

IBM Marketing Operations
Version 9 Release 0
January 15, 2013

Integration Module



Note

Before using this information and the product it supports, read the information in "Notices" on page 33.

This edition applies to version 9, release 0, modification 0 of IBM Marketing Operations and to all subsequent releases and modifications until otherwise indicated in new editions.

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Chapter 1. What is IBM Marketing Operations Integration Services?

IBM® Marketing Operations Integration Services is a composite of the following.

- **Marketing Operations Integration Webservice**

Integration Services provide a way for Marketing Operations customers, partners, and IBM Professional Services to integrate Marketing Operations with other applications running in their environment.

- **Marketing Operations procedures and API**

Custom procedures can be defined within Marketing Operations to extend Marketing Operations business logic in arbitrary ways. Once defined, these procedures can be the targets for the Integration Services webservice calls from other applications. Procedures also can be defined to send messages to other applications.

- **Marketing Operations triggers**

Triggers can be associated with events and procedures in Marketing Operations. When one such event occurs, the associated trigger is executed.

What are the requirements for Marketing Operations Integration Services?

Marketing Operations Integration Services must:

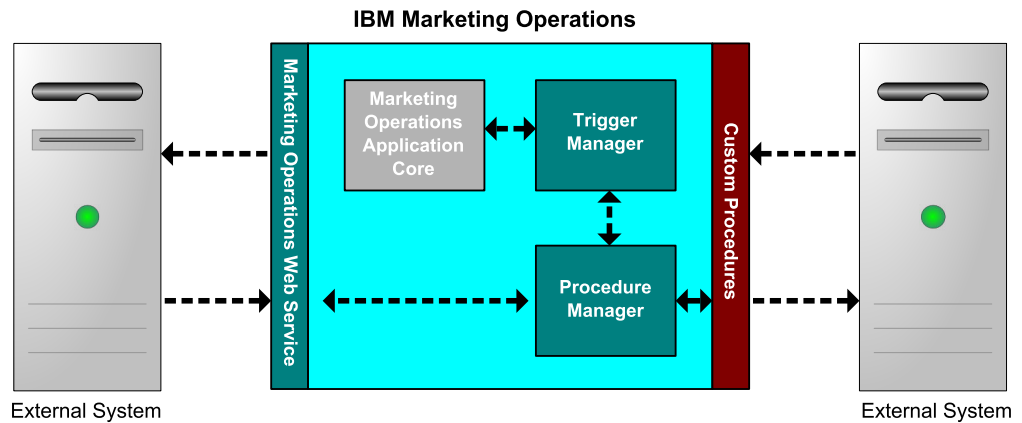
- Loosely couple system integration.
- Provide a mechanism for customer applications to affect Marketing Operations through webservice calls.
- Provide a mechanism for customer applications to be notified of certain events in Marketing Operations.
- Provide a simple programming model that is easy to understand and use.
- Be robust when recovering from failure.
- Guarantee data integrity.
- Integrate with, and minimize the effect on, existing Marketing Operations GUI-based customers.
- Provide fine-grained access to Marketing Operations components while insulating programmers from underlying implementation details.

Getting started with IBM Marketing Operations Integration Services

You use IBM Marketing Operations Integration Services functionality to create custom procedures. You can use these procedures to trigger external events when certain events occur within Marketing Operations. You can use these procedures to perform Marketing Operations functions from external systems or programs.

You use the API to interface with IBM Marketing Operations at the programmatic level, in the same way you use the GUI to interface with Marketing Operations at a user level. Using the API, you construct procedures. Using these procedures you communicate between Marketing Operations and external systems. The Marketing Operations Webservice is the container object for the procedures, API, and triggers.

The architecture of the Marketing Operations Integration Services is shown here.

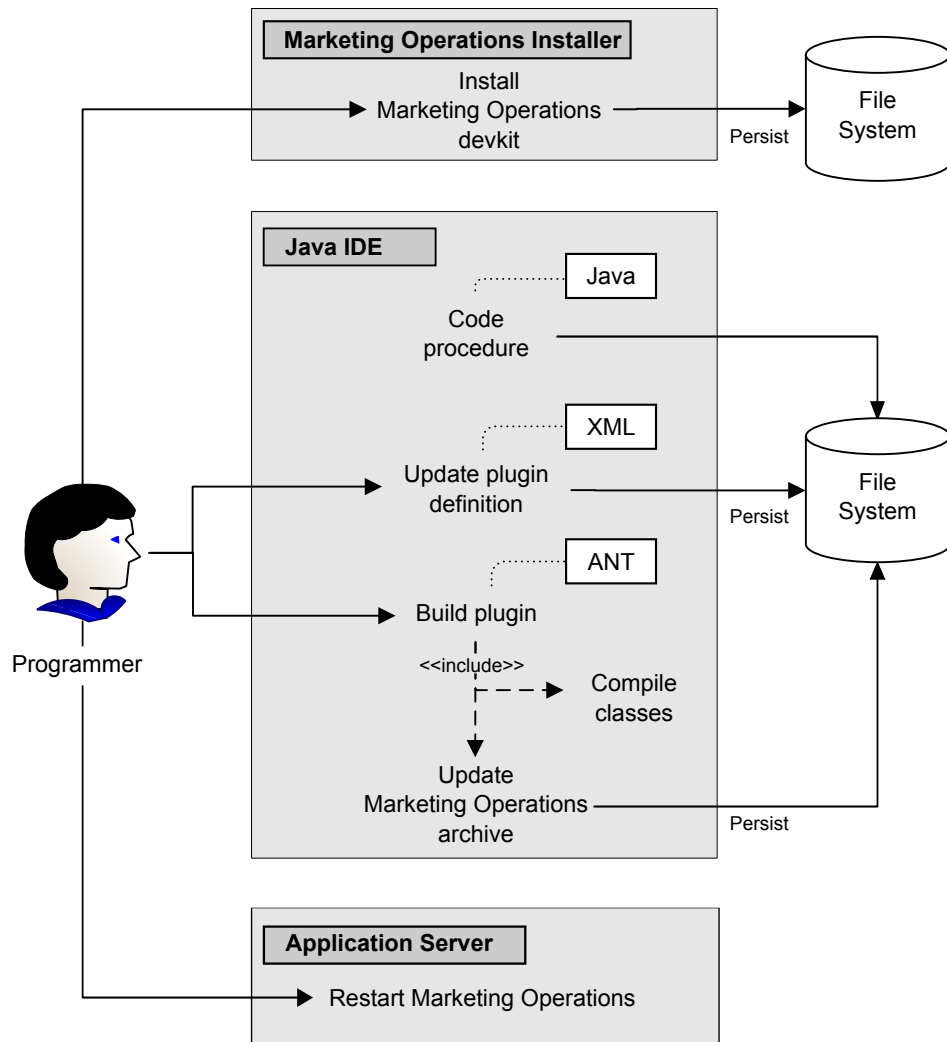


The following are key components of the Integration Services.

