, you have the option to validate the data, or ignore this step. The purpose of import validation is to check the data for compliance with applicable server rules such as length tolerances, allowable values, and other constraints. The validation process informs you of the data that will fail to import before initiating the process.

The SDK exposes two methods to programmatically perform the following import-related tasks:

- The `IImportManager.validateData(byte[], String, byte[], byte[], String[], List)` method to validate the imported data for compliance with server business rules. This action is performed before importing the data to identify the invalid items in the input source data.
- The `IImportManager.importData(byte[], String, byte[], byte[], String[], List)` method supports importing data into the PLM databases. This action is performed after running the `IImportManager.validateData()` method to select the data that meets the server business rules and is importable into the PLM system.

For more information about importing data, refer to *Agile Integration Services Developer Guide* and *Agile Import and Export Guide*.

The following example uses these methods to validate the imported data for compliance and import it into the PLM system upon validation.

Validating Data and Importing Data with SDK

Example: Validating and Importing Data into PLM

```
import com.agile.api.*;
import java.util.*;
import java.io.ByteArrayInputStream;
```

```
import java.io.ByteArrayOutputStream;
import java.io.FileInputStream;
import java.io.FileOutputStream;
import java.io.IOException;
import java.io.InputStream;
import java.util.ArrayList;
import java.util.List;

public class ImportClient {
    public static IAgileSession session = null;
    public static AgileSessionFactory factory;
    public static void main(String[] args) {
        try {
            String _url="http://localhost/Agile";
            String _user="admin";
            String _pwd="agile";
            String srcFilePath="bom.txt";

/* Supported file types: aXML,IPC2571, ExcelFile, DelimitedTextFile
 * The value of "-f" parameter is the same
 * in Import AIS sample command
 */

            String srcFileType="DelimitedTextFile";
// Null implies loading the default mapping
            String mappingPath="NewMapFile.xml";
// Null implies do not transform
            String transformPath=null;
/* The value used by operations is the
same as the value of the "-t" parameter in the import AIS sample
command.
all supported
operations:"items.bom","items.aml","items.attachments",
"items.relationships", "manufacturers",
"manufacturers.relationships",
"manufacturers.attachments", "manufacturerParts",
"manufacturerParts.relationships",
"manufacturerParts.attachments" "partgroups",
"partgroups.relationships",
"partgroups.attachments", "productServiceRequests"
"productServiceRequests.affectedItems",
"productServiceRequests.relatedPSR"
"productServiceRequests.relationships"
"productServiceRequests.attachments" "qualityChangeRequests"
"qualityChangeRequests.affectedItems"
"qualityChangeRequests.relationships"
"qualityChangeRequests.attachments"
 */
            String [] operations=new String[]{"items", "items.bom","items.aml"};
/* The value used by options is the
 * same as the "-n" parameter in the import AIS sample command
 */
            List options=new ArrayList();
            options.add("BusinessRuleOptions|ChangeMode=Authoring");
```

```

options.add("BusinessRuleOptions|BehaviorUponNonExistingObjects=Accept");
String _output="log.xml";
FileOutputStream fop=new FileOutputStream(_output);
// Create an instance of IAgileSession
session = connect(_url,_user,_pwd);
IImportManager imgr = (IImportManager)
session.getManager(IImportManager.class);
byte[] logData=null;
/* Sample code to import data
* Remove comments to run the importData example.
* byte []logData=imgr.importData(stream2byte
* (new FileInputStream(srcFilePath)),
* srcFileType, convertFiletoStream(mappingPath),
* convertFiletoStream(transformPath),
* operations, options);
* Sample code to validate data
* Remove comments to run the validateData example
* logData=imgr.validateData(stream2byte
* (new FileInputStream(srcFilePath)),
* srcFileType, convertFiletoStream(mappingPath),
* convertFiletoStream(transformPath), * operations, options);
* byte buf []=new byte[1024*4];

int n=0;
InputStream logStream=byte2stream(logData);
while((n=logStream.read(buf))!=-1){
fop.write(buf, 0, n);
}
fop.close();
}
catch (Exception e) {e.printStackTrace();
}
finally {session.close();
}
}

/*
* <p> Create an IAgileSession instance </p>
*
* @return IAgileSession
* @throws APIException
*/
private static IAgileSession connect(String _url,String _user,String
_pwd) throws APIException {
factory = AgileSessionFactory.getInstance(_url);
HashMap params = new HashMap();
params.put (AgileSessionFactory.USERNAME, _user);
params.put (AgileSessionFactory.PASSWORD, _pwd);
session = factory.createSession(params);
return session;
}

private static byte[] stream2byte(InputStream stream) throws
IOException {
ByteArrayOutputStream outputStream=new ByteArrayOutputStream();

```

```
byte buf []=new byte[1024*4];
int n=0;
while( (n=stream.read(buf)) !=-1) {
    outputStream.write(buf, 0, n);
}
byte [] data=outputStream.toByteArray();
outputStream.close();
return data;
}

private static InputStream byte2stream(byte [] data) throws
IOException{
    ByteArrayInputStream stream=new ByteArrayInputStream(data);
    return stream;
}

private static byte [] convertFiletoStream(String path) throws
IOException{
    if(path==null || path.equals(""))
        return null;

    return stream2byte(new FileInputStream(path));
}
}
```

Exporting Data from the SDK

The SDK exposes the `exportData()` method to programmatically export data from PLM databases. This method is designed to overcome performance and memory issues that are encountered when loading large BOMs into the SDK programs. To overcome this issue, you can invoke the export functionality to load the BOM. The SDK programs can then read and export the data from the extracted XML files.

For more information about exporting data, refer to the *Agile Integration Services Developer Guide* and *Agile Import and Export Guide*.

Invoking SDK's Export Function

Use the following call to invoke the export function of the SDK.

```
public byte [] exportData (Object [], Integer, String [])
```

In this call,

- `exportData` – Is the method that returns the exported data in an array of bytes. The byte array represents a ZIP file that contains the export XML file in aXML or PDX formats and any file attachments that are included in the exported package.
- `Object []` – Is the array of objects that are exported from PLM to the external system. These objects are passed as `IDataObject` objects.
- `Integer` – Is the indicator (constants that are provided in `ExportConstants.java`) to identify whether the output export format should be aXML or PDX. These are the two formats that the SDK supports.
- `String []` – Is the array of ACS filter names that are used for the export. The filter names are

not case sensitive and must match the names of filters defined by the Admin tool for ACS.

The conditions that will cause the `exportData` method to throw an exception and the respective exceptions are:

- **Invalid Data Format** – The method was called with an unrecognized value for the export data format. Only aXML (provide constant label) and PDX (provide constant label) values are valid.
- **No Filter Specified** – The method was called but no filters were specified. At least one valid filter must be provided.
- **Specified Filter Not Found** – The method was called with specified filter which was not found in the system

Example: Exporting data from PLM using the SDK

```
... //

IItem item = (IItem) session.getObject(IItem.OBJECT_TYPE, "P0001");
if (item == null) {
    ... // throw an error, the part wasn't found
}
IDataObject[] expObjs = {item};
String[] filters = {"Default Item Filter"};

...

IExportManager eMgr = (IExportManager)
session.getManager(IExportManager.class);
try {
    byte[] exportData = eMgr.exportData(expObjs,
ExportConstants.EXPORT_FORMAT_PDX, filters);
    if (exportData != null) {
        String fileName = createOutputFileName();
        FileOutputStream outputFile = new FileOutputStream(fileName);
        outputFile.write(exportData);
        outputFile.close();
        System.out.println("Data exported to file: " + fileName);
    }
} catch (Throwable t) {
    ... // error handling
}
...

```


Managing Workflow

This chapter includes the following:

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- Adding and Removing Approvers 208
- Approving or Rejecting Change..... 217
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- Changing the Workflow Status of an Object 220
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About Workflow

Agile has electronic routing, Notification, and signoff capabilities, thus automating the change control process and providing a simplified but powerful Workflow mechanism. With these Workflow features, you can

- Route changes automatically to the users who need to approve or observe the change.
- Send email alerts automatically to approvers and observers to notify them that a change has been routed to them.
- Approve or reject changes online.
- Attach comments to changes.

The Change Control Process

The change control process can vary for each Workflow defined for a routable object. The table below lists the sequences for the default Workflows for each type of routable object. For changes the first four steps in the sequence are identical and only the final step is different.

Workflow	Default sequence
Default Activities	Not Started > In Process > Complete
Default Attachments	Review
Default Audits	Prepared > Initiated > Audited > Issued > Corrected > Validated > Closed
Default CAPAs	Identified > Acknowledged > Investigated > Implemented > Validated > Closed
Default Change Orders	Pending > Submitted > CCB > Released > Implemented
Default Change Requests	Pending > Submitted > CCB > Released > Closed

Workflow	Default sequence
Default CTOs	Pending > Review > Released > Complete
Default Declarations	Pending > Open to Supplier > Submit to Manager > Review > Released > Implemented
Default Deviations	Pending > Submitted > CCB > Released > Expired
Default Gates	Closed > In Review > Open
Default Manufacturer Orders	Pending > Submitted > CCB > Released > First Article Complete
Default Non-Conformance Reports	Pending > Submitted > Review > Released > Closed
Default Packages	Pending > Submitted > Review > Accepted > Closed
Default Price Change Orders	Pending > Submitted > Price Review > Released > Implemented
Default Problem Reports	Pending > Submitted > Review > Released > Closed
Default Sites Change Orders	Pending > Submitted > CCB > Released > Implemented
Default Stop Ships	Pending > Submitted > CCB > Released > Resumed

Dynamics of Workflow Functionality

The Workflow functionality available to each user for a particular routable object depends on the status of the routable object and the user's privileges. Your Agile API program should take these Workflow dynamics into account and, where possible, adjust your program accordingly.

How the Status of a Change Affects Workflow Functionality

The Workflow actions available for a pending change are different from those for a released change. To check the status of a change to determine whether it's pending or released, use the `IRoutable.getStatus()` method. The `getStatus()` method returns an `IStatus` object for the Workflow status. `IStatus` extends the `INode` interface and provides helpful methods for working with status nodes. The following example shows how to use `getStatus()` to determine whether a change is released.

Example: Getting the status of a change object

```
private static boolean isReleased(IChange change) throws APIException {
    return
        (change.getStatus().getStatusType().equals(StatusConstants.TYPE_RELEASED));
}
```

How User Privileges Affect Workflow Functionality

Agile privileges determine the types of Workflow actions a user can perform on a change. The Agile system administrator assigns roles and privileges to each user. The table below lists privileges needed to perform Workflow actions.

Privilege	Related API
Change Status	<code>IRoutable.changeStatus()</code>

Privilege	Related API
Comment	<code>IRoutable.comment()</code>
Send	<code>DataObject.send()</code>

To determine at run time whether a user has the appropriate privileges to perform an action, use the `IUser.hasPrivilege()` method. You can adjust your program's UI based on the user's privileges. The following example shows how to check whether a user has the privilege to change the status of a change before calling the `IRoutable.changeStatus()` method.

Example: Checking the privileges of a user before changing the status of a change

```
private void goToNextStatus(IChange change, IUser user) throws
APIException {
    // Check if the user can change status
    if (user.hasPrivilege(UserConstants.PRIV_CHANGESTATUS, change)) {
        IUser[] approvers = new IUser[] { user };
        IStatus nextStatus = change.getDefaultNextStatus();
        change.changeStatus(nextStatus, true, "", true, true, null,
            approvers, null, false);
    } else {
        System.out.println("Insufficient privileges to change status.");
    }
}
```

Selecting a Workflow

When you create a new change, package, product service request, or quality change order, you must select a Workflow. Otherwise, the object is in an unassigned state and cannot progress through a Workflow process. Your Agile system can have multiple Workflows defined for each type of routable object. To retrieve the valid Workflows for an object, use the `IRoutable.getWorkflows()` method. If a routable object has not been assigned a Workflow yet, you can use the `IRoutable.getWorkflows()` method to select a Workflow.

As long as a change is in the Pending status, you can select a different Workflow. Once a change moves beyond the Pending status, you can't change the Workflow.

Example: Selecting a Workflow

```
private IChange createECO(IAgileSession session) throws APIException {
    // Get an Admin instance
    IAdmin admin = session.getAdminInstance();

    // Create a change
    IAgileClass ecoClass =
admin.getAgileClass(ChangeConstants.CLASS_ECO);
    IAutoNumber[] autoNumbersPart = ecoClass.getAutoNumberSources();
    IChange change = (IChange)m_session.createObject(ecoClass,
autoNumbersPart[0]);
    // Get the current Workflow (a null object,
    // since the Workflow has not been set yet)
    IWorkflow wf = change.getWorkflow();
}
```

```
// Get all available Workflows
IWorkflow[] wfs = change.getWorkflows();

// Set the change to use the first Workflow
change.setWorkflow(wfs[0]);

// Set the change to use the second Workflow
change.setWorkflow(wfs[1]);

return change;
}
```

If a change is still in the Pending status type, you can deselect a Workflow to make the change “unassigned.” To make a change unassigned, use the `IRoutable.setWorkflow()` method and specify null for the Workflow parameter.

Example: Making a change unassigned

```
private void unassign(IChange change) throws APIException {
    change.setWorkflow(null);
}
```

Adding and Removing Approvers

After a change is routed and the online approval process is initiated, it is sometimes necessary to add or remove people from the list of approvers or observers. To add or remove approvers or observers, a user must have the Route privilege.

You don’t need to load the Workflow table to modify the list of approvers. Once you have a routable object, such as an ECO, you can modify its list of approvers using the `IRoutable.addApprovers()` and `IRoutable.removeApprovers()` methods. When you use `addApprovers()` or `removeApprovers()`, you specify the lists of approvers and observers, whether the Notification is urgent, and an optional comment. The Agile API provides overloaded `addApprovers()` and `removeApprovers()` methods for adding or removing a user or a user group from the list of approvers. For more information, refer to the API Reference files at Oracle® E-Cloud Web site (<http://edelivery.oracle.com/>).

If any users you select as approvers or observers do not have appropriate privileges to view a change, your program throws an `APIException`. To avoid the possible exception, check the privileges of each user before adding him to the approvers or observers list.

The following example shows how to add and remove approvers for a change.

Example: Adding and removing approvers and observers

```
public void modifyApprovers(IChange change) {
    try {

// Get current approvers for the change
        IDataObject[] currApprovers =
            change.getApproversEx(change.getStatus());
// Get current observers for the change
```

```

        IDataObject[] currObservers =
        change.getObserversEx(change.getStatus());
// Add hhawkes to approvers
    IUser user = (IUser)m_session.getObject(IUser.OBJECT_TYPE,
        "hhawkes");
    IUser[] approvers = new IUser[]{user};
// Add flang to observers
    user = (IUser)m_session.getObject(IUser.OBJECT_TYPE, "flang");
    IUser[] observers = new IUser[]{user};
// Add approvers and observers
    change.addApprovers(change.getStatus(), approvers, observers, true,
        "Adding hhawkes to approvers and flang to observers");
// Add skubrick to approvers
    user = (IUser)m_session.getObject(IUser.OBJECT_TYPE, "skubrick");
    approvers[0] = user;
// Add kwong to observers
    user = (IUser)m_session.getObject(IUser.OBJECT_TYPE, "kwong");
    observers[0] = user;
// Remove skubrick from approvers and kwong from observers
    change.removeApprovers(change.getStatus(), approvers, observers,
        "Removing skubrick from approvers and kwong from observers");
} catch (APIException ex) { System.out.println(ex);
}
}

```

If you want to modify only the list of approvers or the list of observers for a change, you can pass a null value for the parameter you don't want to change. The following example shows how to add the current user to the approvers list without changing the list of observers.

Example: Adding approvers without changing observers

```

public void addMeToApprovers(IChange change) {
    try {
        // Get the current user
        IUser user = m_session.getCurrentUser();

        // Add the current user to the approvers list for the change
        IUser[] approvers = new IUser[]{user};
        change.addApprovers(change.getStatus(), approvers, null, true,
            "Adding current user to approvers list");
    } catch (APIException ex) {
        System.out.println(ex);
    }
}
}

```

Setting the “Signoff User Dual Identification” Preference

The “*Signoff User Dual Identification*” feature is a systemwide preference that controls whether approval/rejection signoff requires a dual identification, or a “second signoff.” This feature is required by FDA-regulated companies and can benefit companies with a corporate policy requiring double authentication of user identity when approving or rejecting change orders. For more information, refer to the latest release of the *Agile PLM Administrator Guide*.

The following paragraphs list and describe the APIs that support the Signoff User Dual Identification feature and provide code samples that use these methods.

Approving a Routable Object

The `approve()` method informs users if the object is approved by the approver, or when the approver is approving the object on behalf of one or more user groups. You can also use this method to specify the `secondSignature`, `escalations`, `transfers`, or `signoffForSelf` parameters as they are set in the server's Preferences settings.

```
// Approving a user
/*
Parameters:
  password: User's approval password
  secondSignature: User's second signature for approval
  comment: A character string for user comments (4000 characters
maximum)
  notifyList: List of users and user groups to notify
  approveForGroupList: List of user groups to approve for
  escalations: Escalated from other users and user groups to approve
for
  transfers: From other users and user groups to approve for
  signoffForSelf: True to signoff for self and False otherwise
  APIException:
  Thrown if the method fails to approve the routable object
*/
public void approve (String password, String secondSignature,
                    String comment, Collection notifyList,
                    Collection approveForGroupList, Collection escalations,
                    Collection transfers, boolean signoffForSelf)
    throws APIException;
```

The following code example approves a routing object requiring Dual identification. Other conditions are:

- Display User ID when Sever Settings > Preferences Signoff User Dual Identification is selected.
- Set the Workflow Settings for *Workflow Status CCB: Default Change Orders Dual Identification Required* to Yes.
- Create a *change object* and add a user, for example `admin` as approver to the CCB Status and the Released Status.

Example: Approving a routable object

```
// Admin approves the change by supplying approval password and "User
// ID" as the second signature
String chgNo = "ECO-12345";
IChange chg = (IChange) session.getObject (ChangeConstants.CLASS_ECO,
chgNo);
String userName = session.getCurrentUser().getName();
chg.approve ("agile", userName, "OK, Approved", null, null, null,
null, true);
```

Rejecting a Routable Object

This `reject()` method informs users that the routable object is rejected by the approver, or when the approver is rejecting the object on behalf of one or more user groups. You can also use this method to specify the `secondSignature`, `escalations`, `transfers`, or `SignoffForSelf` parameters as they are set in server's Preferences settings.

```
// Rejecting a user
/*
Parameters
  password: User's approval password
  secondSignature: User's second signature for approval
  comment: A character string for user comments
            (4000 characters maximum)
  notifyList: List of users and user groups to notify
  approveForGroupList: List of user groups to approve for
  escalations: Escalated from other users and user groups
                to approve for
  transfers: From other users and user groups to approve for
  signoffForSelf: True to signoff for self and False otherwise
APIException
  Thrown if the method fails to approve the routable object
*/
public void reject(String password, String secondSignature,
                  String comment, Collection notifyList,
                  Collection approveForGroupList, Collection escalations,
                  Collection transfers, boolean signoffForSelf)
    throws APIException;
```

The following code sample requires Dual identification to reject a routing object. Other conditions are:

- Display User ID when Sever Settings > Preferences Signoff User Dual Identification is selected.
- Set the Workflow Settings for Workflow Status CCB: Default Change Orders Dual Identification Required to Yes.
- Create a *change object* and add a user, for example `admin` as an approver of the CCB Status and the Released Status.

Example: Rejecting a routable object

```
// Admin rejects the change by supplying approval password and "User
// ID" as the second signature
String chgNo = "ECO-12345";
IChange chg = (IChange) session.getObject(ChangeConstants.CLASS_ECO,
chgNo);
String userName = session.getCurrentUser().getName();
chg.reject("agile", userName, "Rejected", null, null, null, null,
true);
```

Adding User Groups of Approvers and Users to Approve Routable Objects

The `getPossibleUserGroupsForSignoff()` method is designed to retrieve an array of user groups that is added as approvers for a particular Workflow status and the current user/approver is also a group member.

```
/*
Parameters
    status: A node corresponding to the desired Workflow status. You can
    retrieve the current status using getStatus(). To retrieve the
    default next status, use getDefaultNextStatus().
APIExceptions and Returns
    - throws APIException if the method fails
    - returns an array of IUserGroup objects
*/
public IDataObject[] getPossibleUserGroupsForSignoff(IStatus status)
    throws APIException;
```

The following code sample adds a user group that approves the ECO at the CCB status and contains the current user as its member. In addition to Dual identification, the following conditions are also required:

- Display User ID when Sever Settings > Preferences Signoff User Dual Identification is selected.
- Set the *Workflow Settings* for Workflow Status CCB: Default Change Orders Dual Identification Required to Yes.

Example: Adding User Groups of Approvers with Current User as a Member of the “User Group”

```
IChange change;
//Add the User Group as approver for CCB
Object [] appr=new Object [] {user_group};
IStatus current=change.getStatus();
StatusConstants type=current.getStatusType();
m_session.disableWarning(new Integer(574));
while(!(type == (StatusConstants.TYPE_REVIEW))){
    IStatus nextstatus=change.getDefaultNextStatus();
    change.changeStatus(nextstatus,true,"",true,true,(Object [])null,(
    Object [])null,(Object [])null,false);
    current=change.getStatus();
    type=change.getStatus().getStatusType();
}
m_session.enableWarning(new Integer(574));
change.addApprovers(current, appr, (Object [])null, false, "");
//Get one of the possible signoff groups and have current user signoff
//in their behalf
IDataObject [] u = change.getPossibleUserGroupsForSignoff(current);
Collection gl = new ArrayList();
gl.add(u[0]);
change.approve("agile", session.getCurrentUser().getName(),
    "ESIGN-FIRST", null, gl, null, null, false);
```


Approving a Routable Object by Users on behalf of “Transferred from Users”

The `getPossibleTransferredFromUsers()` method is designed to retrieve an array of users that is added as transfer authorities for the current user and for a particular Workflow status.

```

/*
Parameters
    status: A node corresponding to the desired Workflow status. You can
    retrieve the current status using getStatus(). To retrieve the
    default next status, use getDefaultNextStatus().
APIExceptions and Returns
    - throws APIException if the method fails
    - returns an array of IUserGroup objects
*/
public IDataObject[] getPossibleTransferredFromUsers(IStatus status)
    throws APIException;

```

The following code sample sets up a Transfer Authority from user A to user B, creates an ECO, and adds user A as an approver of the CCB status.

Note The `getPossibleTransferredFromUsers(IStatus status)` return value for user B's CCB status is the array of Users whose Sign-off authority is transferred to user B.

In addition to Dual identification, the following conditions are also required:

- Display User ID when Sever Settings > Preferences Signoff User Dual Identification is selected.
- Set the *Workflow Settings* for Workflow Status CCB: Default Change Orders Dual Identification Required to Yes.

Example: Setting up a Transfer of Authority from one user to another user

```

//Log in and execute the following code as User B
IChange change;
IStatus current = change.getStatus();
IDataObject [] usrs =
change.getPossibleTransferredFromUsers(current);

// Prepare the collection
Collection col = new ArrayList ();
for (int i=0; i < usrs.length; i++){
col.add(usrs[i]);
}

// approve the change
chg.approve("agile", userName, "OK, Approved", null, null, null,
col, false);

```

Adding Active Escalations for Current Users to a Approve Routable Object

The `getPossibleEscalatedFromUsers()` method is designed to retrieve an array of users that serve as active escalations for the current user for a particular Workflow status. This method will override the settings in the *Allow Escalation Designation Approval* attribute on the user's cover page.

```
/*
Parameters
    status: A node corresponding to the desired Workflowstatus. You can
    retrieve the current status using getStatus(). To retrieve the
    default next status, use getDefaultNextStatus().
APIExceptions and Returns
    - throws APIException if the method fails
    - returns an array of IUser and IUserGroup objects
*/
public IDataObject[] getPossibleEscalatedFromUsers(IStatus status)
    throws APIException;
```

The following code sample sets up an Escalation from user A to user B, creates an ECO, and adds user A as an approver of the CCB status.

Note The `getPossibleEscalatedFromUsers(IStatus status)` for user B for the CCB status will return the array of Users whose escalations are set to user B.

In addition to Dual identification, the following conditions are also required:

- Display User ID when Sever Settings > Preferences Signoff User Dual Identification is selected.
- Set the *Workflow Settings* for Workflow Status CCB: Default Change Orders Dual Identification Required to Yes.

Example: Setting up an escalation for a user

```
// Log in and execute the following code as "User B"
IChange change;
IStatus current = change.getStatus();
IDataObject [] usrs = change.getPossibleEscalatedFromUsers(current);

// Prepare the collection
Collection col = new ArrayList ();
for (int i=0; i < usrs.length; i++){
    col.add(usrs[i]);
}

// approve the change
chg.approve("agile", userName, "OK, Approved", null, null, null, col,
false);
```

Specifying a Second Signature to Approve a Routable Object

The `isSecondSignatureRequired()` method is designed to verify if a second signature is required to approve a routable object. Use this method in combination with the methods documented in [Adding User ID as Second Signature to Approve a Routable Object](#) on page 216 (which also has the `secondSignature`) parameter and [Approving a Routable Object](#) on page 210 and [Rejecting a Routable Object](#) on page 210.

Examples

```
/*
Parameters
    Status: The status (IStatus) of the object checked for the next
    Workflowstatus.
Returns
    true if a second signature is required, false otherwise
*/
public boolean isSecondSignatureRequired(IStatus status)
    throws APIException;
```

The following code sample sets the system preference “Signoff User Dual Identification Type” to “User ID”, sets the Default Change Orders workflow CCB status property “Dual Identification Required” to “Yes”, and prints the value of the “Second Signature Required Property” for the various states of the workflow. The `isSecondSignatureRequired (IStatus status)` for the CCB status will return true.

Example: Specifying a second signature to approve a routable object

```
// set the "Signoff User Dual Identification Type" preferences Node
IAdmin admin = session.getAdminInstance();
INode node = admin.getNode(NodeConstants.NODE_PREFERENCES);
// Node Properties
IProperty propSecondSignature = node.getProperty("Signoff User Dual
Identification Type");
I AgileList lst = propSecondSignature.getAvailableValues();
lst.setSelection(new Object [] {"User ID"});
propSecondSignature.setValue(lst);

// set the "Dual Identification Required" property for "Workflow Status
CCB: Default Change Orders" to "Yes"
INode root=admin.getNode(NodeConstants.NODE_AGILE_WORKFLOWS);
INode CCBStatus=(INode)root.getChildNode("Default Change
Orders/Status List/CCB");
IProperty propDualIdentification = CCBStatus.getProperty("Dual
Identification Required");
I AgileList lst = propDualIdentification.getAvailableValues();
lst.setSelection(new Object [] {"Yes"});
propDualIdentification.setValue(lst);

// Get and print the "Second Signature Required Property" for the
// various states of a workflow
IChange change;
IWorkflow [] wfs = change.getWorkflows();
IWorkflow wf = wfs[0];
change.setWorkflow(wf);
IStatus [] sts = wf.getStates();
```

```
for (int i=0; i< sts.length; i++) {
    IStatus st = sts[i];
    System.out.println("Status Name =" + st.getName());
    System.out.println("IS Second Signature Reqd = "+
        change.isSecondSignatureRequired(st));
    System.out.println("IS Second Signature UserId = " +
        change.isSecondSignatureUserId(st));
}
```

Adding User ID as Second Signature to Approve a Routable Object

The `isSecondSignatureUserId()` method is designed to set the user's ID as the second signature to approve a routable object. Use this method in combination with methods documented in [Specifying a Second Signature to Approve a Routable Object](#) on page 214. These methods have the `secondSignature` parameter. See [Approving a Routable Object](#) on page 210 and [Rejecting a Routable Object](#) on page 210.

```
/*
Parameters
  Status: The status (IStatus) of the object checked for the next
  Workflow status.
  Returns true if a second signature required is User ID, false
  otherwise.
*/
public boolean isSecondSignatureUserId(IStatus status)
    throws APIException;
```

The following code sample creates an ECO `chg` (change order). The `chg.isSecondSignatureRequired (IStatus status)` for the CCB status will return `true`.

In addition to Dual identification, the following conditions are also required:

- Display User ID when Sever Settings > Preferences Signoff User Dual Identification Type is selected.
- Set the *Workflow Settings* for Workflow Status CCB: Default Change Orders Dual Identification Required to Yes.

Example: Specifying User ID as the second signature

```
// Get and print the "Second Signature Is User Id Property" for the
// various states of a workflow
IChange change;
IWorkflow [] wfs = change.getWorkflows();
IWorkflow wf = wfs[0];
change.setWorkflow(wf);
IStatus [] sts = wf.getStates();

for (int i=0; i< sts.length; i++) {
    IStatus st = sts[i];
    System.out.println("Status Name =" + st.getName());
    System.out.println("IS Second Signature Reqd = "+
        change.isSecondSignatureRequired(st));
    System.out.println("IS Second Signature UserId = " +
        change.isSecondSignatureUserId(st));
}
```

Approving or Rejecting Change

After a change is routed to a group of approvers, the online approval process begins. Users listed in the Workflow table for a change can approve or reject the change.

When you approve a change, the Agile system records the approval on the Workflow table. When all approvers have approved the change, the system sends an email Notification to the change analyst or component engineer indicating that the change is ready to be released.

Note To approve or reject a change, users must have the correct privileges. For more information, refer to *Agile PLM Administrator Guide*.

When you use the `IRoutable.approve()` method, you specify the user's approval password and an optional comment. `approve()` methods allow you to specify a Notification list and a collection of user groups for which you're approving; refer to the API Reference files at Oracle® E-Cloud Web site (<http://edelivery.oracle.com/>) for details.

The following paragraphs document approving or rejecting a given routable object. The APIs that support approving or rejecting a change object when a second signature is required are described in detail in [Setting the "Signoff User Dual Identification" Preference](#) on page 209.

The following example shows how to approve a change.

Example: Approving a change

```
public void approveChange(IChange change) {
    try {
        change.approve("agile", "Looks good to me");
    } catch (APIException ex) {
        System.out.println(ex);
    }
}
```

If a change has a fundamental flaw, users listed on the Workflow table may reject it. When you reject a change, the system records the rejection on the Workflow tab for the change and sends an email Notification to the change analyst or component engineer. The change analyst or component engineer may decide to return the rejected change to the originator, thus reverting its status to Pending.

When you use the `IRoutable.reject()` method, you must specify the userNotifications approval password and optional comments. An overloaded `reject()` method allows you to specify a Notification list and a collection of user groups for which you're approving; refer to the API Reference files at Oracle® E-Cloud Web site (<http://edelivery.oracle.com/>) for more information.

The following example shows how to reject a change.

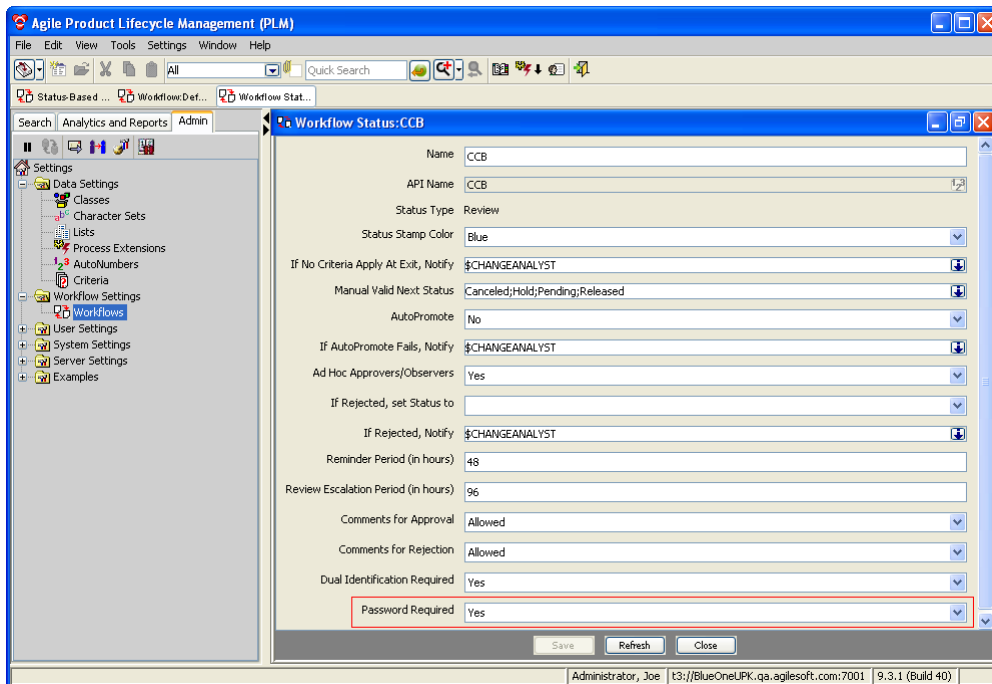
Example: Rejecting a change

```
public void rejectChange(IChange change) {
    try {
        change.reject("agile", "Incorrect replacement part!");
    } catch (APIException ex) {
        System.out.println(ex);
    }
}
```

Approving or Rejecting a Change Without Password

Agile PLM's Java Client provides the option to configure Workflow Settings to enable the approval or rejection of a change with or without typing a password. Users with the Administrator role and privileges configure this option by selecting the Yes or No option in the Password Required field shown in the following illustration.

Figure 17: Configuring workflow settings without a password



The following example uses the Agile SDK to programmatically configure this requirement.

Example: Approving or rejecting change without a password

```
// Workflow settings - Password Required
Iadmin admin = session.getAdminInstance();
INode root = admin.getNode(NodeConstants.NODE_AGILE_WORKFLOWS);
INode CCBStatus = (INode)root.getChildNode("Default Change
Orders/Status List/CCB/Status Properties");
```

```

IProperty PwdReq =
CCBStatus.getProperty(PropertyConstants.PROP_WORKFLOW_PASSWORD_REQUIRE);
PwdReq.setValue("No");
// Approve change without passing password
change.approve(null, null, "Approve", null, null, null, null, true);

```

Commenting a Change

When you comment a change, you send a comment to other CCB reviewers during the online approval process. In addition to the comment, you can specify whether to notify the originator, the change analyst, and the change control board. An overloaded `comment()` method allows you to specify a Notification list. For more information, refer to the API Reference files at Oracle® E-Cloud Web site (<http://edelivery.oracle.com/>).

The following example shows how to comment a change.

Example: Commenting a change

```

public void commentChange(IChange change) {
    try {
        change.comment(true, true, true, "Change flagged for transfer to
ERP.");
    } catch (APIException ex) {
        System.out.println(ex);
    }
}

```

Auditing a Change

At any point in a change's workflow, you can audit it to determine if any required entry cells are not completed or if the change violates any Agile SmartRules. When you use the `IRoutable.audit()` method, the method returns a `Map` object containing `ICell` objects as keys and a `List` of `APIException` objects as values. The `ICell` key can be null if there are no problems with the change. The `APIException` object describes a problem with the associated entry cell.

The `Map` object returned by the `audit()` method may also contain null objects as keys. The `APIException` object associated with a null object describes a problem unrelated to data cells.

The following example shows how to audit a change.

Example: Auditing a change

```

public void auditChange(IChange change) {
    try {
        // Audit the release
        Map results = change.audit();

        // Get the set view of the map
        Set set = results.entrySet();

        // Get an iterator for the set

```

```
Iterator it = set.iterator();

// Iterate through the cells and print each cell name and exception
while (it.hasNext()) {
    Map.Entry entry = (Map.Entry)it.next();
    ICell cell = (ICell)entry.getKey();
    if(cell != null) {
        System.out.println("Cell : " + cell.getName());
    } else {
        System.out.println("Cell : No associated data cell");
    }
    //Iterate through exceptions for each map entry.
    //(There can be multiple exceptions for each data cell.)
    Iterator jt = ((Collection)entry.getValue()).iterator();
    while (jt.hasNext()) {
        APIException e = (APIException)jt.next();
        System.out.println("Exception : " + e.getMessage());
    }
}
} catch (APIException ex) {
    System.out.println(ex);
}
}
```

Changing the Workflow Status of an Object

The `IRouteable.changeStatus()` method is a general purpose method for changing the status of an Agile object. For example, you can use `changeStatus()` to submit, release, or cancel a change. In instances such as failed audits, it throws the compound exception `ExceptionConstants.API_SEE_MULTIPLE_ROOT_CAUSES`. You can disable this exception by modifying the code that caught the exception. See the example below.