- Marketing Operations Procedure Manager: extends the business logic by interacting with Marketing Operations through the API.
- Marketing Operations Trigger Manager: associates a condition (for example the state change of a marketing object) with an action (a procedure to execute when the condition for the trigger is met).

Methodology

You use the components of IBM Marketing Operations Integration Services to develop custom procedures, as shown in this diagram:



After using the Marketing Operations Installer to install the developer's kit, you follow these basic steps:

1. Code the custom procedure. Currently, you must use Java™.
2. Update the plug-in definition in the XML definition file.
3. Build the plug-in:
 - a. Compile the necessary classes.
 - b. Update the Marketing Operations archive (the WAR file).
4. Restart Marketing Operations.

Basic Example to communicate between IBM Marketing Operations and the API

This section describes a basic example of establishing communication between the API and Marketing Operations. It does not do any useful work; it performs a round trip between Marketing Operations and the Integration Services.

This section uses portions of the example procedures included with the Marketing Operations Integration Services developer's kit. Specifically, you can find the code referenced here in the following files.

- PlanClientFacade.java
- PlanWSNOOPTestCase.java

The noop method is a webservice call to Marketing Operations. It is defined in the PlanClientFacade class, and passes null values in an array.

```
public ProcedureResponse noop(String jobId)
    throws RemoteException, ServiceException {
    NameValueArrays parameters =
        new NameValueArrays(null, null, null, null, null, null, null, null);
    return _serviceBinding.executeProcedure("uapNOOPProcedure", jobId, parameters);
}
```

The procedure testExecuteProcedure calls the noop method from PlanClientFacade to establish a round trip with the Marketing Operations application.

```
public void testExecuteProcedure() throws Exception {
    // Time out after a minute
    int timeout = 60000;
    PlanClientFacade clientFacade = new PlanClientFacade(urlWebService, timeout);
    System.out.println("noop w/no parameters");
    long startTime = new Date().getTime();
    ProcedureResponse response = clientFacade.noop("junit-jobid");
    long duration = new Date().getTime() - startTime;

    // zero or positive status => success
    System.out.println("Status: " + response.getStatus());
    System.out.println("Duration: " + duration + " ms");
    assertTrue(response.getStatus() >= 0);
    System.out.println("Done.");
}
```

For details of NameValueArrays, ProcedureResponse, and other listed methods and data types, refer to specific sections in the remainder of this guide and the JavaDocs.

For more information

Different people in your organization use IBM Marketing Operations to accomplish different tasks. Information about Marketing Operations is available in a set of guides, each of which is intended for use by team members with specific objectives and skill sets.

Table 1. Guides in the Marketing Operations documentation set

If you	See	Audience
<ul style="list-style-type: none"> • Plan and manage projects • Establish workflow tasks, milestones, and personnel • Track project expenses • Get reviews and approvals for content • Produce reports 	<i>IBM Marketing Operations User's Guide</i>	<ul style="list-style-type: none"> • Project managers • Creative designers • Direct mail marketing managers

Table 1. Guides in the Marketing Operations documentation set (continued)

If you	See	Audience
<ul style="list-style-type: none"> • Design templates, forms, attributes, and metrics • Customize the user interface • Define user access levels and security • Implement optional features • Configure and tune Marketing Operations 	<i>IBM Marketing Operations Administrator's Guide</i>	<ul style="list-style-type: none"> • Project managers • IT administrators • Implementation consultants
<ul style="list-style-type: none"> • Create marketing campaigns • Plan offers • Implement integration between Marketing Operations and Campaign • Implement integration between Marketing Operations and IBM Digital Recommendations 	<i>IBM Marketing Operations and IBM Campaign Integration Guide</i>	<ul style="list-style-type: none"> • Project managers • Marketing execution specialists • Direct marketing managers
<ul style="list-style-type: none"> • Learn about new system features • Research known issues and workarounds 	<i>IBM Marketing Operations Release Notes</i>	Everyone who uses Marketing Operations
<ul style="list-style-type: none"> • Install Marketing Operations • Configure Marketing Operations • Upgrade to a new version of Marketing Operations 	<i>IBM Marketing Operations Installation Guide</i>	<ul style="list-style-type: none"> • Software implementation consultants • IT administrators • Database administrators
Create custom procedures to integrate Marketing Operations with other applications	<i>IBM Marketing Operations Integration Module</i> and the API JavaDocs available when you click Help > Product Documentation in Marketing Operations, and then download the IBM <version>PublicAPI.zip file	<ul style="list-style-type: none"> • IT administrators • Database administrators • Implementation consultants
Learn about the structure of the Marketing Operations database	<i>IBM Marketing Operations System Schema</i>	Database administrators
Need more information while you work	<ul style="list-style-type: none"> • Get help and search or browse the <i>User's, Administrator's, or Installation</i> guides: Click Help > Help for this page • Access all of the Marketing Operations guides: Click Help > Product Documentation • Access guides for all IBM Enterprise Marketing Management (EMM) products: Click Help > All IBM EMM Suite Documentation 	Everyone who uses Marketing Operations

Hosted JavaDocs

For specific information about the public API methods, refer to the iPlanAPI class in the JavaDocs API documentation files. These files are available in the following ways:

- By the files in the `<IBM_EMM>/<MarketingOperations_Home>/devkits/integration/javadocs` directory on the server that hosts Marketing Operations.
- By logging in to Marketing Operations and selecting **Help > Product Documentation** from any page, and then downloading the IBM `<version>PublicAPI.zip` file.

Chapter 2. About Marketing Operations Integration Webservice

The webservice provides a client view of the Marketing Operations Integration Services, which is part of the deployment of the IBM Marketing Operations server. The service is designed to be used concurrently with Marketing Operations web users.

The webservice supports one API call, `executeProcedure`.

A client makes this webservice call directly.

Authentication

Authentication is not required; all clients are associated with a known IBM Marketing Operations user named `PlanAPIUser`. We assume that the security capabilities of this special user are configured by a Marketing Operations system administrator to the needs of all webservice clients.

A future version of the service may provide a more general mechanism for secure client authentication.

Locale

The only locale supported is the locale currently configured for the IBM Marketing Operations system instance. All locale-dependent data accessible via the service (messages, currency, and so on) are assumed to be in the system locale.

A future version of the service may provide a mechanism for the client to tell Marketing Operations which locale to use.

State management

The webservice is *stateless*; no per-client information is saved by the service implementation across API calls. This feature provides for an efficient service implementation and simplifies cluster support.