Example: Throwing compound exception s

```
while (true) {
    try {
        change.changeStatus(
            wf.getStates(expectStatus) [0],
            false,
            "comment",
            false,
            false,
            null,
            null,
            null,
            false
        );
    } catch (APIException ae) {
        try {
```



```

        if
(ae.getErrorCode().equals(ExceptionConstants.API_SEE_MULTIPLE_ROOT_CAUS
ES)){
    Throwable[] causes = ae.getRootCauses();
    for (int i = 0; i < causes.length; i++) {
        m_session.disableWarning(
            (Integer) ((APIException) causes[i]).getErrorCode()
                );
    }
    } else {
        m_session.disableWarning((Integer) ae.getErrorCode());
    }
    } catch (Exception e) {
    throw ae;
    }
    continue;
    }
    break;
}

```

In general, you release a change after it is signed off by CCB members. In addition to modifying the status of a change, you can also use `changeStatus()` to specify a Notification list, optional comments, and whether to notify the originator and change control board.

Depending on the overloaded `changeStatus()` method you use, the `notifyList` parameter is an array of `IUser` or `IUserGroup` objects that should be notified about the change in status; refer to the API Reference files at Oracle® E-Cloud Web site (<http://edelivery.oracle.com/>) for details. To use the default Notification list for the Workflow status, specify a null value. To indicate that no users should be notified, specify an empty array.

For both the `approvers` and `observers` parameters of the `changeStatus()` method, you must explicitly pass an array of users or user groups. If you pass null, no approvers or observers are used. To get the default approvers and observers for a particular Workflow status, use `getApproversEx()` and `getObserversEx()`, respectively.

The following example shows how to check the Workflow status of a change.

Example: Checking the status of a change

```

void checkStatus(IChange change) {
    try {
        // Get current workflow status (an IStatus object)
        IStatus status = change.getStatus();
        System.out.println("Status name = " + status.getName());
        // Get next available Workflow statuses
        IStatus[] nextStatuses = change.getNextStatuses();
        for (int i = 0; i < nextStatuses.length; i++) {
            System.out.println("nextStatuses[" + i + "] = " +
                nextStatuses[i].getName());
        }
        // Get next default Workflow status
    }
}

```

```
        IStatus nextDefStatus = change.getDefaultNextStatus();  
        System.out.println("Next default status = " +  
nextDefStatus.getName());  
    } catch (APIException ex) {  
        System.out.println(ex);  
    }  
}
```

The following example shows how to change the status of a change.

Example: Changing the status of a change

```
public void nextStatus(IChange change, IUser[] notifyList,  
    IUser[] approvers, IUser[] observers) {  
    try {  
        // Check if the user has privileges to change to the next status  
        IStatus nextStatus = change.getDefaultNextStatus();  
        if (nextStatus == null) {  
            System.out.println("Insufficient privileges to change status.");  
            return;  
        }  
        // Change to the next status  
        else {  
            change.changeStatus(nextStatus, true, "", true, true, notifyList,  
                approvers, observers, false);  
        }  
    } catch (APIException ex) {  
        System.out.println(ex);  
    }  
}
```

The following example shows how to use the default approvers and observers when you change the status of a routable object.

Example: Changing the status and routing to the default approvers and observers

```
public void changeToDefaultNextStatus(IChange change) throws  
APIException {  
    // Get the next status of the change  
    IStatus nextStatus = change.getDefaultNextStatus();  
    // Get default approvers for the next status  
    IDataObject[] defaultApprovers = change.getApproversEx(nextStatus);  
    // Get default observers for the next status  
    IDataObject[] defaultObservers = change.getObserversEx(nextStatus);  
    // Change to the next status  
    change.changeStatus(nextStatus, false, "", false, false, null,  
defaultApprovers,  
    defaultObservers, false);  
}
```

Sending an Agile Object to Selected Users

You can send any Agile object to a selected group of users. When you send an object, such as an ECO, there is no signoff required. The selected recipients receive an email message with an attached link to the object. When you use the `IDataObject.send()` method, you can specify an array of Agile users and an optional comment. Unlike other Workflow commands, the `send()` method is not limited to routable objects. You can use it to send any type of Agile dataobject, including an item.

The following example shows how to send an object to all users.

Example: Sending an Agile object to selected users

```
public void sendToAll(IDataObject object) {
    try {
        // Get all users
        IQuery q = (IQuery)m_session.createObject(IQuery.OBJECT_TYPE,
"select * from [Users]");
        ArrayList userList = new ArrayList();
        Iterator i = q.execute().getReferentIterator();
        while (i.hasNext()) {
            userList.add(i.next());
        }
        IUser[] users = new IUser[userList.size()];
        System.arraycopy(userList.toArray(), 0, users, 0, userList.size());
        // Send the object to all users
        object.send(users, "Please read this important document.");
    } catch (APIException ex) {
        System.out.println(ex);
    }
}
```

Sending an Agile Object to User Groups

You can send an Agile change object or an item object to a user group. When you send an object, such as an ECO, there is no signoff required. The selected recipients receive an email message with an attached link to the object. When you use the `IDataObject.send(IDataObject[] to, String Comment)` method, you can specify an array of Agile User Groups and an optional comment. The `IDataObject` parent interface represents the `IUserGroup` Agile object. Unlike other Workflow commands, the `send()` method is not limited to routable objects. You can use it to send any type of Agile dataobject, including an item.

The following example shows how to send an object to all User Groups.

Example: Sending an Agile object to selected user groups

```
public void sendToAll(IDataObject[] object) {
    try {

// Get all user groups
        IQuery q = (IQuery)m_session.createObject(IQuery.OBJECT_TYPE,
        "select * from [UserGroup]");
        ArrayList usergroupList = new ArrayList();
        Iterator i = q.execute().getReferentIterator();
        while (i.hasNext()) {
            usergroupList.add(i.next());
        }
        IUserGroup[] group = (IUserGroup[]) (usergroupList.toArray());
// Send the object to all user groups
        object.send(usergroups, "Please read this important document.");
    } catch (APIException ex) {
        System.out.println(ex);
    }
}
```

Managing and Tracking Quality

This chapter includes the following:

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▪ Working with Product Service Requests.....	228
▪ Working with Quality Change Requests.....	231
▪ Using Workflow Features with PSRs and QCRs.....	233

About Quality Control

The Agile PLM system provides tools that allow companies to track and manage the following quality-related items:

- customer complaints
- product and manufacturing quality issues
- enhancement and corrective action requests

The corrective action process in the Agile PLM system is flexible and can be implemented in many different ways. For example, one way to customize the Agile PLM system is to use the Agile API to integrate the system with a Customer Relationship Management (CRM) system.

Quality-Related API Objects

The Agile API includes the following new interfaces:

- `ICustomer` – interface for the `Customer` class. A customer is anyone that uses a company's product(s). In some Agile PLM implementations, customers and problem reports will be imported directly from Customer Relationship Management (CRM) systems.
- `IServiceRequest` – interface for the `ServiceRequest` class. `IServiceRequest` is a subinterface of `IRoutable`; it lets you create two types of service requests, problem reports and nonconformance reports (NCRs).
- `IQualityChangeRequest` – interface for the `QualityChangeRequest` class, which is similar to an ECR and other types of change requests. It represents a closed loop Workflow process that addresses quality problems. Audit and CAPA (Corrective Action/Preventive Action) are subclasses of `QualityChangeRequest`.

Quality-Related Roles and Privileges

To create, view, and modify problem reports, NCRs, CAPAs, and Audits, you must have the appropriate privileges. The Agile PLM system has two default user roles that provide users with privileges to work with these quality-related objects:

- Quality Analyst – role for users who manage problem reports, and NCRs.
- Quality Administrator – role for users who manage audits and CAPAs.

For more information about roles and privileges, refer to the *Agile PLM Administrator Guide*.

Working with Customers

This section describes how to create, load, and save `ICustomer` objects.

About Customers

The `ICustomer` object stores contact information about a customer. What role does a customer have in the Agile PLM system? Customers provide feedback on your company's products, alerting you to quality issues or problems they encounter.

This object can originate in another system, such as a CRM system. You can use the Agile API to import customer data and problem reports from CRM systems into the Agile PLM system.

Creating a Customer

To create a customer, use the `I AgileSession.createObject()` method. At a minimum, you should specify values for the `General Info.Customer Name` and `General Info.Customer Number` attributes.

Example: Creating a customer

```
try {
    //Create a Map object to store parameters
    Map params = new HashMap();

    //Initialize the params object
    params.put(CustomerConstants.ATT_GENERAL_INFO_CUSTOMER_NUMBER,
"CUST00006");
    params.put(CustomerConstants.ATT_GENERAL_INFO_CUSTOMER_NAME, "Western
Widgets");
    //Create a new customer
    ICustomer cust1 =
(ICustomer)m_session.createObject(CustomerConstants.CLASS_CUSTOMER,
params);
} catch (APIException ex) {
    System.out.println(ex);
}
```

Loading a Customer

To load a customer, use the `IAgileSession.getObject()` method. To uniquely identify a customer, specify the value for the General Info | Customer Number attribute.

Example: Loading a customer

```
try {
    // Load a customer by specifying a CustomerNumber
    ICustomer cust =
    (ICustomer)m_session.getObject(ICustomer.OBJECT_TYPE, "CUST00006");
} catch (APIException ex) {
    System.out.println(ex);
}
```

Saving a Customer as Another Customer

To save a customer as another customer, use the `IDataObject.saveAs()` method, which has the following syntax:

```
public IAgileObject saveAs(java.lang.Object type, java.lang.Object
params)
```

For the *params* parameter, specify the General Info | Customer Name and General Info | Customer Number attributes.

Example: Saving a customer to another customer

```
try {
    // Load an existing customer
    ICustomer cust1 =
    (ICustomer)m_session.getObject(ICustomer.OBJECT_TYPE, "CUST00006");
    //Create a Map object to store parameters
    Map params = new HashMap();

    //Initialize the params object
    params.put(CustomerConstants.ATT_GENERAL_INFO_CUSTOMER_NUMBER,
"CUST00007");
    params.put(CustomerConstants.ATT_GENERAL_INFO_CUSTOMER_NAME, "Wang
Widgets");
    // Save the customer
    ICustomer cust2 =
    (ICustomer)cust1.saveAs(CustomerConstants.CLASS_CUSTOMER, params);
} catch (APIException ex) {
    System.out.println(ex);
}
```

Working with Product Service Requests

This section describes how to work with the two classes of Product Service Requests: Problem Reports and Nonconformance Reports

About Problem Reports

A problem report describes a problem or an issue that occurred with a product from the customer's perspective. A problem report can be submitted by a customer, sales representative, or customer service representative.

Because a problem report usually originates with a customer, it may not accurately describe the actual cause of the problem. To understand the root cause of a problem, a Quality Analyst must investigate the problem.

Problem reports can be routed for investigation. The investigating team, consisting of Quality Analysts, determines the root cause of the problem and decides whether to escalate the problem into an issue.

About Nonconformance Reports

A nonconformance report (NCR) is used to report material damages, failure modes, or defects in a product received by a customer or supplier. An NCR is typically identified when a product shipment is inspected after receipt from a supplier. A product is nonconforming if it does not meet customer requirements or specifications. Such products are generally rejected or segregated to await disposition. A nonconformance report may require that a Quality Analyst investigate the problem and determine whether corrective action is required.

NCRs can be routed for review. Typically, the review is used for additional information gathering rather than approval and rejection.

Creating a Product Service Request

To create a problem report or nonconformance report, use the `IAgileSession.createObject()` method. The only required attribute value you must specify is the object's number. The following example shows how to create problem reports and NCRs.

Example: Creating a problem report or NCR

```
public IServiceRequest createPR(String strNum) throws APIException {
    IServiceRequest pr = (IServiceRequest)m_session.createObject(
        ServiceRequestConstants.CLASS_PROBLEM_REPORT, strNum);
    return pr;
}

public IServiceRequest createNCR(String strNum) throws APIException {
    IServiceRequest ncr = (IServiceRequest)m_session.createObject(
        ServiceRequestConstants.CLASS_NCR, strNum);
    return ncr;
}
```


Assigning a Product Service Request to a Quality Analyst

To assign a problem report or NCR to a Quality Analyst, set the value for the Cover Page | Quality Analyst field, which is a list field. The available values for the list field consists of Agile PLM users. The following example shows how to set the value for the Cover Page.Quality Analyst field for a problem report or NCR.

Example: Assigning a problem report or nonconformance report

```
void assignServiceRequest(IServiceRequest sr) throws APIException {
    Integer attrID;
    //Set attrID equal to the Quality Analyst attribute ID
    attrID = ServiceRequestConstants.ATT_COVER_PAGE_QUALITY_ANALYST;
    //Get the Cover Page.Quality Analyst cell
    ICell cell = sr.getCell(attrID);
    //Get available list values for the list
    IAgileList values = cell.getAvailableValues();
    //Set the value to the current user
    IUser user = m_session.getCurrentUser();
    values.setSelection(new Object[] { user });
    cell.setValue(values);
}
```

Adding Affected Items to a Product Service Request

To associate a problem report or nonconformance report with one or more items, you add items to the Affected Items table. Each Product Service Request can be associated with many items.

Note If Product Service Requests have been added to the Related PSR table, the Affected Items table cannot be modified.

Example: Adding an affected item to a Product Service Request

```
void addAffectedItem(IServiceRequest sr, String strItemNum) throws
APIException {
    //Get the class
    IAgileClass cls = sr.getAgileClass();

    //Attribute variable
    IAttribute attr = null;

    //Get the Affected Items table
    ITable affItems =
sr.getTable(ServiceRequestConstants.TABLE_AFFECTEDITEMS);
    //Create a HashMap to store parameters
    HashMap params = new HashMap();

    //Set the Item Number value
    params.put(ServiceRequestConstants.ATT_AFFECTED_ITEMS_ITEM_NUMBER,
strItemNum);
    //Set the Latest Change value
```

```
    attr =
cls.getAttribute(ServiceRequestConstants.ATT_AFFECTED_ITEMS_LATEST_CHANGE);
    IAgileList listvalues = attr.getAvailableValues();
    listvalues.setSelection(new Object[] { new Integer(0) });
    params.put(ServiceRequestConstants.ATT_AFFECTED_ITEMS_LATEST_CHANGE,
listvalues);
    //Set the Affected Site value
    attr =
cls.getAttribute(ServiceRequestConstants.ATT_AFFECTED_ITEMS_AFFECTED_SITE);
    IAgileList listvalues = attr.getAvailableValues();
    listvalues.setSelection((new Object[] { "Hong Kong" }));
    params.put(ServiceRequestConstants.ATT_AFFECTED_ITEMS_AFFECTED_SITE,
listvalues);
    //Create a new row in the Affected Items table
    IRow row = affItems.createRow(params);
}
```

Adding Related PSRs to a Product Service Request

A Product Service Request can be used to aggregate multiple problem reports or NCRs into one master. To do this, create a new Product Service Request and don't add items to the Affected Items table. Instead, select the Related PSR table and add a row for each related Product Service Request. The single PSR you create is the Parent PSR. All the added PSRs on the Related PSR tab are child PSRs.

Note SmartRules settings control whether a PSR can be associated with both affected items and related PSRs, or only affected items or related PSRs. Depending on enabling/disabling the "PSR contains Items and Related PSRs" SmartRule setting, you can enable/disable the Affected Items tab after you add Related PSRs. For information on SmartRules and PSRs, refer to *Agile PLM Product Quality Management User Guide* and *Agile PLM Administrator Guide*. The following example assumes SmartRules are set properly.

Example: Adding related PSRs to a Product Service Request

```
void addRelatedPSRs(IServiceRequest sr, String[] psrNum) throws
APIException {
    //Get the Related PSR table
    ITable relPSR =
sr.getTable(ServiceRequestConstants.TABLE_RELATEDPSR);
    //Create a HashMap to store parameters
    HashMap params = new HashMap();

    //Add PSRs to the Related PSR table
    for (int i = 0; i < psrNum.length; i++)
    {
        //Set the PSR Number value
        params.put(ServiceRequestConstants.ATT_RELATED_PSR_PSR_NUMBER,
psrNum[i]);
    }
}
```

```

//Create a new row in the Related PSR table
IRow row = relPSR.createRow(params);

//Reset parameters
params = null;
}
}

```

Working with Quality Change Requests

A Quality Change Request, or QCR, allows a Quality Analyst to manage quality records that contain aggregated problems related to products, documents, suppliers, and customers. You can route the QCR for review and approval, driving the issue(s) to closure using a corrective or preventive action (CAPA). This may result in changes to a product, process, or supplier by initiating an ECO or MCO. QCRs also provide an audit trail between problems, corrective and preventive actions, and engineering changes.

Agile PLM provides two classes of Quality Change Requests:

- **CAPA** – Stands for Corrective Action/Preventive Action, which addresses defects that (generally) surfaced from problem reports. By the time a problem reaches the CAPA stage, the team has figured out which specific items must be fixed. Consequently, the affected item for a CAPA may be different from the affected item of its related problem report. For example, say a customer reported a problem with a DVD-ROM drive. A CAPA is initiated and the root-cause is identified to be a defect in the IDE controller. Therefore, the CAPA and its related problem report have different affected items.
- **Audit** – Systematic, independent and documented processes for obtaining evidence and evaluating it objectively to determine the extent to which criteria are fulfilled. Audits can be initiated against items for which no problems have been reported.

Creating a Quality Change Request

To create a QCR, use the `I AgileSession.createObject()` method. The only required attribute value you must specify is the object's number. The example below shows how to create both CAPA and Audit QCRs.

Example: Creating a QCR

```

public IQualityChangeRequest createCAPA(String strNum) throws
APIException {
    IQualityChangeRequest capa =
    (IQualityChangeRequest)m_session.createObject(
        QualityChangeRequestConstants.CLASS_CAPA, strNum);
    return capa;
}

public IQualityChangeRequest createAudit(String strNum) throws
APIException {
    IQualityChangeRequest audit =
    (IQualityChangeRequest)m_session.createObject(

```

```
        QualityChangeRequestConstants.CLASS_AUDIT, strNum);
    return audit;
}
```

Assigning a Quality Change Request to a Quality Administrator

To assign a QCR to a Quality Administrator, you set the value for the Cover Page | Quality Administrator field. This process is similar to the way you assign a Product Service Request to a Quality Analyst.

Example: Assigning a QCR

```
void assignQCR(IQualityChangeRequest qcr) throws APIException {
    Integer attrID;
    //Set attrID equal to the Quality Administrator attribute ID
    attrID =
QualityChangeRequestConstants.ATT_COVER_PAGE_QUALITY_ADMINISTRATOR;
    //Get the Cover Page.Quality Administrator cell
    ICell cell = qcr.getCell(attrID);

    //Get available list values for the list
    IAgileList values = cell.getAvailableValues();

    //Set the value to the current user
    IUser user = m_session.getCurrentUser();
    values.setSelection(new Object[] { user });
    cell.setValue(values);
}
```

Saving a Quality Change Request as a Change

You can use the `IDataObject.saveAs()` method to save a QCR as another QCR or as an ECO (or another type of change order). When you save a QCR as an ECO, the items affected by the QCR are not automatically transferred to the Affected Items tab of the ECO. If you want to transfer affected items from the QCR to the ECO, you must write the code in your program to provide that functionality. Workflow is a required input parameter for using `saveAs()` on QCRs.

Note If you try to save a QCR to an object that is not a subclass of either the Quality Change Request or Change superclasses, the Agile API throws an exception.

Example: Saving a QCR as an ECO

```
public IChange saveQCRasECO(IAgileSession session,
IQualityChangeRequest qcr) throws APIException {
    // Get the ECO class
    IAgileClass cls = m_admin.getAgileClass(ChangeConstants.CLASS_ECO);
    // Get autonumber sources for the ECO class
    IAutoNumber[] numbers = cls.getAutoNumberSources();
    // Get Workflow for the ECO class
    IWorkflow ecoWf =
    ((IRoutableDesc) session.getAdminInstance().getAgileClass(ChangeConst
ants.CLASS_ECO)).getWorkflows()[0];
```

```
// Save the QCR as an ECO
  HashMap map = new HashMap();
  map.put(ChangeConstants.ATT_COVER_PAGE_NUMBER, numbers[0]);
  map.put(ChangeConstants.ATT_COVER_PAGE_WORKFLOW, ecoWf);
  IChange eco = (IChange)qcr.saveAs(ChangeConstants.CLASS_ECO, map);
// Add code here to copy affected items from the QCR to the ECO
return eco;
}
```

Using Workflow Features with PSRs and QCRs

PSRs and QCRs derive all Workflow functionality from the `IRoutable` interface. The following table lists the Workflow commands you can use to manage product quality objects.

Feature	Equivalent API(s)
Audit a PSR or QCR	<code>IRoutable.audit()</code>
Change the status of a PSR or QCR	<code>IRoutable.changeStatus()</code>
Send a PSR or QCR to another user	<code>IDataObject.send()</code>
Approve a PSR or QCR	<code>IRoutable.approve()</code>
Reject a PSR or QCR	<code>IRoutable.reject()</code>
Comment on a PSR or QCR	<code>IRoutable.comment()</code>
Add or remove approvers for a PSR or QCR	<code>IRoutable.addApprovers()</code> <code>IRoutable.removeApprovers()</code>

Selecting Workflows for PSRs and QCRs

When you create a new Product Service Request or a Quality Change Request, you must select a workflow. Your Agile PLM system can have multiple workflows defined for each type of Product Service Request and Quality Change Request. To retrieve the valid workflows for an object, use `IRoutable.getWorkflows()`. If a Workflow has not been assigned yet, you can use `IRoutable.getWorkflows()` to select a workflow, as shown in the following example.

Example: Selecting a workflow

```
public static IServiceRequest createPSR() throws APIException {
  // Create a problem report
  IAgileClass prClass =
  admin.getAgileClass(ServiceRequestConstants.CLASS_PROBLEM_REPORT);
  IAutoNumber[] numbers = prClass.getAutoNumberSources();
  IServiceRequest pr =
  (IServiceRequest)m_session.createObject(prClass, numbers[0]);
  // Get the current Workflow (a null object, since the Workflow has
  not been set yet)
```

```
IWorkflow wf = pr.getWorkflow();
// Get all available workflows
IWorkflow[] wfs = pr.getWorkflows();

// Set the problem report to use the first workflow
pr.setWorkflow(wfs[0]);
return pr;
}
```

You can also set the Workflow for a Product Service Request or a Quality Change Request by selecting a value for the `Cover Page.Workflow` field, as shown in the following example.

Example: Selecting a Workflow by setting the value of the “Cover Page.Workflow” attribute

```
void selectWorkflow(IServiceRequest psr) throws APIException {
    int nAttrID;

    //Set nAttrID equal to the Workflow attribute ID
    nAttrID = ServiceRequestConstants.ATT_COVER_PAGE_WORKFLOW;
    //Get the Workflow cell
    ICell cell = psr.getCell(nAttrID);

    //Get available list values for the list
    IAgileList values = cell.getAvailableValues();

    //Select the first workflow
    values.setSelection(new Object[] {new Integer(0)});
    cell.setValue(values);
}
```

Creating and Managing Projects

This chapter includes the following:

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Note In Release 9.3, the name of the Program Base Class was changed to Projects and Projects to Sourcing Projects. However the interface for the Projects Base Class is still called `IProgram` in the SDK Guide and in Javadoc references.

About Projects and Project Objects

You can use the project management features of Agile Product Portfolio Management (PPM) to define a project and its associated elements such as activity schedules, deliverables, and discussions. These capabilities enable you to determine the availability of the required resources, assigning resources to tasks, identifying bottlenecks, and responding to over- and under-allocated resource conditions. You can also create and reuse project templates.

The Project object is used to schedule and execute projects. Each project, in addition to schedule information, contains attachments, discussions and actions items, resources and roles, and history and content of related activities. For management visibility, data is rolled up to higher levels by rules and parent-child relationships.

The Agile API provides support for creating, loading, and working with Projects. The `IProgram` interface represents all Project objects, including programs, phases, tasks, and gates.

Similar to other Agile PLM business objects, the `IProgram` interface implements `IRoutable`, which means it uses the same `IRoutable.changeStatus()` method to change a Projects' Workflow status and to route it to other users. For more information, see [Changing the Workflow Status of an Object](#) on page 220.

Differences in the Behavior of Project Objects

The `IProgram` interface implements several interfaces commonly used by other Agile PLM objects. However, it also provides the following distinct functionality that separates Project objects from other objects.

- The Project object is a container of other underlying Project objects, such as Phases, Tasks, and Gates. The underlying Project objects are related to the parent object, usually the Projects, through the Schedule table.
- Projects have baselines that allow you to track changes in the schedule. Therefore, the `IProgram` interface provides methods that let you create, get, or remove a baseline.
- Projects can be archived. If you archive the root Projects, the entire Projects tree is soft-deleted from the system.
- Projects can be locked or unlocked.

Creating Projects

Use the `IAgileSession.createObject()` method to create Projects. When you specify the Project's parameters, you must specify the Project subclass (for example, Program, phase, task, or gate). For Programs, phases, and tasks, you must also specify following required Project attributes:

- `General Info.Name`
- `General Info.Schedule Start Date`
- `General Info.Schedule End Date`
- `General Info.Duration Type`

For gates, only two attributes are required, `General Info.Name` and `General Info.Schedule End Date`.

The following example shows how to create new Projects and specify the required attributes.

Example: Creating Projects

```
try {
    // Create a Map object to store parameters
    Map params = new HashMap();
    // Set Projects name
    String name = "APOLLO PROJECTS";
    // Set Projects start date
    Date start = new Date();
    start.setTime(1);

    // Set Projects end date
    Date end = new Date();
    end.setTime(1 + 2*24*60*60*1000);

    // Set Projects duration type
```



```

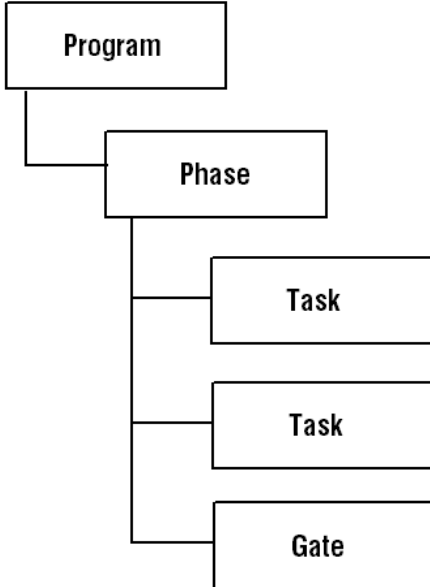
IAttribute attr =
m_admin.getAgileClass(ProgramConstants.CLASS_PROGRAM).
    getAttribute(ProgramConstants.ATT_GENERAL_INFO_DURATION_TYPE);
IAgileList avail = attr.getAvailableValues();
avail.setSelection(new Object[] {"Fixed"});

// Initialize the params object
params.put(ProgramConstants.ATT_GENERAL_INFO_NAME, name);
params.put(ProgramConstants.ATT_GENERAL_INFO_SCHEDULE_START_DATE,
start);
params.put(ProgramConstants.ATT_GENERAL_INFO_SCHEDULE_END_DATE, end);
params.put(ProgramConstants.ATT_GENERAL_INFO_DURATION_TYPE, avail);
// Create Projects
IProgram program =
(IProgram)m_session.createObject(ProgramConstants.CLASS_PROGRAM,
params);
} catch (APIException ex) {
    System.out.println(ex);
}
}

```

Projects contain other types of activities, such as phases, tasks, and gates. A gate is a special milestone—a task with an end date but no duration—that denotes the completion of a set of related phases, tasks, or Projects. The following figure shows the hierarchy of Project objects.

Figure 18: Program hierarchy



You can use the `IAgileSession.createObject()` method to create phases, tasks, and gates in the same way that you create other Project objects. Once you create these different types of activities, you can add them to the Schedule table of a Projects object. For more information, see [Scheduling Projects](#) on page 244.

Adding Rules for PPM Objects

In PLM, any object that is assigned a lifecycle phase or a workflow can be added as a deliverable. The only exceptions are Discussions, Users, and User groups.

Rules in PPM ensure an activity will not complete before the completion of the preceding activity as set in the workflow, or lifecycle phase. For example, if you want to ensure the completion of an activity before a Gate is opened, you can add that activity as a deliverable for the Gate to open. You can even restrict one Gate from opening before another by adding the prior Gate as a deliverable for the subsequent Gate to open. For more information, refer to the Agile PLM *Product Portfolio Management User Guide*.

The SDK supports this function with `IProgram` interface as shown in the following example.

Example: Setting rules for PPM objects

```
try{
    //Get Program
    IProgram pgm =
        (IProgram)session.getObject
        (ProgramConstants.CLASS_PROGRAM,"PGM00239");
    //Get Object and add as relationship under Content tab
    IChange eco = (IChange)session.getObject
        (ChangeConstants.CLASS_ECO,"C00060");
    ITable table = pgm.getTable
        (ProgramConstants.TABLE_RELATIONSHIPS);
    IRow row = table.createRow(eco);
    //Get the Control object status
    IStateful state = (IStateful)pgm;
    IStatus[] statuses = state.getStates();
    IStatus ctl_status = null;
    for(int i=0; i<statuses.length; i++){
        if(statuses[i].getName().equals("In Process")){
            ctl_status = statuses[i];
            break;
        }
    }
    //Get the Affected object status
    state = (IStateful)eco;
    statuses = state.getStates();
    IStatus aff_status = null;
    for(int i=0; i<statuses.length; i++){
        if(statuses[i].getName().equals("Submitted")){
            aff_status = statuses[i];
            break;
        }
    }

    //Add Rule
    HashMap map = new HashMap();
    map.put(CommonConstants.ATT_RELATIONSHIPS_RULE_CONTROLOBJECT, pgm);
    map.put(CommonConstants.ATT_RELATIONSHIPS_RULE_AFFECTEDOBJECT, eco);
    map.put(CommonConstants.ATT_RELATIONSHIPS_RULE_CONTROLOBJECTSTATUS,
        ctl_status);
    map.put(CommonConstants.ATT_RELATIONSHIPS_RULE_AFFECTEDOBJECTSTATUS,
        aff_status);
}
```

```

        row.setValue(CommonConstants.ATT_RELATIONSHIPS_RULE, map);
        System.out.println(row.getCell
(CommonConstants.ATT_RELATIONSHIPS_RULE));
    } catch (APIException ex) {
        System.out.println(ex);
    }
}

```

Loading Projects

To load Projects, use the `IAgileSession.getObject()` method. To uniquely identify a Project object, specify the value for the `General Info.Number` attribute. You can also load a Project object by searching for it by name, and then selecting it from the search results.

Note The `IProgram.getName()` method actually returns the value of the `General Info.Number` attribute, not `General Info.Name`.

Example: Loading Projects

```

public IProgram loadProgram(String number) throws APIException {
    IProgram program =
    (IProgram)m_session.getObject(IProgram.OBJECT_TYPE, number);
    return program;
}

```

Note The News table for Projects is disabled by default. To enable it, log in to the Java Client as an Administrator and make the News tab visible.

Adding "FileFolder" to Project's Content Tab

You can add FileFolders to the Content tab of a Project using the `IProgram` API. The following example shows how to perform this task.

Example: Adding FileFolder to the Content tab of a Project

```

import java.io.File;
import java.net.MalformedURLException;
import java.net.URL;
import java.text.ParseException;
import java.text.SimpleDateFormat;
import java.util.Date;
import java.util.HashMap;
import java.util.Map;

import com.agile.api.*;
public class Sample {
    public static void main(String[] args) {
        try{
            Sample sample = new Sample();
            String url = "http://localhost:8888/web";
            String userName = "admin";

```

```
        String password = "agile";

        AgileSessionFactory instance =
        AgileSessionFactory.getInstance(url);
        HashMap params = new HashMap();
        params.put(AgileSessionFactory.USERNAME, userName);
        params.put(AgileSessionFactory.PASSWORD, password);
        IAgileSession session =
instance.createSession(params);
        IFileFolder ff = createFileFolder(session);
        System.out.println(ff.getName());
        // Add file to Files table
        addFile2FileFolder(session,ff);
        // Add filefolder to contents tab

        sample.uploadFile(session,ff.getName());
    }catch(Throwable th){
        th.printStackTrace();
    }
}

/**
 * Upload attachment to Contents tab of a Program
 *
 * @param session
 * @throws APIException
 */
private void uploadFile(IAgileSession session,String foldname)
throws APIException {
    IProgram program = (IProgram)
session.getObject(IProgram.OBJECT_TYPE, "PGM00041");
    IFileFolder ff = (IFileFolder)
session.getObject(IFileFolder.OBJECT_TYPE, foldname);
    //Upload filefolder to Conents table
    ITable table =
program.getTable(ProgramConstants.TABLE_RELATIONSHIPS);
    table.createRow(ff);
}

/**
 * Upload attachment to FileFolder
 *
 * @param session
 * @param foldername
 * @throws APIException
 */
private static void addFile2FileFolder(IAgileSession session,
IFileFolder ff) throws APIException {
```

```

        ff.checkOut();
        ITable table = ff.getTable(FileFolderConstants.TABLE_FILES);
        String path = "C:\\temp\\out3.txt";
        File file = new File(path);

        table.createRow(file);
        ff.checkIn();
        System.out.println("Finish");
    }

    private static IFileFolder createFileFolder(IAgileSession session)
    throws APIException {
        IAgileClass objClass =
        session.getAdminInstance().getAgileClass(
        FileFolderConstants.CLASS_FILE_FOLDER);
        IAutoNumber autoNumber = objClass.getAutoNumberSources()[0];
        IFileFolder obj = (IFileFolder)session.createObject(
        FileFolderConstants.CLASS_FILE_FOLDER,
        autoNumber);
        return obj;
    }
}

```

Using Project Templates

Project templates make it easy to define a new Project object, activity, or task. A template is a Project with the `General.Info.Template` attribute set to "Template". You can use a template to create a new Project by loading it and then using the `IProgram.saveAs()` method.

This special version of the `saveAs()` method enables to use the SDK to:

- Create a new Project from a template and specify the tables that you want copied over
- Change the owner of the Project and the owner of the children
- Create a new Project template by saving a Project as a template

Creating New Projects Using Templates

You can use this special version of the `saveAs()` method to specify the Project tables that you want to copy from the original Project to the new Project. You don't need to specify all tables. The `General Info`, `Schedule`, `Dependencies - Dependent Upon`, `Dependencies - Required For`, and `Workflow` tables are copied automatically. The `Discussion`, `News`, and `History` tables cannot be copied. Generally, you should copy `Page Two`, `Page Three` (if it's used), and the `Team` table, as shown in the example below.

Example: Creating a new Project from a template

```

try {
    // Get the Project template whose number is PGM00004

```

```
    IProgram template =
        (IProgram)m_session.getObject(IProgram.OBJECT_TYPE, "PGM00004");
    if (template != null) {
// Create a hash map of the program attributes to use for the new
program
        HashMap map = new HashMap();
        String name = "Scorpio Program";

    IAttribute att =
        m_admin.getAgileClass(ProgramConstants.CLASS_PROGRAM).getAttribute(
            ProgramConstants.ATT_GENERAL_INFO_TEMPLATE);
    IAgileList templateList = att.getAvailableValues();
// Note: Available values for the Template attribute are Active,
Proposed, and Template
        templateList.setSelection(new Object[] {"Active"});
        map.put(ProgramConstants.ATT_GENERAL_INFO_NAME, name);
        map.put(ProgramConstants.ATT_GENERAL_INFO_SCHEDULE_START_DATE, new
            Date());
        map.put(ProgramConstants.ATT_GENERAL_INFO_TEMPLATE, templateList);
// Define the tables to copy to the new program from the template
        Integer pagetwo = ProgramConstants.TABLE_PAGETWO;
        Integer pagethree = ProgramConstants.TABLE_PAGETHREE;
        Integer team = ProgramConstants.TABLE_TEAM;
        Object[] tables = new Object[] {pagetwo, pagethree, team};
// Save the template as a new program
        IProgram program =
            (IProgram)template.saveAs(ProgramConstants.CLASS_PROGRAM, tables, map);
    } catch (APIException ex) {
        System.out.println(ex);
    }
}
```

Creating Projects and Changing Ownerships

When you create a Project from a template using the `saveAs()` API call, you can change the ownership of the Project and propagate the change to the children of the Project. In SDK, the exposed API is used to accomplish this:

```
public IAgileObject saveAs(Object type, Object[] tablesToCopy, Object
params, boolean applyToChildren)
throws APIException;
```

This is done by specifying a value for both the `ProgramConstants` and the `OWNER` attributes. The value for the `OWNER` attribute is required in order to change the Project's ownership. Set the Boolean `applyToChildren` to true if you want to apply the `OWNER` value to all children.

In the UI, when you create a Project from a template, you have the option to change ownership of the Project and apply the change to the children. In this situation, the SDK mirrors the UI. However, the original Project must be a *Template* to create a Project from a template via SDK's `saveAs()` API.

Note In the SDK, a Project is a template when the value of the `General Info.Template` attribute in the original program is set to `Template`.