Database transactions

The webservice does not expose database transactions nor edit locks to the client. It does, however, guarantee that the effect of any procedure execution is *atomic*. This result means that the procedure either succeeds or fails; a failure leaves the database in the same state as if the API was never called at all.

About Marketing Operations Integration Webservice data types

This section defines the data types used by the webservice, independent of a particular service binding or programming implementation.

The following notation is used.

- `<type>`: `<type definition>` defines a simple data type. For example:
Handle: string

- `<type>: [<type definition>]` defines a complex data type or a data structure.
- `<type>: { <type definition> }` defines a complex data type or a data structure.

Complex type elements and API parameters can use these types to declare arrays. For example:

```
Handle [] handles
```

The type, `handles`, is an array of `Handle` types.

Primitive types

Primitive types are restricted to the types defined in the table that follows to simplify support for SOAP 1.1 bindings. All types can be declared as arrays, for example, `String []`. Inherently, binary data types such as `long` can be represented as strings by a protocol binding (for example, SOAP). This representation, however, has no effect on the semantics of the type, permissible values, etc., as seen by the client.

Table 2. Primitive types

API Type	Description	SOAP Type	Java Type
boolean	Boolean value: true or false	xsd:boolean	boolean
dateTime	A date time value	xsd:datetime	Date
decimal	An arbitrary-precision, decimal value	xsd:decimal	java.math.BigDecimal
double	A double-precision, signed, decimal value	xsd:double	double
int	A signed, 32-bit, integer value	xsd:int	int
integer	An arbitrary-precision, signed, integer value	xsd:integer	java.math.BigInteger
long	A signed, 64-bit, integer value	xsd:long	long
string	A string of Unicode characters	xsd:string	java.lang.String

MessageTypeEnum

```
MessageTypeEnum: { INFORMATION, WARNING, ERROR }
```

`MessageTypeEnum` is an enumerated type that defines all possible message types.

- `INFORMATION`: an informational message
- `WARNING`: a warning message
- `ERROR`: an error message

Message

```
Message: [MessageTypeEnum type, string code, string localizedText, string logDetail]
```

`Message` is a data structure that defines the result of a webservice API call. It provides optional fields for a non-localized code, localized text, and log detail. Currently, all localized text uses the locale set for the IBM Marketing Operations server instance.

Table 3. Message parameters

Parameter	Description
type	A MessageTypeEnum, setting the type of the message.
code	An optional code, in string format, for the message.
localizedText	An optional text string to associate with the message.
logDetail	An optional stack trace message.

NameValue

NameValue: [string name, int sequence]

NameValue is a base complex type that defines a name-value pair. It also defines an optional sequence that the service uses to construct value arrays as needed (the sequences are zero-based).

All NameValues with the same name, but different sequence numbers, are converted into an array of values and associated with the common name.

The array size is determined by the maximum sequence number; unspecified array elements have null values. Array sequence numbers must be unique. The value and its type are provided by the extended type.

Table 4. NameValue parameters

Parameter	Description
name	A string that defines the name of a NameValue type.
sequence	A zero-based integer that sets the sequence number for the NameValue implied value.

Extended NameValue types are defined for each primitive type, as follows:

Table 5. Extended NameValue types

Extended type	Description
BigDecimalNameValue: NameValue [decimal value]	A NameValue type whose value is an arbitrary-precision, decimal number.
BigIntegerNameValue: NameValue [integer value]	A NameValue type whose value is an arbitrarily sized integer.
BooleanNameValue: NameValue [boolean value]	A NameValue type whose value is a boolean.
CurrencyNameValue: NameValue [string locale, decimal value]	A NameValue type suitable for representing currency in some locale. Locale is an ISO Language Code, that is, the lowercase, two-letter codes as defined by ISO-639. Currently, the locale must agree with the locale set in the IBM Marketing Operations server instance.
DateNameValue: NameValue [datetime value]	A NameValue type whose value is a date.
DecimalNameValue: NameValue [double value]	A NameValue type whose value is a double-precision, decimal number.

Table 5. Extended NameValue types (continued)

Extended type	Description
IntegerNameValue: NameValue [long value]	A NameValue type whose value is a 64-bit integer.
String NameValue: NameValue [string value]	A NameValue type whose value is a string.

And finally, an array of the extended NameValue types is defined for use when you need to define a set of NameValues of with different types.

```

    NameValueArrays: [
BooleanNameValue[]    booleanValues,
StringNameValue[]     stringValues,
IntegerNameValue[]    integerValues,
BigIntegerNameValue[] bigIntegoooleanNameValue,
DecimalNameValue[]    decimalValues,
BigDecimalNameValue[] bigDecimalValues
DateNameValue[]       dateNameValues
CurrencyNameValue[]   currencyValues
    ]

```

executeProcedure

Syntax

```
executeProcedure(string key, string jobid, NameValueArrays paramArray)
```

Returns

```

int: status
Message[]: messages

```

Description

This method invokes the specified procedure with an optional array of parameters. The call executes synchronously; that is, it blocks the client and returns the result upon completion.

Parameters

Table 6. executeProcedure parameters

Name	Description
key	The unique key of the procedure to execute. A <i>RemoteException</i> error is returned if no procedure is bound to key .
jobid	Optional string identifying the job associated with this procedure execution. This string is a pass-through item, but it can be used to tie client jobs to the execution of a particular procedure.
paramArray	An array of parameters to pass to the procedure. An error status and message is returned if one or more of the parameters is invalid (the wrong type, an illegal value, and so on). It is up to the client to determine the parameters, their types, and the number of values required by the procedure.

Return Parameters

Table 7. *executeProcedure* return parameters

Name	Description
status	An integer code: <ul style="list-style-type: none">• 0 indicates the procedure executed successfully• an integer indicates an error Procedures can use the status to indicate different levels of errors.
messages	An array of zero or more message data structures. If status is 0, this array does not contain ERROR messages, but could contain INFORMATION and WARNING messages. If status is non-zero, messages can contain any mix of ERROR, INFORMATION, and WARNING messages.

Marketing Operations Integration Services WSDL

This topic defines the Web Services Definition Language (WSDL) for the Marketing Operations Integration Services. The WSDL was defined by hand and is the final word on the webservice definition.

Axis

This version of the webservice uses Axis2 1.5.2 to generate the server-side classes that make up the Web service implementation from the WSDL file. Users can use any version of Axis, or a non-Axis technique, to create a client side implementation for integrating with the API from the supplied WSDL.

Protocol version

The version of the protocol is explicitly bound to the WSDL as follows:

- As part of the WSDL name, for example, PlanIntegrationService1.0.wsdl
- As part of the WSDL targetNamespace, for example, xmlns:tns="http://webservices.unica.com /MktOps/services/PlanIntegrationServices1.0?wsdl"

WSDL

One WSDL file is provided with IBM Marketing Operations Integration Services: PlanIntegrationServices1.0.wsdl. The WSDL is delivered in the integration/examples/soap/plan directory. The example build script uses this file to generate the appropriate client-side stubs to connect to the webservice.