Example: Creating a Project from a template, change owner, and propagate change

```

public IProgram saveTemplateAndSetOwner (IProgram template, String
userID, boolean applyToChildren) throws APIException {
/* "template" is a program template
   userID -- The "userID" of the user that
   is specified as the owner of the Saved program object
   applyToChildren -- true or false.
   If "true" the "specified owner" will be the owner of the entire
   program tree
   If "false", the specified owner will be the owner of the Root Parent
   object only
*/

HashMap map = new HashMap () ;
String newPgmName =
    "PROG" + System.currentTimeMillis() ; // Generate a random name for
    the Saved Program object
IUser user =
    session.getObject (UserConstants.CLASS_USER, userID) ;
map.put (ProgramConstants.ATT_GENERAL_INFO_NAME, newPgmName);
map.put (ProgramConstants.ATT_GENERAL_INFO_OWNER, user);
map.put (ProgramConstants.ATT_GENERAL_INFO_SCHEDULE_START_DATE, new
    Date());
// Define the tables to copy from the template
// If you do not want any tables to be copied,
// specify "null" for the "tables" param

    Integer pageTwo = ProgramConstants.TABLE_PAGETWO ;
    Integer pageThree = ProgramConstants.TABLE_PAGETHREE ;
    Integer team = ProgramConstants.TABLE_TEAM ;
Object[] tables =
    { pageTwo, pageThree, team } ;
IProgram pgm =
    (IProgram) root.saveAs (ProgramConstants.CLASS_PROGRAM, tables, map,
    applyToChildren);
System.out.println
    ("New Program Number = " + pgm.getName()) ;
System.out.println
    ("Owner Value = " +
    pgm.getValue (ProgramConstants.ATT_GENERAL_INFO_OWNER) .toString())
return pgm ;
}

```

Saving Projects as Templates

When you create a Project, you can specify that it's a template by setting the value of the Template attribute (`ProgramConstants.ATT_GENERAL_INFO_TEMPLATE`) to "Template". You can only do this when you create a Project or when you save it as a new Project. Existing Projects cannot be changed from the "Active" or "Proposed" state to "Template".

The following example shows how to open a Project object and save it as a template.

Example: Saving a Projects object as a template

```
try {
// Get the program whose number is PGM00005
    IProgram program =
        (IProgram)m_session.getObject(IProgram.OBJECT_TYPE, "PGM00005");
    if (program != null) {
// Create a hash map of the program attributes to use for the new
program
        HashMap map = new HashMap();
        String name = "Rapid Development");
        IAttribute att =
            m_admin.getAgileClass(ProgramConstants.CLASS_PROGRAM).getAttribute(P
rogramConstants.ATT_GENERAL_INFO_TEMPLATE);
        IAgileList templateList =
            att.getAvailableValues();
// Note: Available values for the Template attribute
are Active, Proposed, and Template
        templateList.setSelection(new Object[] {"Template"});
        map.put(ProgramConstants.ATT_GENERAL_INFO_NAME, name);
        map.put(ProgramConstants.ATT_GENERAL_INFO_SCHEDULE_START_DATE, new
Date());
        map.put(ProgramConstants.ATT_GENERAL_INFO_TEMPLATE, templateList);
//Define the tables to copy to the template
        Integer pagetwo =
            ProgramConstants.TABLE_PAGETWO;
        Integer pagethree =
            ProgramConstants.TABLE_PAGETHREE;
        Integer team =
            ProgramConstants.TABLE_TEAM;
        Object[] tables =
            new Object[]{pagetwo, pagethree, team};
// Save the program as a template
        IProgram program =
            (IProgram)template.saveAs(ProgramConstants.CLASS_PROGRAM,
                tables, map);
    }
} catch (APIException ex) {
    System.out.println(ex);
}
```

Scheduling Projects

To schedule Projects, edit the Schedule table, which lets you add, edit, and remove schedule items. To add a new row to the Schedule table, use the `ITable.createRow()` method and specify an `IProgram` object for the parameter.

Example: Modifying the Schedule table

```
try {
// Define a row variable
```



```

        IRow row = null;
// Set the date format
DateFormat df = new SimpleDateFormat("MM/dd/yy");
// Get a Project
IProgram program =
    (IProgram)m_session.getObject(ProgramConstants.CLASS_PROGRAM,
        "PGM00012");
if (program != null) {
// Get the Schedule table
ITable schedule =
    program.getTable(ProgramConstants.TABLE_SCHEDULE);
    Iterator i = schedule.iterator();
// Find task T000452 and remove it
while (i.hasNext()) {
    row = (IRow)i.next();
    String num =
        (String)row.getValue(ProgramConstants.ATT_GENERAL_INFO_NUMBER);
    if (num.equals("T000452")) {
        schedule.removeRow(row);
        break;
    }
}
// Add a phase
HashMap info = new HashMap();
info.put(ProgramConstants.ATT_GENERAL_INFO_NAME, "Specifications
phase");
info.put(ProgramConstants.ATT_GENERAL_INFO_SCHEDULE_START_DATE,
df.parse("06/01/05"));
info.put(ProgramConstants.ATT_GENERAL_INFO_SCHEDULE_END_DATE,
df.parse("06/10/05"));
IAttribute attr =
m_admin.getAgileClass(ProgramConstants.CLASS_PHASE).
    getAttribute(ProgramConstants.ATT_GENERAL_INFO_DURATION_TYPE);
IAgileList list = attr.getAvailableValues();
list.setSelection(new Object[] {"Fixed"});
info.put(ProgramConstants.ATT_GENERAL_INFO_DURATION_TYPE, list);
IProgram phase =
    (IProgram)m_session.createObject(ProgramConstants.CLASS_PHASE,
info);
row = schedule.createRow(phase);
// Add a task
info = null;
list = null;
info.put(ProgramConstants.ATT_GENERAL_INFO_NAME, "Write
specifications");
info.put(ProgramConstants.ATT_GENERAL_INFO_NUMBER, "T000533");
info.put(ProgramConstants.ATT_GENERAL_INFO_SCHEDULE_START_DATE,
df.parse("06/01/05"));
info.put(ProgramConstants.ATT_GENERAL_INFO_SCHEDULE_END_DATE,
df.parse("06/05/05"));
attr = m_admin.getAgileClass(ProgramConstants.CLASS_TASK).
    getAttribute(ProgramConstants.ATT_GENERAL_INFO_DURATION_TYPE);
list = attr.getAvailableValues();
list.setSelection(new Object[] {"Fixed"});
info.put(ProgramConstants.ATT_GENERAL_INFO_DURATION_TYPE, list);
IProgram task =
    (IProgram)m_session.createObject(ProgramConstants.CLASS_TASK, info);
    row = schedule.createRow(task);

```

```
// Add a gate
info = null;
info.put (ProgramConstants.ATT_GENERAL_INFO_NAME, "Specifications
complete");
info.put (ProgramConstants.ATT_GENERAL_INFO_SCHEDULE_END_DATE,
df.parse ("06/10/05"));
IProgram gate =
(IProgram)m_session.createObject (ProgramConstants.CLASS_GATE, info);
row = schedule.createRow (gate);
}
} catch (APIException ex) {
    System.out.println (ex);
}
}
```

Once a Project's schedule is defined, you can reschedule it using the `IProgram.reschedule()` method. The `reschedule()` method takes a couple of parameters, the `IProgram.RESCHEDULE` constant and the new value for that schedule option. Here are the list of `IProgram.RESCHEDULE` constants you can use:

- `STARTDATE` – This moves the scheduled start date to the specified date.
- `ENDDATE` – This moves the scheduled end date to the specified date.
- `BACKWARDDDAYS` – This moves the schedule backward by the specified number of days.
- `FORWARDDDAYS` – This moves the schedule forward by the specified number of days.

Example: Rescheduling Projects

```
try {
// Get a Project
IProgram program =
    (IProgram)m_session.getObject (IProgram.OBJECT_TYPE,
        "PGM00012");
if (program != null) {
// Define new start and end dates
String startDate = "02/01/2005 GMT";
String endDate = "06/01/2005 GMT";
SimpleDateFormat df = new SimpleDateFormat ("MM/dd/yyyy z");
Date start = df.parse (startDate);
Date end = df.parse (endDate);

// Change the schedule start date
program.reschedule (IProgram.RESCHEDULE.STARTDATE, start);
// Change the schedule end date
program.reschedule (IProgram.RESCHEDULE.ENDDATE, end);
// Move the schedule backward three days
program.reschedule (IProgram.RESCHEDULE.BACKWARDDDAYS, new
    Integer (3));
// Move the schedule forward two days
program.reschedule (IProgram.RESCHEDULE.FORWARDDDAYS, new Integer (2));
}
} catch (Exception ex) {
    System.out.println (ex);
}
}
```

Setting Start and End Timestamps for PPM Date Attributes

Start and End timestamps are automatically set for PPM Date attributes when the end user creates or edits a scheduled PPM task. You can schedule PPM tasks in *Working Time*, which is configurable in the `agile.properties` file. When creating or editing PPM objects, the end user must specify a valid date for Working Time within the Start and End values set in `agile.properties` file for the following PPM Date attributes:

- Schedule
- Estimated
- Actual

Note If the specified time for the above Date attributes is not within the Start and End values set in `agile.properties`, PPM will not complete the end user's operation. For example, if the Start and End values in `agile.properties` are 8:00 AM and 6:00 PM and those specified by the user are different, PPM will not complete the applicable operation.

The environment variable (flag) called `ppm.date.appendtime` automatically sets the appropriate time for PPM's Schedule, Estimated, or Actual dates before sending these values to the Agile server to update the Date attribute. When the flag is turned on, the existing *time* in the date value for Schedule, Estimated, or Actual dates is ignored and is automatically set according to the following rules:

- If the attribute is *Schedule Start Date*, *Estimated Start Date* or *Actual Start Date*, then the start working time of the day set in `agile.properties` is appended. For example, if the working time in `agile.properties` is configured as 8:00:00-12:00:00, 13:00:00-17:00:00, then the start working time for the day is 8 AM. The time portion in the date value for start date attributes is set to 8 AM.
- If the attribute is *Schedule End Date*, *Estimated End Date* or *Actual End Date*, then the end working time of the day set in `agile.properties` is appended. For example, if the working time in `agile.properties` is configured as 8:00:00-12:00:00, 13:00:00-17:00:00, then the end working time for the day is 5 PM. The time portion in the date value for end date attributes is set to 5 PM.

By default, the value of the `ppm.date.appendtime` flag is set to True. This is to ensure backward compatibility of PPM SDK so that SDK Clients compiled in earlier releases can execute without recompilation.

Example: To set timestamp for PPM date attributes in SDK Client:

You have the following options:

- Set the `ppm.date.appendtime` flag to False using syntax such as `java -Dppm.date.appendtime=false <SDK Program Name>`

OR,

- Set an environment variable called `ppm.date.appendtime` and execute the SDK program.

Note This is a global setting and the setting will apply to all SDK programs that are running on the given platform.

Working with Projects Baselines

Project baselines allow you to compare actual progress with your original plans. When you create a baseline, a snapshot of your Project's schedule is preserved. The original estimates contained in the baseline are permanent reference points against which you can compare the updated task structure, schedule, and actual dates.

Baselines can be created only for the root Project object. You can save multiple baselines, and retrieve them later for comparison. The `IProgram` interface provides the following methods for creating, retrieving, and removing baselines:

- `createBaseline(java.lang.Object)`
- `getBaseline()`
- `getBaselines()`
- `removeBaseline(java.lang.Object)`
- `selectBaseline(java.lang.Object)`

Example: Creating and retrieving baselines

```
try {
    // Get a Project
    IProgram program =
        (IProgram)m_session.getObject(IProgram.OBJECT_TYPE, "PGM00012");
    if (program != null) {
        // Create a baseline
        Object baseline = program.createBaseline("august 8 baseline");
        // Get all baselines
        Map map = program.getBaselines();

        // Get the first baseline
        Set keys = map.keySet();
        Object[] objs = keys.toArray();
        baseline = map.get(objs[0]);

        // Remove the first baseline
        program.removeBaseline(baseline);

        // Get all baselines again
        map = program.getBaselines();

        // Select the first baseline
        If (map.size() > 0) {
            keys = map.keySet();
```

```

        objs = keys.toArray();
        baseline = map.get(objs[0]);
        program.selectBaseline(baseline);
    }
}
} catch (APIException ex) {
    System.out.println(ex);
}
}

```

Delegating Ownership of a Projects to Another User

The owner or manager of a Project object can assign the ownership of the Project to other users by delegating it. The delegated user receives a request that he can accept or decline. If he accepts, the delegated user becomes owner of the task. A delegated owner is automatically given the Project Manager role for the delegated Project object.

To delegate ownership of a Project, use the `IProgram.delegateOwnership()` method. When you delegate ownership of a Project, you automatically update the Delegated Owner field, which is read-only. The `delegateOwnership()` method lets you specify whether delegated ownership also applies to the Project's children.

Example: Delegating ownership of a Project object

```

try {
    // Get the task whose number is T00012
    IProgram task = (IProgram)m_session.getObject(IProgram.OBJECT_TYPE,
        "T00012");
    if (task != null) {
        // Get a user
        IUser user1 = (IUser)m_session.getObject(UserConstants.CLASS_USER,
            "kkieslowski");
        if (user1 != null) {
            // Delegate the task to the user
            task.delegateOwnership(user1, false);
        }
    }
} catch (APIException ex) {
    System.out.println(ex);
}
}

```

Adding Resources to a Projects Team

The Team table lets you manage the team member list for a Project object. You can add or remove team members, change team members' roles, and change their allocation. You must have the appropriate privileges to modify a Project's Team table.

When you add a resource to the Team table, you specify what roles the user or user group has for that Project object. The roles available are not the complete set of Agile PLM roles; they are roles specifically related to Project functionality. Here is the list of roles you can assign to team members:

- Executive
- Change Analyst
- Program Team Member
- Program Manager
- Resource Pool Owner
- Program Administrator

For a description of each of these roles, refer to the *Agile PLM Administrator Guide*.

The Team table has two attributes that require special mention:

- `ProgramConstants.ATT_TEAM_NAME`
- `ProgramConstants.ATT_TEAM_ROLES`.

These are SingleList and MultiList attributes, respectively. To get the available values for these attributes, use `ITable.getAvailableValues()` instead of `IAttribute.getAvailableValues()`. Otherwise, the `IAgileList` object returned from the method may contain invalid list values.

Example: Adding resources to a Project team

```
try {
    // Get users
    IUser user1 = (IUser)session.getObject(UserConstants.CLASS_USER,
    "daveo");
    IUser user2 = (IUser)session.getObject(UserConstants.CLASS_USER,
    "yvonnec");
    IUser user3 = (IUser)session.getObject(UserConstants.CLASS_USER,
    "albert1");
    IUser user4 = (IUser)session.getObject(UserConstants.CLASS_USER,
    "brians");
    // Get a resource pool (user group)
    IUserGroup pool =
    (IUserGroup)session.getObject(IUserGroup.OBJECT_TYPE, "Development");
    // Add all four users to the resource pool
    ITable usersTable =
    pool.getTable(UserGroupConstants.TABLE_USERS);
    usersTable.createRow(user1);
    usersTable.createRow(user2);
    usersTable.createRow(user3);
    usersTable.createRow(user4);

    // Get a Project
    IProgram program =
    (IProgram)session.getObject(IProgram.OBJECT_TYPE, "PGM02423");
    if (program != null) {
```

```

// Get the Team table of the program
    ITable teamTable = program.getTable(ProgramConstants.TABLE_TEAM);
    // Get Roles attribute values (use ITable.getAvailableValues)
    IAgileList attrRolesValues =
teamTable.getAvailableValues(ProgramConstants.ATT_TEAM_ROLES);
    // Create a hash map to hold values for row attributes
    Map map = new HashMap();
    // Add the first user to the team
    attrRolesValues.setSelection(new Object [] {"Change
Analyst", "Projects Manager"});
    map.put(ProgramConstants.ATT_TEAM_NAME, user1);
    map.put(ProgramConstants.ATT_TEAM_ROLES, attrRolesValues);
    IRow row1 = teamTable.createRow(map);
    // Add the second user to the team
    attrRolesValues.setSelection(new Object [] {"Projects
Administrator"});
    map.put(ProgramConstants.ATT_TEAM_NAME, user2);
    IRow row2 = teamTable.createRow(map);
    // Add the resource pool to the team
    attrRolesValues.setSelection(new Object [] {"Projects Team Member"});
    map.put(ProgramConstants.ATT_TEAM_NAME, pool);
    IRow row3 = teamTable.createRow(map);

}

```

In Agile Web Client, when you add a resource pool to the Team table, you can replace the pool with one or more resources contained within it. In other words, instead of assigning the entire resource pool, you can assign select users from the pool. The `IProgram.assignUsersFromPool()` method reproduces this functionality. To use `assignUsersFromPool()`, you must specify a user group that has already been added to the Project's Team table.

Example: Assigning users from a resource pool

```

public void replaceUserGroupWithUser(IProgram program) throws Exception
{
    // Get the Team table
    ITable teamTable = program.getTable(ProgramConstants.TABLE_TEAM);
    // Get a table iterator
    Iterator it = teamTable.iterator();

    // Find a user group and replace it with one of its members, kwong
    while(it.hasNext()){
        IRow row = (IRow)it.next();
        IDataObject object = row.getReferent();
        if(object instanceof IUserGroup){
            IUserGroup ug = (IUserGroup)object;
            ITable users = ug.getTable(UserGroupConstants.TABLE_USERS);
            Iterator ref_it = users.getReferentIterator();
            while(ref_it.hasNext()){
                IUser user = (IUser)ref_it.next();
                if(user.getName().equals("kwong")) {

```

```
        program.assignUsersFromPool(new IUser[] {user}, ug, true);
        break;
    }
}
}
```

Substituting Project Resources

A resource's availability can frequently change due to overloading, reassignments, vacation, and illness. You can substitute an existing resource for another resource. The current resource's role is assigned to the substituted resource, but only for that Project. To substitute Project resources, use the `IProgram.substituteResource()` method.

When you substitute resources, you can specify users as well as user groups. You can also specify whether the resource assignment applies to the Project's children.

Example: Substituting Project resources

```
try {
    // Get a Project
    IProgram program =
        (IProgram)m_session.getObject(IProgram.OBJECT_TYPE, "PGM00012");
    if (program != null) {
        // Get users
        IUser u1 =
            (IUser)m_session.getObject(UserConstants.CLASS_USER, "akurosawa");
        IUser u2 =
            (IUser)m_session.getObject(UserConstants.CLASS_USER, "creed");
        IUser u3 =
            (IUser)m_session.getObject(UserConstants.CLASS_USER, "dlean");
        IUser u4 =
            (IUser)m_session.getObject(UserConstants.CLASS_USER, "jford");
        // Get a user group
        IUserGroup ug =
            (IUserGroup)m_session.getObject(IUserGroup.OBJECT_TYPE,
                "Directors");
        // Substitute u1 with u3 and do not apply to children
        program.substituteResource(u1, u3, false);
        // Substitute u2 with u4 and apply to children
        program.substituteResource(u2, u4, true);
        // Substitute u4 with a user group, and apply to children
        program.substituteResource(u4, ug, true);
    }
} catch (APIException ex) {
    System.out.println(ex);
}
```


Locking or Unlocking Projects

The owner of Project can lock or unlock the Project object. When a Projects is locked, its schedule cannot be modified. To lock or unlock a Project, use the `IProgram.setLock()` method.

Note Projects are automatically locked when you use the Gantt Chart or the Microsoft Project integration functionality in Agile Web Client.

Example: Locking Projects

```
try {
    // Get a Program
    IProgram program =
        (IProgram)m_session.getObject(IProgram.OBJECT_TYPE, "PGM00012");
    if (program != null) {
        // Lock it
        program.setLock(true);
    }
} catch (APIException ex) {
    System.out.println(ex);
}
```

Working with Discussions

During the course of a project, issues arise that require users to collaborate and exchange information. Agile PLM provides threaded discussion functionality that allows team members to reply with their feedback, providing a record of their thoughts and ideas. Discussions are asynchronous; that is, they do not require a simultaneous connection from all discussion participants. People can reply to any thread of the discussion independently. To close issues, action items can be assigned to team resources. The Discussion object is used to manage both threaded discussions and the action items related to them.

Discussion objects, unlike Projects, are not routable objects. Therefore, discussions do not have workflows associated with them.

Note The Action Items, Cover Page, and Replies tables appear on the Discussion tab in Agile PLM clients. The Page Two table appears on the Details tab in Agile PLM clients. The Where Used table is not supported, its functionality is replaced by `GeneralInfo.Related To` field.

Creating a Discussion

To create a discussion, use the `IAgileSession.createObject()` method. When you specify discussion parameters, you must specify the discussion subclass and the following required discussion attributes:

- `CoverPage.Number`
- `CoverPage.Subject`

In addition, you must also specify data for the Cover Page.Notify List and Cover Page.Message attributes. Otherwise, the discussion does not have a Notification list, or a message that users can respond to.

The following example shows how to create a new discussion and add it to the Discussion table of a Project.

Example: Creating a discussion

```
try {
    // Create a hash map variable
    Map map = new HashMap();

    // Set the Number field
    IAgileClass discussionClass =
m_session.getAdminInstance().getAgileClass(
        DiscussionConstants.CLASS_DISCUSSION);

    String number =
discussionClass.getAutoNumberSources()[0].getNextNumber();
    // Set the Subject field
    String subject = "Packaging issues";

    // Make the Message field visible
    IAttribute attr =
discussionClass.getAttribute(DiscussionConstants.ATT_COVER_PAGE_MESSAGE
);
    IProperty propVisible =
attr.getProperty(PropertyConstants.PROP_VISIBLE);
    IAgileList list = propVisible.getAvailableValues();
    list.setSelection(new Object[] { "Yes" });
    // Set the Message field
    String message = "We still have problems with the sleeves and
inserts." +
        "Let's resolve these things at the team meeting on
Friday.";
    // Set the Notify List field
    IUser user1 = m_session.getCurrentUser();
    IUser user2 = (IUser)m_session.getObject(UserConstants.CLASS_USER,
"jdassin");
    attr =
discussionClass.getAttribute(DiscussionConstants.ATT_COVER_PAGE_NOTIFY_
LIST);
    list = attr.getAvailableValues();
    list.setSelection(new Object[] {user1, user2});

    // Put the values into the hash map
    map.put(DiscussionConstants.ATT_COVER_PAGE_NUMBER, number);
    map.put(DiscussionConstants.ATT_COVER_PAGE_SUBJECT, subject);
    map.put(DiscussionConstants.ATT_COVER_PAGE_MESSAGE, message);
    map.put(DiscussionConstants.ATT_COVER_PAGE_NOTIFY_LIST, list);
    // Create a Discussion object
    IDiscussion discussion = (IDiscussion)m_session.createObject(
```

```

        DiscussionConstants.CLASS_DISCUSSION, map);

    // Get a Projects
    IProgram program =
    (IProgram)m_session.getObject(IProgram.OBJECT_TYPE, "PGM00012");
    if (program != null) {
        // Get the Discussion table
        ITable discTable =
    program.getTable(ProgramConstants.TABLE_DISCUSSION);
        // Add the new discussion to the table
        discTable.createRow(discussion);
    }

} catch (APIException ex) {
    System.out.println(ex);
}

```

Replying to a Discussion

Team members or notified users—that is, users listed in the Cover Page.Notified List field of a discussion—can reply to discussions. When you reply to a discussion, you create another nested table in the Replies table.

Example: Replying to a discussion

```

private void replyToDiscussion() throws Exception {
    Iterator it;
    IDiscussion discussion;

    // Get a Project
    IProgram program =
        (IProgram)m_session.getObject(IProgram.OBJECT_TYPE, "PGM00012");
    // Get the Discussion table
    ITable discTable =
        program.getTable(ProgramConstants.TABLE_DISCUSSION);
    // Get the first Discussion listed
    if (discTable.size() != 0) {
        it = discTable.iterator();
        if (it.hasNext()) {
            IRow row = (IRow)it.next();
            discussion = (IDiscussion)row.getReferent();
        }
    }
    // Get the Replies table
    ITable repliesTable =
        discussion.getTable(DiscussionConstants.TABLE_REPLIES);
    // Iterate to the only row of the Replies table and send a reply
    it = repliesTable.iterator();
    if (it.hasNext()) {
        IRow row = (IRow)it.next();
        IMessage message = (IMessage)row;
        HashMap response = new HashMap();

        // Set the Subject field (use the same Subject as the parent)
        response.put(MessageConstants.ATT_COVERPAGE_SUBJECT,

```

```

        row.getValue(DiscussionConstants.ATT_REPLIES_SUBJECT));
// Make the Message field visible
IAgileClass discussionClass =
    m_session.getAdminInstance().getAgileClass(DiscussionConstants.CL
ASS_DISCUSSION);
IAttribute attr =
    discussionClass.getAttribute(DiscussionConstants.ATT_COVER_PAGE_M
ESSAGE);
IProperty propVisible =
    attr.getProperty(PropertyConstants.PROP_VISIBLE);
IAgileList list =
    propVisible.getAvailableValues();
    list.setSelection(new Object[] { "Yes" });
// Set the Message field
response.put(MessageConstants.ATT_COVERPAGE_MESSAGE,
    "The spec needs to be updated to reflect the latest decisions.");
// Send a reply
message.reply(response);
    }
}
}

```

The previous example showed how to reply to the root discussion. But what if a discussion has several replies and you want to reply to the latest one? That is a little more complicated, and requires further understanding of the Replies table.

The Replies table of a discussion is different from other Agile PLM tables. It contains only one row, even if there are multiple replies. If the discussion has multiple replies, they are contained within a series of nested tables. To select the latest reply, expand the Replies table to its last nested table. The following figure shows an expanded Replies table in Agile Web Client.

Figure 19: Expanded Replies table

Subject	Creator
[-] Stress testing	Dassin, Jules (jdassin)
RE: Stress testing	Hitchcock, Alfred (ahitchcock)
[-] RE: Stress testing	Reed, Carol (creed)
[-] RE: Stress testing	Huston, John (jhuston)
RE: Stress testing	Dassin, Jules (jdassin)

You can use a recursive method (one that calls itself) to expand all levels of the Replies table, as shown in the following example. Subsequent levels of the Replies table are obtained by getting the value of the Child Table attribute (`DiscussionConstants.ATT_REPLIES_CHILD_TABLE`).

Example: How to expand the Replies table

```

// Read the Replies table
public void readRepliesTable(IDiscussion discussion) throws Exception {
    ITable replies =
        discussion.getTable(DiscussionConstants.TABLE_REPLIES);
    browseReplies(0, replies);
}
// Recursively browse through all levels of the Replies table
void browseReplies(int indent, ITable replies) throws Exception {
    Iterator i = replies.iterator();
    while (i.hasNext()) {
        IRow row = (IRow) i.next();
    }
}

```

```

        System.out.print(indent(indent*4));
        readRow(row);
        System.out.println();
    ITable followup =
        (ITable)row.getValue(DiscussionConstants.ATT_REPLIES_CHILD_TABLE);
        browseReplies(indent + 1, followup);
    }
}
// Read each cell in the row and print the attribute name and value
static protected void readRow(IRow row) throws Exception {
    ICell[] cells = row.getCells();
    for (int j = 0; j < cells.length; ++j) {
        Object value = cells[j].getValue();
        System.out.print( "\t" + cells[j].getAttribute().getName() + "=" +
            value);
    }
}
// Indent text
private String indent(int level) {
    if (level <= 0) {
        return "";
    }
    char c[] = new char[level*2];
    Arrays.fill(c, ' ');
    return new String(c);
}
}

```

Joining a Discussion

Agile Web Client allows users to join a discussion by clicking the Discussion tab of a Project, and then clicking the Join button. When you join a discussion, your username is added to the Notify List field of the Discussion object. To join a discussion using the Agile API, simply add yourself to the Notify List field. You can join a discussion only if you are a team member of the Project.

Note If you are not on the Notify List of a Discussion object, you cannot read the replies. However, anyone listed on the Team table of a Projects can join a discussion associated with that Project.

Example: Joining a discussion

```

try {
    // Get a Project
    IProgram program =
        (IProgram)m_session.getObject(ProgramConstants.CLASS_PROGRAM,
            "PGM00012");
    if (program != null) {
        // Get the Discussion table
        ITable discTable =
            program.getTable(ProgramConstants.TABLE_DISCUSSION);
        // Get the first discussion
        IRow row =
            (IRow)discTable.iterator().next();
        IDiscussion discussion =

```

```
(IDiscussion) row.getReferent();
// Add yourself and another user to the Notify List field
IUser user1 =
    m_session.getCurrentUser();
IUser user2 =
    (IUser)m_session.getObject(UserConstants.CLASS_USER, "owelles");
ICell cell =
    discussion.getCell(DiscussionConstants.ATT_COVER_PAGE_NOTIFY_LIST);
I AgileList list =
    (I AgileList) cell.getAvailableValues();
    list.setSelection(new Object[] {user1, user2});
}
} catch (APIException ex) {
    System.out.println(ex);
}
```

Creating an Action Item

Action items can be created as part of a Discussion object. If a discussion raises an issue that requires someone to perform an action, you can assign that action to another user. Action items have a subject, status, due date, and an assigned user. When you create an action item, it appears in the Notifications & Requests Inbox of the assigned user.

To create an action item, use the `ITable.createRow()` method to add a row to the Action Items table of a Project object. Make sure the map object used to initialize the row contains parameters for the Subject, Assigned To, and Due Date fields.

Example: Creating an action item

```
private void replyToDiscussion() throws Exception {
    // Get a Project
    IProgram program =
        (IProgram)m_session.getObject(IProgram.OBJECT_TYPE, "PGM00012");
    if (program != null) {
        // Create a hash map for Action Item parameters
        HashMap map = new HashMap();
        // Set the Subject field
        String subj = "Update packaging requirements";
        map.put(ProgramConstants.ATT_ACTION_ITEMS_SUBJECT, subj);
        // Set the Assigned To field
        IUser user1 = (IUser)m_session.getObject(UserConstants.CLASS_USER,
            "akurosawa");
        IAttribute attr = m_session.getAdminInstance().getAgileClass(
            ProgramConstants.CLASS_PROGRAM).getAttribute(
            ProgramConstants.ATT_ACTION_ITEMS_ASSIGNED_TO);
        I AgileList list = attr.getAvailableValues();
        list.setSelection(new Object[] {user1});
        map.put(ProgramConstants.ATT_ACTION_ITEMS_ASSIGNED_TO, list);
    }
}
```

```
// Set the Due Date field
DateFormat df = new SimpleDateFormat("MM/dd/yy");
map.put(ProgramConstants.ATT_ACTION_ITEMS_DUE_DATE,
df.parse("03/30/05"));
// Get the Action Items table
Table table = program.getTable(ProgramConstants.TABLE_ACTIONITEMS);
// Add the new Action Item to table
table.createRow(map);
}
} catch (APIException ex) {
    System.out.println(ex);
}
}
```


Working with Product Cost Management

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Overview

The Product Sourcing module of the Agile PLM supports, enhances, and simplifies the handling of all product cost-related data throughout the product lifecycle. This enables you to effectively manage and manipulate Sourcing content, collaborate with suppliers to establish new Sourcing content, and analyze the data. Product Sourcing supports the following functions:

- Create Sourcing Projects
- Gather and prepare product content
- Leverage pricing contracts and history
- Create Request for Quote (RFQ) objects
- Manage supplier RFQ responses and negotiate pricing (Not supported by PCM SDK)
- Conduct Sourcing Project analysis

The Agile API supports the following Product Sourcing objects:

- `IChange` – This interface is for the `Change` class, which includes Price Change Orders (PCOs).
- `IPrice` – This interface is for the `Price` class, which handles both published prices and historical prices.
- `IProject` – This interface is for the `Sourcing Projects` class, which is the container used for product Sourcing data.
- `IRequestForQuote` – This interface is for the `RequestForQuote` class, which represents an RFQ for a Sourcing Project.
- `ISupplier` – This interface is for the `Supplier` class.

Except for the `ISupplierResponse` object, the Agile API allows you to read and modify all Product Sourcing objects. The following table lists the create, read, and modify rights for Product Sourcing objects.

Object	Create	Read	Modify
IChange (including PCO)	Yes	Yes	Yes
IPrice	Yes	Yes	Yes
IProject	Yes	Yes	Yes
IRequestForQuote	Yes	Yes	Yes
ISupplier	Yes	Yes	Yes

Working with Price Objects

Agile PLM's price management solution replaces inefficient manual systems, where prices are often stored in files, spreadsheets, or databases in disparate locations. The Agile PLM system allows you to create and centrally manage prices and terms for items and manufacturer parts.

There are two out-of-the-box Price classes provided with the system:

- **Historical Quotes** – This is a historical Quote object that contains price quotes from previous Sourcing projects or legacy data.
- **Published Prices** – This is a historical Published Price that contains published prices or contract prices on current items and manufacturer parts.

These are the basic steps used to define pricing for an item or manufacturer part:

1. Users with the appropriate role can create a new Price object, specifying the Number, Description, Item or Manufacturer Part, Supplier, Site, and Customer.
2. After creating a Price object, users can build out a price/terms matrix for each associated item or manufacturer part. The price and terms matrix includes Effectivity Dates, Quantity, Price, and Cancellation Windows.
3. The Price object is submitted and goes through a Workflow approval process. Other users can approve or reject the object.
4. Users with the appropriate role can create a Price Change Order (PCO) to modify a Price object that has been released. The updated Price object is again submitted for approval.

Loading a Price Object

To load a Price object, use the `IAgileSession.getObject()` method. To uniquely identify a Price object, specify the value for the Title Block | Number attribute.

Example: Loading a Price object

```
public IPrice getPrice() throws Exception {
    IPrice price = (IPrice)m_session.getObject(IPrice.OBJECT_TYPE,
        "PRICE10008");
    return price;
}
```

For a list of Price object tables, refer to the Javadoc generated HTML files that document the SDK

code. You can find them in the HTML folder in SDK_samples (ZIP file). To access this file, see the Note in [Client-Side Components](#) on page 2.

Adding Price Lines

The Price Lines table of a Price object is where you define the prices and terms for the related item or manufacturer part. When you add a row to the Price Lines table, you must initialize the row with values. At a minimum, you must specify values for the following attributes:

- ATT_PRICE_LINES_SHIP_FROM
- ATT_PRICE_LINES_SHIP_TO
- ATT_PRICE_LINES_PRICE_EFFECTIVE_FROM_DATE
- ATT_PRICE_LINES_PRICE_EFFECTIVE_TO_DATE
- ATT_PRICE_LINES_QTY

If you fail to specify a value for one of these attributes, the Price Lines row won't be created.

Example: Adding price lines

```
public void addPriceLines(IPrice price) throws Exception {
    DateFormat df = new SimpleDateFormat("MM/dd/yy");
    IAgileClass cls = price.getAgileClass();
    ITable table = price.getTable(PriceConstants.TABLE_PRICELINES);
    IAttribute attr = null;
    IAgileList listvalues = null;
    HashMap params = new HashMap();

    //Set Ship-To Location (List field)
    attr = cls.getAttribute(PriceConstants.ATT_PRICE_LINES_SHIP_TO);
    listvalues = attr.getAvailableValues();
    listvalues.setSelection(new Object[] { "San Jose" });
    params.put(PriceConstants.ATT_PRICE_LINES_SHIP_TO, listvalues);
    //Set Ship-From Location (List field)
    attr = cls.getAttribute(PriceConstants.ATT_PRICE_LINES_SHIP_FROM);
    listvalues = attr.getAvailableValues();
    listvalues.setSelection(new Object[] { "Hong Kong" });
    params.put(PriceConstants.ATT_PRICE_LINES_SHIP_FROM, listvalues);
    //Set Effective From (Date field)
    params.put(PriceConstants.ATT_PRICE_LINES_PRICE_EFFECTIVE_FROM_DATE,
        df.parse("10/01/03"));
    //Set Effective To (Date field)
    params.put(PriceConstants.ATT_PRICE_LINES_PRICE_EFFECTIVE_TO_DATE,
        df.parse("10/31/03"));
    //Set Quantity (Number field)
    params.put(PriceConstants.ATT_PRICE_LINES_QTY, new Integer(1000));
    //Set Currency Code (List field)
    attr =
        cls.getAttribute(PriceConstants.ATT_PRICE_LINES_CURRENCY_CODE);
    listvalues = attr.getAvailableValues();
    listvalues.setSelection(new Object[] { "USD" });
    params.put(PriceConstants.ATT_PRICE_LINES_CURRENCY_CODE,
        listvalues);
    //Set Total Price (Money field)
```

```
        params.put(PriceConstants.ATT_PRICE_LINES_TOTAL_PRICE, new
            Money(new Double(52.95), "USD"));
//Set Total Material Price (Money field)
    params.put(PriceConstants.ATT_PRICE_LINES_TOTAL_MATERIAL_PRICE, new
        Money(new Double(45.90), "USD"));
//Set Total Non-Materials Price (Money field)
    params.put(PriceConstants.ATT_PRICE_LINES_TOTAL_NON_MATERIAL_PRICE,
        new Money(new Double(7.05),
            "USD"));
//Set Lead Time (Number field)
    params.put(PriceConstants.ATT_PRICE_LINES_LEAD_TIME, new Integer(5));
//Set Transportation Time (List field)
    attr =
        cls.getAttribute(PriceConstants.ATT_PRICE_LINES_TRANSPORTATION_TIME);
    listvalues = attr.getAvailableValues();
    listvalues.setSelection(new Object[] { "FOB" });
    params.put(PriceConstants.ATT_PRICE_LINES_TRANSPORTATION_TIME,
        listvalues);
//Set Country of Origin (List field)
    attr =
        cls.getAttribute(PriceConstants.ATT_PRICE_LINES_COUNTRY_OF_ORIGIN);
    listvalues = attr.getAvailableValues();
    listvalues.setSelection(new Object[] { "United States" });
    params.put(PriceConstants.ATT_PRICE_LINES_COUNTRY_OF_ORIGIN,
        listvalues);
//Create a new Price Lines row and initialize it with data
    IRow row = table.createRow(params);
}
```

Creating a Price Change Order

Price objects such as published prices and contracts have a revision history. To modify a released Price object, you must first create a Price Change Order (PCO) and adding the Price object to the Affected Prices table. The PCO is then submitted for approval. Any changes made to the Price object take effect when the PCO completes its Workflow approval process.