Chapter 3. IBM Marketing Operations procedures

A *procedure* is a custom or standard Java class hosted by IBM Marketing Operations that does some unit of work. Procedures provide a way for customers, partners, and IBM Professional Services to extend Marketing Operations business logic in arbitrary ways.

Procedures follow a simple programming model, using a well-defined API to affect components managed by Marketing Operations. Procedures are "discovered" through a simple lookup mechanism and XML-based definition file. Marketing Operations executes the procedures according to needs of their "clients." For example, in response to an integration request (incoming) or a trigger firing (internal or outgoing).

Procedures run synchronously with respect to their client; results are made available directly to the client, and through a persisted auditing mechanism. The execution of a procedure could also cause other events and triggers to fire in Marketing Operations.

Procedures must be written in Java.

Assumptions

Note the following assumptions that concern procedures.

- The procedure implementation classes are packaged into a separate classes tree or JAR file and made available to IBM Marketing Operations through a URL path. The procedure execution manager uses an independent class loader to load these classes as needed. By default, Marketing Operations looks in the following directory:

`<MarketingOperations_Home>/devkits/integration/examples/classes`

To change this default, set the **integrationProcedureClasspathURL** parameter under **Settings > Configuration > Marketing Operations > umoConfiguration > integrationServices**.

- The procedure implementation class name follows the accepted Java naming conventions, to avoid package collisions with "unica" and classes from other vendors. In particular, customers must not place procedures under the **com.unica** or **com.unicacorp** package tree.
- The procedure implementation is coded to the Java runtime version used by IBM Marketing Operations on the application server (at least JRE 1.5.10).
- IBM Marketing Operations provides some number of open source and third-party libraries; application servers also use different versions of these libraries. Generally, this list changes from release to release.

Note: To avoid possible compatibility problems, do not use any open source, third-party, or application server-specific libraries in procedures.

If a procedure, or the secondary classes that it imports, does use such packages, their use must agree exactly with the packages provided by Marketing Operations or the application server. In this case, rework of your procedure code is required if a later version of Marketing Operations upgrades or abandons a library.

- The procedure implementation class is loaded by the class loading policy that is normally used by IBM Marketing Operations (typically **parent-last**). The application server may provide development tools and options to reload classes that would apply to Marketing Operations procedures, but that is not required.
- The procedure must be thread-safe concerning its own state; that is, its execute method cannot depend on internal state changes from call to call.
- A procedure cannot create threads on its own.

Design

In your design, focus on producing a single unit of work that operates atomically. Ideally, a procedure performs some series of tasks that can be scheduled asynchronously to execute at some later time. This "fire and forget" integration model results in the least load on both systems.

The procedure implementation class uses the IBM Marketing Operations API to read and update Marketing Operations components, invoke services, and so on. Other Java packages can be used to do other tasks.

Note: Only the documented classes and methods will be supported in future releases of Marketing Operations. Consider all other classes and methods in Marketing Operations to be off-limits.

After you code and compile the procedure implementation classes, you make them available to Marketing Operations. The build scripts that are supplied with the Marketing Operations Integration Services place the compiled procedures in the default location. The final development step is to update the custom procedure plug-in definition file that is used by Marketing Operations to discover the custom procedures.

The procedure must implement the **com.unica.publicapi.plan.plugin.procedure.IProcedure** interface and have a parameter-less constructor (usual JavaBeans model). Coding and compilation of each procedure is done in a Java IDE of the customer's choice, such as Eclipse, Borland JBuilder, or Idea. Sample code is provided with IBM Marketing Operations as developer toolkits, in the following location:

`<MarketingOperations_Home>/devkits/integration/examples/src/procedure`

Configuration

Use the parameters under **Settings > Configuration > Marketing Operations > umoConfiguration > integrationServices** to configure the Marketing Operations Integration Module.

For details, see the *Marketing Operations Installation Guide*.

Procedure lifecycle

The runtime lifecycle of a procedure is:

1. Discovery and initialization
2. Selection (optional)
3. Execution
4. Destruction

Discovery and initialization

IBM Marketing Operations must be made aware of all standard and custom procedures available for a particular installation instance. This process is called discovery.

Note: Standard procedures (procedures defined by the Marketing Operations engineering team) are known implicitly and so do not need any action to be discovered.

Custom procedures are defined in the procedure plug-in definition file. The Marketing Operations plug-in manager reads this file during initialization. For each procedure found, the plug-in manager does the following:

1. Instantiate the procedure; transition its state to INSTANTIATED.
2. Create a new procedure audit record.
3. If the procedure could be instantiated, its **initialize()** method is called with any initialization parameters found in its plug-in description file. If this method throws an exception, the status is logged and the procedure is abandoned. Otherwise, the procedure transitions to the INITIALIZED state. It is now ready to execute.
4. Create a new procedure audit record.
5. If the procedure could be initialized, its **getKey()** method is called to determine the key used by clients to reference the procedure. This key is associated with the instance and saved for later lookup.

Selection

From time to time, IBM Marketing Operations may need to present a list of available procedures to users, for example to enable administrators to setup a trigger. This is done only after the procedure has been initialized. The procedure's **getDisplayName()** and **getDescription()** methods are used for this purpose.

Execution

At some point after the procedure has been initialized, IBM Marketing Operations receives a request to execute the procedure. This may happen concurrently with other procedures (or the same procedure) executing on other threads.

At execution time, the procedure execution manager does the following.

1. Start a database transaction.
2. Set the procedure state to EXECUTING.
3. Create a new procedure audit record.
4. Call the procedure's **execute()** method with an execution context and any execute parameters provided by the client. The method implementation uses the Marketing Operations API as needed, acquiring edit locks and passing along the execution context. If the execute method throws an exception, the execution manager marks the transaction for rollback.
5. Commit or rollback the transaction according to the execution results; set procedure state to EXECUTED.
6. Release any outstanding edit locks.
7. Create a new procedure audit record.

Note: The **execute()** method should not alter the procedure instance data.

Destruction

When IBM Marketing Operations shuts down, the procedure plug-in manager walks through all loaded procedures. For each procedure found, it does the following:

1. Calls the procedure's `destroy()` method to allow the procedure to clean up before the instance is destroyed.
2. Changes the state of the procedure to `FINALIZED` (it cannot be executed).
3. Creates a new procedure audit record.
4. Destroys the instance of the procedure.