A PCO is similar to other Change objects, such as ECOs and ECRs. You can create a PCO using the `IAgileSession.createObject()` method.

Example: Creating a PCO

```
public void createPCO(IPrice price) throws Exception {
//Get the PCO class
    IAgileClass cls =
        m_admin.getAgileClass(ChangeConstants.CLASS_PCO);
//Get autonumber sources for the PCO class
    IAutoNumber[] numbers =
        cls.getAutoNumberSources();

//Create the PCO
    IChange pco =
```

```

        (IChange)m_session.createObject(ChangeConstants.CLASS_PCO,
        numbers[0]);
//Get the Affected Prices table
    ITable affectedPrices =
        pco.getTable(ChangeConstants.TABLE_AFFECTEDPRICES);
//Add the Price object to the Affected Prices table
    IRow row = affectedPrices.createRow(price);
}

```

Creating a Price Object

There are several steps to create a Price object. First, specify the object class and the unique identifying attributes, and then use `IAgileSession.createObject()` to return the new Price object.

Price objects are more complex than other Agile API objects because they have several key attributes that must be specified. Most other Agile API objects have only one key object, such as the object's number. With a Price object, you must specify a number, customer, item or manufacturer part, revision (for items), Program, site, and supplier. If any one of these attributes is missing, an exception will be thrown and the Price object won't be created.

Note If you are not dealing with site-specific information, specify the Global site for the Manufacturing Site attribute.

After you create a Price object, you can further define it by setting values for Cover Page, Page Two, and Page Three fields. To define prices and terms for items and manufacturer parts, add rows to the Price Lines table. If there are files or documents to attach, add them to the Attachments table.

Defaults

To create a price with `Program==All` and `Customer==All`, you do not need to pass values for `PriceConstants.ATT_GENERAL_INFORMATION_CUSTOMER` and `PriceConstants.ATT_GENERAL_INFORMATION_Program` during price creation. By default, the price will be created with `Program==All` and `Customer==All`.

Specifying Item Revision

When you specify the item revision during price creation, you need to pass the change number, instead of the revision number.

Example: Specifying Item Revision by Passing the Change Number

```

//Pass the change number
params.put(Priceconstants.ATT_GENERAL_INFORMATION_ITEM_REV, "CO-
35884");
//Instead of the revision number
params.put(PriceConstants.ATT_GENERAL_INFORMATION_ITEM_REV, "B")

```

Creating a Published Price

The following example shows how to create a published price.

Example: Creating a published price

```
public void createPublishedPrice(ICustomer customer, ISupplier
supplier) throws Exception {
    HashMap params = new HashMap();
    IAgileClass cls =
        m_admin.getAgileClass(PriceConstants.CLASS_PUBLISHED_PRICE);
    IAutoNumber an =
        cls.getAutoNumberSources()[0];
    params.put(PriceConstants.ATT_GENERAL_INFORMATION_NUMBER, an);
    params.put(PriceConstants.ATT_GENERAL_INFORMATION_CUSTOMER,
customer);
    params.put(PriceConstants.ATT_GENERAL_INFORMATION_ITEM_NUMBER,
"1000-02");
    params.put(PriceConstants.ATT_GENERAL_INFORMATION_ITEM_REV, "CO-
35884");
    params.put(PriceConstants.ATT_GENERAL_INFORMATION_PROGRAM,
"PROGRAM0023");
    params.put(PriceConstants.ATT_GENERAL_INFORMATION_MANUFACTURING_SITE
, "San Jose");
    params.put(PriceConstants.ATT_GENERAL_INFORMATION_SUPPLIER,
supplier);
    IPrice price = (IPrice)m_session.createObject(cls, params);
}
```

Working with Suppliers

The Agile PLM system comes with five out-of-the-box supplier classes:

- Broker
- Component Manufacturer
- Contract Manufacturer
- Distributor
- Manufacturer Rep

There are two primary key attributes that uniquely identify each supplier: `GENERAL_INFO_NUMBER` and `GENERAL_INFO_NAME`.

Loading a Supplier

To load a supplier, use the `IAgileSession.getObject()` method. To uniquely identify the supplier, specify the General Info | Number attribute.

Example: Loading a supplier

```
public ISupplier getSupplier() throws APIException {
    ISupplier supplier =
        (ISupplier)m_session.getObject(ISupplier.OBJECT_TYPE, "SUP20013");
    return supplier;
}
```

Note The Agile API does not support adding new rows to Supplier tables.

Modifying Supplier Data

The Agile API lets you read and update all read/write Supplier fields. For General Info, Page One, and Page Three fields, you can access the cells directly. To access cells on multirow tables like the Contact Users table, you must first load the table and select a particular row.

Example: Modifying supplier data

```
public void updateSupplierGenInfo(ISupplier supplier) throws Exception
{
    ICell cell = null;
    IAgileList listvalues = null;

    //Update Name (Text field)
    cell = supplier.getCell(SupplierConstants.ATT_GENERAL_INFO_NAME);
    cell.setValue("Global Parts");
    //Update URL (Text field)
    cell = supplier.getCell(SupplierConstants.ATT_GENERAL_INFO_URL);
    cell.setValue("http://www.globalpartscorp.com");
    //Update Corporate Currency (List field)
    cell =
supplier.getCell(SupplierConstants.ATT_GENERAL_INFO_CORPORATE_CURRENCY)
;
    listvalues = cell.getAvailableValues();
    listvalues.setSelection(new Object[] { "EUR" });
    cell.setValue(listvalues);
}

public void updateSupplierContactUsers(ISupplier supplier) throws
Exception {
    ICell cell = null;
    IAgileList listvalues = null;

    //Load the Contact Users table
    ITable contactusers =
supplier.getTable(SupplierConstants.TABLE_CONTACTUSERS);
    //Get the first row
    ITwoWayIterator i = contactusers.getTableIterator();
    IRow row = (IRow)i.next();
    //Update Email (Text field)
    cell = row.getCell(SupplierConstants.ATT_CONTACT_USERS_EMAIL);
    cell.setValue("wangsh@globalpartscorp.com");
}
```

Working with Sourcing Projects

A Sourcing Project is where you prepare content for Sourcing tasks, such as Requests for Quotes (RFQs) and Sourcing analysis. Sourcing Project is a centralized, collaborative solution. Multiple users can add data to a Sourcing Project and perform analysis of Sourcing results. Because Sourcing projects serve as the home for all Sourcing activities, they are linked to many classes of objects, including `Supplier`, `RequestForQuote` (RFQ), and `SupplierResponse`.

You can use the Agile API to:

- Load an existing Sourcing Project
- Create Sourcing Projects by quantity breaks
- Create Sourcing Projects by price periods
- Open and close a Sourcing Project
- Add items, including AMLs to Sourcing Project items
- Access and modify objects, tables, and attributes in Sourcing Projects
- Access and modify Sourcing Project status
- Update Sourcing Project AMLs
- Update Page 1, Page 2, and Page 3 in Sourcing projects
- Read and update a nested Pricing table in Sourcing projects
- Set quantity for an item in Sourcing Projects
- Update the target price for items in Sourcing Projects
- Set partners for items in Sourcing Projects
- Perform quantity Rollups in Sourcing Projects
- Set a response designated as *best* in Sourcing Projects

Unlike the Web Client which provides additional functionality for Sourcing projects, the Agile API exposes Sourcing projects for simple data extraction and updating. Consequently, the Agile API does not support the following functions:

- Validation for items, commodities, or manufacturer parts.
- Filter Sourcing Project tables
- Modify the price scenario for Sourcing Projects (change quantity breaks and effectivity periods)

Supported API Methods

The SDK supports the following API methods for Sourcing projects. For information on these interfaces, refer to the Javadoc generated HTML files that document the SDK code. You can find them in the HTML folder in SDK_samples (ZIP file). To access this file, see the Note in [Client-Side Components](#) on page 2.

- `IAgileSession.createObject(Object, Object)`
- `IAgileSession.createObject(int, Object)`
- `IAgileSession.getObject(Object, Object)`
- `IAgileSession.getObject(int, Object)`
- `IProject.assignSupplier (Object partnerParams)`
- `IProject.Costrollup()`
- `IProject.lookupPrices()`
- `IProject.rollupQuantity()`
- `IProject.getName()`
- `IProject.changeStatusToOpen()`
- `IProject.changeStatusToClose()`
- `IProject.getTable(Object)`
- `IRow.getValue(Object)`
- `IRow.setValue(Object, Object)`
- `ITable.iterator()`
- `ITable.getName()`
- `ITable.getTableDescriptor()`
- `ITable.size()`
- `ITable.createRow(Object)`

Note The PCM SDK does not support the `IRow.getReferent()` method.

Loading an Existing Sourcing Project

To load existing Sourcing Projects, use the `IAgileSession.getObject()` method. To uniquely identify the Sourcing Projects, specify the value for the Cover Page | Number attribute.

Example: Loading Sourcing Projects

```
public IProject getProject() throws APIException {
    String prjnum = "PRJACME_110";
    IProject prj = (IProject)m_session.getObject(IProject.OBJECT_TYPE,
        prjnum);
}
```

```
    return prj;
}
```

Creating Sourcing Projects by Quantity Breaks

Defining Sourcing projects uses the generic `IAgileSession` method.

Example: Creating Sourcing Projects

```
IAgileObject createObject (Object objectType, Object params)
    throws APIException;
```

Creating Sourcing Projects requires specifying one of the following set of parameters:

- Sourcing Project number and quantity breaks

Or,

- Sourcing Project number, quantity breaks, and price period information

Note Quantity breaks is a required parameter and is always specified. The example below creates a Sourcing Project using the quantity break parameter.

Example: Creating Sourcing Projects by quantity breaks

```
IAgileClass agClass =
m_admin.getAgileClass(ProjectConstants.CLASS_SOURCING_PROJECT);
IAutoNumber number = agClass.getAutoNumberSources()[0];
HashMap map = new HashMap();
map.put(ProjectConstants.ATT_GENERAL_INFORMATION_NUMBER, number);
map.put(ProjectConstants.ATT_GENERAL_INFORMATION_NUMBER_OF_QTY_BREAKS,
new Integer(4));
```

```
    IProject prj = (IProject) m_session.createObject(agClass, map);
```

Important Do not pass numbers that are greater than two digits to the `QUANTITY_BREAK` attribute.

Creating Sourcing Projects by Quantity Breaks and Price Periods

Alternatively, you can create Sourcing Projects by specifying quantity breaks and price period information such as the number of periods, period type, and start date. Example below creates a Sourcing Project using these parameters.

Note When you create a Sourcing Project with price period information set to period type, you must specify the `Period Type` attribute. The supported values are `Monthly`, `Quarterly`, `Semi-Annually`, and `Yearly`. However, `Period Type` is not correctly returned afterwards when you check the value of period type, for example, by invoking `getValue(ProjectConstants.ATT_GENERAL_INFORMATION_PERIOD_TYPE)`. That is, instead of returning the value that you set when creating the Sourcing Project, the future returned value is always “weekly”. This is not an error. It is normal SDK behavior and the specified period type value is not altered, because it is for internal use only.

Example: Creating a Sourcing Project by quantity breaks and price periods

```
/*
```

Descriptions

ATT_GENERAL_INFORMATION_PERIOD_TYPE is described in ProjectConstants
 Name: Period Type
 Description: Period Type indicates the recurrence of price periods in a Sourcing Project.
 Type: List
 List: Period Type List
 List Id: 4565
 List Valid Values: {Monthly, Quarterly, Semi-Annually, Yearly}
 Restrictions: Required, Read Only. Used only when creating Sourcing Projects. Internal use only. Not available through Agile UI clients.
 ATT_GENERAL_INFORMATION_PERIOD_START_DATE is described in ProjectConstants
 Name: Period Start Date
 Description: Period Start Date indicates the start date for price periods in a Sourcing Project
 Type: Date
 Valid Values: any Date object.
 Restrictions: Required, Read only, Used only when creating Sourcing Projects, Internal use only /Not available through Agile UI clients
 */

```
IAgileClass agClass =
    m_admin.getAgileClass(ProjectConstants.CLASS_SOURCING_PROJECT);
IAutoNumber number =
    agClass.getAutoNumberSources()[0];
HashMap map =
    new HashMap();
map.put(ProjectConstants.ATT_GENERAL_INFORMATION_NUMBER, number);
map.put(ProjectConstants.ATT_GENERAL_INFORMATION_NUMBER_OF_QTY_BREAK
S, new Integer(4));
map.put(ProjectConstants.ATT_GENERAL_INFORMATION_NUMBER_OF_PERIODS,
new Integer(4));
IAgileList list =
    agClass.getAttribute(PERIODTYPE).getAvailableValues();
String TYPE = "Monthly";
list.setSelection(new Object[]{TYPE});
map.put(ProjectConstants.ATT_GENERAL_INFORMATION_PERIOD_TYPE, list);
map.put(ProjectConstants.ATT_GENERAL_INFORMATION_PERIOD_START_DATE,
(new GregorianCalendar()).getTime());
IProject prj =
    (IProject) m_session.createObject(agClass, map);
```

Accessing and Modifying Objects, Tables, and Attributes

You can use the generic IDataObject method with standard calls such as getObject, getTable, getValue, setValue to access and subsequently modify objects, tables, and attributes as follows:

- Read Page 1 or Cover Page, Page 2, Page 3, Items, AML, Analysis, and nested pricing tables
- Update Page 1 or Cover Page, Page 2, Page 3, and AML tables
- Add items including AML to Items table
- Read RFQ table

▫ Load RFQ table

The `com.agile.api.ProjectConstants.java` file contains information about classes, tables, and attributes.

The SDK does not support the following table operations:

- Sourcing Projects class
 - Sorting PCM specific tables that have a default sorting order. These tables are Sourcing Project Item, Sourcing Project AML, Sourcing Project Changes, Sourcing Project Analysis, and Sourcing Project RFQ, RFQ Response, RFQ Changes, Supplier Response, and Supplier Changes.
- Request for quote and RFQ responses classes
 - Responses and Changes tables
- Removing items from RFQ Response and Sourcing Projects tables because the PCM SDK does not support `ITable.clear()` or `ITable.removeRow()`

Setting Cover Page Values for Sourcing Projects

You can read and update all read/write Sourcing Projects cells. The following example updates the cells on a Sourcing project's Cover Page (Page 1).

Example: Setting values for a Sourcing project's Cover Page

```
public void updateProjectGenInfo (IProject project) throws Exception {  
  
    ICell cell = null;  
    IAgileList listvalues = null;  
  
    //Update Customer (List field)  
    cell =  
        project.getCell(ProjectConstants.ATT_GENERAL_INFORMATION_CUSTOMER);  
    listvalues =  
        cell.getAvailableValues();  
    listvalues.setSelection(new Object[] { "CUST00010" });  
    cell.setValue(listvalues);  
    //Update Description (Text field)  
    cell =  
        project.getCell(ProjectConstants.ATT_GENERAL_INFORMATION_DESCRIPTION  
        );  
    cell.setValue("Sourcing Projects for Odyssey III");  
    //Update Manufacturing Site (List field)  
    cell =  
        project.getCell(ProjectConstants.ATT_GENERAL_INFORMATION_MANUFACTURI  
        NG_SITE);  
    listvalues =  
        cell.getAvailableValues();  
    listvalues.setSelection(new Object[] { "Global" });  
    cell.setValue(listvalues);  
    //Update Ship To Location (List field)  
    cell =
```

```

    project.getCell(ProjectConstants.ATT_GENERAL_INFORMATION_SHIP_TO_LOCATION);
    listvalues =
        cell.getAvailableValues();
        listvalues.setSelection(new Object[] { "San Jose" });
        cell.setValue(listvalues);
}

```

Understanding Nested Tables in PCM

A nested table is a table within a table. They are used to access and modify data in multi-level objects such as BOMs and Items with AMLs. The way the SDK fulfills this function is to treat the cell values in a nested table as a table. For example, when the SDK finds the next level in a cell in a BOM table, it treats and processes the cell as a table. Nested tables are unique to the PCM SDK.

Sourcing Projects' Parent Table and Nested Child Table Constants

The list of parent Sourcing Projects table and the corresponding nested child table constants appear in the Parent Sourcing Projects Table Constants and the Corresponding Nested Sourcing Projects Tables.

Parent Table Constant	Nested Child Table Constant	Read/Write Mode
TABLE_ITEMS	ATT_ITEMS_AML	Read/Write
TABLE_ITEMS	ATT_ITEMS_PRICING	Read/Write
TABLE_AML	ATT_AML_PRICETABLE	Read/Write
TABLE_ITEM	ATT_ITEM_PRICE_TABLE	Read/Write
TABLE_ITEM	ATT_ITEM_BOM_TABLE	Read
TABLE_ANALYSIS	ATT_ANALYSIS_AML	Read
TABLE_ANALYSIS	ATT_ANALYSIS_PRICING	Read

Accessing and Modifying Nested Tables in Sourcing Projects or RFQs

The example below is a Read mode example that accesses a nested table. To modify/update a nested table, see the Example entitled "Nested RFQ table update" in [RFQ Parent Table and Nested Child Table Constants](#) on page 291.

Note The Money type attribute in nested PCM Pricing tables always uses "USD" as the default currency unit. This applies even if the buyer specifies a different currency unit. In this case, the "United State Dollar" is the default and only supported currency.

Example: Accessing a nested table

```

Row row = (IRow) table.iterator.next();
ITable nested_table =
    (ITable) row.getValue(ProjectConstants.ATT_ITEMS_AML);

```

Viewing Updates after Modifying a Nested Table

After modifying a nested table, it is necessary to reload the table as shown in the previous example for changes to take effect, otherwise, the old data will reappear and the new values are not displayed.

Accessing and Modifying the Status of Sourcing Project

Because Sourcing Projects do not have a Workflow connected to them, their status change is controlled internally. They control their status with a set of methods. This is a special case for some PCM objects such as Sourcing Projects and Requests for Quote. This release supports changing the status of a Sourcing Project from Draft to Open and Open to Close.

You can access the status of Sourcing Projects using the standard `IDataObject` method for the lifecycle phase field on the Cover Page (Page 1). You can modify the status of Sourcing Projects with `IProject` methods which enable you to open, modify, and close a Sourcing Project. You must set the Ship to Location parameter in order to open a Sourcing Project, as shown in the following example.

Example: Setting values for a Sourcing project's Cover Page

```
// add Ship To //
String sj = "San Jose";
IAgileList ship2List =
    (IAgileList)prj.getValue(ProjectConstants.ATT_GENERAL_INFORMATION_SHIP_TO_LOCATION);
ship2List.setSelection(new Object[] {sj});
prj.setValue(ProjectConstants.ATT_GENERAL_INFORMATION_SHIP_TO_LOCATION, ship2List);
// open Sourcing Project //
prj.changeStatusToOpen();

// close Sourcing Project //
prj.changeStatusToClose();
```

Managing Data in Sourcing Projects

The following paragraphs provide descriptions and examples to prepare a Sourcing Project to issue an RFQ. You can then use the SDK to complete the RFQ-related tasks.

Note The *Sourcing Project Start* date that you specify is converted to the GMT format for storage in the PLM database. Due to this conversion, the date value returned by `IProject.getValue(ProjectConstants.ATT_GENERAL_INFORMATION_PERIOD_START_DATE)` is not guaranteed to be the same that the user may expect.

Setting Quantity for Items in Sourcing Projects

You can use the SDK to set the required quantity for the an Item object in a Sourcing Project. The code sample below sets this value in the Item table, under the Items tab, for a single price target. The end user can specify the target price using the displayed name which is `QuantityBreak2` in the following example.

Example: Setting quantity for Items

```
// Setting Quantity for an Item //
ITable tab_item = dObj.getTable(ProjectConstants.TABLE_ITEM);
IRow row = (IRow) tab_item.iterator().next()
ITable priceTable =
row.getValue(ProjectConstants.ATT_ITEM_PRICE_TABLE);
for (Iterator iterator = priceTable.iterator(); iterator.hasNext();) {
    IRow row = (IRow) iterator.next();
    String name = row.getName();
    if(name.equals("QuantityBreak2")){
        row.setValue(ProjectConstants.ATT_PRICEDETAILS_QUANTITY, new
Double(123));
    }
}
```

Note For items, quantity is only set at the root level. Thus, if an item is not a root, the exception `ExceptionConstants.PCM_PROJECT_ITEM_IS_NOT_ROOT` is thrown.

In addition, because `priceTable` is a nested table, you must reload the table to get the updated value of Quantity. This is shown in the following example.

Example: Reloading a nested table to get an updated value

```
// Getting the updated value //
priceTable = row.getValue(ProjectConstants.ATT_ITEM_PRICE_TABLE);
for (Iterator iterator = priceTable.iterator(); iterator.hasNext();) {
    IRow iRow = (IRow) iterator.next();
    String name = iRow.getName();
    if(name.equals("QuantityBreak2")){
        Object qty =
row.getValue(ProjectConstants.ATT_PRICEDETAILS_QUANTITY);
    }
}
```

Adding Items to Sourcing Projects with BOM Filters

The PLM Web Client supports setting up BOM filters to selectively add Items to Sourcing Projects. This filtering applies to all enabled attributes on the Cover page, P2, and BOM tabs of the Item object and includes the Parts and Documents fields in the Cover page. These attributes are enabled using the Java Client. For background information and procedures on BOM filtering, refer to *Agile PLM Product Cost Management User Guide*. To enable Item object attributes, refer to *Agile PLM Administrator Guide*.

The SDK enables replicating this Web Client feature programmatically. SDK filter operators that support this feature are implemented in the `OperatorConstants` class. The following code samples show how BOM filters are applied to Item object's *numeric*, *multilist*, *money*, and *mass* attributes. As indicated above, these attributes must be enabled in the Java Client by an Admin user.

Example: Applying BOM filter operators located in the OperatorConstants class

```

IProject prj = (IProject)m_session.getObject(IProject.OBJECT_TYPE,
"PRJ00001");
IItem assembly = (IItem)m_session.getObject(IItem.OBJECT_TYPE,
"P00001");
//Applying BOM filter to numeric attributes
ProjectItemFilter itemfilter = new ProjectItemFilter();
itemfilter.addCriteria(ItemConstants.ATT_BOM_BOM_NUMERIC03,
OperatorConstants.RELOP_EQ, new Integer(10));
itemfilter.addCriteria(ItemConstants.ATT_BOM_BOM_NUMERIC04,
OperatorConstants.RELOP_GE, new Integer(100));
Map params = new HashMap();
params.put(ProjectConstants.ATT_ITEM_NUMBER, assembly);
params.put(ProjectConstants.ATT_ITEM_FILTER, itemfilter);
ITable ITEM = prj.getTable(ProjectConstants.TABLE_ITEM);
IRow row = ITEM.createRow(params);
//Applying BOM filter to multilist attributes
ProjectItemFilter itemfilter = new ProjectItemFilter();
IAttribute list03 =
m_session.getAdminInstance().getAgileClass(ItemConstants.CLASS_PARTS
_CLASS).getAttribute(ItemConstants.ATT_PAGE_TWO_MULTILIST01);
IAgileList list3 = list03.getAvailableValues();
list3.setSelection(new Object[]{"Austria","India"});
itemfilter.addCriteria(ItemConstants.ATT_PAGE_TWO_MULTILIST01,
OperatorConstants.RELOP_CONTAINS_ALL_VALUE, list3);
Map params = new HashMap();
params.put(ProjectConstants.ATT_ITEM_NUMBER, assembly);
params.put(ProjectConstants.ATT_ITEM_FILTER, itemfilter);
ITable ITEM = prj.getTable(ProjectConstants.TABLE_ITEM);
IRow row = ITEM.createRow(params);
//Applying BOM filter to money attributes
Money mny = new Money(new Double(15.3), "USD");
ProjectItemFilter itemfilter = new ProjectItemFilter();
itemfilter.addCriteria(ItemConstants.ATT_PAGE_TWO_MONEY01,
OperatorConstants.RELOP_EQ, mny);
Map params = new HashMap();
params.put(ProjectConstants.ATT_ITEM_NUMBER, assembly);
params.put(ProjectConstants.ATT_ITEM_FILTER, itemfilter);
ITable ITEM = prj.getTable(ProjectConstants.TABLE_ITEM);
IRow row = ITEM.createRow(params);
//Applying BOM filter to mass attributes
IUnitOfMeasureManager uommm
=(IUnitOfMeasureManager)m_session.getManager(IUnitOfMeasureManager.c
lass);
IUnitOfMeasure uom = uommm.createUOM(10.1,"Gram");
ProjectItemFilter itemfilter = new ProjectItemFilter();
itemfilter.addCriteria(ItemConstants.ATT_TITLE_BLOCK_MASS, OperatorCo
nstants.RELOP_NEQ, uom);
Map params = new HashMap();
params.put(ProjectConstants.ATT_ITEM_NUMBER, assembly);
params.put(ProjectConstants.ATT_ITEM_FILTER, itemfilter);
ITable ITEM = prj.getTable(ProjectConstants.TABLE_ITEM);
IRow row = ITEM.createRow(params);

```

Performing Quantity Rollup in Sourcing Projects

Quantity rollups generate data related the quantity values for the selected Item in a Sourcing Project. In the SDK, you can use the following API to invoke a Quantity rollup in a Sourcing Project.


```
public void rollupQuantity() throws APIException, RemoteException,
Exception;
```

This code sample uses `rollupQuantity()` to do a Quantity rollup.

Example: Quantity Rollup

```
IProject prj =
    (IProject)m_session.getObject(ProjectConstants.CLASS_SOURCING_PRO
    JECT, "PRJ00001");
prj.rollupQuantity();
```

Note To get the updated value of Quantity, it is necessary to invoke `rollupQuantity()` on the Sourcing Project similar to the example in [Modifying Spplier Data](#) on page 267. This is necessary because `getValue()` does not return the updated value of the affected item after setting Quantity.

Performing Cost Rollup in Sourcing Projects

Cost Rollup (Rollup cost) generates an Assembly Cost Report (ACR) based on available prices. In this process, it picks up the lowest costs from filtered data, performs Set as Best (on user defined or default parameters) and costed BOM rollup (aggregation) to generate the ACR. In the UI, Rollup cost provides an intuitive mechanism for non PCM users to cost a BOM without going through PCM steps.

Note Cost Rollup runs on existing Sourcing Project prices. If Cost Rollup needs to run on looked up prices, `lookupPrices()` must be invoked prior to running `costRollup()`. If there are no assemblies in the Sourcing Project, the `ExceptionConstants.PCM_NO_ASSEMBLY_IN_PROJECT` is thrown.

The PCM SDK supports the Cost Rollup function with the following API.

```
public void costRollup()
throws APIException, RemoteException, Exception;
```

Example: Using the costRollup API

```
IProject prj = (IProject)
m_session.getObject(ProjectConstants.CLASS_SOURCING_PROJECT,
"PRJ0001");
prj.costRollup();
```

Note If you need to run quantity rollup immediately after cost rollup, be sure to provide some delay (For example as in `Thread.currentThread().sleep(10000);`) to allow the results of the cost rollup to be refreshed in the database.

Performing Price Lookup in Sourcing Projects

You can use the SDK to verify the existence of a price scenario for a specified period and quantity in the Item Master. You can either use the price information of the Item, or modify the price information and send the RFQ to suppliers for requote.

In Agile PCM, there are three types of price objects:

- Contracts – Predefined agreements with suppliers for Item prices over a specified time period

- **Published Prices** – The Item price information that has been published from other Sourcing projects
- **Quote Histories** – Quoted prices that were previously received for an Item

For information about price objects and price lookups in Sourcing projects, refer to the Agile PLM *Product Cost Management User Guide*.

Price Lookup API and Price Lookup Options

- **Supported API**

The SDK supports price lookups with the following API in `IProject`.

```
public void lookupPrices(Object lookupParams)
    throws APIException, RemoteException, Exception;
```

- **Price lookup options**

This API performs price lookups from Price history and price lookups from another Sourcing Project.

Note `lookupPrices()` looks for an Item or an MPN one object at a time. To run lookup for multiple Items/MPNs, you must run the API one Item or one MPN at a time.

The following examples show price lookups from the Sourcing Project History and from another Sourcing Project. In addition, applicable parameters are grouped and listed as those that are specific to the price lookup type and necessary in the price lookup type.

Parameters for Price Lookup from History or Another Sourcing Project

This example shows a price lookup from Sourcing Project History and from another Sourcing Projects. It provides a list of specific and required parameters for the two price lookups.

Example: Price lookup from History and another Sourcing Projects

```
ArrayList priceTypes = new ArrayList();
priceTypes.add(PriceConstants.CLASS_PUBLISHED_PRICE);
priceTypes.add(PriceConstants.CLASS_QUOTE_HISTORY);
priceTypes.add(PriceConstants.CLASS_CONTRACT);
ArrayList suppliers = new ArrayList();
suppliers.add(supplier1);
suppliers.add(supplier2);
//supplier1, supplier2 are objects of ISupplier or String

ArrayList customers = new ArrayList();
customers.add(customer1);
customers.add(customer2);
//customer1, customer2 are objects of ICustomer or String

ArrayList programs = new ArrayList();
programs.add(program1);
programs.add(program2);
//program1, program2 are objects of IProgram or String
```

```

String shipTo = "berlin";
HashMap itemMap = new HashMap();
itemMap.put("IPN1","REV1");//itemMap.put("IPN1", null) if no revision
or
itemMap.put(item); //item is an object of IItem

HashMap mpnMap = new HashMap();
mpnMap.put("MPN1","MFR1");
or
mpnMap.put(mfrPart); //mfrPart is and object of IManufacturerPart

IProject srcPrj = (IProject)
    m_session.getObject(ProjectConstants.CLASS_SOURCING_PROJECT,
        "PRJ_SRC");
Boolean isLookupFromPrice = new Boolean(false);
String priceScenario = null;
Map priceScenarios = new HashMap();
//if lookup from price history
priceScenario = "QuantityBreak1";
//if lookup from Sourcing project
String destPricePoint1 = "QuantityBreak1";
String destPricePoint2 = "QuantityBreak2";
String srcPricePoint1 = "QuantityBreak1";
String srcPricePoint2 = "QuantityBreak2";
priceScenarios.put(destPricePoint2,srcPricePoint1);
priceScenarios.put(destPricePoint1,srcPricePoint2);
Boolean ignoreQtyRange = new Boolean(true);
Double qtyPercentRange = new Double(15);

Boolean ignoreDateRange = new Boolean(true);
Integer dateRange = new Integer(20);

HashMap map = new HashMap();
map.put(PriceConstants.ATT_GENERAL_INFORMATION_PRICE_TYPE,priceTypes);
map.put(ProjectConstants.ATT_ANALYSIS_SUPPLIER,suppliers);
map.put(ProjectConstants.ATT_GENERAL_INFORMATION_CUSTOMER,customers);
map.put(ProjectConstants.ATT_GENERAL_INFORMATION_PROGRAM,programs);
map.put(ProjectConstants.ATT_GENERAL_INFORMATION_SHIP_TO_LOCATION,shipTo);
map.put(ProjectConstants.ATT_ITEMS_NUMBER,itemMap);
map.put(ProjectConstants.ATT_ITEMS_AML,mpnMap);
map.put(ProjectConstants.ATT_GENERAL_INFORMATION_NUMBER,srcPrj);
map.put(LookupConstants.FLAG_IGNORE_ITEM_REVISION,ignoreItemRev);
map.put(LookupConstants.FLAG_CONSIDER_BEST_PRICES,considerBestPrices);
map.put(LookupConstants.FLAG_ALL_PRICE_SCENARIOS,allPriceScenarios);
map.put(LookupConstants.FIELD_PRICE_SCENARIO,priceScenario);

```

```
map.put (LookupConstants.FIELD_PRICE_SCENARIOS,priceScenarios);
map.put (LookupConstants.FLAG_IGNORE_QUANTITY,ignoreQtyRange);
map.put (LookupConstants.FIELD_QUANTITY_RANGE,qtyPercentRange);
map.put (LookupConstants.FLAG_IGNORE_DATE_RANGE,ignoreDateRange);
map.put (LookupConstants.FIELD_DATE_RANGE,dateRange);
map.put (LookupConstants.FIELD_SELECT_RESPONSE_BY,
        LookupConstants.OPTION_LOWEST_PRICE);
map.put (LookupConstants.FIELD_LOOKUP_TYPE,
        LookupConstants.OPTION_LOOKUP_FROM_PRICE);
prj.lookupPrices(map);
```

Parameters specific to price lookups from price history

```
PriceConstants.ATT_GENERAL_INFORMATION_PRICE_TYPE
ProjectConstants.ATT_GENERAL_INFORMATION_CUSTOMER
ProjectConstants.ATT_GENERAL_INFORMATION_PROGRAM
ProjectConstants.ATT_GENERAL_INFORMATION_SHIP_TO_LOCATION
LookupConstants.FLAG_ALL_PRICE_SCENARIOS
LookupConstants.FIELD_PRICE_SCENARIO
LookupConstants.FLAG_IGNORE_QUANTITY
LookupConstants.FIELD_QUANTITY_RANGE
LookupConstants.FLAG_IGNORE_DATE_RANGE
LookupConstants.FIELD_DATE_RANGE
LookupConstants.FIELD_SELECT_RESPONSE_BY
```

Parameters specific to price lookups from Sourcing Projects

```
ProjectConstants.ATT_GENERAL_INFORMATION_NUMBER
LookupConstants.FLAG_ALL_PRICE_SCENARIOS
LookupConstants.FLAG_IGNORE_ITEM_REVISION
LookupConstants.FLAG_CONSIDER_BEST_PRICES
```

Note The remaining parameters are common to both cases.

Parameters required for price lookups from price history

```
PriceConstants.ATT_GENERAL_INFORMATION_PRICE_TYPE
ProjectConstants.ATT_ITEMS_NUMBER or ProjectConstants.ATT_ITEMS_AML
LookupConstants.FIELD_QUANTITY_RANGE if
LookupConstants.FLAG_IGNORE_QUANTITY is 'false'
LookupConstants.FIELD_DATE_RANGE if
LookupConstants.FLAG_IGNORE_DATE_RANGE is 'false'
LookupConstants.FIELD_PRICE_SCENARIO if
LookupConstants.FLAG_ALL_PRICE_SCENARIOS is 'false'
```

Parameters required for price lookups from Sourcing Projects

```
ProjectConstants.ATT_GENERAL_INFORMATION_NUMBER
LookupConstants.FLAG_ALL_PRICE_SCENARIOS
ProjectConstants.ATT_ITEMS_NUMBER or ProjectConstants.ATT_ITEMS_AML
```

Note Parameters that are not required in one of the price lookups, for example, History, may be optional in price lookup from another Sourcing Project. Comparing the list of required parameters above, the `LookupConstants.FLAG_ALL_PRICE_SCENARIOS` parameter is optional when performing a price lookup from History. You can either omit the optional parameters, or set them to `null`.