Data locking

IBM Marketing Operations uses a pessimistic edit locking scheme; that is, only one user is granted update access to component instances at a time. For the GUI user, this locking is done at the visual tab level. In some cases this represents a subset of an instance (for example, a project summary tab), while in others it represents many instances (the workflow tab). Once a user acquires a lock, all other users are restricted to read-only access to the related data.

Note: Edit locks are not the same as database transactions.

In order to ensure that the changes made by a procedure to a component instance or group of instances are not inadvertently overwritten by another user, a procedure must acquire the appropriate locks before updating component data. The execution context object passed to the procedure's **execute()** method is used to accomplish this.

Before the procedure updates any data, it must call the context's **acquireLock()** method for each lock it needs. For example, if a procedure is going to update a project and the associated workflow, the procedure needs to acquire locks for both.

If another user already has a lock, the **acquireLock()** method throws a **LockInUseException** immediately. In order to minimize collisions, the procedure should release the lock as soon as it updates the object.

The execution manager automatically releases any outstanding locks when the execute method returns. In any case, locks are only held for the life of the database transaction. That is, locks expire if the database-specific transaction timeout is exceeded.

Procedure transactions

The procedure execution manager automatically wraps execution of the procedure with a database transaction, committing or rolling it back as appropriate based on the outcome of the procedure execution. This guarantees that updates to the IBM Marketing Operations database are not visible to other users until committed and that the updates are atomic.

The procedure writer still must acquire the necessary edit locks to ensure that other users cannot write changes to the database before the procedure execution completes.

Communicating results

The **execute()** method of a procedure returns an integer status code and zero or more messages which are logged and persisted to the IBM Marketing Operations procedure audit table. The client may also communicate the status information in some other fashion.

Procedure logging

IBM Marketing Operations has a separate log file for procedures.

`<MarketingOperations_Home>\logs\procedure.log`

The procedure execution manager logs the lifecycle of each procedure and creates audit records.

- **logInfo()**: write an informational message to the procedure log.
- **logWarning()**: write a warning message to the procedure log.
- **logError()**: write an error message to the procedure log.
- **logException()**: dump the stack trace for the exception to the procedure log.

Key Java classes

The supplied integration devkit contains a set of Javadoc for the public IBM Marketing Operations API and supporting classes. The most important are listed here.

- **IProcedure** (com.unica.publicapi.plan.plugin.procedure.IProcedure): interface that all procedures must implement. Procedures go through a well-defined lifecycle and access the Marketing Operations API to perform work.
- **ITriggerProcedure** (com.unica.publicapi.plan.plugin.procedure.ITriggerProcedure): interface that all trigger procedures must implement (marker interface).
- **IExecutionContext** (com.unica.publicapi.plan.plugin.procedure.IExecutionContext): interface of opaque context object handed to the procedure by the execution manager. This object has public methods for logging and edit lock management. The procedure also passes this object to all PlanAPI calls.
- **IPlanAPI** (com.unica.publicapi.plan.api.IPlanAPI): interface to the Marketing Operations API. The execution context provides a **getPlanAPI()** method to retrieve the proper implementation.

Procedure example

This example shows a standard procedure to change the state of a project from an integration webservice or a trigger.

Note: Do not modify the sample procedures and their XML definitions. The samples are overwritten each time you upgrade IBM Marketing Operations, and your changes are lost. Instead, create and modify all custom procedures in a different directory.

```
// ProjectStateChangeProcedure
// (c) Copyright 2012 by IBM Corporation. All rights reserved.

package com.unica.uap.plugin.procedure.standard;
```

```

import java.util.Iterator;
import java.util.List;
import java.util.Locale;
import java.util.Map;

import com.unica.publicapi.plan.api.Handle;
import com.unica.publicapi.plan.api.IExecutionContext;
import com.unica.publicapi.plan.api.IPlanAPI;
import com.unica.publicapi.plan.api.LockInUseException;
import com.unica.publicapi.plan.api.ProjectHandle;
import com.unica.publicapi.plan.api.ProjectStateEnum;
import com.unica.publicapi.plan.plugin.PluginVersion;
import com.unica.publicapi.plan.plugin.procedure.IProcedure;
import com.unica.publicapi.plan.plugin.procedure.ProcedureExecutionException;
import com.unica.publicapi.plan.plugin.procedure.ProcedureInitializationException;
import com.unica.publicapi.plan.plugin.procedure.ProcedureMessage;
import com.unica.publicapi.plan.plugin.procedure.ProcedureMessageTypeEnum;
import com.unica.publicapi.plan.plugin.procedure.ProcedureResult;

/**
 * <b>ProjectStateChangeProcedure</b> is a standard Marketing Operations procedure
 * that attempts to
 * transition the state of a project.
 * <p>
 * Expects the following initialization parameters:
 * <ul>
 * <li>debug: Boolean object, <tt>true</tt> or <tt>false</tt>, indicating
 * if debug tracing is enabled or not</li>
 * </ul>
 *
 * <p>
 * Expects the following execute parameters:
 * <ul>
 * <li>hProject: string array form of project handle, e.g.,
 * "http://mymachine:7001/MktOps/affiniumplan.jsp?
 * cat=projecttabs&projectid=12"</li>
 * <li>uapState: string array form of new project state, e.g.,
 * "COMPLETED". Note, case matters!</li>
 * </ul>
 *
 */
public final class ProjectStateChangeProcedure implements IProcedure {
// initialization parameters
private final static String DEBUG_INITPARAMETER_NAME = "debug";
// execute parameters
private final static String HPROJECT_PARAMETER_NAME = "hProject";
private final static String STATE_PARAMETER_NAME
    = IPlanAPI.PROJECT_ATTRIBUTE_STATEENUM; // same as attribute name

// our status codes
private final static int STATUS_SUCCESS = 0;

// debug property. set the procedure's "debug" init parameter
// to true to enable debug trace
private boolean _debug = false;
private boolean isDebug() { return _debug; }

// simple name is unqualified class name
public String getName() {
    return "uapProjectStateChangeProcedure";
}

// display name is always key
public String getDisplayName(Locale locale) {
    // only do EN for now
    return getName();
}