Setting the price lookup from History or Sourcing Projects

Set `LookupConstants.FIELD_LOOKUP_TYPE` for lookup from history or Sourcing Projects as follows:

- For lookup from price history – `LookupConstants.OPTION_LOOKUP_FROM_PRICE`
- For lookup from an existing Sourcing Project –
`LookupConstants.OPTION_LOOKUP_FROM_PROJECT`

Settings for Quantity Breaks in price lookups

You can set quantity breaks in a price lookup by cost, date, or leadtime by setting `LookupConstants.FIELD_SELECT_RESPONSE_BY` as follows:

- For break tie by cost – `LookupConstants.OPTION_LOWEST_PRICE`
- For break tie by date – `LookupConstants.OPTION_MOST_RECENT_RESPONSE`
- For break tie by leadtime – `LookupConstants.OPTION_SHORTEST_LEAD_TIME`

Impact of improper parameter settings

If the following parameters are not set, or are improperly set, the API will take the following actions:

- `LookupConstants.FIELD_LOOKUP_TYPE` will default to `LookupConstants.OPTION_LOOKUP_FROM_PRICE` which corresponds to the lookup from price history
- `LookupConstants.FLAG_IGNORE_QUANTITY` or `LookupConstants.FLAG_IGNORE_DATE_RANGE` will default to `true`.
- `LookupConstants.FIELD_SELECT_RESPONSE_BY` will default to `LookupConstants.OPTION_LOWEST_PRICE` which corresponds to the break tie by cost
- `LookupConstants.FLAG_IGNORE_ITEM_REVISION` or `LookupConstants.FLAG_CONSIDER_BEST_PRICES` will default to `false`
- `LookupConstants.LookupConstants.FLAG_ALL_PRICE_SCENARIOS` is not set it will be defaulted to 'true'.
- `ExceptionConstants.APDM_ADMIN_MISSINGREQUIREDFIELD` exception is thrown when a required parameter is missing
- `ExceptionConstants.API_INVALID_PARAM` exception is thrown when the datatype or the value of a parameter is incorrectly set

For RFQ lookup:

The settings are similar to Sourcing Project lookup from price history. Following is a code sample.

```
HashMap map = new HashMap();
map.put (PriceConstants.ATT_GENERAL_INFORMATION_PRICE_TYPE,priceTypes);
map.put (ProjectConstants.ATT_GENERAL_INFORMATION_CUSTOMER,customers);
map.put (ProjectConstants.ATT_GENERAL_INFORMATION_PROGRAM,programs);
map.put (ProjectConstants.ATT_GENERAL_INFORMATION_SHIP_TO_LOCATION,shipT
o);
map.put (ProjectConstants.ATT_ITEMS_NUMBER,itemMap);
map.put (ProjectConstants.ATT_ITEMS_AML,mpnMap);
map.put (LookupConstants.FLAG_ALL_PRICE_SCENARIOS,allPriceScenarios);
map.put (LookupConstants.FIELD_PRICE_SCENARIO,priceScenario);
map.put (LookupConstants.FLAG_IGNORE_QUANTITY,ignoreQtyRange);
map.put (LookupConstants.FIELD_QUANTITY_RANGE,qtyPercentRange);
map.put (LookupConstants.FLAG_IGNORE_DATE_RANGE,ignoreDateRange);
map.put (LookupConstants.FIELD_DATE_RANGE,dateRange);
map.put (LookupConstants.FIELD_SELECT_RESPONSE_BY,LookupConstants.OPTION
_LOWEST_PRICE);
map.put (LookupConstants.FLAG_EXCLUDE_AUTH_SUPPLIER,excludeAuthSupplier)
;
rfq.lookupPrices (map);
```

Following is the list of the required parameters for the RFQ lookup:

```
PriceConstants.ATT_GENERAL_INFORMATION_PRICE_TYPE
ProjectConstants.ATT_ANALYSIS_SUPPLIER,suppliers
ProjectConstants.ATT_ITEMS_NUMBER or ProjectConstants.ATT_ITEMS_AML
LookupConstants.FIELD_QUANTITY_RANGE if
LookupConstants.FLAG_IGNORE_QUANTITY is 'false'
LookupConstants.FIELD_DATE_RANGE if
LookupConstants.FLAG_IGNORE_DATE_RANGE is 'false'
LookupConstants.FIELD_PRICE_SCENARIO if
LookupConstants.FLAG_ALL_PRICE_SCENARIOS is 'false'
```

Note If you do not set the value of `LookupConstants.FLAG_EXCLUDE_AUTH_SUPPLIER`, it will default to false.

Generating the Assembly Cost Report for Sourcing Projects

The PLM Web Client supports generating the Assembly Cost Report to help understand the total cost of a BOM, including the material and non-material costs. To simplify this operation, the Web Client provides a wizard to locate and select the required Sourcing Project, including the necessary parameters. See [Understanding Assembly Cost Report Parameters](#) on page 284 for a description of these parameters.

A sample report is shown in the following screen shot. Once the report is prepared, the PLM user can invoke the Export command and send the data from the PLM to an external device in a supported format, for example, to an Excel worksheet.

Figure 20: Assembly Cost Report for Sourcing Projects

ORACLE Assembly Cost (Sourcing Project) Page 1 of 3

Project Name: PRJ00011
 Assembly Lines: P00007
 Suppliers: Best of Supplier;EMS1-EMS1 COMPONENT SUPPLIER
 Currency: USD(United States Dollar)

Summary Section

suppliers.Name	Assembly	OPA	QuantityBreak1		
			Material Price	Total Materials Price	Total Non-Materials Price
Best of Supplier	P00007	1		123.00	0.00
EMS1 COMPONENT SUPPLIER (EMS1)	P00007	1		123.00	0.00

The highlight for total unit cost indicates that the rollup is incomplete.

Created By: Administrator (admin)
 Create Time: 06/16/2010 07:51:05 AM WST

The SDK supports this Web Client feature by enhancing the `ProductReport.execute()` API. The extent of the SDK operation does not include invoking the Export command. The following is a code sample that uses the `ProductReport.execute()` API and the required parameters to programmatically generate this report.

Example: Generating Assembly Cost Reports

```
String[] items = new String[1];
items[0] = "P00001";
String[] suppliers = new String[2];
suppliers[0] = "-101"; //to include data for best suppliers
suppliers[1] = "EMS1 COMPONENT SUPPLIER";
String[] priceScenarios = new String[1];
priceScenarios[0] = "QuantityBreak1";
Boolean doCostRollup = new Boolean(true);
HashMap map = new HashMap();
map.put(ProductReportConstants.REPORTPARAM_REPORT_TYPE, ProductReport
Constants.REPORT_PROJECT_ASSEMBLY_COST);
map.put(ProductReportConstants.REPORTPARAM_REPORT_CATEGORY, "data");
map.put(ProductReportConstants.PROJECT_NUMBER, "PRJ00001");
map.put(ProductReportConstants.PROJECT_ITEMS, items);
map.put(ProductReportConstants.PROJECT_SUPPLIERS, suppliers);
map.put(ProductReportConstants.PROJECT_PRICEPOINTS, priceScenarios);
map.put(ProductReportConstants.PROJECT_DO_COST_ROLLUP,
doCostRollup);
```

```
try{
    IProductReport report =
    (IProductReport)m_session.createObject(IProductReport.OBJECT_TYPE, "My
    Reports");
    String result =report.execute(map);
}
catch (Exception e){
    e.printStackTrace();
}
```

Note The returned value of the `ProductReport.execute()` API represents either the XML data of the Assembly Cost Report or the XML schema. To get the schema, you must set the values of the first two parameters in the `map` where the value of the parameter `REPORTPARAM_REPORT_CATEGORY` is set to `"schema"`.

Understanding Assembly Cost Report Parameters

The Assembly Cost Report parameters supported by `ProductReport.execute()` are defined as follows:

- `items` – The array of top level assembly items: "`<itemNumber>::<revNumber>`" if there is a revision, and "`<itemNumber>`" if there are no revisions.
- `suppliers` – The array of supplier names along with the optional indicators for the "Best of Suppliers": `"-101"` or the "Best Of Suppliers/Partners"
- `pricescenarios` – The array of price scenarios names
- `doCostRollup` – The flag to run the cost Rollup option for the report

If you want to generate a report for all assemblies, all suppliers/partners, or all price scenarios without specifying their names, you must provide the following corresponding parameters:

- `String[] items = new String[1];`
`items[0] = "all";`
- `String[] suppliers = new String[2];`
`suppliers[0] = "-101";`
`suppliers[1] = "all";`
- `String[] priceScenarios = new String[0];`
`priceScenarios[0] = "all";`

Modifying the Target Price for Items in Sourcing Projects

Target Price is the market cost per unit of the item or the manufacturer part. It is specified when items are ordered. For each Item and for each Pricepoint, Target Price is set in the Items table, under the AML tab. A Pricepoint is the Target price quoted for a given quantity for an Item. For example, price quoted for X number of tires, which can be different for Y number of the same tires.

Note The Target price is always a positive number. Setting a negative value for Target price will throw the `ExceptionConstants.PCM_NEGATIVE_TARGET_PRICE` exception.

Target Price is set at the Item level only. You cannot set a Target Price the AML level. The end user specifies a Pricepoint using the name displayed for the Pricepoint. In the following example, `QuantityBreak2` is the Pricepoint.

Example: Setting the Target price in Sourcing Projects

```

ITable tab_item = dObj.getTable(ProjectConstants.TABLE_ITEMS);
IRow row = (IRow) tab_item.iterator().next();
ITable priceTable = row.getValue(ProjectConstants.ATT_ITEMS_PRICING);
for (Iterator iterator = priceTable.iterator(); iterator.hasNext();) {
    IRow row = (IRow) iterator.next();
    String name = row.getName();
    if (name.equals("QuantityBreak2")) {
        row.setValue(ProjectConstants.ATT_PRICEDETAILS_TARGET_COST,
            new Money(new Double(1.23), "USD") );
    }
}

```

Because `priceTable` is a nested table, you must reload this table to get the updated value of the Target price as shown in the following example. This is similar to the example in [Setting Quantity for Items in Sourcing Projects](#) on page 274.

Example: Reloading the priceTable to get the updated value of the target price

```

priceTable = row.getValue(ProjectConstants.ATT_ITEMS_PRICING);
for (Iterator iterator = priceTable.iterator(); iterator.hasNext();) {
    IRow iRow = (IRow) iterator.next();
    String name = iRow.getName();
    if (name.equals("QuantityBreak2")) {
        Object qty =
row.getValue(ProjectConstants.ATT_PRICEDETAILS_TARGET_COST));
    }
}

```

Setting the Best Response for Items in Sourcing Projects

The Best Response is set in the Analysis table under the Analysis tab for both the Item and Manufacturer Part number objects. The end user specifies three of these parameters: Lowest Cost, Lowest Cost Within Lead Time Constraint, Shortest Lead Time, Supplier Rating, and AML Preferred status. For more information, refer to *Agile Product Lifecycle Management - Product Cost Management Supplier Guide*.

You can use the SDK to find the best response for an Item Part Number (IPN), a Manufacturer Part Number (MPN), and for an IPN and an MPN as shown in the following code samples.

Example: Setting the Best Response for an IPN

```

//set best response for ipn //
ITable table_analysis = prj.getTable(ProjectConstants.TABLE_ANALYSIS);
Iterator it = table_analysis.iterator();
while(it.hasNext()) {

```

```
        IRow row = (IRow) it.next();
        String itemName =
row.getValue(ProjectConstants.ATT_ANALYSIS_NUMBER);
        String suppName =
row.getValue(ProjectConstants.ATT_ANALYSIS_SUPPLIER);
        if (itemName.equals("IPN1") && suppName.equals("suppName1
(suppNumber1)")) {
            row.setValue(ProjectConstants.ATT_ANALYSIS_BEST_RESPONSE
, "Yes");
        }
    }
}
```

Example: Setting the Best Response for an MPN

```
ITable table_aml =
    (ITable) row.getValue(ProjectConstants.ATT_ANALYSIS_AML);
Iterator _it =
    table_aml.iterator();
while(it.hasNext()){
    String itemName =
row.getValue(ProjectConstants.ATT_ANALYSIS_NUMBER);
    String suppName =
row.getValue(ProjectConstants.ATT_ANALYSIS_SUPPLIER);
    String mfrName = row.getValue(ProjectConstants.
ATT_ANALYSIS_MANUFACTURER);
    if (itemName.equals("MPN1") && suppName.equals("suppName1
(suppNumber1) "
        && mfrName.equals("MFR1"))) {
        row.setValue(ProjectConstants.ATT_ANALYSIS_BEST_RESPONSE, "Yes");
    }
}
```

Note Because you can only set the Best Response to `Yes`, if you pass any value other than `Yes`, the `ExceptionConstants.API_INVALID_PARAM` exception is thrown.

Example: Getting the Best Response for an IPN and an MPN

```
String bResp =
row.getValue(ProjectConstants.ATT_ANALYSIS_BEST_RESPONSE).toString();
```

Setting Partners in Sourcing Projects

Partners can view complete Sourcing Project BOMs in RFQs. You can assign partners to an item in the Sourcing Project when you add the item to the RFQ that will be sent to the partners. If multiple partners are selected, you can split the quantity among the partners by specifying what percentage of an item you want to receive from each supplier. For example, if two partners supply the same item, you can add both partners to the list and then assign a certain percentage to each, for example, 50%-50%, or 60%-40%, and so on.

In the SDK, the following API is used to set partners for an item in a Sourcing Project and split the percentage among the partners.

```
public void assignSupplier(Object partnerParams) throws APIException,
RemoteException, Exception;
```

The behavior of this API and its use cases are similar to `IRequestForQuote.assignSupplier()`. However, when you add new partners for an item with this API, you will override the existing ones. Thus, to avoid removing existing partners, it is necessary to once again add the existing partners and set the split (Percentage for each) level for each one. This only occurs in the SDK, the GUI does not require adding the existing partners when you add new partners. You cannot remove a partner for an item, but assigning a `split = 0`, (Percentage of ownership/participation) will remove the partner. For more information on the GUI behavior, refer to the latest release of *Agile Product Lifecycle Management - Product Cost Management Supplier Guide*.

The following code sample sets partners and splits the percentages among the assigned partners.

Example: Setting partners and splitting percentages among partners

```
HashMap map = new HashMap();
HashMap supplierSplit = new HashMap();
HashMap partnerMap = new HashMap();

map.put(ProjectConstants.ATT_ITEM_NUMBER, item);
Double split1 =
    new Double(55);
Double split2 =
    new Double(75);
supplierSplit.put(supplier1, split1);
supplierSplit.put(supplier2, split2);
partnerMap.put(ProjectConstants.ATT_PARTNERS_PARTNER, supplierSplit);
map.put(ProjectConstants.ATT_ITEM_PARTNER_TABLE, partnerMap);
prj.assignSupplier(map);
```

An item or supplier can be an `IItem` object, a `ISupplier` object, or a `String` object. Partners can be assigned to any Item Part Number (IPN), but not a Manufacturer Part Number (MPN). If the item is not in the Sourcing Project, the `ExceptionConstants.PCM_ERROR_INVALID_PROJECT_ITEM` is thrown.

Split percentages can be any object representing a number. If it is not a number, the `ExceptionConstants.API_INVALID_PARAM` exception is thrown.

To get data about a given partner, you can use the Items or AML tabs as shown below.

Example: Getting partner data using Item or AML

```
ITable tab_item =
    prj.getTable(ProjectConstants.TABLE_ITEMS);
IRow row = (
    IRow) tab_item.iterator().next();
ITable partnerTable =
    (ITable) row.getValue(ProjectConstants.ATT_ITEMS_PARTNERS);
```

Or,

```
ITable tab_item =
    prj.getTable(ProjectConstants.TABLE_ITEM);
IRow row =
    (IRow) tab_item.iterator().next();
ITable partnerTable =
    (ITable) row.getValue(ProjectConstants.ATT_ITEM_PARTNER_TABLE);
```

```
for (Iterator iterator =
    partnerTable.iterator(); iterator.hasNext();) {
    IRow iRow =
        (IRow) iterator.next();
    String partner =
        iRow.getValue(ProjectConstants.ATT_PARTNERS_PARTNER).toString();
    String split =
        iRow.getValue(ProjectConstants.ATT_PARTNERS_PARTNER_SPLIT).toString(
        );
}
```

Working with RFQs

Requests for Quotes (RFQs) allow users to request pricing information from suppliers. RFQs serve as the instrument to negotiate pricing and terms for items or manufacturer parts. RFQs are defined for Sourcing projects. Thus, to define an RFQ, you must first create the Sourcing Project and then create the required RFQs for that Sourcing Project.

A single Sourcing Project can generate several RFQs. RFQs support a one-to-many relationship with suppliers. That is, one RFQ may generate several responses from suppliers.

The Agile API supports the following RFQ-related tasks.

- Create an RFQ for Sourcing a Project
- Load and modify RFQ objects, tables, and attributes
- Access and modify the Page 1, Page 2, and RFQ Response tables
- Add items to the RFQ Response table from the RFQ's Sourcing Project
- Read and update the nested tables in the Page 1, Page 2, and RFQ Response table
- Assign suppliers to items or manufacturer parts in the RFQ Response table

For a list of API methods that support these RFQ functions, see [Supported API Methods](#) on page 288.

Note The PCM SDK RFQ objects do not have a Page three, and no Page three RFQ constant is supported. Do not invoke these constants because the RFQ will not produce the expected result.

Supported API Methods

The SDK supports the following APIs for RFQs. For information on these interfaces, refer to the Javadoc generated HTML files that document the SDK code. You can find them in the HTML folder in SDK_samples (ZIP file). To access this file, see the Note in [Client-Side Components](#) on page 2.

- `IAgileSession.createObject(Object, Object)`
- `IAgileSession.createObject(int, Object)`
- `IAgileSession.getObject(Object, Object)`
- `IAgileSession.getObject(int, Object)`

- `IRequestForQuote.getName()`
- `IRequestForQuote.assignSupplier(Object)`
- `IRequestForQuote.getTable(Object)`
- `IRequestForQuote.lookupPrices(Object)`
- `ITable.iterator()`
- `ITable.getTableDescriptor()`
- `ITable.size()`
- `ITable.createRow(Object)`
- `IRow.getValue(Object)`
- `IRow.setValue(Object, Object)`

Creating RFQs for Sourcing Projects

RFQs are defined for a specific Sourcing Project. Creating an RFQ uses the generic `I AgileSession` method.

Similar to Sourcing Projects (see [Creating RFQs for Sourcing Projects](#) on page 289), you can use `IDataObject` with standard calls such as `getObject`, `getTable`, `getValue`, `setValue` to access and modify objects, tables, and attributes as follows:

- Read Page 1 or Cover Page and Page 2 tables
- Update Page 1 or Cover Page and Page 2 tables

Example: Creating an object

```
I AgileObject createObject(Object objectType, Object params)
throws APIException;
```

To create an RFQ, you must open the Sourcing Project. However, to open the Sourcing Project, it is necessary to first set the ship to location. See the code example in [Accessing and Modifying the Status of Sourcing Projects](#).

You cannot create an RFQ by specifying the Sourcing Project number only. You must also specify the related Sourcing Project as this is a required parameter. This is shown in the example below.

Example: Creating an RFQ for a Sourcing Project

```
I AgileClass rfqClass =
    m_admin.getAgileClass(RequestForQuoteConstants.CLASS_RFQ);
    IAutoNumber rfqNumber = rfqClass.getAutoNumberSources()[0];
    HashMap map = new HashMap();
map.put(RequestForQuoteConstants.ATT_COVERPAGE_RFQ_NUMBER, rfqNumber);
map.put(RequestForQuoteConstants.ATT_COVERPAGE_PROJECT_NUMBER,
    pnumber);
    I RequestForQuote rfq =
        (I RequestForQuote) m_session.createObject(rfqClass, map);
```

Loading Existing RFQs

You can load an existing RFQ using the `IAgileSession.getObject()` method, or select it from the RFQ table of the Sourcing Project object.

To load an RFQ, use the `IAgileSession.getObject()` method. To uniquely identify an RFQ, specify the value for the Cover Page | RFQ Number attribute.

Example: Loading an RFQ

```
public IRequestForQuote getRFQ() throws APIException {
    IRequestForQuote rfq =
        (IRequestForQuote)m_session.getObject(IRequestForQuote.OBJECT_TYPE,
            "RFQ01004");
    return rfq;
}
```

Loading RFQs from Sourcing Project's RFQ Table

In addition to loading an RFQ using `IAgileSession.getObject()`, you can also select an RFQ from the RFQ table of the Sourcing Project object.

Example: Loading an RFQ from the Sourcing Project RFQ table

```
ITable table = prj.getTable(ProjectConstants.TABLE_RFQS);
Iterator it = table.iterator();
IRow row1 = (IRow) it.next();
IDataObject obj1 = (IDataObject)
    m_session.getObject(IRequestForQuote.OBJECT_TYPE,
        row1.getValue(ProjectConstants.ATT_RFQS_RFQ_NUMBER));
```

Note The `getReferent()` method does not support the PCM SDK, including the RFQ tables. A list of supported RFQ tables appears in the table below.

Supported RFQ Tables

The supported RFQ tables and their respective constants are listed in the table below.

Table	Constant	Read/Write Mode
Cover Page	TABLE_COVERPAGE	Read/Write
Page Two	TABLE_PAGETWO	Read/Write
Responses	TABLE_RESPONSES	Read/Write

Note The Agile API does not support adding new rows to RFQ tables. However, you can add new rows to the RFQ response table.

Accessing and Modifying RFQ Objects, Tables, Nested Tables, and Attributes

You can access RFQ objects, tables, and attributes using the generic `IAgileSession` and `IDataObject` methods and standard calls such as `getObject`, `getValue`, `setValue`. Information about these classes, tables, and attributes is provided in the `com.agile.api.RequestForQuoteConstants.java` file in the API HTML reference files. See [Client-Side Components](#) on page 2 to access these files.

RFQ Parent Table and Nested Child Table Constants

The list of parent RFQ table and the corresponding nested child table constants appears in the table below.

Parent Table Constant	Nested Child Table Constant	Read/Write Mode
TABLE_RESPONSES	ATT_RESPONSES_AML	Read/Write
TABLE_RESPONSES	ATT_RESPONSES_PRICING	Read/Write

Similar to Sourcing Projects, nested RFQ tables are accessed by treating their cell value as a table. See [Accessing and Modifying Nested Tables in Sourcing Projects or RFQ](#) on page 273. The following example updates a nested table.

Note Do not use `Project.ATT_RFQ_RFQ_STATE` to get the status of an RFQ, because it is not exposed to the SDK and will not render the correct value of the RFQ row. To get the status of an RFQ, you must first load the RFQ, and then get the status from the RFQ itself.

Example: Nested RFQ table update

```

ITable subtab1 =
    (ITable) row.getValue(RequestForQuoteConstants.ATT_RESPONSES_PRICING)
    ;
IRow pricing1 =
    (IRow) subtab1.iterator().next();
Integer nest =
    ProjectConstants.ATT_PRICEDETAILS_MATERIAL_PRICE;
Object nre =
    pricing1.getValue(nest);
Money tc =
    new Money(new Integer(100), "USD");
pricing1.setValue(nest, (Object)tc);

```

Note You must assign the supplier before updating an RFQ response table entry.

Performing Price Lookup in RFQs

Similar to [Performing Price Lookup in a Sourcing Project](#) on page 277, you can verify the existence of a price scenario for a specified period and quantity for RFQs. If they exist, you do not have to create an RFQ for the specified item. You can either use the price information of the item, or you can modify the price information and send the RFQ to suppliers for quote. This is shown in the following code sample.

Example: Price lookup from history and from another Sourcing Project

```
HashMap map = new HashMap();
map.put (PriceConstants.ATT_GENERAL_INFORMATION_PRICE_TYPE,priceTypes);
map.put (ProjectConstants.ATT_ANALYSIS_SUPPLIER,suppliers);
map.put (ProjectConstants.ATT_GENERAL_INFORMATION_CUSTOMER,customers);
map.put (ProjectConstants.ATT_GENERAL_INFORMATION_PROGRAM,programs);
map.put (ProjectConstants.
    ATT_GENERAL_INFORMATION_SHIP_TO_LOCATION,shipTo);
map.put (ProjectConstants.ATT_ITEMS_NUMBER,itemMap);
map.put (ProjectConstants.ATT_ITEMS_AML,mpnMap);
map.put (LookupConstants.FLAG_ALL_PRICE_SCENARIOS,allPriceScenarios);
map.put (LookupConstants.FIELD_PRICE_SCENARIO,priceScenario);
map.put (LookupConstants.FLAG_IGNORE_QUANTITY,ignoreQtyRange);
map.put (LookupConstants.FIELD_QUANTITY_RANGE,qtyPercentRange);
map.put (LookupConstants.FLAG_IGNORE_DATE_RANGE,ignoreDateRange);
map.put (LookupConstants.FIELD_DATE_RANGE,dateRange);
map.put (LookupConstants.
    FIELD_SELECT_RESPONSE_BY,LookupConstants.OPTION_LOWEST_PRICE);
map.put (LookupConstants.FLAG_EXCLUDE_AUTH_SUPPLIER,excludeAuthSupplier)
;
rfq.lookupPrices (map);
```

Required parameters for an RFQ price lookup

```
PriceConstants.ATT_GENERAL_INFORMATION_PRICE_TYPE
ProjectConstants.ATT_ANALYSIS_SUPPLIER,suppliers
ProjectConstants.ATT_ITEMS_NUMBER or ProjectConstants.ATT_ITEMS_AML
LookupConstants.FIELD_QUANTITY_RANGE if
LookupConstants.FLAG_IGNORE_QUANTITY is 'false'
LookupConstants.FIELD_DATE_RANGE if
LookupConstants.FLAG_IGNORE_DATE_RANGE is 'false'
LookupConstants.FIELD_PRICE_SCENARIO if
LookupConstants.FLAG_ALL_PRICE_SCENARIOS is 'false'
```

Impact of Improper parameter settings

LookupConstants.FLAG_EXCLUDE_AUTH_SUPPLIER will default to false if not set.

Working with RFQ Responses

The PCM SDK supports the following operations for RFQ responses, nested table of items responses, and Child AML responses:

- Read RFQ tables with different views (price scenarios, currency modes)

This is supported through generic SDK API.

- Add items to RFQs
- Add Response lines (Assign Suppliers)

PCM RFQ provides the following method for assigning suppliers to items or manufacturer parts.

```
public void assignSupplier(Object supplierParams)
    throws APIException, RemoteException, Exception;
```

You can assign supplier data such as Manufacturer Part Number (`mpn`) or supplier name as a String or an Object to the RFQ response.

Example: Adding supplier data as String constants

```
IRequestForQuote dObj =
    (IRequestForQuote)m_session.getObject(RequestForQuoteConstants.CLASS
        _RFQ, number);
ITable tab =
    dObj.getTable(RequestForQuoteConstants.TABLE_RESPONSES);
Map mp = new HashMap();
mp.put(ProjectConstants.ATT_RESPONSES_NUMBER, "P00007");
mp.put(ProjectConstants.ATT_RESPONSES_SUPPLIER, "SDKSUP");
dObj.assignSupplier(mp);
```

Example: Adding supplier data as Objects

You can also add an item as an `IItem` object as shown below.

```
mp.put(ProjectConstants.ATT_RESPONSES_NUMBER, itemObject);
```

If you are assigning a supplier to an `mpn`, you must specify the `mpn` as an `IManufacturerPart` Object, or as a pair of Objects. One for the `mpn` name and one for `mfr` name.

```
mp.put(RequestForQuoteConstants.ATT_RESPONSES_NUMBER, mpnObject);
```

Or,

```
mp.put(RequestForQuoteConstants.ATT_RESPONSES_NUMBER, mpnName);
mp.put(RequestForQuoteConstants.ATT_RESPONSES_MANUFACTURER, mfrName);
```

Caution When you invoke `RequestForQuote.TABLE_RESPONSE` to assign suppliers to item components, the table size may change if there is more than one supplier for that item component. That is, if an item has a single supplier, each item and the corresponding supplier will occupy their own distinct separate rows in the `TABLE_RESPONSE` table. However, if the item has more than one supplier, then the row for this item component is split into the number of suppliers, thus changing `TABLE_RESPONSE` by increasing the number of rows in the table. It is therefore necessary to immediately reload the `ITERATOR` to reflect the change in `TABLE_RESPONSE` table. This is not an SDK defect and is due to `SUN J2SE ITERATOR` behavior.

▫ Update Response Lines

The PCM SDK supports the RFQ response table through generic SDK API. It does not support the RFQ Response Class or Supplier Response.

Note The response currency in the RFQ response line is determined by the response currency attribute. This causes the server to ignore the currency parameter in the material price. Buyers can modify the response currency in the response line and it will be applied to all pricing attributes in the response line. The supplier RFQ response currency is set to your RFQ currency preference and cannot be modified in the supplier responses. Once the response line is opened to suppliers, the response line must be locked before buyers can modify them.

Managing Product Governance & Compliance

This chapter includes the following:

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About Agile Product Governance and Compliance

Agile Product Governance & Compliance (PG&C) addresses the growing number of environmental regulations and corporate environmental policies that impact product definition and the import, export, and disposal of restricted substances. Agile PG&C is designed to help OEM manufacturers audit the amount of regulated substances used in their products, and show that they responsibly dispose of, recycle or reuse electronics containing those substances.

Agile PG&C allows companies to cost-effectively comply with environmental regulations. Companies can use Agile PG&C to obtain compliance data for parts from their suppliers. This allows companies to

- Meet substance restrictions
- Satisfy reporting requirements for regulations
- Design recyclable products
- Minimize compliance costs
- Eliminate noncompliance on future products

Agile PG&C is a communication vehicle between the Compliance Manager and suppliers. The Compliance Manager ensures that a company's products adhere to government regulations and company policy. As the Material Provider, the supplier completes and signs off on material

declarations, thereby disclosing which hazardous substances are contained within the components and subassemblies it provides. For a more detailed overview of Agile PG&C features, refer to the *Product Governance & Compliance User Guide*.

Agile PG&C Interfaces and Classes

The following table lists Agile PG&C-related interfaces and classes:

Object	Interface	Constants Class
Declaration	IDeclaration	DeclarationConstants
Specification	ISpecification	SpecficationConstants
Substance	ISubstance	SubstanceConstants
Part Groups	ICommodity	PartGroupConstants

Items, Manufacturer Parts, and Part Groups are objects that are also related to Agile PG&C. They have Specifications, Compositions, and Substances tables that are populated with data when declarations are released. For Manufacturer Parts, you can edit the Compositions and Substances tables directly without submitting a declaration.

Note The terms “part group” and “commodity” are used interchangeably in this guide to refer to any `ICommodityObject`. `ICommodity` represents the Part Group base class, which includes the Commodity and Part Family subclasses.

Of course, other common Agile API interfaces, such as `ITable`, `IDataObject`, and `ICell`, are also used to work with Agile PG&C objects.

Agile PG&C Roles

Agile PLM provides two out-of-the-box roles designed for Agile PG&C users:

- **Compliance Manager** – This provides privileges needed to create and manage Agile PG&C objects, such as Declarations, Substances, and Specifications, and run Agile PG&C reports. Compliance Managers are responsible for routing material declarations to suppliers.
- **(Restricted) Material Provider** – This provides privileges needed to create and modify declarations, as well as read all other types of Agile PG&C objects. This role is typically assigned to supplier users, who have restricted access to the Agile PLM system. Material Providers are responsible for completing and signing off on material declarations.

To use Agile PG&C APIs mentioned in this chapter, make sure you log in as a user assigned either the Compliance Manager role, or the (Restricted) Material Provider role. For more information about Agile PLM roles, refer to the *Agile PLM Administrator Guide*.

Note The *Discover Change* privilege mask is not included in the *Compliance Manager* role. If you only have the Compliance Manager role, then you do not have sufficient privileges to use the API to set the calculated compliance of a part in a Declaration, and pass the *Change Number* to the SDK call. To pass the Change Number in the SDK call, you must have the *Discover Change* privilege mask for that object in the Change Orders class. For more information, see [Setting Values in the Calculated Compliance Field for Declaration Objects](#) on page 320.

Creating Declarations, Specifications, and Substances

The following paragraphs provide definitions and procedures to define and manage these PG&C classes.

Creating Declarations

A Declaration object is the main record of Agile PG&C. It tracks the substances and materials that are used for items, manufacturer parts, and part groups. When you release a declaration, the information gathered from it is published to the product record, thereby updating the Composition data contained within the items, manufacturer parts, and part groups listed by the declaration.

There are seven declaration subclasses provided with Agile PLM:

- Homogeneous Material Declaration – A homogeneous material composition declaration that uses material-level specifications.
- IPC 1752-1 Declaration – A material composition declaration for electronic products that conforms to IPC standards and uses only one part-level specification.
- IPC 1752-2 Declaration – A homogeneous material composition declaration for electronic products that conforms to IPC standards and uses only one material-level specification.
- JGPSSI Declaration – A material composition declaration that follows the Japanese Green Procurement (JGP) standard and uses part-level specifications.
- Part Declaration – A material composition declaration that uses part-level or material-level specifications.
- Substance Declaration – A material composition declaration for each substance within part-level specifications.
- Supplier Declaration of Conformance – A questionnaire to assess supplier compliance with specifications from customers and government agencies. The survey addresses compliance at a general company level. Can be used for CSR type declarations.

The procedure for creating a declaration is the same for all declaration subclasses. You must specify the declaration subclass as well as values for the Cover Page.Name and Cover Page.Supplier attributes. Other declaration attributes are optional.

By default, the Cover Page.Name field uses an Autonumber format with the prefix “MD” (for “Material Declaration”). Although the Autonumber format isn’t required, it makes sense to use the same prefix for all declarations to make it easier to search for them.

Note The case required for the Cover Page.Name field depends on the selected character set for the field. For more information about defining and modifying character sets, Refer to the *Agile PLM Administrator Guide*.

Supplier users with the (Restricted) Material Provider role can also create declarations. However, in this case, only the Cover Page.Name attribute is required to create the object. The Cover Page.Supplier attribute is filled in automatically with the user's supplier organization.

The following example shows how to create a JGPSSI declaration.

Example: Creating a JGPSSI Declaration

```
public void CreateJGPSSIDeclaration(String num, ISupplier supplier)
throws Exception {
    // Create a Map object to store parameters
    Map params = new HashMap();
    // Initialize the params object
    params.put(DeclarationConstants.ATT_COVER_PAGE_NAME, num);
    params.put(DeclarationConstants.ATT_COVER_PAGE_SUPPLIER, supplier);
    // Get the JGPSSI Declaration subclass
    IAgileClass declClass = m_session.getAdminInstance().getAgileClass(
        DeclarationConstants.CLASS_JGPSSI_DECLARATION);
    // Create a new JGPSSI declaration
    IDeclaration object =
        (IDeclaration)m_session.createObject(declClass, params);
}
```

Creating Specifications

Specifications are used to state the criteria that a product is expected to meet or exceed. They are generally used to limit the amount of restricted substances contained in a product. Specifications can be internal documents issued by a company or industry, or, more commonly, they are regulations issued by a governing body. Here are some examples of government regulations:

- Restrictions on the Use of Certain Hazardous Substances in Electrical and Electronic Equipment (RoHS) Directive, issued by the European Union
- Waste Electrical and Electronic Equipment (WEEE) Directive, issued by the European Union
- Food Allergen Labeling and Consumer Protection Act (FALCPA), issued by the U.S.A. Food and Drug Administration (FDA)

A specification defines a list of substances, the parts-per-million (PPM) threshold for each substance, and whether a particular substance is restricted. Compliance Managers can use specifications to pre-populate material declarations with appropriate substances to ensure compliance.

The only required attribute you must specify when you create a specification is General Info.Name. The name must be unique. The name is case-insensitive, which means "ROHS" is treated the same as "Rohs".

The General Info.Validation Type attribute is important because it determines whether the specification is Part Level (the default) or Homogeneous Material Level, which affects the types of declarations that can be used with the specification. Another optional attribute is General Info.Lifecycle Phase.

When you create a specification, the default lifecycle phase is Active. To make the specification obsolete, change the value of its lifecycle phase attribute to Obsolete.

Example: Creating a specification

```
public void createSpecification(String name) throws Exception {
    ISpecification spec =
        (ISpecification)
        m_session.createObject(SpecificationConstants.CLASS_SPECIFICATION,
            name);
}
```

Creating Substances

There are four substance subclasses provided with Agile PLM:

- Subpart – a subunit of a component manufacturer part. The Composition table of a subpart can have other subparts, materials, substance groups, and substances.
- Material – a compound consisting of several substances. The Composition table of a material can have substance groups or substances.
- Substance Group – a group of substances. The Composition table of a substance group can have only substances.
- Substance – a single element, such as lead, chromium, or cadmium. Substances do not have a Composition table.

These substance subclasses comprise the hierarchy of objects that can appear on a Composition table, also known as the Bill of Substances.

Creating a Subpart

A subpart object is a subunit of a component that is tracked in Agile PLM. Subparts are parts without a part number that are used to create a bill of material of manufacturer parts or parts within a composition.

Example: Creating a subpart

```
public void createSubpart(String num) throws Exception {
    // Create a Map object to store parameters
    Map params = new HashMap();
    // Initialize the map object
    params.put(SubstanceConstants.ATT_GENERAL_INFO_NAME, num);
    // Get the Subpart subclass
    IAgileClass subClass =
        m_session.getAdminInstance().getAgileClass(SubstanceConstants.CLASS_
            SUBPART);
    // Create a new Subpart
    ISubstance sub =
        (ISubstance)m_session.createObject(class, params);
}
```

Creating a Substance Group

A substance group object is a group of multiple substances tracked in Agile PLM that have a common base substance. Every substance within the group has a conversion factor used to convert the weight of the base substance of the group.

Example: Creating a substance group

```
public void createSubstanceGroup(String num, ISubstance sub) throws
Exception {
    // Create a Map object to store parameters
    Map params = new HashMap();
    // Initialize the map object
    params.put(SubstanceConstants.ATT_GENERAL_INFO_NAME, num);
    params.put(SubstanceConstants.ATT_GENERAL_INFO_BASE_SUBSTANCE, sub);
    // Get the Substance Group subclass
    IAgileClass subClass =
    m_session.getAdminInstance().getAgileClass(SubstanceConstants.CLASS_
    SUBSTANCE_GROUP);
    // Create a new Substance Group
    ISubstance sub =
    (ISubstance)m_session.createObject(subClass, params);
}
```

Creating a Material

When you create a material object, the only attribute you need to specify is the General Info.Name attribute, which is equivalent to the substance number. After you create a material object, you can add substances to its Composition table.

Example: Creating a material object and adding substances to it

```
public void createMaterial(String num, ISubstance[] substances) throws
Exception {
    // Create a Map object to store parameters
    Map params = new HashMap();
    // Initialize the params object
    params.put(SubstanceConstants.ATT_GENERAL_INFO_NAME, num);
    // Create a new material
    ISubstance material =
    (ISubstance)m_session.createObject(SubstanceConstants.CLASS_MATERIAL
    , params);
    // Get the Composition table
    ITable composition =
    material.getTable(SubstanceConstants.TABLE_COMPOSITION);
    // Add substances to the Composition table
    for (int i = 0; i < substances.length; ++i) {
        IRow row = composition.createRow(substances[i]);
    }
}
```


Creating a Substance

Like material objects, the only attribute you need to specify to create a substance is the General Info.Name attribute, which is equivalent to the substance number. You can also specify other optional attributes, such as General Info.CAS Number.

Example: Creating a substance

```
public void createSubstance(String num, String casNumber) throws
Exception {
    // Create a Map object to store parameters
    Map params = new HashMap();
    // Initialize the params object
    params.put (SubstanceConstants.ATT_GENERAL_INFO_NAME, num);
    params.put (SubstanceConstants.ATT_GENERAL_INFO_CAS_NUMBER,
casNumber);
    // Get the Substance subclass
    IAgileClass subClass =
m_session.getAdminInstance().getAgileClass (SubstanceConstants.CLASS_
SUBSTANCE);
    // Create a new substance
    ISubstance substance =
(ISubstance)m_session.createObject(subClass, params);
}
```

Adding Items, Manufacturer Parts, and Part Groups to Declarations

Each declaration has separate tables for items, manufacturer parts, and part groups. Each of these also has an associated composition table: Item Composition, Manufacturer Part Composition, and Part Group Composition.

When you add an item to the Items table of a declaration, the latest released revision of the item is used. If the item does not have a released revision, the Introductory revision is used.

The following example shows how to add items, manufacturer parts, and part groups to a declaration.

Example: Adding items, manufacturer parts, and part groups to a declaration

```
public void addDecObjects(IDeclaration dec) throws APIException {
    try {
        HashMap params = new HashMap();
        //Add an Item to the Items table
        ITable tblItems =
dec.getTable (DeclarationConstants.TABLE_ITEMS);
        params.clear();
        params.put (DeclarationConstants.ATT_ITEMS_ITEM_NUMBER, "1000-02");
        IRow rowItems =
tblItems.createRow(params);

        //Add a Manufacturer Part to the Manufacturer Parts table
```

```

ITable tblMfrParts =
    dec.getTable(DeclarationConstants.TABLE_MANUFACTURERPARTS);
    params.clear();
    params.put(DeclarationConstants.ATT_MANUFACTURER_PARTS_MFR_PART_NUMBER, "Widget103");
    params.put(DeclarationConstants.ATT_MANUFACTURER_PARTS_MFR_NAME, "ACME");
    IRow rowMfrParts = tblMfrParts.createRow(params);
    //Add a Commodity to the Part Groups table
ITable tblPartGroups =
    dec.getTable(DeclarationConstants.TABLE_PARTGROUPS);
    params.clear();
    params.put(DeclarationConstants.ATT_PART_GROUPS_NAME, "RES");
    IRow rowPartGroups =
        tblPartGroups.createRow(params);
    } catch (APIException ex) {
        System.out.println(ex);
    }
}
}

```

Adding Substances to Declarations

You can add substances to the Item Composition, Manufacturer Part Composition, and Part Group Composition tables contained within a declaration. To publish substances into items, manufacturer parts, and part groups, you release the declaration. When the declaration is released, the substances get added automatically to the Substances tables of the corresponding items, manufacturer parts, and part groups.

The composition tables for a declaration are mapping tables; they map parts to their substances. If there are no substances for the parent object, the composition table has no rows.

To add a row to the composition tables of a declaration, use the `ITable.createRow()` method. Because the composition tables are mapping tables, you cannot pass an `ISubstance` object to create the row. Instead, specify a `Map` object containing attribute-value pairs.

Important The Substances and Composition tables for items and part groups are read-only. They get populated with data only when declarations are released.

To add a substance to one of the Composition tables of a declaration:

1. Add an item, manufacturer part, or part group to the Items, Manufacturer Parts, or Part Groups tables of a declaration, respectively.
2. Add a substance row to the Composition table that references the parent row on the Items, Manufacturer Parts, or Part Groups table. Use the virtual attribute `DeclarationConstants.ATT_PARENT_ROW` to specify the parent row. When you add a substance, specify the substance name and substance type.

Important For the Agile SDK, Composition tables for declarations list all parent objects contained in the Items, Manufacturer Parts, and Part Groups tables. Agile Web Client represents Composition tables differently. It shows a separate Composition table for each parent object.

When you create a row in the Composition tables, you pass a `Map` object containing attribute-value pairs. The following table lists the attributes the `Map` object must contain:

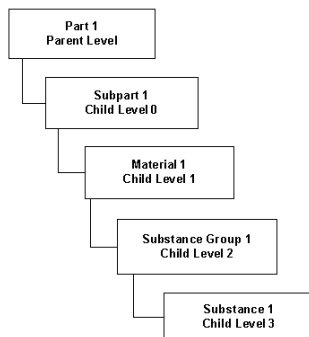
Composition Table	Required Attributes	DeclarationConstants
Item Composition	Item Row Substance Name	ATT_PARENT_ROW ATT_ITEM_COMPOSITION_SUBSTANCE_NAME
Manufacturer Part Composition	Manufacturer Part Row Substance Name	ATT_PARENT_ROW ATT_MANUFACTURER_PART_COMPOSITION_SUBSTANCE_NAME
Part Group Composition	Part Group Row Substance Name	ATT_PARENT_ROW ATT_PART_GROUP_COMPOSITION_SUBSTANCE_NAME

Structure of Bill of Substances

When you add substances to the Composition tables of a declaration, you can structure them in multiple levels. The number of levels you can use depends on the type of declaration.

- Homogeneous Materials Declaration – You can create a multilevel Bill of Substances with subparts, materials, substance groups, and substances. The composition must contain either a subpart or a material as a direct child. It can also include substances and substance groups, but they must be attached to a subpart or material.
- Substance Declaration/JGPSSI Declaration – Users can add substances or substance groups to the Composition tables.
- Part Declaration/Supplier Declaration of Conformance – These declarations do not have Composition tables.

The following figure shows the hierarchy for a Bill of Substances (Composition) with four child levels.



Rules for Adding Substances

Follow these rules when adding substances to a Composition table:

- Parent objects must be added before their children.
- Subparts can have the following children: other Subparts, Materials, Substance Groups, or Substances.
 - A Subpart cannot contain Subparts, Materials, Substance Groups, and Substances all at the same level.
 - A Subpart can contain other Subparts and Material at the same level.
 - A Subpart can contain Substance Groups and Substances at the same level.
- Material can have the following children: Substance Groups or Substances.
- Substance Groups can have the following children: Substances only.

Adding Subparts and Materials that Do Not Exist

When you add substances to a Composition table of a declaration, you can specify “dummy” subparts and materials that do not exist in the Agile PLM system. Such subparts and materials will be visible only within the Composition table. When you add “dummy” subparts and materials to the Composition table, you must specify the Substance Type attribute:

- `ATT_ITEM_COMPOSITION_SUBSTANCE_TYPE`
- `ATT_MANUFACTURER_PART_COMPOSITION_SUBSTANCE_TYPE`
- `ATT_PART_GROUP_COMPOSITION_SUBSTANCE_TYPE`

The following example shows how to add a dummy subpart or material to the Manufacturer Part Composition table. Because the `Substance Type` field is a list field, the value passed for it is an `I AgileList`.

Example: Adding a dummy subpart or material to the Manufacturer Part Composition table

```
public IRow addDummy(IDeclaration dec, IRow parentRow,
    String dummyName, IAgileList subtype)
    throws APIException {
    try {
        HashMap params = new HashMap();
        ITable tblMfrPartComp =
            dec.getTable(DeclarationConstants.TABLE_MANUFACTURERPARTCOMPOSITION)
            ;
        params.put(DeclarationConstants.ATT_PARENT_ROW, parentRow);
        params.put(DeclarationConstants.ATT_MANUFACTURER_PART_COMPOSITION_SU
            BSTANCE_NAME, dummyName);
        params.put(DeclarationConstants.ATT_MANUFACTURER_PART_COMPOSITION_SU
            BSTANCE_TYPE, subtype);
        IRow dummyRow = tblMfrPartComp.createRow(params);
        return dummyRow;
    } catch (APIException ex) {
        System.out.println(ex);
    }
}
```

Examples of Adding Substances

The following examples show how to add:

- Substances to the Manufacturer Part Composition Table of a Homogeneous Material Declaration
- Substances to the Manufacturer Part Composition Table of a Substance Declaration

Adding Substances to Manufacturer Part Composition Table of Homogeneous Material Declarations

The following example shows how to add substances to a Manufacturer Part Composition table of a Homogeneous Material Declaration. The table has four levels: subparts, materials, substance groups, and substances. When you add a substance row to the table, we recommend that you pass a substance object (`ISubstance`) instead of a substance name (`String`) as the input parameter.

Example: Adding Homogeneous Material Level substances to a Manufacturer Part Composition table

```
public void addHomogeneousMaterialComp(IAgileSession m_session) throws
APIException {
    try {
        HashMap params = new HashMap();
// Create a Declaration
String num =
    "MDTEST001";
ISupplier supplier =
    (ISupplier)m_session.getObject(ISupplier.OBJECT_TYPE,
    "DISTRIBUTOR00007");
params.put(DeclarationConstants.ATT_COVER_PAGE_NAME, num);
params.put(DeclarationConstants.ATT_COVER_PAGE_SUPPLIER, supplier);
IAgileClass declClass =
    m_session.getAdminInstance().getAgileClass(DeclarationConstants.CLAS
    S_HOMOGENEOUS_MATERIAL_DECLARATION);
IDeclaration dec =
    (IDeclaration)m_session.createObject(declClass, params);
// Add a Homogeneous Material Level spec to the Specifications table
ITable tblSpec =
    dec.getTable(DeclarationConstants.TABLE_SPECIFICATION);
params.clear();
ISpecification spec =
    (ISpecification)m_session.getObject(ISpecification.OBJECT_TYPE,
    "Lead Homogeneous Material Level");
IRow rowSpec = tblSpec.createRow(spec);
// Add a Manufacturer Part to the Manufacturer Parts table
ITable tblMfrParts =
    dec.getTable(DeclarationConstants.TABLE_MANUFACTURERPARTS);
params.clear();
params.put(DeclarationConstants.ATT_MANUFACTURER_PARTS_MFR_PART_NUMB
    ER, "Widget103");
params.put(DeclarationConstants.ATT_MANUFACTURER_PARTS_MFR_NAME,
    "ACME");
IManufacturerPart mfrPart =
```

```
        (IManufacturerPart) m_session.  
        getObject(IManufacturerPart.OBJECT_TYPE, params);  
        IRow rowMfrParts =  
            tblMfrParts.createRow(mfrPart);  
    // Add a subpart to the Composition table  
    ITable tblMfrPartComp =  
        dec.getTable(DeclarationConstants.TABLE_MANUFACTURERPARTCOMPOSITION)  
        ;  
    ISubstance subpart =  
        (ISubstance)m_session.getObject(SubstanceConstants.CLASS_SUBPART,  
        "Steel Casing");  
        params.clear(); params.put(DeclarationConstants.ATT_PARENT_ROW,  
        rowMfrParts);  
        params.put(DeclarationConstants.ATT_MANUFACTURER_PART_COMPOSITION_SU  
        BSTANCE_NAME, subpart);  
        IRow rowSubpart =  
            tblMfrPartComp.createRow(params);  
    // Add a material  
    ISubstance material =  
        (ISubstance)m_session.getObject(SubstanceConstants.CLASS_MATERIAL,  
        "Steel");  
        params.clear();  
        params.put(DeclarationConstants.ATT_PARENT_ROW, rowSubpart);  
        params.put(DeclarationConstants.ATT_MANUFACTURER_PART_COMPOSITION_SU  
        BSTANCE_NAME, material);  
        IRow rowMaterial =  
            tblMfrPartComp.createRow(params);  
    // Add a substance group  
    ISubstance sg =  
        (ISubstance)m_session.getObject(SubstanceConstants.CLASS_SUBSTANCE_G  
        ROUP, "Lead Compounds");  
        params.clear(); params.put(DeclarationConstants.ATT_PARENT_ROW,  
        rowMaterial);  
        params.put(DeclarationConstants.ATT_MANUFACTURER_PART_COMPOSITION_SU  
        BSTANCE_NAME, sg);  
        IRow rowSubGroup =  
            tblMfrPartComp.createRow(params);  
    // Add a substance  
    ISubstance sub =  
        (ISubstance)m_session.getObject(SubstanceConstants.CLASS_SUBSTANCE, "  
        Lead");  
        params.clear();  
        params.put(DeclarationConstants.ATT_PARENT_ROW, rowSubGroup);  
        params.put(DeclarationConstants.ATT_MANUFACTURER_PART_COMPOSITION_SU  
        BSTANCE_NAME, sub);  
        IRow rowSubs =  
            tblMfrPartComp.createRow(params);  
    } catch (APIException ex) { System.out.println(ex);  
    }  
}
```

Adding Substances to Manufacturer Part Composition Table of Substance Declarations

The following example shows how to add substances to a Manufacturer Part Composition table of a Substance Declaration. The table has two levels: substance groups and substances.

Example: Adding Part Level substances to a Manufacturer Part Composition table

```
public void addSubstanceComp(IAgileSession m_session) throws
APIException {
    try {
        HashMap params = new HashMap();
        //Create a Declaration
        String num =
            "MDTEST001";
        ISupplier supplier =
            (ISupplier)m_session.getObject(ISupplier.OBJECT_TYPE,
            "DISTRIBUTOR00007");
        params.put(DeclarationConstants.ATT_COVER_PAGE_NAME, num);
        params.put(DeclarationConstants.ATT_COVER_PAGE_SUPPLIER, supplier);
        IAgileClass declClass =
            m_session.getAdminInstance().getAgileClass(DeclarationConstants.C
            LASS_SUBSTANCE_DECLARATION);
        IDeclaration dec =
            (IDeclaration)m_session.createObject(declClass, params);
        //Add a Specification to the Specifications table
        ITable tblSpec =
            dec.getTable(DeclarationConstants.TABLE_SPECIFICATION);
        params.clear();
        // Part Level
        ISpecification spec =
            (ISpecification)m_session.getObject(ISpecification.OBJECT_TYPE,
            "Lead Part Level");
        IRow rowSpec =
            tblSpec.createRow(spec);
        //Add a Manufacturer Part to the Manufacturer Parts table
        ITable tblMfrParts =
            dec.getTable(DeclarationConstants.TABLE_MANUFACTURERPARTS);
        params.clear();
        params.put(DeclarationConstants.ATT_MANUFACTURER_PARTS_MFR_PART_N
        UMBER, "Widget103");
        params.put(DeclarationConstants.ATT_MANUFACTURER_PARTS_MFR_NAME,
        "ACME");
        IManufacturerPart mfrPart =
            (IManufacturerPart)
            m_session.getObject(IManufacturerPart.OBJECT_TYPE, params);
        IRow rowMfrParts =
            tblMfrParts.createRow(mfrPart);
        //Add a substance group
        ITable tblMfrPartComp =
            dec.getTable(DeclarationConstants.TABLE_MANUFACTURERPARTCOMPOSITI
            ON);
        ISubstance sg =
            (ISubstance)m_session.getObject(SubstanceConstants.CLASS_SUBSTANC
            E_GROUP, "Lead Compounds");
        params.clear();
        params.put(DeclarationConstants.ATT_PARENT_ROW, rowMfrParts);
```

```
        params.put(DeclarationConstants.ATT_MANUFACTURER_PART_COMPOSITION_SUBSTANCE_NAME, sg);
        IRow rowSubGroup =
            tblMfrPartComp.createRow(params);
//Add a substance
        ISubstance sub =
            (ISubstance)m_session.getObject(SubstanceConstants.CLASS_SUBSTANCE, "Lead");
        params.clear();
        params.put(DeclarationConstants.ATT_PARENT_ROW, rowSubGroup);
        params.put(DeclarationConstants.ATT_MANUFACTURER_PART_COMPOSITION_SUBSTANCE_NAME, sub);
        IRow rowSubs =
            tblMfrPartComp.createRow(params);
    } catch (APIException ex) { System.out.println(ex);
    }
}
```

Adding Substances to a Specification

The Substances table of a specification is important to Agile PG&C because it identifies which substances are restricted and their threshold mass parts per million (PPM). Only substances and substance groups can be added to the Substances table of a Specification. To add a substance to the Substances table, use the `ITable.createRow()` method. You can pass an `ISubstance` or a `Map` object to create the new row.

Example: Adding a substance to a specification

```
public void addSubstanceToSpec(ISpecification spec, ISubstance
substance)
    throws Exception {
    IRow row = null;
    //Add a substance to the Substances table
    ITable tableSub =
spec.getTable(SpecificationConstants.TABLE_SUBSTANCES);
    row = tableSub.createRow(substance);
    if (row!=null){
        //Set value of Restricted
        ICell cell =
row.getCell(SpecificationConstants.ATT_SUBSTANCES_RESTRICTED);
        IAgileList list = (IAgileList)cell.getAvailableValues();
        list.setSelection(new Object[] {"Yes"});
        cell.setValue(list);

        //Set value of Threshold Mass PPM

row.setValue(SpecificationConstants.ATT_SUBSTANCES_THRESHOLD_MASS_PPM,
new Integer(10));
    }
}
```


Adding Specifications to a Declaration

The Specifications table of a declaration lists specifications related to the items, manufacturer parts, and part groups contained in the declaration. The purpose of a declaration is to ensure that suppliers comply with any restrictions stated in the specifications.

Rules for Adding Specifications

Specifications are optional for declarations. If you submit a declaration without a specification, it means you intend to collect raw data (mass or PPM) at the substance level. The supplier must provide information on all materials and substances.

If you add a specification to a declaration, note that declaration classes support different types of specifications. The following table lists the specification requirements for each type of declaration:

Declaration Type	Supported Specification Validation Types
Homogeneous Material Declaration	Homogeneous Material Level
IPC 1752-1 Declaration	Part Level
IPC 1752-2 Declaration	Homogeneous Material Level
JGPSSI Declaration	Part Level
Part Declaration	Part Level and Homogeneous Material Level
Substance Declaration	Part Level
Supplier Declaration of Conformance	Part Level and Homogeneous Material Level

Specifications may concern many substances, including those not used by the parts contained in the declaration. When the declaration is opened to the supplier, any relevant substances from the specifications are automatically added to the Item Composition, Manufacturer Part Composition, and Part Group Composition tables. This ensures that you are properly tracking any restricted substances contained in parts listed in the declaration.

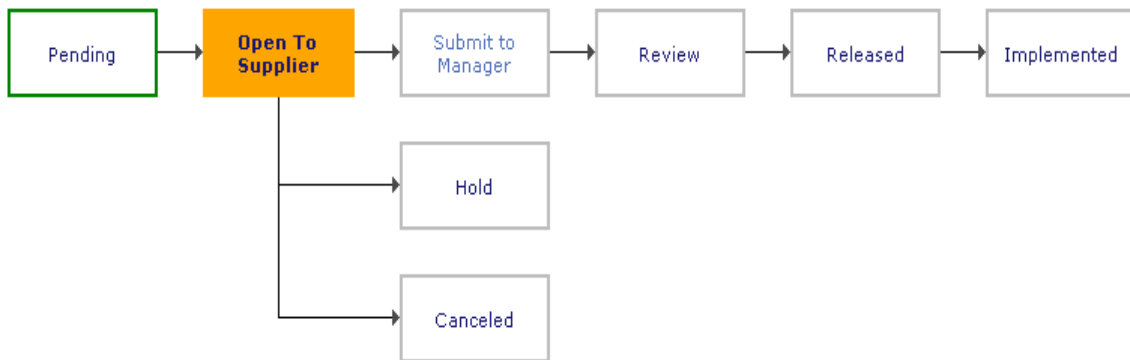
Example: Adding specifications to the Specification table

```
private void addSpecifications(IDeclaration dec, ISpecification[]
specs) throws Exception {
    ITable tableSpecs =
dec.getTable(DeclarationConstants.TABLE_SPECIFICATION);
    for (int i = 0; i < specs.length; ++i) {
        ISpecification spec = specs[i];
        IRow row = tableSpecs.createRow(spec);
    }
}
```

Routing Declarations

The Default Declarations Workflow follows a straightforward process flow, as shown in the following figure.

Figure 21: Default Declarations workflow



The following table describes each status in the Default Declarations workflow.

Status	Description
Pending	The Compliance Manager creates a new declaration, adding new items, manufacturer parts, or part groups. He also adds specifications to the declaration.
Open To Supplier	The Compliance Manager opens the declaration to the supplier, asking him to confirm whether parts comply with specifications. When the Workflow status of a declaration is changed from "Pending" to "Open To Supplier," the Agile PLM server automatically populates the declaration's Substances tables with any substances listed on its specifications.
Submit to Manager	The supplier electronically "signs" and submits the declaration back to the Compliance Manager.
Review	The Compliance Manager and other reviewers verify and approve the contents of the declaration.
Released	The Compliance Manager releases the declaration, thereby publishing the materials into the product record.
Implemented	Once the parts are manufactured and disseminated in the field, the Compliance Manager implements the declaration, thereby completing the workflow.

Before you can route a declaration, you should set values for the following three `Cover Page` fields:

- `Cover Page.Compliance Manager`
- `Cover Page.Workflow`
- `Cover Page.Due Date`

Technically, only the Compliance Manager and Workflow fields are required to route the declaration. The Due Date field is optional but should be specified for tracking purposes. The following example shows how to set values for these three fields.

Example: Setting values for the Compliance Manager, Workflow, and Due Date fields

```
public void setFieldsNeededForRouting(IDeclaration dec) throws
Exception {
    //Set the Compliance Manager field
    IUser user = m_session.getCurrentUser();
    dec.setValue(DeclarationConstants.ATT_COVER_PAGE_COMPLIANCE_MANAGER,
user);
    //Set the Workflow field
    IWorkflow workflow = dec.getWorkflows()[0];
    dec.setWorkflow(workflow);

    //Set the Due Date field
    DateFormat df = new SimpleDateFormat("MM/dd/yy");
    dec.setValue(DeclarationConstants.ATT_COVER_PAGE_DUE_DATE,
df.parse("05/01/05"));
}
```

To change the status of a declaration, use the `IRoutable.changeStatus()` method. Once a declaration is opened to a supplier, only the supplier's contact users can edit it. For other users, including the Compliance Manager, the declaration becomes read-only. The following example shows how the Compliance Manager can change the status of a declaration to "Open To Supplier."

Example: Opening a declaration to a supplier

```
public void openToSupplier(IDeclaration dec) throws Exception {
    IStatus status = null;
    // Get the Open to Supplier status type
    IStatus[] stats = dec.getNextStatuses();
    for (int i = 0; i < stats.length; i++) {
        if (stats[i].toString().equals("Open To Supplier")) {
            status = stats[i];
            break;
        }
    }
    // Change to the Open to Supplier status
    dec.changeStatus(status, false, null, false, false, null, null, null,
false);
}
```

For more information about Agile APIs that support Workflow processes, see [Managing Workflow](#) on page 205.

Completing a Declaration

When a declaration is opened to a supplier, the supplier is responsible for completing the declaration and disclosing if any restricted substances are contained in the components and subassemblies it provides and whether those substances comply with specifications. To complete and sign off on declarations, one or more contact users for the supplier must be assigned the (Restricted) Material Provider role.

The Material Provider user should do the following to complete a declaration:

- Fill in the Mass and Declared PPM fields or the Declared Compliance field for every substance listed on the Item Composition, Manufacturer Part Composition, and Part Group Composition tables, particularly for substances that are restricted by specifications.
- Complete other flex fields on the Composition tables as necessary.
- Add or remove substances from the declaration.

When the declaration is complete, the Material Provider user can sign off and submit the declaration to the Compliance Manager, described below.

Submitting Declarations to Compliance Managers

When the supplier changes the status of the declaration from “Open to Supplier” to “Submit to Manager,” he must sign-off on the declaration. Therefore, he must use the `changeStatus()` method that has an additional `password` parameter:

```
changeStatus(IStatus newStatus, boolean auditRelease, String comment,
boolean notifyOriginator, boolean notifyCCB, Object[] notifyList,
Object[] approvers, Object[] observers, boolean urgent, String
password)
```

The following example shows how the supplier can sign off and submit the declaration to the Compliance Manager.

Example: Signing off and submitting a declaration to the Compliance Manager

```
public void submitToCM(IDeclaration dec) throws Exception {

    IStatus status = null;
    // Get the Submit to Manager status type
    IStatus[] stats = dec.getNextStatuses();
    for (int i = 0; i < stats.length; i++) {
        if (stats[i].toString().equals("Submit To Manager")) {
            status = stats[i];
            break;
        }
    }

    // Change to the Submit to Manager status (signoff password is "agile")
    dec.changeStatus(status, false, null, false, false, null, null,
    null, false, "agile");
}
```

Publishing a Declaration

The Agile API does not provide a method to publish a material declaration to the product record. Instead, a declaration is automatically published when it is released. Therefore, as far as the API is concerned, the substances table for an item, manufacturer part, or part group always reflects the last released declarations. However, Agile Web Client allows you to select an later declaration and publish it, thereby updating the substances information in the product record.

Getting and Setting Weight Values

Unit of Measure fields have been implemented in Agile PLM to support mass (weight) values for Agile PG&C objects. The Unit of Measure datatype is a compound datatype that includes a numeric value and a unit, for example, grams or ounces.

You can configure and manage weight fields using the following interfaces:

- IMeasure
- IUnit
- IUnitOfMeasure
- IUnitOfMeasureManager

Although the Agile PLM administrator can define new measures from the UOM node in Agile Java Client, the Agile API supports only the Weight measure for Agile PG&C objects. You cannot use the Agile API to define new measures.

In Agile 9.2.1, the `Title Block.Weight` field for items was changed to `Title Block.Mass`. However, the Agile API constant for the field is still `ItemConstants.TITLE_BLOCK_WEIGHT`.

The following example shows how to get and set values for the `Title Block.Mass` field of an item.

Example: Getting and setting the mass (weight) value for an item

```
private IUnitOfMeasure getMassValue(IItem item) throws APIException {
    IUnitOfMeasure uom =
        (IUnitOfMeasure) item.getValue(ItemConstants.ATT_TITLE_BLOCK_WEIGHT);
    System.out.println("Value: " + uom.getValue());
    System.out.println("Unit: " + uom.getUnit().toString());
    return uom;
}

private void setMassValue(IItem item, double value, String unit) throws
APIException {
    IUnitOfMeasure uom = null;
    IUnitOfMeasureManager uommm =
        (IUnitOfMeasureManager) m_session.getManager(IUnitOfMeasureManager
            .class);
    uom = uommm.createUOM(value, unit);
    item.setValue(ItemConstants.ATT_TITLE_BLOCK_WEIGHT, uom);
    System.out.println("Value: " + uom.getValue());
    System.out.println("Unit: " + uom.getUnit().toString());
}
```

```
}
```

If you create a query to search for items by mass, only the numeric value is searched, not the unit. The server converts mass values to the standard unit before returning query results. For example, the following query returns all items whose mass value is between 1.0 and 2.0 grams (the default standard unit). Items with a mass between 1000 and 2000 milligrams would also be included in the search results.

Example: Searching for items by mass

```
try {
    IQuery query = (IQuery)m_session.createObject(IQuery.OBJECT_TYPE,
        "select * from [Items] where [Title Block.Weight] between (1.0,
        2.0)"
    );
    ITable results = query.execute();
} catch (APIException ex) {
    System.out.println(ex);
}
```

Adding Substance Compositions for Manufacturer Parts

With appropriate privileges, you can modify the Specifications, Compositions, and Substances tables of a manufacturer part directly without submitting a declaration. This feature is useful for manufacturing partners that want to specify composition information for their parts. To add a row to the Specifications, Compositions, and Substances tables, use the `ITable.createRow(Object)` method.

Note Once a row has been added to the Compositions and Substances tables of a Manufacturer Part, you cannot update or remove it.

The procedure for adding rows to the Substances table of a Manufacturer Part is similar to the way you add rows to the composition tables for a declaration. Follow these steps to add substance compositions into a manufacturer part:

1. Optionally, add a specification to the Specifications table.
2. Add a row to the Compositions table. You must specify a value for the `ManufacturerPartConstants.ATT_COMPOSITIONS_COMPOSITION_TYPE` attribute.
3. Add one or more rows to the Substances table. Each row must reference the parent row from the Compositions table. Use the virtual attribute `ManufacturerPartConstants.ATT_PARENT_ROW` to specify the parent row. When you add a substance, specify the substance name and substance type.

For additional rules about adding substances to the Substances table, see [Rules for Adding Substances](#) on page 303.

The Composition Type attribute for the parent row determines the types of substances you can add to the Substances table. There are three possible Composition Type values:

- Homogeneous Material Composition – You can create a multilevel Bill of Substances with subparts,

materials, substance groups, and substances. The composition must contain either a subpart or a material as a direct child. It can also include substances and substance groups, but they can only be attached to a subpart or material.

- Substance Composition – The Substances table can contain only substance groups and substances.
- Part Composition – You can't add rows to the Substances table.

Specifications that you reference in a row in the Compositions table must match the Composition Type attribute for that row. For example, if the Composition Type for the row is Homogeneous Material Composition, the validation type for a specification referenced in that row must be Homogeneous Material Level.

The following example shows how to define a Homogeneous Material composition for a manufacturer part. The Substances table has four levels: subparts, materials, substance groups, and substances.

Example: Adding specifications, compositions, and substances to a Manufacturer Part

```
public void addMfrPartSubs(IAgileSession m_session) throws APIException
{
    try {
        // Create a Manufacturer Part
        HashMap params = new HashMap();
        params.put (ManufacturerPartConstants.ATT_GENERAL_INFO_MANUFACTURER_P
            ART_NUMBER, "Widget");
        params.put (ManufacturerPartConstants.ATT_GENERAL_INFO_MANUFACTURER_N
            AME, "ACME");
        IManufacturerPart mfrPart =
            (IManufacturerPart)
            m_session.createObject (ManufacturerPartConstants.CLASS_MANUFACTURER_
                PART, params);
        // Add a Specification to the Specifications table
        ITable tblSpec =
            mfrPart.getTable (ManufacturerPartConstants.TABLE_SPECIFICATIONS);
        ISpecification spec =
            (ISpecification)m_session.getObject (ISpecification.OBJECT_TYPE, "Lead
                Spec");
        // Add Spec
        IRow rowSpec =
            tblSpec.createRow (spec);
        // Get the Compositions table and Set as Homogeneous Material Level
        ITable tblComp =
            mfrPart.getTable (ManufacturerPartConstants.TABLE_COMPOSITIONS);
        // Add a row to the Compositions table that references the
        // specification
        params.clear ();
        params.put (ManufacturerPartConstants.ATT_COMPOSITIONS_SPECIFICATION,
            spec.getName ());
        params.put (ManufacturerPartConstants.ATT_COMPOSITIONS_COMPOSITION_TY
            PE,
            "Homogeneous Material Composition");
        IRow rowComp =
            tblComp.createRow (params);
    }
}
```

```
// Get the Substances table
ITable tblSubs =
    mfrPart.getTable(ManufacturerPartConstants.TABLE_SUBSTANCES);
// Add a subpart
ISubstance subpart =
    (ISubstance)m_session.
        getObject(SubstanceConstants.CLASS_SUBPART,
"Steel Casing");
    params.clear();
    params.put(ManufacturerPartConstants.ATT_PARENT_ROW, rowComp);
    params.put(ManufacturerPartConstants.ATT_SUBSTANCES_SUBSTANCE_NAME,
subpart);
    IRow rowSubpart =
        tblSubs.createRow(params);
// Add a material
ISubstance material =
    (ISubstance)m_session.getObject(SubstanceConstants.CLASS_MATERIAL,
"Steel");
    params.clear();
    params.put(ManufacturerPartConstants.ATT_PARENT_ROW, rowSubpart);
    params.put(ManufacturerPartConstants.ATT_SUBSTANCES_SUBSTANCE_NAME,
material);
    IRow rowMaterial =
        tblSubs.createRow(params);
// Add a substance group
ISubstance sg =
    (ISubstance)m_session.getObject(SubstanceConstants.CLASS_SUBSTANCE_G
ROUP, "Lead Compounds");
    params.clear();
    params.put(ManufacturerPartConstants.ATT_PARENT_ROW, rowMaterial);
    params.put(ManufacturerPartConstants.ATT_SUBSTANCES_SUBSTANCE_NAME,
sg);
    IRow rowSubGroup =
        tblSubs.createRow(params);
// Add a substance
ISubstance sub =
    (ISubstance)m_session.getObject(SubstanceConstants.CLASS_SUBSTANCE, "
Lead");
    params.clear();
    params.put(ManufacturerPartConstants.ATT_PARENT_ROW, rowSubGroup);
    params.put(ManufacturerPartConstants.ATT_SUBSTANCES_SUBSTANCE_NAME,
sub);
    IRow rowSubs =
        tblSubs.createRow(params);
} catch (APIException ex) {
    System.out.println(ex);
}
}
```


Rolling Up Compliance Data

After gathering compliance data for items, manufacturer parts, and part groups, compliance managers review the completed declarations to determine if the data is ready for publication into the product record. Once declarations are published with the data written through to parts and part groups on BOMs, compliance managers must examine and test BOMs to ensure the assemblies and products are compliant. This process is called compliance validation and is fulfilled through compliance rollups. Rollups are built into the system. They are easy to use and rollup results are available on the UI. For more information on rolling up compliance data and the business logic behind this process, refer to the *Agile Product Governance & Compliance User Guide*.

The SDK supports calling the PG&C Rollup function on the server side. This is the same rollup function that is called by the UI. The `IPGCRollup` interface supports this feature.

Understanding the IPGCRollup Interface

The `IPGCRollup` interface provides the following methods to support rolling up compliance data:

- `rollup()`
- `rollup(Date)`

One of these methods has no parameters and the other has *Date* as a parameter. The *Date* parameter in the rollup API is used by the system to set the timestamp for the rollup, when it is done.

Example: IPGCRollup methods

```
public interface IPGCRollup {
    public void rollup()
        throws APIException;
    public void rollup(Date rollupDate)
        throws APIException;
}
```

Note After invoking `rollup(Date)`, it is necessary to call `IDataObject.refresh()` to make sure the rollup function has taken effect. Otherwise, the system will display the results obtained in the previous rollup if the timestamp of the recent rollup is the same as the *Date* parameter.

Passing the Date Parameter

If you do not pass the date, the system will use the current time provided by the system. When a rollup is performed on a set of items, if the timestamp of the recent rollup on an item is the same as the passed *Date* parameter, the system will not repeat the rollup process on that item. Instead, it will display the results obtained in the previous rollup. You may want to use this date feature if there is a large number of items to rollup and you want to use the SDK to call all of them. In this case, you will get the current date first, and then the pass that date for the subsequent SDK `Rollup(Date)` call. For example, you want to use the SDK to roll up data for Assembly 1 and Assembly 2. In this case, the SDK is called twice. The first instance, to roll up data for Assembly 1, and the second instance, to rollup data for Assembly 2. With the date parameter already inside the rollup when performing the rollup on Assembly 2, the system will reuse the previous rollup data obtained for Item1.

```
Assembly 1
  Item1
  Item2
Assembly 2
  Item1
  Item3
```

Using the IPGCRollup Interface

The following examples roll up the assembled data on Items and Manufacturer Parts:

- Item (latest released ECO or MCO)
- MPN (latest released ECO or MCO)

Rolling Up Assembled Data on Items

This example calls an API using the SDK to identify the top level parent of a given *Item* (its latest released ECO or MCO). Next, it will call the rollup API on the top level parent returned by the previous API to ensure the assemblies and products are compliant.