```

```

// description always in english
public String getDescription(Locale locale) {
    // only do EN for now
    return "A procedure to transition the state of a project.";
}

// version we're coded to; must be 1.0.0 for now
public PluginVersion getVersion() {
    return new PluginVersion(1,0,0);
}

// initialize instance from init parameters
public void initialize(Map initParameters)
    throws ProcedureInitializationException {
    // the only init parameter we have is: debug, Boolean
    if (initParameters.containsKey(DEBUG_INITPARAMETER_NAME)) {
        try {
            _debug = ((Boolean)initParameters.get(DEBUG_INITPARAMETER_NAME)).
                booleanValue();
        } catch (Exception exception) {
            throw new ProcedureInitializationException("Problem using "
                + DEBUG_INITPARAMETER_NAME
                + " init parameter: "
                + exception.getMessage());
        }
    }
}

// execute: expect hProject and state enum
public ProcedureResult execute(IExecutionContext context, Map parameters)
    throws ProcedureExecutionException {
    // get execute parameters: we expect two:
    // - hProject: string[] form of project handle
    // - uapState: string[] form of ProjectStateEnum
    ProjectHandle hProject = null;
    if (parameters.containsKey(HPROJECT_PARAMETER_NAME)) {
        try {
            hProject = (ProjectHandle)
                Handle.makeHandle(((String[])parameters.get(HPROJECT_PARAMETER_NAME))[0]);
        } catch (Exception exception) {
            throw new ProcedureExecutionException("Problem using "
                + HPROJECT_PARAMETER_NAME
                + " parameter: "
                + exception.getMessage());
        }
    } else throw new ProcedureExecutionException(HPROJECT_PARAMETER_NAME
        + " parameter must be provided.");

    ProjectStateEnum stateEnum = null;
    if (parameters.containsKey(STATE_PARAMETER_NAME)) {
        try {
            stateEnum =
                ProjectStateEnum.valueOf(((String[])parameters.
                    get(STATE_PARAMETER_NAME))[0]);
        } catch (Exception exception) {
            throw new ProcedureExecutionException("Problem using "
                + STATE_PARAMETER_NAME
                + " parameter: "
                + exception.getMessage());
        }
    } else throw new ProcedureExecutionException(STATE_PARAMETER_NAME
        + " parameter must be provided.");

    int status = -1;
    ProcedureMessage[] messages = null;
    try {

```

```

        // try to acquire an edit lock for the project
        context.acquireLock(hProject, IExecutionContext.LOCK_ALL_FIELDS);

        // use PlanAPIImpl to update state
        IPlanAPI planAPI = context.getPlanAPI();
        planAPI.updateAttribute(context, hProject, STATE_PARAMETER_NAME,
            new ProjectStateEnum[]{stateEnum});

        // success
        status = STATUS_SUCCESS;

    } catch (Exception exception) {
        // write stack trace if debug
        if (isDebug()) {
            context.logError(getName(), exception);
        }
        throw new ProcedureExecutionException(exception);
    } finally {
        // release our lock
        try {
            context.releaseAllLocks();
        } catch (Exception exception) { /* ignored */ }
    }

    return new ProcedureResult(status, messages);
}

public void destroy( ){
    // we don't need to do anything
}
}

```

Procedure plug-in definition file

The procedure plug-in definition file defines implementation class, metadata, and other information about the custom procedures to be hosted in IBM Marketing Operations. By default, the procedure plug-in definition is assumed to be in the following path:

```
<MarketingOperations_Home>/devkits/integration/examples/src/procedures/
procedure-plugins.xml
```

This file is an XML document that contains the following information.

Procedures: a list of zero or more **Procedure** elements.

Procedure: an element that defines a procedure. Each procedure contains the following elements.

- **key** (optional): string that defines the lookup key for the procedure. This key must be unique among all standard (IBM-supplied) and custom procedures that are hosted by a particular Marketing Operations instance. If not defined, defaults to the fully qualified version of the **className** element. Names starting with the string "uap" are reserved for use by IBM Marketing Operations.
- **className** (required): fully qualified package name of the procedure class. This class must implement the `IProcedure` class (`com.unica.public.plan.plugin.procedure.IProcedure`).
- **initParameters** (optional): a list of zero or more **initParameter** elements.
 - initParameter**(optional): parameter to be passed to the procedure's `initialize()` method. This element includes the nested parameter name, type, and value elements.

- name: string that defines the parameter name
- type: optional class name of the Java wrapper class that defines the type of the parameter value. Must be one of the following types:
 - java.lang.String (the default)
 - java.lang.Integer
 - java.lang.Double
 - java.lang.Calendar
 - java.lang.Boolean
- value: string form of the attribute value according to its type

Chapter 4. About the IBM Marketing Operations API

The IBM Marketing Operations API is a façade that provides a client view of a running Marketing Operations instance. Only a subset of the Marketing Operations capabilities are exposed. The API is designed to be used concurrently by Marketing Operations web users and Marketing Operations Integration Services WebService SOAP requests and triggers. The API supports the following types of operations.

- Component creation and deletion
- Discovery (by component type, attribute value, and so on)
- Component inspection (via its attributes, specialized links, and so on)
- Component modification

Versioning and backwards-compatibility

Future versions of this API will be backwardly compatible with all minor and maintenance releases that share a major version number. However, IBM reserves the right to break compatibility with an earlier version for dot zero (x.0) major releases if the business or technical case warrants doing so.

The major version number of this API will be incremented if any of the following changes are made.

- Data interpretation changed
- Business logic changed (for example service method functionality changed)
- Method parameters and/or return types changed

The minor version number of the API will be incremented if any of the following changes are made (note, that these changes are by definition backward-compatible).

- New method added
- New data type added and its usage restricted to a new method
- New element added to an enumerated type
- A new version of an interface is defined with a version suffix

User security

Authentication is assumed to be done by the procedure's execution manager and the authenticated user information bound to the execution context used by all APIs. The API does not expose the authenticated user, but will pass it on to IBM Marketing Operations to use as needed.

The authenticated user, however, may not be authorized to perform all the operations exposed by the API; in this case, the API method will throw an **AuthorizationException**.

Locale

The only locale supported by this version is the locale currently configured for the IBM Marketing Operations server instance. All locale-dependent data accessible via the API (messages, currency, etc.) are assumed to be in this system locale.

State management

This API is stateless, meaning that no per-client information is saved by the API across calls.

Note, however, that specific API calls may change the state of underlying component instances managed by IBM Marketing Operations, and these state changes may be persisted to a database.

Database transactions

This API does not expose database transactions to the client, but will use such information if included in the execution context. If a transaction is started, then the effect of all API calls within a particular procedure will be atomic. Other users of IBM Marketing Operations will not see the changes until the procedure successfully commits the transaction.

API calls that update the database must first acquire an edit lock to prevent other Marketing Operations users from modifying the underlying data during the course of the API call(s). Other users will not be able to update locked components until the API completes; likewise, another Marketing Operations user or API client may have acquired the lock on the desired data which will prevent the API call from completing.

Event processing

Operations performed on IBM Marketing Operations components via this API generate the same events as if the operation were performed by a Marketing Operations Web user. In particular, triggers waiting for certain events eventually will fire in both cases. Users that subscribed to certain notifications (for example, when a project state changes) will be notified of state changes that result from API calls as well as Web user actions.

Contents of the IBM Marketing Operations API

The `com.unica.publicapi.plan.api` package delivers the IBM Marketing Operations API. This package offers interfaces and exceptions, and contains the following types of classes:

- Enumerated data types.
- Handles to identify object and component instances.
- A Java map, `AttributeMap`.