Example: Identifying the top level parent for an Item

```
public void itemRollup(String itemStr) throws Exception{
    try {

        IItem item =
            (IItem)m_session.getObject(IItem.OBJECT_TYPE, itemStr);
        IQuery query =
            (IQuery)m_session.createObject(IQuery.OBJECT_TYPE,
            ItemConstants.CLASS_ITEM_BASE_CLASS);
        //      IQuery query = (IQuery)
m_session.createObject(IQuery.OBJECT_TYPE, ItemConstants.CLASS_PART);
        query.setSearchType(QueryConstants.WHERE_USED_TOP_LEVEL);
        query.setCriteria("[1001] Equal To '"+item.getName()+"");
        //

        query.setCriteria("[ "+SDKWrapper.getString("TITLE_BLOCK")+ ". "+SDKWrapper
        r.getString("IQuery_Number")+ "] Equal To '"+item.getName()+"");
        ITable results=query.execute();
        if (results.size() > 0) {
            Iterator it =
                results.getReferentIterator();
            if (it.hasNext()) {
                IItem obj =
                    (IItem)it.next();
```

```

IItem tlaItem =
    (IItem)m_session.getObject(IItem.OBJECT_TYPE, obj.getName());
    tlaItem.rollup();
    }
    }
    else {
    item.rollup();
    }

    } catch (APIException e) {
    throw e;
    }
return;
}

```

Rolling Up Assembled Data on MPNs

This example calls an API using the SDK to identify the top level parent of a given *MPN* (its latest released ECO or MCO). Next, it will call the rollup API on the top level parent returned by the previous API to ensure the assemblies and products are compliant.

Example: Identifying the top level parent for an MPN

```

public void testMfrPartRollup() throws Exception{

    IManufacturerPart mfrp =
        (IManufacturerPart)
        m_session.getObject(IManufacturerPart.OBJECT_TYPE,
            "HARRIS::IS82C55A96");
    ITable whereused =
        mfrp.getTable(ManufacturerPartConstants.TABLE_WHEREUSED);
    Iterator it =
        whereused.iterator();
    while(it.hasNext())
    {
        IRow r = (IRow)it.next();
        // read item number
        String itemStr =
            r.getValue(ManufacturerPartConstants.ATT_WHERE_USED_ITEM_NUMBER).toString();
        try {
            itemRollup(itemStr);
        } catch (APIException e) {
            int error =
                ((Integer)e.getErrorCode()).intValue();
        }
    }
    return;
}

```

Setting Values in the Calculated Compliance Field for Item Objects

Use the following API to set the value of the *Calculated Compliance* field on the Specifications table of Item and ManufacturerPart objects:

```
Public void setCalculatedComplianceForPartSpec(Object specName, Object complianceEntryValue) throws APIException
```

In this API, the `specName` parameter is the name of the `Specification` object, and the `complianceEntryValue` parameter is the actual value of the Calculated Compliance field, which can be any entry in the Calculated Compliance list. Both parameters are of type `String`.

When this value is set by the SDK Client, it is never overwritten during the Rollup. This API allows users to set the calculated compliance value based on their own defined logic, instead of using the system's default logic.

Example: Setting the value of the Calculated Compliance field for Item objects

```
// COMPLIANT, the actual value of the Calculated Compliance field shows
// the Specification is compliant or not, based on customized calculated
// compliance result
String COMPLIANT = "Compliant";
// spec_num is the Specification Name in Item object's Specification
// Table
String spec_num =
    row.getValue(ItemConstants.ATT_SPECIFICATIONS_SPECIFICATION).toString();
item.setCalculatedComplianceForPartSpec(spec_num, COMPLIANT);
```

Setting Values in the Calculated Compliance Field for Declaration Objects

This is similar to the previous API that enabled setting the *Calculated Compliance* field for Item objects. You can use this API to set the value of the Calculated Compliance field in Item table and Manufacturer Part table for Declaration objects.

```
Public void setCalculatedComplianceForMDOPartSpec (Object partName, Object partClassName, Object changeNumber, Object specName, Object complianceEntryValue)) throws APIException
```

The system recognizes that the SDK Client has set this value and will use the new setting in the subsequent response during Rollup. In this API, the parameter `changeNumber` is optional. When the Declaration object has only one revision of an item, you can set the value of `changeNumber` to null. If the Declaration object has more than one revision of an item, you must set the value of `changeNumber` for the proper execution of the API.

Similar to the previous API, when this value is set by the SDK Client, it is never overwritten during the Rollup within the declaration. This API allows users to set the calculated compliance value based on their own defined logic, instead of using the system's default logic.

Note If the SDK developer intends to pass the `changeNumber` field to `setCalculatedComplianceForDeclarationPartSpec()`, the developer must have the Discover Change privilege mask for that change.

Example: Setting the value of the Calculated Compliance field for Declaration objects

```
// complianceValue -- This is the customized calculated compliance
// value and shows if the part is compliant to a Spec
String complianceValue = "Compliant";
// partName is the Item/Mfr Part name in Declaration's Item/MfrPart
// table. If it is a mfr part, it should be like "MfrName::MfrPartName"
String partName = "P00001"; String partClassName = "Parts";
// If the added part in Declaration is an Item, the changeName should
// be the
// Change number corresponding to the Item's revision.
// If the added part in Declaration is a Mfr Part, the
// changeName should be "null"
String changeName = "C00001";
// spec_num is the Specification Name in Declaration object's
// Specification Table
String specName = "Rohs";
Declaration.setCalculatedComplianceForDeclarationPartSpec
(partName, partClassName, changeName, specName, complianceValue);
```


Handling Exceptions

This chapter includes the following:

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About Exceptions

Errors that cause a problem in a Java program are called exceptions. When Java throws an exception that is not caught, your program may quit, or errors may appear onscreen. To handle an exception gracefully, your program must:

- Protect code that contains a method that might throw an exception by putting it in a `try` block.
- Test for and handle any exceptions that are thrown inside a `catch` block.

The Agile API provides a subclass of `Exception` called `APIException`. This is a general-purpose exception class that is used throughout the Agile API to handle Agile PLM runtime errors. In the Agile API HTML reference, each method indicates the types of exceptions it throws. Generally, any Agile API method that requires interaction with the Agile Application Server throws `APIException`. The table below lists the `APIException` class methods for handling exceptions:

Method	Description
<code>getErrorCode ()</code>	Returns the number of the error code associated with the <code>APIException</code> .
<code>getMessage ()</code>	Returns the error message associated with the <code>APIException</code> .
<code>getRootCause ()</code>	Returns the root cause of the <code>APIException</code> , if any.
<code>getType ()</code>	Returns the type of exception.

Exception Constants

The `ExceptionConstants` class contains `String` constants for all Agile Application Server and Agile API runtime error and warning codes. For a description of each of these constants, refer to the API Reference files at <http://edelivery.oracle.com/>.

Several of `ExceptionConstants` are for exceptions that are used to display an Agile PLM warning message before completing an action. All constants for warning messages end with the suffix `WARNING`. If you don't want to use Agile PLM warning messages in your code, you can disable them. For more information, see [Disabling and Enabling Warning Messages](#) on page 326.

Getting Error Codes

To properly trap warning errors, you may need to retrieve the error code of the exception and then handle it appropriately. Generally, this involves displaying a confirmation dialog box to let the user choose whether to complete the action. The following example shows how to check for the error code of an exception in the `catch` block.

Example: Getting Agile PLM error codes

```
private void removeApprover(IChange change, IUser[] approvers, IUser[]
observers, String comment) {
    try {
        // Remove the selected approver
        change.removeApprovers(change.getStatus(), approvers, observers,
comment);
    } catch (APIException ex) {
        if
(ex.getErrorCode().equals(ExceptionConstants.APDM_RESPONDEDUSERS_WAR
NING))
        JOptionPane.showMessageDialog(null, ex.getMessage(), "Warning",
JOptionPane.YES_NO_OPTION);
    }
}
```

Disabling and Enabling Error Codes with Bulk APIs

The SDK supports the following bulk operations in `IAgileSession` to disable/enable all error codes or for a given set of error codes:

- `IAgileSession.enableWarnings(Integer[])`
- `IAgileSession.disableWarnings(Integer[])`
- `IAgileSession.enableAllWarnings()`
- `IAgileSession.disableAllWarnings()`

The process is similar to the previous example. The following example shows how to use these bulk APIs to suppress warnings while releasing a Change.

Example: Disabling and enabling error codes in the bulk mode

```
public static void releaseECO(IAgileSession session, IChange change)
    throws Exception {
    // Set workflow
    IWorkflow workflow = change.getWorkflows()[0];
    change.setWorkflow(workflow);
    IStatus submit = getStatus(workflow, StatusConstants.TYPE_SUBMIT);
    IStatus ccb = getStatus(workflow, StatusConstants.TYPE_REVIEW);
    IStatus released = getStatus(workflow,
        StatusConstants.TYPE_RELEASED);
    session.disableWarnings(new Integer[] {
        ExceptionConstants.APDM_WFL_ATLEASTONECHGANALYST_WARNING,
        ExceptionConstants.APDM_MISSINGFIELDS_WARNING });
    // instead you can use session.disableAllWarnings()
    // route to SUBMIT
    change.changeStatus(submit, false, null, false, false, new
        Object[] {}, new Object[] {}, new Object[] {}, false);
    // Change status to CCB
    change.changeStatus(ccb, false, null, false, false, new Object[] {},
        new Object[] {}, new Object[] {}, false);
    // route from CCB to release
    change.changeStatus(released, false, "release", false, false, new
        Object[] {}, new Object[] {}, new Object[] {}, false);
    session.enableWarnings(new Integer[] {
        ExceptionConstants.APDM_WFL_ATLEASTONECHGANALYST_WARNING,
        ExceptionConstants.APDM_MISSINGFIELDS_WARNING });
    // instead you can use session.enableAllWarnings()
}

public static IStatus getStatus(IWorkflow workflow, StatusConstants
status)
    throws Exception {
    IStatus[] states = workflow.getStates(status);
    IStatus state = states[0];
    return state;
}
}
```

Getting Error Messages

If your program throws an `APIException`, which indicates an Agile PLM runtime error, you may want to display an error message. You can use the `getMessage()` method to return the error message string and then display it in a message dialog box, as shown in the following example.

Example: Getting an error message

```
// Display an error message dialog
void errorMessage(APIException ex) {
    try {
        JOptionPane.showMessageDialog(null, ex.getMessage(), "Error",
            JOptionPane.ERROR_MESSAGE);
    } catch (Exception e) {}
}
```

```
}
```

For a list of Agile PLM error messages, refer to the API Reference files (at <http://edelivery.oracle.com/>) under `ExceptionConstants`.

Disabling and Enabling Warning Messages

Several Agile PLM error messages are warnings that give you the option to stop or continue with an operation. By default, most error messages, including warning messages, are enabled. If you try to perform an action that triggers a warning, an exception will be thrown. To avoid the exception, you can disable the warning message before performing the action.

The following example shows how to check whether attempting to release a change causes an exception to be thrown. If the error code for the exception is `ExceptionConstants.APDM_UNRESPONDEDCHANGE_WARNING`, the program displays a warning. The user can click Yes in the warning dialog box to release the change.

Example: Disabling and enabling error codes

```
private void releaseChange(IAgileSession m_session, IChange chgObj) {
    IStatus nextStatus = null;
    try {
        // Get the default next status
        nextStatus = chgObj.getDefaultNextStatus();
        // Release the Change
        chgObj.changeStatus(nextStatus, false, "", false, false, null, null,
            null, false);
    } catch (APIException ex) {
        // If the exception is error code
        // ExceptionConstants.APDM_UNRESPONDEDCHANGE_WARNING,
        // display a warning message
        if (ex.getErrorCode() ==
            ExceptionConstants.APDM_UNRESPONDEDCHANGE_WARNING) {
            int i =
                JOptionPane.showConfirmDialog(null, ex.getMessage(),
                    "Warning", JOptionPane.YES_NO_OPTION);
            if (i == 0) {
                // If the user clicks Yes on the warning, disable the error code and
                // release the change
                try {
                    // Disable the warning
                    m_session.disableWarning(ExceptionConstants.APDM_UNRESPONDEDCHANGE_W
                        ARNING);

                    // Release the Change
                    chgObj.changeStatus(nextStatus, false, "", true, true, null, null,
                        null, false);
                    // Enable all warnings
                    m_session.enableWarning(ExceptionConstants.APDM_UNRESPONDEDCHANGE_WA
                        RNING);
                } catch (APIException exc) {}
            }
        }
    }
}
```

```
}

```

Checking if APIException is Warning and not Error

As noted above, if you try to perform an operation that triggers a warning, an exception will be thrown. Warning messages are helpful for interactive GUI clients, like Agile Web Client, but you may not want to use them in your Agile API program, particularly if it performs batch processes.

You can use `APIException.isWarning()` to check whether an Agile PLM exception is a warning. If so, you can disable the warning to continue the operation.

Example: Checking if an APIException is a warning

```
private void checkIfWarning(IAgileSession m_session) {

    boolean gotWarning = true;
    while (gotWarning) {
        try {
            // Add some API code here that throws an exception
            m_session.doNothing();
            gotWarning = false;
        } catch (APIException e) {
            try {
                if (e.isWarning())
                    m_session.disableWarning((Integer)e.getErrorCode());
            } catch (Exception ex) {}
            continue;
        }
        break;
    }
}
```

Saving and Restoring State Enabled and Disabled Warnings

Rather than keep track of which warning messages are disabled or enabled before beginning a particular operation, you can use `IAgileSession.pushWarningState()` to save the current state of enabled and disabled warnings. After completing the operation, you can restore the previous state of enabled and disabled warnings using `IAgileSession.popWarningState()`.

Example: Using `pushWarningState()` and `popWarningState()`

```
private void pushPopWarningState(IAgileSession m_session, IItem item)
throws APIException {
    // Save the current state of enabled/disabled warnings
    m_session.pushWarningState();
    // Disable two AML warnings
    m_session.disableWarning(ExceptionConstants.APDM_WARN_MFRNAMECHANGE_
        WARNING);
    m_session.disableWarning(ExceptionConstants.APDM_ONEPARTONEMFRPART_W
        ARNING);
}
```

```
// Get the Manufacturers table
ITable aml = item.getTable(ItemConstants.TABLE_MANUFACTURERS);
// Create a new row and set a value for the row
HashMap amlEntry = new HashMap();
amlEntry.put(ItemConstants.ATT_MANUFACTURERS_MFR_NAME, "MFR_TEST3");
amlEntry.put(ItemConstants.ATT_MANUFACTURERS_MFR_PART_NUMBER,
"MFR_PART3");
IRow rowAML1 = aml.createRow(amlEntry);
rowAML1.setValue(ItemConstants.ATT_MANUFACTURERS_REFERENCE_NOTES,
"new note");
// Restore the previous state of enabled/disabled warnings
m_session.popWarningState();
}
```

Warnings on Deleting Objects Automatically Disabled by Agile API

In the Agile Web Client, when you try to delete an object a warning message appears. These warning messages are not appropriate for batch processes in an Agile API program. Therefore, the Agile API implicitly disables the following warnings, which saves you the trouble of disabling them in your code.

- `ExceptionConstants.APDM_HARDDELETE_WARNING`
- `ExceptionConstants.APDM_SOFTDELETE_WARNING`

For more information about deleting objects, see [Deleting and Undeleting Objects](#) on page 32.

Performing Administrative Tasks

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About Agile PLM Administration

Agile Java Client provides administrative functionality that lets you manage the Agile Application Server. It lets you quickly and easily adapt your Agile PLM system to fit the way you do business. You can customize the Agile PLM system in several ways:

- Modify Agile PLM database properties
- Define object classes and subclasses
- Set preferences
- Create and configure user accounts
- Define user groups
- Define roles and privileges
- Define *SmartRules*, which set how you manage your change control process

The Agile API provides read/write access to all nodes of Agile PLM's administrative functionality. This means you can create Agile API programs that let users read and modify Agile PLM subclasses, and add, modify, or delete Agile PLM users. The Agile API does not allow you to create new nodes in the administrative tree structure. Therefore, you can't create workflows, criteria, and roles. However, you can create users and user groups because those objects have been implemented as data objects; `IUser` and `IUserGroup` both extend `IDataObject`.

Privileges Required to Administer Agile PLM

Before you can administer the Agile Application Server, you must have proper privileges. For access to administrative functionality, you should have the Administrator privilege. The Administrator role grants the Administrator privilege to all administrative functionality available on the server. The User Administrator role grants the Administrator privilege for functionality related to users and user groups.

Without the Administrator privilege, you cannot modify administrative nodes, users, and user groups. If you have not yet been granted Administrator rights to the Agile PLM system, contact the Agile PLM administrator.

To create users and user groups, you need the Create privilege for those objects. Several roles supplied with the Agile PLM system, such as the Administrator, User Administrator, and Change Analyst roles, include the Create privilege for users and user groups.

Administrative Interfaces

The following table lists interfaces related to Agile PLM's administrative functionality.

Interface	Description
IAdmin	Interface that lets you get Agile PLM classes, nodes, users, or user groups
IAgileClass	Class definition used to identify the category to which an object belongs
IAgileList	A general-purpose list interface for all SingleList or MultiList attributes and properties
IAttribute	Provides detailed information about a particular data member in an object
IAutoNumber	An AutoNumber source, which is a predefined, consecutive number series used to automatically number Agile PLM objects
ICriteria	A reusable set of search criteria used primarily for queries and Workflows
INode	A node in the administrative hierarchy. Each node is equivalent to an Admin node in the Agile Java Client
IProperty	A property of an Agile PLM administrative node
IRoutableDesc	Metadata that describes any object that implements the IRoutable interface, you can use IRoutableDesc to get the workflows for a class without instantiating an object of that class
ITableDesc	Metadata that describes an Agile PLM table, you can use ITableDesc to get table attributes without loading a table
ITreeNode	A generic node in a hierarchical tree structure. Several administrative interfaces, such as INode and IFolder, are subinterfaces of ITreeNode and therefore inherit its functionality Note: There is also a deprecated ITree interface which provides similar functionality to ITreeNode. Be sure to use ITreeNode instead.
IUser	An Agile PLM user
IUserGroup	A user group. Use user groups to define project teams, site-related groups, departments, or global groups

Interface	Description
IWorkflow	A Workflow node

Getting an IAdmin Instance

The `IAdmin` interface provides access to most administrative functionality for the Agile Application Server. To use the `IAdmin` interface, you first get an instance of `IAdmin` from the current session. The following example shows how to log in to the Agile Application Server and get an `IAdmin` instance.

Example: Getting an IAdmin instance

```
public IAgileSession m_session;
public IAdmin m_admin;
public AgileSessionFactory m_factory;

try {
    HashMap params =
        new HashMap();
    params.put(AgileSessionFactory.USERNAME, "jdassin");
    params.put(AgileSessionFactory.PASSWORD, "agile");
    m_factory =
        AgileSessionFactory.getInstance("http://agileserver/virtualPath");
    m_session =
        m_factory.createSession(params);
    m_admin =
        m_session.getAdminInstance();
} catch (APIException ex) {
    System.out.println(ex);
}
```

Once you have an `IAdmin` instance, you can:

- Traverse the server nodes
- Traverse the folder hierarchy
- Get Agile PLM classes and subclasses

Working with Nodes

The `INode` object represents a single node or object within Agile PLM's administrative tree. Similar to the Windows Explorer interface, each `INode` can be expanded to show child nodes. This simple hierarchy lets you navigate the administrative tree structure on the Agile Application Server. Examples of nodes are the root node (also called the Database node), Classes, Preferences, Roles, Privileges, and SmartRules.

This table shows the mapping of Agile Java Client nodes to Agile API administrative functionality.

Agile Java Client node	Agile API equivalent
Data Settings	
Classes	<code>NodeConstants.NODE_AGILE_CLASSES</code>
Character Sets	<code>NodeConstants.NODE_CHARACTER_SETS</code>
Lists	Not supported
Process Extensions	Not supported
AutoNumbers	<code>NodeConstants.NODE_AUTONUMBERS</code>
Criteria	<code>NodeConstants.NODE_CRITERIA_LIBRARY</code>
Workflow Settings	
Workflows	<code>NodeConstants.NODE_AGILE_WORKFLOWS</code>
User Settings	
Account Policy	Not supported
Users	Create a query of users
User Groups	Create a query of user groups
Supplier Groups	Not supported
Roles	<code>NodeConstants.NODE_ROLES</code>
Privileges	<code>NodeConstants.NODE_PRIVILEGES</code>
User Monitor	Not supported
Deleted Users	Not supported
Deleted User Groups	Not supported
System Settings	
SmartRules	<code>NodeConstants.NODE_SMARTRULES</code>
Viewer & Files	<code>NodeConstants.NODE_VIEWER_AND_FILES</code>
Notifications	<code>NodeConstants.NODE_NOTIFICATION_TEMPLATES</code>
Full Text Search	Not supported
UOM	Not supported
Company Profile	Not supported
Currency Exchange Rates	<code>IAdmin.getConversionRates()</code>
Commodities	Not supported
Product Cost Management	

Agile Java Client node	Agile API equivalent
Ship To Locations	Not supported
Project Portfolio Management	
Projects Health	Not supported
Cost Status	Not supported
Quality Status	Not supported
Resource Status	Not supported
Dashboard Management	Not supported
Default Role	Not supported
Agile Content Service	
Subscribers	<code>NodeConstants.NODE_SUBSCRIBERS</code>
Destinations	<code>NodeConstants.NODE_DESTINATIONS</code>
Events	<code>NodeConstants.NODE_EVENTS</code>
Filters	<code>NodeConstants.NODE_FILTERS</code>
Package Services	Not supported
Response Services	Not supported
Product Governance & Compliance	
Sign Off Message	Not supported
Server Settings	
Locations	<code>NodeConstants.NODE_SERVER_LOCATION</code>
Database	<code>NodeConstants.ROOT</code>
Preferences	<code>NodeConstants.NODE_PREFERENCES</code>
Licenses	<code>NodeConstants.NODE_SERVER_LICENSES</code> <code>NodeConstants.NODE_USER_LICENSES</code>
Task Monitor	Not supported
Task Configuration	Not supported
Example	
Example Roles	Not supported
Example Privileges	Not supported
Example Criteria	Not supported

Agile Web Client allows you to view and edit system and user settings by choosing `Admin` and `Settings` from the menu, respectively. The following table identifies how Agile Web Client administrative functionality maps to the Agile API.

Agile Web Client Node	Agile API equivalent
Tools > My Settings	
User Profile	User.General Info page
Change Password	IUser.changeLoginPassword() and IUser.changeApprovalPassword()
Transfer Authority	Not supported
Organize Bookmarks	My-Inbox folder
Organize Searches	Searches folder
Organize Reports	Not supported
Personal Groups	My-Inbox folder
Deleted Personal Groups	Not supported
Personal Criteria	Not supported
Personal Supplier Groups	Not supported
Tools > Administration > Web Client Settings	
Themes	Not supported
Tools > Administrator > User Settings	
Users	Create a query of users
User Groups	Create a query of user groups
Supplier Groups	Not supported
Deleted Users	Not supported
Deleted User Groups	Not supported
Dashboard Configuration	Not supported

Admin nodes in Agile PLM Clients do not have names that match up identically to their respective `NodeConstants`. For example, the Notifications node in Agile Java Client is equivalent to `NodeConstants.NODE_NOTIFICATION_TEMPLATES`. Similarly, the hierarchy of nodes that are represented in the Agile PLM database does not exactly match Agile Java Client node hierarchy.

If your Agile API program provides a tree view of the Agile PLM administrative nodes, you can use the view to interactively retrieve `INode` objects. From each `INode` object you can get the child nodes. If you continue to traverse the administrative node hierarchy, you can reach all node levels.

The following example shows how to retrieve the root node and its children, thus displaying the top-level nodes on the Agile Application Server.

Example: Retrieving top-level nodes

```
private void getTopLevelNodes() throws APIException {
    INode root =
        m_admin.getNode(NodeConstants.ROOT);
    if (null != root) {
        System.out.println(root.getName() + ", " + root.getId());
    }
}
```

```

Collection childNodes =
    root.getChildNodes();
for (Iterator it =
    childNodes.iterator();it.hasNext();) {
    INode node =
        (INode)it.next();
    System.out.println(node.getName() + ", " + node.getId());
}
}
}

```

Note When you call `getChildNodes()` on the root node, the results include several undocumented Agile PLM nodes. Any undocumented nodes are not supported by the Agile API.

For faster access, you can also retrieve a node by specifying its node ID constant. The `NodeConstants` class lists all administrative nodes that are directly accessible. The following example shows how to retrieve the `SmartRules` node and its properties.

Example: Retrieving SmartRules values

```

private void getSmartRules() throws APIException {
    //Get the SmartRules node in Agile Administrator
    INode node = m_admin.getNode(NodeConstants.NODE_SMARTRULES);
    System.out.println("SmartRules Properties");
    //Get SmartRules properties
    IProperty[] props = (IProperty[])node.getProperties();
    for (int i = 0; i < props.length; i++) {
        System.out.println("Name : " + props[i].getName());
        Object value = props[i].getValue();
        System.out.println("Value : " + value);
    }
}
}

```

Another way to get a node is to locate a parent node and then get one of its children using the `ITreeNode.getChildNode()` method. The `getChildNode()` method lets you specify a node by name or ID. You can also specify the path to a subnode, separating each node level with a slash character (`/`). The following example shows how to use the `getChildNode()` method to retrieve a node.

Example: Retrieving nodes using `ITreeNode.getChildNode()`

```

private INode getChildNode(INode node, String childName) throws
APIException {
    Node child = (INode)(node.getChildNode(childName)); return child;
}
}

```

Working with the Classes Node

The Classes node and its subnodes are similar to the `IAgileClass` objects that are returned by the `IAdmin.getAgileClasses()` method. The difference is that `getAgileClasses()` returns several virtual classes, such as `Item` and `Change`, that are not represented as nodes. To modify the properties of the attribute of a particular node, Agile recommends using the `IAdmin.getAgileClasses()` or `IAdmin.getAgileClass()` methods. Although it's possible to modify a subclass by traversing the Classes node and its subnodes, it is much easier to work with `IAgileClass` objects. For more information, see [Managing Agile PLM Classes](#) on page 336.

Managing Agile PLM Classes

The Agile Classes node provides a framework for classifying Agile PLM objects, such as parts, changes, and packages. Using Agile Java Client, you can define new subclasses for your organization. Although you can't use the Agile API to create new subclasses, you can read or modify any of the existing subclasses. For example, you can customize a subclass by defining the attributes that are visible in each table or on each page.

The Agile PLM classes framework is based on the types of objects that are created in Agile PLM. The objects that are available on your Agile PLM system depend on the Agile PLM agreement with Oracle.

Each Agile PLM class has at least one subclass. The following table lists Agile PLM base classes, classes, and Agile-supplied subclasses. Your Agile PLM system may include other user-defined subclasses.

Base Class	Classes	Predefined Subclasses
Changes	Change Orders	ECO
	Change Requests	ECR
	Deviations	Deviation
	Manufacturer Orders	MCO
	Price Change Orders	PCO
	Site Change Orders	SCO
	Stop Ships	Stop Ship
Customers	Customers	Customer
Declarations	Homogeneous Material Declarations	Homogeneous Material Declaration
	IPC 1752-1 Declarations	IPC 1752-1 Declaration
	IPC 1752-2 Declarations	IPC 1752-2 Declaration
	JGPSSI Declarations	Japan Green Procurement Survey Standardization Initiative Declaration
	Part Declarations	Part Declaration
	Substance Declarations	Substance Declaration

Base Class	Classes	Predefined Subclasses
	Supplier Declarations of Conformance	Supplier Declaration of Conformance
Discussions	Discussions	Discussion
File Folders	File Folders	File Folder
	Historical Report File Folders	Schedule Generated
		User Saved
Items	Documents	Document
	Parts	Part
Manufacturer Parts	Manufacturer Parts	Manufacturer Part
Manufacturers	Manufacturers	Manufacturer
Packages	Packages	Package
Prices	Published Prices	Contract
		Published Price
	Quote Histories	Quote History
Product Service Requests	Non-Conformance Reports	NCR
	Problem Reports	Problem Report
Projects	Activities	Phase
		Program
		Task
	Gates	Gate
Quality Change Requests	Audits	Audit
	Corrective and Preventive Actions	CAPA
Reports1	Custom Reports	Custom Report
	External Reports	External Report
	Standard Reports	Administrator Report
		Standard Report
Requests for Quote	Requests for Quote	RFQ
RFQ Responses	RFQ Responses	RFQ Response
Sites	Sites	Site
Sourcing Projects	Sourcing Projects	Sourcing Project
Specifications	Specifications	Specification
Substances	Materials	Material
	Subparts	Subpart

Base Class	Classes	Predefined Subclasses
	Substance Groups	Substance Group
	Substances	Substance
Suppliers	Suppliers	Broker
		Component Manufacturer
		Contract Manufacturer
		Distributor
		Manufacturer Representative
Transfer Orders	Automated Transfer Orders	ATO
	Content Transfer Orders	CTO
User Groups	User Groups	User Group
Users	Users	User

Note Report objects are not supported by the Agile API.

Concrete and Abstract Classes

Agile PLM super classes, such as Item and Change, are abstract classes that serve as the parent classes for other abstract classes, such as Parts Class, Documentation Class, and Engineering Change Order Class. Abstract superclasses and classes cannot be instantiated.

Concrete classes are user-defined subclasses that can be instantiated by the Agile API. Examples of concrete classes are Part, Document, ECO, and ECR.

When you load an object using the `IAgileSession.getObject()` method, you can specify either a concrete or an abstract Agile PLM class. For example, all of the following methods load the same specified part.

Example: Loading an object using abstract or concrete classes

```
try {
    IItem item;
    // Load a part using the Item base class
    item =
        (IItem)m_session.getObject(ItemConstants.CLASS_ITEM_BASE_CLASS,
            "1000-02");
    // Load a part using the Parts class
    item =
        (IItem)m_session.getObject(ItemConstants.CLASS_PARTS_CLASS, "1000-
            02");
    // Load a part using the Part subclass
    item =
        (IItem)m_session.getObject(ItemConstants.CLASS_PART, "1000-02");
} catch (APIException ex) {
    System.out.println(ex);
}
```

```
}

```

To get an array of classes, use the `IAgileClass.getAgileClasses()` method. You can specify a range of classes to return. For example, specify `IAdmin.CONCRETE` for the range parameter to return only concrete classes or `IAdmin.ALL` to return all classes.

Example: Getting classes

```
private void getConcreteClasses() throws APIException {
    IAgileClass[] classes =
        m_admin.getAgileClasses(IAdmin.CONCRETE);
    for (int i = 0; i < classes.length; i++) {
        System.out.println("Class Name : " + classes[i].getName());
        System.out.println("ID : " + classes[i].getId());
    }
}

void getAllClasses() throws APIException {
    IAgileClass[] classes =
        m_admin.getAgileClasses(IAdmin.ALL);
    for (int i = 0; i < classes.length; i++) {
        System.out.println("Class Name : " + classes[i].getName());
        System.out.println("ID : " + classes[i].getId());
    }
}

```

When you create a new object using the `IAgileSession.createObject()` method, you must specify a concrete Agile PLM class, that is, one of the user-defined subclasses. Remember, abstract classes cannot be instantiated. The following example shows how to create an object of the Part subclass.

Example: Creating a part

```
try {
    Map params =
        new HashMap();
    params.put(ItemConstants.ATT_TITLE_BLOCK_NUMBER, "1000-02");
    IItem item =
        (IItem)m_session.createObject(ItemConstants.CLASS_PART, params);
} catch (APIException ex) {
    System.out.println(ex);
}

```

Referencing Classes

You can reference Agile PLM classes in the following ways:

- by object (an `IAgileClass`)
- by class ID constant, such as `ItemConstants.CLASS_PART` or `ChangeConstants.CLASS_ECO`. All Agile API constants are contained in classes that have a suffix name “Constants.” For example, `ItemConstants` contains all constants related to `IItem` objects.
- by class name, such as “Part” or “ECO”.

In general, avoid referencing classes by name for the following reasons:

- Class names can be modified.
- Class names are not necessarily unique. It's possible to have duplicate class names. Consequently, if you reference a class by name you may inadvertently reference the wrong class.
- Class names are localized; that is, the names are different for different languages.

Identifying the Target Type of a Class

Each class has a specified target type, which is the type of Agile PLM object that the class can create. For example, the target type for the Part subclass is `IItem.OBJECT_TYPE`. You can use the target type to classify the user-defined subclasses that have been defined in your Agile PLM system. For example, if you want to create a user interface that displays item classes, you can list the classes at run time by selecting those with the target type `IItem.OBJECT_TYPE`.

Example: Getting the target type for a class

```
private void getConcreteItemClasses() throws APIException {
    IAgileClass[] classes =
        m_admin.getAgileClasses(IAdmin.CONCRETE);
    for (int i = 0; i < classes.length; i++) {
        if (classes[i].getTargetType()
            == IItem.OBJECT_TYPE) {
            System.out.println("Class Name : " + classes[i].getName());
            System.out.println("ID : " + classes[i].getId());
        }
    }
}
```

There are two predefined concrete classes for the Item class, Document and Part. If your company hasn't added any Item subclasses to the Agile PLM system, the code in the previous example should print the following results:

```
Class Name : Document
ID : 9141
Class Name : Part
ID : 10141
```

Working with Attributes

Each object that you can retrieve in an Agile API program has a set of attributes. An attribute represents metadata for a particular business object. It defines the properties and values of the object. For example,

`Title Block.Number`, `Title Block.Description`, and `Title Block.Part Category` are three of the Title Block attributes for a Part.

When you create an instance of an object in your program, each `IAttribute` in your object classes is equivalent to a field, or an `ICell` object. `IAttribute` objects directly correspond with `ICell` objects for an object that you created or opened in your program. For more information about `ICell` objects, see [Working with Data Cells](#) on page 89.

Referencing Attributes

You can reference Agile PLM attributes in the following ways:

- by object (an `IAttribute`)
- by attribute ID constants

All Agile API constants, including attribute ID constants, are contained in classes that have the suffix “Constants.” For example, `ItemConstants` contains all constants related to `IItem` objects.
- by fully qualified name, such as “Title Block.Number” or “Cover Page.Change Category”
- by short name, such as “Number”. However, attribute short names are not unique in Agile PLM. If you are referencing multiple attributes, you may run into a conflict if two different attributes have the same short name.

Note Because attribute names can be modified and referencing attributes by ID number or constant is difficult to identify or remember, Agile recommends using the `APIName` field for this purpose. For information and procedures, see [Accessing PLM Metadata with APIName Field](#) on page 123. Many of the examples in this manual reference attributes by name because they were constructed before the introduction of this field.

The following example shows how to reference an attribute ID constant.

Example: Referencing an attribute ID constant

```
Integer attrID =
    ItemConstants.ATT_TITLE_BLOCK_DESCRIPTION;
try {
    v = item.getValue(attrID);
} catch (APIException ex) {
    System.out.println(ex);
}
```

A fully qualified attribute name is a string with the following format:

```
TableName.AttributeName
```

`TableName` is the name of the table in which the attribute appears. `AttributeName` is the current value for the `Name` property of an attribute. All attributes have default names, but the names can be changed. In particular, Page Two and Page Three attributes that have been made visible in your Agile PLM system are likely to have been assigned more meaningful names than “Text01,” “List01,” and “Date01.”

“Cover Page.Reason for Change” and “Title Block.Number” are two examples of fully qualified attribute names.

The following example shows how to reference to a fully qualified attribute name.

Example: Referencing an attribute name

```
Object v;
String attrName = "Title Block.Description";
try {
    v = item.getValue(attrName);
}
```

```

} catch (APIException ex) {
    System.out.println(ex);
}

```

Note Attribute names are case-sensitive.

Retrieving Attributes

IAttribute objects are associated with a particular subclass. For example, the attributes for a Part are different from those of an ECO. Therefore, if you know the subclass of an object you can retrieve the list of attributes for it. The following table lists methods that can be used to retrieve attributes.

Method	Description
I AgileClass.getAttribute()	Retrieves the specified IAttribute object for a class
I AgileClass.getAttributes()	Retrieves an array of IAttribute objects for all tables of a class
I AgileClass.getTableAttributes()	Retrieves an array of IAttribute objects for a specified table of the class
I Table.getAttributes()	Retrieves an array of IAttribute objects for a table
I Cell.getAttribute()	Retrieves the IAttribute object for a cell

The following example shows how to retrieve BOM table attributes.

Example: Retrieving BOM table attributes for the Part subclass

```

try {
    // Get the Part subclass
    IAgileClass partClass =
        (IAgileClass)m_admin.getAgileClass(ItemConstants.CLASS_PART);
    // Get the collection of BOM table attributes for the Part subclass
    IAttribute[] attrs =
        partClass.getTableAttributes(ItemConstants.TABLE_BOM);
} catch (APIException ex) {
    System.out.println(ex);
}

```

Another way to retrieve the attributes for a particular table is to first get the table, then get its attributes using the ITable.getAttributes() method.

Example: Retrieving the collection of BOM table attributes from the table

```

try {
    // Get Part P200
    IItem item =
        (IItem)m_session.getObject(IItem.OBJECT_TYPE, "P200");
    // Get the BOM table
    ITable bomTable =
        item.getTable(ItemConstants.TABLE_BOM);
    // Get BOM table attributes
    IAttribute[] attrs =
        bomTable.getAttributes();
}

```

```

} catch (APIException ex) {
    System.out.println(ex);
}

```

Retrieving Individual Attributes

If you know the attribute you want to retrieve, you can get it by using the `IAgileClass.getAttribute()` method. The following example shows how to get the “Cover Page.Reason Code” attribute for an ECO.

Example: Retrieving the “Cover Page.Reason Code” attribute

```

try {
    // Get the ECO subclass
    IAgileClass classECO =
        m_admin.getAgileClass("ECO");
    // Get the "Cover Page.Reason Code" attribute
    IAttribute attr =
        classECO.getAttribute(ChangeConstants.ATT_COVER_PAGE_REASON_CODE);
    // Get available values for Reason Code
    IAgileList availValues =
        attr.getAvailableValues();
} catch (APIException ex) {
    System.out.println(ex);
}

```

Editing the Property of an Attribute

Agile PLM classes have attributes, and attributes have properties. To modify the properties of an attribute for a particular subclass, follow these steps:

1. Use the `IAdmin.getAgileClass()` method to get an Agile PLM class.
2. Use the `IAgileClass.getAttribute()` method to get an attribute for the class.
3. Use the `IAttribute.getProperty()` method to get a property for the attribute.
4. Use the `IProperty.getValue()` method to get the current value for the property.
5. Use the `IProperty.setValue()` method to set a new value for the property.

Working with User-Defined Attributes

For each Agile PLM subclass, you can define additional attributes on the Page Two and Page Three tables. These user-defined attributes, also known as customer flex fields, behave the same as predefined Agile PLM attributes. You can retrieve them and edit their properties.

User-defined attributes are custom extensions to the Agile PLM system. Consequently, their IDs are not included in the `CommonConstants` class. However, you can view the base ID for any attribute, including user-defined attributes, in Agile Java Client. You can also write a procedure to programmatically retrieve the ID for a user-defined attribute at run time, or use the API name.

Working with Properties of Administrative Nodes

If you use the Agile API to retrieve an `INode` object, you can also view the `INode`'s property values. An `IProperty` object represents a single property for an administrative node. To return an array of all properties for a node, use the `INode.getProperties()` method.

The following example shows how to get the property value for the Reminder/Escalation Weekend Setting preference. The last part of this example converts the available list values for this `SingleList` property to a comma-delimited string.

Example: Getting Property values

```
private void getReminderEscalationWeekendProp() throws APIException {
    //Get the General Preferences node
    INode node =
        m_admin.getNode(NodeConstants.NODE_PREFERENCES);
    //Get the Reminder/Escalation Weekend Setting property
    IProperty prop =
        node.getProperty(PropertyConstants.PROP_REMINDER_ESCALATION_WEEKE
            ND_SETTING);
    //Get the Reminder/Escalation Weekend Setting property value
    Object value =
        prop.getValue();
    System.out.println("Reminder/Escalation Weekend Setting : " +
        value);
    IAgileList avail =
        prop.getAvailableValues();
    if (avail != null) {
        String strAvail =
            listToString(avail);
        System.out.println("Available Values : " + strAvail);
    }
}

private String listToString(IAgileList list) throws APIException {
    String strList = "";
    Collection children =
        list.getChildNodes();
    for (Iterator it =
        children.iterator();it.hasNext();) {
        IAgileList childList =
            (IAgileList)it.next();
        strList =
            strList + childList.getValue();
        if (it.hasNext()) {
            strList = strList + ", ";
        }
    }
    return strList;
}
```

The `SingleList` and `MultiList` properties are different from other types of properties. You cannot use the `IProperty.getValue()` and `IProperty.setValue()` methods to directly modify a property that contains a list of values. Instead, you use the `IAgileList.setSelection()` method to select a list node, and then use the `IProperty.setValue()` method to set the

value. For more information about how to modify SingleList and MultiList properties, see [Getting and Setting List Values](#) on page 96.

Managing Users

Users are data objects that you can create, like items and changes. Consequently, you can work with users directly without traversing the administrative node hierarchy. If you have the proper Agile PLM privileges, you can create, modify, and delete users. For example, you could create a program that periodically synchronizes Agile PLM users with data available from a corporate directory.

Getting All Users

To retrieve all Agile PLM users, run a query for User objects. The following example retrieves all users and prints the username, first name, and last name for each user.

Example: Getting all users

```
private void getAllUsers() throws APIException {
    IQuery q =
        (IQuery)m_session.createObject(IQuery.OBJECT_TYPE, "select * from
        [Users]");
    ArrayList users =
        new ArrayList();
    Iterator itr =
        q.execute().getReferentIterator();
    while (itr.hasNext()) {
        users.add(itr.next());
    }
    for (int i = 0; i < users.size(); i++) {
        IUser user =
            (IUser)users.get(i);
        System.out.println(
            user.getValue(UserConstants.ATT_GENERAL_INFO_USER_ID) + ", " +
            user.getValue(UserConstants.ATT_GENERAL_INFO_FIRST_NAME) + ", " +
            user.getValue(UserConstants.ATT_GENERAL_INFO_LAST_NAME)
        );
    }
}
```

Creating a User - 9.3.1.2

A user is like other data objects that you can create with the Agile API. To create a user, you define the user's parameters and pass them to the `IAgileSession.createObject()` method. The required parameters you must specify are username and login password. You can also specify other user attributes, which are listed in the `UserConstants` class.

Note If an LDAP directory server is used to authenticate users for your Agile PLM system, you can create only supplier users through the SDK that have restricted access to the Agile PLM system. You must create and maintain other users on the directory server.

The passwords you specify for a new user are default values. If you specify an approval password, it must be different from the login password unless the

`UserConstants.ATT_GENERAL_INFO_USE_LOGIN_PASSWORD_FOR_APPROVAL` cell is set to "Yes." The user can change passwords later.

Example: Creating a user

```
private void userTest() {
    try {
        //Add code here to log in to the Agile Application Server
        //After logging in, create a new user by invoking the createUser method
        below
        IUser user = createUser("akurosawa");
    } catch (APIException ex) {
        System.out.println(ex);
    }
}

private IUser createUser(String newUser) throws APIException {
    //Create the new user
    Map params =
        new HashMap();
    params.put(UserConstants.ATT_GENERAL_INFO_USER_ID, newUser);
    params.put(UserConstants.ATT_LOGIN_PASSWORD, "agile");
    IUser user =
        (IUser)session.createObject
            (UserConstants.CLASS_USER, params);
    return user;
}
```

By default, when you create a new user it's assigned the Concurrent user category and the My User Profile role, a combination that allows the user to only view their own profile. To create and modify objects, the user must be assigned roles with the appropriate create and modify privileges. For an example showing how to change a user's Role settings, see [Configuring User Settings](#) on page 348.

Creating Users and Requiring Password Modification at Login

When creating a user, you can require the new user to change the assigned password, which is usually temporary, for a new and more secure one at login. To create such a user, it is necessary to define the user's parameters as explained in [Creating a User](#) on page 345 and pass a flag to force password change at login. This is illustrated in the following code sample.

Example: Creating a user and requiring password modification at login

```
String username = "USER" + System.currentTimeMillis();
HashMap params = new HashMap();
params.put(UserConstants.ATT_GENERAL_INFO_USER_ID, username);
params.put(UserConstants.ATT_GENERAL_INFO_FIRST_NAME, username);
params.put(UserConstants.ATT_GENERAL_INFO_LAST_NAME, username);
params.put(UserConstants.ATT_LOGIN_PASSWORD, "agile");
params.put(UserConstants.ATT_APPROVAL_PASSWORD, "agile2");
params.put(UserConstants.ATT_MUST_CHANGE_PWD_AT_LOGON, "true");
IUser user = (IUser) session.createObject(UserConstants.CLASS_USER,
params);
System.out.println("Created user: " + user.getName());
```

Creating a Supplier User

Supplier users are assigned to the Restricted user category by default, which restricts their access to the Agile PLM system. The Restricted user category allows supplier users to respond to RFQs and use other features of Agile Product Cost Management (PCM).

To create a supplier user, define the user's parameters and pass them to the `IAgileSession.createObject()` method. You must specify the username, login password, and supplier name. You can also specify other user attributes, which are listed in the `UserConstants` class.

Example: Creating a supplier user

```
private IUser createSupplierUser(String userName, String supplier)
throws APIException {
    HashMap userParams =
        new HashMap();
    userParams.put(UserConstants.ATT_GENERAL_INFO_USER_ID, userName);
    userParams.put(UserConstants.ATT_LOGIN_PASSWORD, "agile");
    userParams.put(UserConstants.ATT_SUPPLIER, supplier);
    return (IUser)m_session.createObject(UserConstants.CLASS_USER,
        userParams);
}
```

Saving a User to a New User

You can use the `IDataObject.saveAs()` method to save an existing user to a new user. The `saveAs()` method serves as a handy shortcut because it allows you to assign a new user the same roles, privileges, and sites as an existing user. When you use the `saveAs()` method to save a user, you must specify parameters for the new user's user name and login password.

Example: Saving an object as a new object

```
private void saveAsUser(IUser user, String newUserName) {
    try {
        //Set parameters for the new user
        Map params =
            new HashMap();
        params.put(UserConstants.ATT_GENERAL_INFO_USER_ID, newUserName);
        params.put(UserConstants.ATT_LOGIN_PASSWORD, "agile");
        // Save the new user
        user.saveAs(UserConstants.CLASS_USER, params);
    } catch (APIException ex) {
        System.out.println(ex);
    }
}
```

Checking for Expired Passwords

An administrator can manually require a password change in Java Client. When a user's login password expires, the user cannot log in to the Agile Application Server. If the login password has expired, the Agile API program can prompt the user to specify a new password. The following example shows how to check for an Agile API error related to an expired password.

Example: Checking for Expired Passwords

```
HashMap params = new HashMap();
    params.put(AgileSessionFactory.USERNAME, user.getName());
    params.put(AgileSessionFactory.PASSWORD, "agile");
    params.put(AgileSessionFactory.URL, "http://localhost/Agile");
// Pass one element array to get the login exception
APIException[] exception = new APIException[1];
    params.put(AgileSessionFactory.STATUS, exception);
    IAgileSession session=AgileSessionFactory.createSessionEx(params);
    System.out.println(exception[0].getErrorCode());
// When error code is ExceptionConstants.APDM_PWDNOCHANGE
    If(exception[0].getErrorCode() ==
        ExceptionConstants.APDM_PWDNOCHANGE) {
        String oldPassowrd = "agile";
        String newPassowrd = "oracle";
// Prompt for new password and change the password
        Session.getUser().changeLoginPassword (oldPassword, newPassword);
    }
}
```

Configuring User Settings

An IUser object, unlike administrative nodes, is a dataobject. Therefore, an IUser object has data cells, not properties, and you use the ICell interface to configure a user's settings. The following example shows how to get visible cells on the General Info and Page Two tables for a user. To access cells on other user tables, use the IDataObject.getTable() method to load the table.

Example: Getting user cells for General Info and Page Two

```
private void getUserCells(IUser user) throws APIException {
    ICell[] cells = user.getCells();
    for (int i = 0; i < cells.length; i++) {
        System.out.println(cells[i].getName() + " : " +
            cells[i].getValue());
    }
}
```

Two important settings for a user are User Category and Roles. The User Category setting defines the broad range of actions a user can perform on the Agile PLM system. Select from one of the following User Category values:

- Power – User can log in to the server at any time with unrestricted use of the Agile PLM system. Power users are not subject to the limited number of concurrent users.
- Concurrent – User can log in to the server only if a concurrent user agreement is available.

Note Licenses are controlled by your agreement with Oracle.

- **Restricted** – User has restricted access to the Agile PLM system. Supplier users are by default assigned the Restricted category, which allows them to respond to RFQs and use other features of Agile Product Cost Management (PCM). Restricted users are not subject to the limited number of concurrent users.

The Roles setting further defines the capabilities of a user, assigning roles and privileges. A user won't be able to create objects without the proper roles and privileges. For more information about Agile PLM user roles, and privileges, refer to the *Agile PLM Administrator Guide*.

The following example shows how to set a user's User Category and Roles settings.

Example: Setting the User Category and Roles settings for a user

```
private void setCategory(IUser user) throws APIException {

    //Get the User Category cell
    ICell cell =
        user.getCell(UserConstants.ATT_GENERAL_INFO_USER_CATEGORY);
    //Get the available values for the cell
    IAgileList license =
        cell.getAvailableValues();
    //Set the selected value to "Concurrent"
    license.setSelection(new Object[] { "Concurrent" });
    //Change the cell value
    cell.setValue(license);
}

private void setRoles(IUser user) throws APIException {
    //Get the Role cell
    ICell cell =
        user.getCell(UserConstants.ATT_GENERAL_INFO_ROLES);
    //Get the available values for the cell
    IAgileList roles =
        cell.getAvailableValues();
    //Set the selected roles to Change Analyst and Administrator
    roles.setSelection(new Object[] {"Change
    Analyst","Administrator","My User Profile"});
    //Change the cell value
    cell.setValue(roles);
}
```

Resetting User Passwords

Administrators with User Administrator privileges can reset the password of other users to a new value. Users without this privilege are not able to reset user passwords. This feature enables resetting large numbers of passwords in the batch mode, which is preferable to manually changing them one at a time using the UI.

The `changeLoginPassword()` method which supports this feature allows passing a null value instead of the current password value. The following example shows how to use this method to reset a user's password using `null` instead of the current password.

Example: Resetting a password to a new value

```
public void changeLoginPassword(null, String newPassword)
    throws APIException;
```

Deleting a User

To delete a user, use the `IDataObject.delete()` method. Like other dataobjects, an object deleted for the first time is "soft-deleted," which means it is disabled but not removed from the database. The Agile Application Server does not allow you to permanently delete a user.

Example: Deleting a user

```
private void removeUser(IUser user) throws APIException {
    user.delete();
    user = null;
}
```

Note In Agile Java Client, deleted users can be listed by choosing Admin > User Settings > Deleted Users.

Managing User Groups

A user group is an object that contains a list of Agile PLM users. You can use user groups to define project teams, departments, and global groups and their assigned users. User groups are not site-related, unlike items and changes, but you can create groups of users based on their location. Whenever you add a user to a user group, that change is reflected in the user's Groups setting, whose attribute ID is `UserConstants.ATT_GENERAL_INFO_GROUPS`.

Note In Agile Clients such as Agile Web Client, you can send an object, such as a change, to a user group. The Agile API does not support sending objects to user groups. However, you can retrieve users from the Users table of a User Group object and then send them an object.

Getting All User Groups

To retrieve all Agile PLM user groups, run a query for User Group objects. You can iterate through the user groups to find a particular group. The following example retrieves all user groups and prints the name, description, maximum number of users, and enabled status for each user group.

Example: Getting all user groups

```
private void getAllUserGroups() throws APIException {
    IQuery q =
        (IQuery)m_session.createObject(IQuery.OBJECT_TYPE, "select * from
        [User Groups]");
    ArrayList groups = new ArrayList();
    Iterator itr =
        q.execute().getReferentIterator();
```

```

while (itr.hasNext()) {
    groups.add(itr.next());
}
for (int i = 0; i < groups.size(); i++) {
    IUserGroup ug =
        (IUserGroup)groups.get(i);
    System.out.println(
        ug.getValue(UserGroupConstants.ATT_GENERAL_INFO_NAME) + ", " +
        ug.getValue(UserGroupConstants.ATT_GENERAL_INFO_DESCRIPTION) + ", " +
        +
        ug.getValue(UserGroupConstants.ATT_GENERAL_INFO_MAX_NUM_OF_NAMED_USE
        RS) + ", " +
        ug.getValue(UserGroupConstants.ATT_GENERAL_INFO_STATUS)
    );
}
}
}

```

Creating a User Group

A user group, like a user, is a dataobject and not an administrative node on the Agile Application Server. To create a user group, you define the user group's parameters, such as its name, and pass the parameters to the `I AgileSession.createObject()` method. The only required parameter you must specify is the name, whose attribute ID is `UserGroupConstants.ATT_GENERAL_INFO_NAME`. You can also specify other user attributes, which are listed in the `UserGroupConstants` class. To enable a user group, make sure the `Enabled` cell is set to `Yes`.

After creating a user group, you need to add users to the `Users` table to make the group meaningful. To create a new row in the `Users` table, use the `ITable.createRow(java.lang.Object)` method.

Example: Creating a user group

```

private void userGroupTest() throws APIException {
    //Add code here to log in to the Agile Application Server
    //After logging in, create a new user group
    IUserGroup group =
        createGroup("Swallowtail Project");
    //Add users to the Western project group
    IUser[] selUsers = new IUser[] {
        m_session.getObject(IUser.OBJECT_TYPE, "jford"),
        m_session.getObject(IUser.OBJECT_TYPE, "hhawkes"),
        m_session.getObject(IUser.OBJECT_TYPE, "speckinpah")
    };
    addUsers(group, selUsers);
}
private IUserGroup createGroup(String groupName) throws APIException {
    //Create the user group
    IUserGroup group =
        (IUserGroup)m_session.createObject(UserGroupConstants.CLASS_USER_
        GROUP, groupName);
}

```

```
//Enable the user group
    ICell cell =
    group.getCell(UserGroupConstants.ATT_GENERAL_INFO_STATUS);
    IAgileList list = cell.getAvailableValues();
    list.setSelection(new Object[] { "Active" });
    cell.setValue(list);
    return group;
}
private void addUsers(IUserGroup group, IUser[] seUsers) throws
APIException {
    ITable usersTable = group.getTable(UserGroupConstants.TABLE_USERS);
    for (int i = 0; i < users.length; i++) {
        IRow row = usersTable.createRow(users[i]);
    }
}
```

User groups can be global or personal. Global user groups are accessible to all Agile PLM users. Personal user groups are accessible only to the person who created the group. The following example shows how to make a user group global.

Example: Making a user group global

```
private void setGlobal(IUserGroup group) throws APIException {
    //Get the Global/Personal cell
    ICell cell =
    group.getCell(UserGroupConstants.ATT_GENERAL_INFO_GLOBAL_PERSONAL);
    //Get the available values for the cell
    IAgileList values = cell.getAvailableValues();

    //Set the selected value to "Global"
    values.setSelection(new Object[] { "Global" });

    //Change the cell value
    group.setValue(UserGroupConstants.ATT_GENERAL_INFO_GLOBAL_PERSONAL,
    values);
}
```

Adding a User Group to the User's User Group Table

IUserGroup cannot be passed to createRow() to add a user group to the user's user group table. You must use a Map as shown in the following example.

Example: Using a Map to add a User Group to a User Group Table

```
ITable ugTable = user.getTable(UserConstants.TABLE_USERGROUP);
Map map = new HashMap();
map.put(UserConstants.ATT_USER_GROUP_GROUP_NAME, ug.getName());
ugTable.createRow(map);
```

Listing Users in a User Group

The users contained within a user group are listed on the Users table. Therefore, to get the list of users in the user group, use the `IDataObject.getTable()` method and then iterate over the table rows to access data for each user. The following example shows how to list the users in a user group.

Example: Listing the users in a user group

```
private void listUsers(IUserGroup group) throws APIException {
    ITable usersTable =
        group.getTable(UserGroupConstants.TABLE_USERS);
    Iterator it =
        usersTable.iterator();
    while (it.hasNext()) {
        IRow row = (IRow)it.next();
        System.out.println(row.getValue(UserGroupConstants.ATT_USERS_USER_NAME));
    }
}
```


Mapping Agile PLM Client Features to Agile API

This Appendix includes the following:

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Login Features

The following table lists general features for logging in to the Agile Application Server.

Feature	Equivalent Method(s)
Get an instance of the Agile Application Server session	<code>AgileSessionFactory.getInstance()</code>
Create a session and log in to the Agile Application Server	<code>AgileSessionFactory.createSession()</code>
Close a session and disconnect from the Agile Application Server	<code>IAgileSession.close()</code>

General Features

The following table lists the General features that apply to all Agile PLM business objects.

Feature	Equivalent Method(s)
Create a new object	<code>IAgileSession.createObject()</code>
Load an existing object	<code>IAgileSession.getObject()</code>
Save an object as another object	<code>IDataObject.saveAs()</code>
Delete an object	<code>IDataObject.delete()</code> <code>IFolder.delete()</code> <code>IQuery.delete()</code>
Undelete an object	<code>IDataObject.undelete()</code>
Get a cell value for an object	<code>IDataObject.getValue()</code>
Set an cell value for an object	<code>IDataObject.setValue()</code>
Get a table for an object	<code>IDataObject.getTable()</code>
Add a row to a table	<code>ITable.createRow()</code>
Remove a row from a table	<code>ITable.removeRow()</code>
Get subscriptions for an object	<code>ISubscribable.getSubscriptions()</code>
Enable a subscription event	<code>ISubscription.enable()</code>
Modify subscriptions for an object	<code>ISubscribable.modifySubscriptions()</code>

Search Features

The table below lists the supported Search (Query) features.

Feature	Equivalent Method(s)
Set the name of a search	<code>IQuery.setName()</code>
Make the search public or private	<code>IQuery.setQueryType()</code>
Set the search type for a query (object search or Where Used search)	<code>IQuery.setSearchType()</code>
Set and get search criteria	<code>IQuery.setCriteria()</code> <code>IQuery.getCriteria()</code>
Run a search	<code>IQuery.execute()</code>
Make a search case-sensitive	<code>IQuery.setCaseSensitive()</code>
Delete a search	<code>IQuery.delete()</code>
Save a search as another search	<code>IQuery.saveAs()</code>

Attachment Features

The table below lists features for working with attachments and file folders.

Feature	Equivalent Method(s)
Download all files contained in a file folder	<code>IFileFolder.getFile()</code>
Download a single file listed on the Attachments tab	<code>IAttachmentFile.getFile()</code>
Check out a file folder	<code>IFileFolder.checkOut()</code>
Check in a file folder	<code>IFileFolder.checkIn()</code>
Cancel checkout	<code>IFileFolder.cancelCheckOut()</code>
Incorporate or unincorporate an item, thereby locking or unlocking its attachments	<code>IAttachmentContainer.setIncorporated()</code>

Workflow Features

The table below lists Workflow features for routable Agile PLM objects.

Feature	Equivalent Method(s)
Audit a routable object	<code>IRoutable.audit()</code>
Change the status of a routable object	<code>IRoutable.changeStatus()</code>
Send an object to another Agile PLM user(s)	<code>IDataObject.send()</code>
Approve a routable object	<code>IRoutable.approve()</code>
Reject a routable object	<code>IRoutable.reject()</code>
Comment on a routable object	<code>IRoutable.comment()</code>
Add or remove approvers and observers for a routable object	<code>IRoutable.addApprovers()</code> <code>IRoutable.removeApprovers()</code>

Manufacturing Site Features

The table below lists features for working with manufacturing sites.

Feature	Equivalent Method(s)
Get the current manufacturing site selected for an item	<code>IManufacturingSiteSelectable.getManufacturingSite()</code>
Get all manufacturing sites for an item	<code>IManufacturingSiteSelectable.getManufacturingSites()</code>
Set an item to use all manufacturing sites	<code>IManufacturingSiteSelectable.setManufacturingSite(ManufacturingSiteConstants.ALL_SITES)</code>
Specify that an item is not site-specific and is common to all sites.	<code>IManufacturingSiteSelectable.setManufacturingSite(ManufacturingSiteConstants.COMMON_SITE)</code>
Set an item to use a specific manufacturing site	<code>IManufacturingSiteSelectable.setManufacturingSite(site)</code>

Folder Features

The following table lists the Folder features for working with folders.

Feature	Equivalent Method(s)
Add an item (such as a query) to the folder	<code>IFolder.addChild()</code>
Set the type of folder (public or private)	<code>IFolder.setFolderType()</code>
Set the folder name	<code>IFolder.setName()</code>
Get a folder of the current user	<code>IUser.getFolder()</code>
Remove an item from the folder	<code>IFolder.removeChild()</code>
Clear all objects from the folder	<code>IFolder.clear()</code>
Delete a folder	<code>IFolder.delete()</code>

Projects Features

The following table lists features for working with Projects.

Feature	Equivalent Method(s)
Save a Project as another Project or template	<code>IProgram.saveAs()</code>
Reschedule a Project	<code>IProgram.reschedule()</code>
Assign users from a resource pool	<code>IProgram.assignUsersFromPool()</code>
Delegate ownership of a Project to another user	<code>IProgram.delegateOwnership()</code>
Substitute Project resources	<code>IProgram.substituteResource()</code>
Create a baseline	<code>IProgram.createBaseline()</code>
Select a baseline view of the Project	<code>IProgram.selectBaseline()</code>
Lock or unlock a Project	<code>IProgram.setLock()</code>
Reply to a discussion	<code>IMessage.reply()</code>

Administrative Features

The following table provides the list of features for working with Admin nodes and properties in Agile Java Client.

Feature	Equivalent Method(s)
Get an administrative node	<code>IAdmin.getNode()</code>
Get all subnodes (children) of an administrative node	<code>ITreeNode.getChildNodes()</code>
Get all properties of an administrative node	<code>INode.getProperties()</code>
Get the value for an administrative node's property	<code>IProperty.getValue()</code>
Get the possible values for a list field	<code>IProperty.getAvailableValues()</code>
Get all Agile PLM classes	<code>IAdmin.getAgileClasses(ALL)</code>
Get all top-level Agile PLM classes	<code>IAdmin.getAgileClasses(TOP)</code>
Get all Agile PLM classes that can be instantiated	<code>IAdmin.getAgileClasses(CONCRETE)</code>
Get the list of subclasses for a specific class	<code>IAgileClass.getSubclasses()</code>
Get the Autonumber sources for a subclass	<code>IAgileClass.getAutoNumberSources()</code>
Get an array of attributes for a table	<code>IAgileClass.getTableAttributes()</code>
Get the metadata for a table	<code>IAgileClass.getTableDescriptor()</code>
Get the Agile PLM list library	<code>IAdmin.getListLibrary()</code>

Feature	Equivalent Method(s)
Create a new Agile PLM list	<code>IListLibrary.createAdminList()</code>
Get an Agile PLM list	<code>IListLibrary.getAdminList()</code>
Get all Agile PLM users	Create a query of users
Get all Agile PLM user groups	Create a query of user groups
Create a user or user group	<code>IAgileSession.createObject()</code>
Set properties of a user or user group	<code>IProperty.setValue()</code>
Change user passwords	<code>IUser.changeApprovalPassword()</code> <code>IUser.changeLoginPassword()</code>

Migrating Release 9.2.1 and Older Table Constants to Release 9.2.2 or Later

This Appendix includes the following:

- Mapped Pre-Release 9.2.2 Table Constants to 9.2.2 Table Constants 361
- Removed Pre-Release 9.2.2 Table Constants 364

Information about merging and replacing the Relationship tables first appeared in [Accessing the New and Merged Relationships Tables](#) on page 67. Tables in this appendix list the Release 9.2.2 table constants and table constants that are either merged and mapped into a single table constant, or mapped into a new table constant.

Mapped Pre-Release 9.2.2 Table Constants to 9.2.2 Table Constants

This table lists the pre-release 9.2.2 table constants and the new table constants that are either merged and mapped into Release 9.2.2, or mapped into later releases of the SDK.

Pre 9.2.2 Table Constants	9.2.2 Table Constants
<ul style="list-style-type: none"> ▫ TABLE_RELATIONSHIPS_AFFECTED_BY ▫ TABLE_RELATIONSHIPS_AFFECTS ▫ TABLE_REFERENCES 	TABLE_RELATIONSHIPS
<ul style="list-style-type: none"> ▫ ATT_RELATIONSHIPS_AFFECTED_BY_CRITERIA_MET ▫ ATT_RELATIONSHIPS_AFFECTS_CRITERIA_MET 	ATT_RELATIONSHIPS_CRITERIA_MET
<ul style="list-style-type: none"> ▫ ATT_RELATIONSHIPS_AFFECTED_BY_CURRENT_STATUS ▫ ATT_RELATIONSHIPS_AFFECTS_CURRENT_STATUS 	ATT_RELATIONSHIPS_CURRENT_STATUS
<ul style="list-style-type: none"> ▫ ATT_RELATIONSHIPS_AFFECTED_BY_DATE01 ▫ ATT_RELATIONSHIPS_AFFECTS_DATE01 	ATT_RELATIONSHIPS_DATE01
<ul style="list-style-type: none"> ▫ ATT_RELATIONSHIPS_AFFECTED_BY_DATE02 ▫ ATT_RELATIONSHIPS_AFFECTS_DATE02 	ATT_RELATIONSHIPS_DATE02
<ul style="list-style-type: none"> ▫ ATT_RELATIONSHIPS_AFFECTED_BY_DATE03 ▫ ATT_RELATIONSHIPS_AFFECTS_DATE03 	ATT_RELATIONSHIPS_DATE03
<ul style="list-style-type: none"> ▫ ATT_RELATIONSHIPS_AFFECTED_BY_DATE04 ▫ ATT_RELATIONSHIPS_AFFECTS_DATE04 	ATT_RELATIONSHIPS_DATE04
<ul style="list-style-type: none"> ▫ ATT_RELATIONSHIPS_AFFECTED_BY_DATE05 ▫ ATT_RELATIONSHIPS_AFFECTS_DATE05 	ATT_RELATIONSHIPS_DATE05
<ul style="list-style-type: none"> ▫ ATT_REFERENCES_DATE01 	ATT_RELATIONSHIPS_DATE06

▫ ATT_REFERENCES_DATE02	ATT_RELATIONSHIPS_DATE07
▫ ATT_REFERENCES_DATE03	ATT_RELATIONSHIPS_DATE08
▫ ATT_REFERENCES_DATE04	ATT_RELATIONSHIPS_DATE09
▫ ATT_REFERENCES_DATE05	ATT_RELATIONSHIPS_DATE10
▫ ATT_RELATIONSHIPS_AFFECTED_BY_DESCRIPTION ▫ ATT_RELATIONSHIPS_AFFECTS_DESCRIPTION ▫ ATT_REFERENCES_DESCRIPTION	ATT_RELATIONSHIPS_DESCRIPTION
▫ ATT_RELATIONSHIPS_AFFECTED_BY_LIST01, ATT_RELATIONSHIPS_AFFECTS_LIST01	ATT_RELATIONSHIPS_LIST01
▫ ATT_RELATIONSHIPS_AFFECTED_BY_LIST02, ATT_RELATIONSHIPS_AFFECTS_LIST02	ATT_RELATIONSHIPS_LIST02
▫ ATT_RELATIONSHIPS_AFFECTED_BY_LIST03 ▫ ATT_RELATIONSHIPS_AFFECTS_LIST03	ATT_RELATIONSHIPS_LIST03
▫ ATT_RELATIONSHIPS_AFFECTED_BY_LIST04 ▫ ATT_RELATIONSHIPS_AFFECTS_LIST04	ATT_RELATIONSHIPS_LIST04
▫ ATT_RELATIONSHIPS_AFFECTED_BY_LIST05 ▫ ATT_RELATIONSHIPS_AFFECTS_LIST05	ATT_RELATIONSHIPS_LIST05
▫ ATT_REFERENCES_LIST01	ATT_RELATIONSHIPS_LIST06
▫ ATT_REFERENCES_LIST02	ATT_RELATIONSHIPS_LIST07
▫ ATT_REFERENCES_LIST03	ATT_RELATIONSHIPS_LIST08
▫ ATT_REFERENCES_LIST04	ATT_RELATIONSHIPS_LIST09
▫ ATT_REFERENCES_LIST05	ATT_RELATIONSHIPS_LIST10
▫ ATT_RELATIONSHIPS_AFFECTED_BY_MULTITEXT01 ▫ ATT_RELATIONSHIPS_AFFECTS_MULTITEXT01	ATT_RELATIONSHIPS_MULTITEXT01
▫ ATT_RELATIONSHIPS_AFFECTED_BY_MULTITEXT02 ▫ ATT_RELATIONSHIPS_AFFECTS_MULTITEXT02	ATT_RELATIONSHIPS_MULTITEXT02
▫ ATT_RELATIONSHIPS_AFFECTED_BY_MULTITEXT03 ▫ ATT_RELATIONSHIPS_AFFECTS_MULTITEXT03	ATT_RELATIONSHIPS_MULTITEXT03
▫ ATT_RELATIONSHIPS_AFFECTED_BY_MULTITEXT04 ▫ ATT_RELATIONSHIPS_AFFECTS_MULTITEXT04	ATT_RELATIONSHIPS_MULTITEXT04
▫ ATT_RELATIONSHIPS_AFFECTED_BY_MULTITEXT05 ▫ ATT_RELATIONSHIPS_AFFECTS_MULTITEXT05	ATT_RELATIONSHIPS_MULTITEXT05
▫ ATT_REFERENCES_MULTITEXT01	ATT_RELATIONSHIPS_MULTITEXT06
▫ ATT_REFERENCES_MULTITEXT02	ATT_RELATIONSHIPS_MULTITEXT07
▫ ATT_REFERENCES_MULTITEXT03	ATT_RELATIONSHIPS_MULTITEXT08
▫ ATT_REFERENCES_MULTITEXT04	ATT_RELATIONSHIPS_MULTITEXT09

▫ ATT_REFERENCES_MULTITEXT05	ATT_RELATIONSHIPS_MULTITEXT10
▫ ATT_RELATIONSHIPS_AFFECTED_BY_TEXT01 ▫ ATT_RELATIONSHIPS_AFFECTS_TEXT01	ATT_RELATIONSHIPS_TEXT01
▫ ATT_RELATIONSHIPS_AFFECTED_BY_TEXT02 ▫ ATT_RELATIONSHIPS_AFFECTS_TEXT02	ATT_RELATIONSHIPS_TEXT02
▫ ATT_RELATIONSHIPS_AFFECTED_BY_TEXT03, ATT_RELATIONSHIPS_AFFECTS_TEXT03	ATT_RELATIONSHIPS_TEXT03
▫ ATT_RELATIONSHIPS_AFFECTED_BY_TEXT04, ATT_RELATIONSHIPS_AFFECTS_TEXT04	ATT_RELATIONSHIPS_TEXT04
▫ ATT_RELATIONSHIPS_AFFECTED_BY_TEXT05 ▫ ATT_RELATIONSHIPS_AFFECTS_TEXT05	ATT_RELATIONSHIPS_TEXT05
▫ ATT_REFERENCES_TEXT01	ATT_RELATIONSHIPS_TEXT06
▫ ATT_REFERENCES_TEXT02	ATT_RELATIONSHIPS_TEXT07
▫ ATT_REFERENCES_TEXT03	ATT_RELATIONSHIPS_TEXT08
▫ ATT_REFERENCES_TEXT04	ATT_RELATIONSHIPS_TEXT09
▫ ATT_REFERENCES_TEXT05	ATT_RELATIONSHIPS_TEXT10
▫ ATT_RELATIONSHIPS_AFFECTED_BY_NOTES ▫ ATT_RELATIONSHIPS_AFFECTS_NOTES	ATT_RELATIONSHIPS_NOTES1
▫ ATT_REFERENCES_NOTES	ATT_RELATIONSHIPS_NOTES2
▫ ATT_RELATIONSHIPS_AFFECTED_BY_NUMBER ▫ ATT_RELATIONSHIPS_AFFECTS_NUMBER ▫ ATT_REFERENCES_NUMBER	ATT_RELATIONSHIPS_NAME

Removed Pre-Release 9.2.2 Table Constants

The following pre-release 9.2.2 table constants are no longer available and should not be used in later releases of the SDK:

- `ATT_RELATIONSHIPS_AFFECTED_BY_EVENT`
- `AT_TREATIONSHIPS_AFFECTS_TRIGGER_EVENT`
- `ATT_RELATIONSHIPS_AFFECTED_BY_TRIGGER_EVENT`
- `ATT_RELATIONSHIPS_AFFECTS_EVENT`
- `ATT_RELATIONSHIPS_AFFECTS_RESULT`
- `MaterialDeclarationConstants.TABLE_RELATIONSHIPS_AFFECTED_BY`
- `MaterialDeclarationConstants.TABLE_RELATIONSHIPS_AFFECTS`
- `MaterialDeclarationConstants.TABLE_REFERENCES`