Complete documentation of the API, including all methods and possible values, is available by clicking **Help > Product Documentation** in an instance of Marketing Operations, then downloading the IBM `<version>PublicAPI.zip` file. An overview follows.

API Interfaces

The IBM Marketing Operations application programming interface (API) includes the following interfaces.

IPlanAPI

Defines the public API for Marketing Operations. Provides methods for creating, discovering, and modifying objects, including folders, projects, workflow tasks, and team members.

For systems that have the optional integration with IBM Campaign enabled, also provides methods for creating, discovering, and modifying offers.

IExecutionContext

Defines the triggers and locks that execute methods in the API.

API methods

For specific information about the public API methods, refer to the iPlanAPI class in the JavaDocs API documentation files. These files are available by logging in to Marketing Operations and selecting **Help > Product Documentation** from any page, and then downloading the `<version>PublicAPI.zip` file.

Common exceptions

Common exceptions that are thrown by the API include the following.

- `<object type>NotFoundException`: The system is unable to return the specified item or object.
- `AuthorizationException`: The user who is associated with the execution context is not authorized for the requested operation. This exception can be thrown by any API method, so is undeclared.
- `DataException`: An exception occurred in the underlying database layer in IBM Marketing Operations. Check the SQL log for details.
- `InvalidExecutionContextException`: There is a problem with an execution context passed to an API method (for example, the method was not initialized correctly). This exception can be thrown by any API, so is undeclared.
- `NotLockedException`: Attempt to update component data without first acquiring the required lock. See the `acquireLock()` method of the `IExecutionContext` interface.

Enumerated data types

ApprovalMethodEnum

`ApprovalMethodEnum` defines valid approval methods. Possible values are:

- `SEQUENTIAL`
- `SIMULTANEOUS`

ApprovalStateEnum

`ApprovalStateEnum` defines valid approval states. Possible values are:

- `CANCELLED`
- `COMPLETED`
- `IN_PROGRESS`
- `NOT_STATED`
- `ON_HOLD`

AssetLibraryStateEnum

`AssetLibraryStateEnum` defines valid asset library states. Possible values are:

- `DISABLED`
- `ENABLED`

AssetStateEnum

`AssetStateEnum` defines valid asset states. Possible values are:

- `ARCHIVE`

- DRAFT
- FINALIZE
- LOCK

AttachmentTypeEnum

AttachmentTypeEnum defines valid attachment types. Possible values are:

- ASSET
- FILE
- URL

BudgetPeriodEnum

BudgetPeriodEnum defines the possible budget periods. Possible values are:

- ALL
- MONTHLY
- QUARTERLY
- WEEKLY
- YEARLY

BudgetTypeEnum

BudgetTypeEnum defines valid budget types. Possible values are:

- ACTUAL
- ALLOCATED
- COMMITTED
- FORECAST
- TOTAL

ComponentTypeEnum

ComponentTypeEnum identifies the accessible Marketing Operations component types. Possible values are:

- APPROVAL
- ASSET
- ASSET_FOLDER
- ASSET_LIBRARY
- ATTACHMENT
- FINANCIAL_ACCOUNT
- GROUPING_FOLDER
- INVOICE
- MARKETING_OBJECT
- PLAN_TEAM
- PLAN_USER
- PROJECT
- PROJECT_REQUEST
- TASK
-

InvoiceStateEnum

InvoiceStateEnum defines valid invoice states. Possible values are:

- CANCELLED
- DRAFT

- PAID
- PAYABLE

MonthEnum

MonthEnum defines valid values for the month.

OfferStateEnum

OfferStateEnum defines valid offer states. Possible values are:

- STATE_OFFER_DRAFT
- STATE_OFFER_PUBLISHED
- STATE_OFFER_RETIRED

ProjectCopyTypeEnum

ProjectCopyTypeEnum defines valid methods for copying a project.

Possible values are:

- COPY_USING_PROJECT_METRICS
- COPY_USING_TEMPLATES_METRICS

ProjectParticipantLevelEnum

ProjectParticipantLevelEnum identifies the roles that users can have in a project. Possible values are:

- OWNER
- PARTICIPANT
- REQUESTER

ProjectStateEnum

ProjectStateEnum defines valid project and request states. Possible values are:

- ACCEPTED
- CANCELLED
- COMPLETED
- DRAFT
- IN_PROGRESS
- IN_RECONCILIATION
- LATE: the project did not start by its scheduled begin date.
- NOT_STARTED
- ON_HOLD
- OVERDUE: the project was not completed before its scheduled end date.
- RETURNED
- SUBMITTED

For more information about project and task statuses, see the *IBM Marketing Operations User's Guide*.

QuarterEnum

QuarterEnum defines the valid values for quarters: Q1, Q2, Q3, and Q4.

TaskStateEnum

TaskStateEnum defines valid workflow task states. Possible values are:

- ACTIVE
- DISABLED
- FINISHED
- PENDING

- SKIPPED

WeekEnum

WeekEnum defines valid values for weeks in a year, from WEEK_1 to WEEK_53.

Handles

A Handle is special URL object that references a particular object instance in a Marketing Operations instance. Handles include the component type, internal data identifier, and an instance base URL. Handles used or generated by the API can be externalized to a full URL. You can use the resulting URL in different ways, including to open a view of the component in the Marketing Operations GUI, send in email messages, or use in another procedure as a parameter.

Handles are valid only for a particular Marketing Operations service instance or clustered instance, but are valid for the lifetime of the deployed service. As a result, handles can be saved in a file for later reference, but they cannot be used to access components on another Marketing Operations instance. This restriction also applies to instances on the same physical host server. Marketing Operations does provide, however, a mechanism for mapping different base URLs to the current instance to accommodate relocating an instance to another server (for example, if the equipment malfunctions).

Handles are client-independent. For example, a trigger can pass a handle to a procedure, which uses it as a parameter in a SOAP call to a 3rd-party system. The 3rd-party system can then issue a SOAP request back to Marketing Operations to start a procedure that updates an attribute.

Members of the Handle class have factory methods for creating handles from various types of URLs. Examples follow.

Approval

```
http://mymachine:7001/plan/affiniumplan.jsp?cat=approvaldetail&approvalid=101
```

Asset

```
http://localhost:7001/plan/affiniumplan.jsp?cat=asset&assetMode=VIEW_ASSET&assetid=101
```

Asset Folder

```
http://localhost:7001/plan/affiniumplan.jsp?cat=folder&id=101
```

Asset Library

```
http://localhost:7001/plan/affiniumplan.jsp?cat=library&id=101
```

Attachment

```
http://mychane:7001/plan/affiniumplan.jsp?cat=attachmentview&attachid=101&parentObjectId=101&parentObjectType=project
```

Financial Account

```
http://localhost:7001/plan/affiniumplan.jsp?cat=accountdetails&accountid=101
```

Folder

```
http://mymachine:7001/plan/affiniumplan.jsp?cat=grouping_folder&folderid=1234
```

Invoice

```
http://localhost:7001/plan/affiniumplan.jsp?cat=invoicedetails&invoiceid=134
```


Invoice line item

`http://localhost:7001/plan/affiniumplan.jsp?cat=invoicedetails&invoiceid=134&line_item_id=101`

Marketing object

`http://mymachine:7001/plan/affiniumplan.jsp?cat=componenttabs&componentid=creatives&componentinstid=1234`

Marketing object grid

`http://mymachine:7001/plan/affiniumplan.jsp?cat=componenttabs&componentid=creatives&componentinstid=1234&gridid=grid`

Marketing object grid row

`http://mymachine:7001/plan/affiniumplan.jsp?cat=componenttabs&componentid=creatives&componentinstid=1234&gridid=grid&gridrowid=101`

Plan team

`http://mychane:7001/plan/affiniumplan.jsp?cat=teamdetails&func=edit&teamid=100001`

Plan user

`http://mymachine:7001/plan/affiniumplan.jsp?cat=adminuserpermissions&func=edit&userid=101`

Project

`http://mymachine:7001/plan/affiniumplan.jsp?cat=projecttabs&projectid=1234`

Project grid

`http://mymachine:7001/plan/affiniumplan.jsp?cat=projecttabs&projectid=1234&gridid=grid`

Project grid row

`http://mymachine:7001/plan/affiniumplan.jsp?cat=projecttabs&projectid=1234&gridid=grid&gridrowid=101`

Project line item

`http://localhost:7001/plan/affiniumplan.jsp?cat=projecttabs&projectid=1234&projectlineitemid=123&projectlineitemisversionfinal=false`

Workflow stage

`http://mymachine:7001/plan/affiniumplan.jsp?cat=projectworkflow&projectid=1234&taskid=5678`

Workflow task

`http://mymachine:7001/plan/affiniumplan.jsp?cat=projectworkflow&projectid=1234&taskid=5678`

Attribute Map

The `AttributeMap` class is a Java map that contains only attributes. The attribute `<Name>` is the map entry key, and the attribute `<values>` array (note plural) is the map entry value.

`AttributeMap` includes the following fields:

- `<Name>`: the programmatic name of the attribute. This name serves as a unique key for accessing the attribute within the component instance in which it occurs.

Note: *Name* is not necessarily the display name that is presented to a user in the GUI. For components that are created from templates (such as projects or workflow tasks), the attribute name is specified by the template element definition and must be unique. For other components, the attribute name typically is derived programmatically from the server-side component instance (for example, through Java introspection).

Note: By convention, custom attributes include the name of the form in which the editable version is defined: `<form_name>.<attribute_name>`.

- **Values:** a Java object array, containing zero or more attribute values. The type of each value must be the same and agree with the type of the attribute as it is defined in Marketing Operations. Only the following Java wrapper and Marketing Operations types are supported:
 - `AssetLibraryStateEnum`: a `AssetLibraryStateEnum` enumerated type value.
 - `AssetStateEnum`: a `AssetStateEnum` enumerated type value.
 - `AttachmentTypeEnum`: a `AttachmentTypeEnum` enumerated type value.
 - `AttributeMap`: a map that holds attributes.
 - `BudgetPeriodEnum`: a `BudgetPeriodEnum` enumerated type value.
 - `BudgetTypeEnum`: a `BudgetTypeEnum` enumerated type value.
 - `Handle`: a reference to a component instance, grid row, attribute, and so on.
 - `InvoiceStateEnum`: an `InvoiceStateEnum` enumerated type value.
 - `java.io.File`: representation of a file.
 - `java.lang.Boolean`: a boolean value, either `True` or `False`
 - `java.lang.Double`: a double-precision decimal number value.
 - `java.lang.Float`: a single-precision decimal number value
 - `java.lang.Integer`: a 32-bit integer value
 - `java.lang.Long`: a 64-bit integer value
 - `java.lang.Object`: Generic Java object
 - `java.lang.String`: a string of zero or more Unicode characters
 - `java.math.BigDecimal`: arbitrary-precision signed decimal number value. Suitable for currency; the interpretation of the value depends on the currency locale for the client.
 - `java.math.BigInteger`: arbitrary-precision integer value.
 - `java.net.URL`: a Universal Resource Locator (URL) object.
 - `java.util.ArrayList`: List of objects.
 - `java.util.Calendar`: a date-time value for a particular locale.
 - `java.util.Date`: a date-time value. This type is deprecated. Use `java.util.Calendar` or `java.util.GregorianCalendar` instead.

Note: To implement date, users can select either `java.util.Calendar` or `java.util.GregorianCalendar`.

- `java.util.GregorianCalendar`: `GregorianCalendar` is a concrete subclass of `java.util.Calendar` and provides the standard calendar system in use by most of the world.
- `MonthEnum`: a `MonthEnum` enumerated type value.
- `ProjectStateEnum`: a `ProjectStateEnum` enumerated type value.
- `QuarterEnum`: a `QuarterEnum` enumerated type value.
- `TaskStateEnum`: a `TaskStateEnum` enumerated type value.
- `WeekEnum`: a `WeekEnum` enumerated type value.

The metadata of an attribute (such as localized display name and description) is defined by the template that is associated with the attribute and its parent object instance. Attributes provide a simple yet extensible mechanism for exposing both required and optional object instance attributes, such as project name, code, and start date.

Contacting IBM technical support

If you encounter a problem that you cannot resolve by consulting the documentation, your company's designated support contact can log a call with IBM technical support. Use the information in this section to ensure that your problem is resolved efficiently and successfully.

If you are not a designated support contact at your company, contact your IBM administrator for information.

Information to gather

Before you contact IBM technical support, gather the following information:

- A brief description of the nature of your issue.
- Detailed error messages that you see when the issue occurs.
- Detailed steps to reproduce the issue.
- Related log files, session files, configuration files, and data files.
- Information about your product and system environment, which you can obtain as described in "System information."

System information

When you call IBM technical support, you might be asked to provide information about your environment.

If your problem does not prevent you from logging in, much of this information is available on the About page, which provides information about your installed IBM applications.

You can access the About page by selecting **Help > About**. If the About page is not accessible, you can obtain the version number of any IBM application by viewing the `version.txt` file located under the installation directory for each application.

Contact information for IBM technical support

For ways to contact IBM technical support, see the IBM Product Technical Support website: (http://www-947.ibm.com/support/entry/portal/open_service_request).

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