

# HP Operations Orchestration

For the Windows and Linux

Software Version: 10.02

## Action Developers Guide

Document Release Date: January 2014

Software Release Date: January 2014



## Legal Notices

### Warranty

The only warranties for HP products and services are set forth in the express warranty statements accompanying such products and services. Nothing herein should be construed as constituting an additional warranty. HP shall not be liable for technical or editorial errors or omissions contained herein.

The information contained herein is subject to change without notice.

### Restricted Rights Legend

Confidential computer software. Valid license from HP required for possession, use or copying. Consistent with FAR 12.211 and 12.212, Commercial Computer Software, Computer Software Documentation, and Technical Data for Commercial Items are licensed to the U.S. Government under vendor's standard commercial license.

### Copyright Notice

© Copyright 2012 Hewlett-Packard Development Company, L.P.

### Trademark Notices

Adobe™ is a trademark of Adobe Systems Incorporated.

This product includes an interface of the 'zlib' general purpose compression library, which is Copyright © 1995-2002 Jean-loup Gailly and Mark Adler.

AMD and the AMD Arrow symbol are trademarks of Advanced Micro Devices, Inc.

Google™ and Google Maps™ are trademarks of Google Inc.

Intel®, Itanium®, Pentium®, and Intel® Xeon® are trademarks of Intel Corporation in the U.S. and other countries.

Java is a registered trademark of Oracle and/or its affiliates.

Microsoft®, Windows®, Windows NT®, Windows® XP, and Windows Vista® are U.S. registered trademarks of Microsoft Corporation.

Oracle is a registered trademark of Oracle Corporation and/or its affiliates.

UNIX® is a registered trademark of The Open Group.

## Documentation Updates

The title page of this document contains the following identifying information:

- Software Version number, which indicates the software version.
- Document Release Date, which changes each time the document is updated.
- Software Release Date, which indicates the release date of this version of the software.

To check for recent updates or to verify that you are using the most recent edition of a document, go to: <http://h20230.www2.hp.com/selfsolve/manuals>

This site requires that you register for an HP Passport and sign in. To register for an HP Passport ID, go to: <http://h20229.www2.hp.com/passport-registration.html>

Or click the **New users - please register** link on the HP Passport login page.

You will also receive updated or new editions if you subscribe to the appropriate product support service. Contact your HP sales representative for details.

## Support

Visit the HP Software Support Online web site at: <http://www.hp.com/go/hpsupport>

This web site provides contact information and details about the products, services, and support that HP Software offers.

HP Software online support provides customer self-solve capabilities. It provides a fast and efficient way to access interactive technical support tools needed to manage your business. As a valued support customer, you can benefit by using the support web site to:

- Search for knowledge documents of interest
- Submit and track support cases and enhancement requests
- Download software patches
- Manage support contracts
- Look up HP support contacts
- Review information about available services
- Enter into discussions with other software customers
- Research and register for software training

Most of the support areas require that you register as an HP Passport user and sign in. Many also require a support contract. To register for an HP Passport ID, go to:

<http://h20229.www2.hp.com/passport-registration.html>

To find more information about access levels, go to:

[http://h20230.www2.hp.com/new\\_access\\_levels.jsp](http://h20230.www2.hp.com/new_access_levels.jsp)

**HP Software Solutions Now** accesses the HPSW Solution and Integration Portal Web site. This site enables you to explore HP Product Solutions to meet your business needs, includes a full list of Integrations between HP Products, as well as a listing of ITIL Processes. The URL for this Web site is

<http://h20230.www2.hp.com/sc/solutions/index.jsp>

# Contents

Contents .....	3
Developing Extensions for HP OO .....	4
Creating an @Action .....	5
Developing Plugins .....	5
Preparing to Create a Plugin Using a Maven Archetype .....	5
Creating a Plugin Using a Maven Archetype .....	6
Developing @Actions .....	10
"Hello World!" Example .....	10
Passing Arguments to @Actions .....	10
Return Values .....	11
Adding @Action Annotations .....	11
Annotations .....	12
@Action Data Definition Example .....	14
Testing Extensions .....	15
Testing Extensions as Part of the Project Build .....	15
Testing Extensions Independently from the Command Line .....	15
.NET Extensions .....	15
Legacy Actions .....	18

## Developing Extensions for HP OO

This document provides Java and .NET developers with guidelines for developing actions for extending HP Operations Orchestration.

**Note:** Knowledge of Java or .NET is required.

You can extend HP Operations Orchestration programmatically. This means that third parties can add functionalities to HP Operations Orchestration and introduce them as content in the flow execution engine.

Introducing new content requires building an extension and deploying it to HP OO Central. You can write actions in Java or .NET.

In HP Operations Orchestration 10.x, extensions are called plugins (in previous versions, extensions were called IActions). A plugin is a piece of code running within the run engine. This piece of code can define its own isolated classpath. Classpath isolation ensures that different plugins can use conflicting dependencies. For example, plugin A can use dependency X version 1.0 and plugin B can use the same X dependency, but in version 2.0. You are now able to use both plugins in the same flow regardless of the conflicting classpath issue.

A plugin contains one or more actions and references to all required dependencies.

In HP Operations Orchestration 10.x, there is a new `@Action` interface for developing actions. The `@Action` is a method in a class. See ["Developing @Actions" on page 10](#) for more information.

Although all the plugins are run by Java, HP Operation Orchestration also supports .NET actions. The actions written in .NET are referenced by a wrapping Java plugin. See [".NET Extensions" on page 15](#) for more information.

**Note:** The `IAction` interface from HP OO 9.x is now deprecated. Users writing new content should refrain from implementing the `IAction` interface and instead write `@Actions`.

## Creating an @Action

The recommended way to build @Actions is as a Maven plugin.

You should use Apache Maven 3.0.3 - 3.0.5 to build your plugins.

## Developing Plugins

This section describes how to develop plugins.

Using the Maven archetype `com.hp.oo.sdk:oo-plugin-archetype` you can create a skeleton for a plugin and a Studio project.

## Preparing to Create a Plugin Using a Maven Archetype

### Install Maven

Install Maven on a computer with the `bin` directory in the computer's path. This enables you to run `mvn` from anywhere in the file system.

### Create a local Maven repository

- Expand `sdk-dotnet-<version>.zip` and `sdk-java-<version>.zip` to:

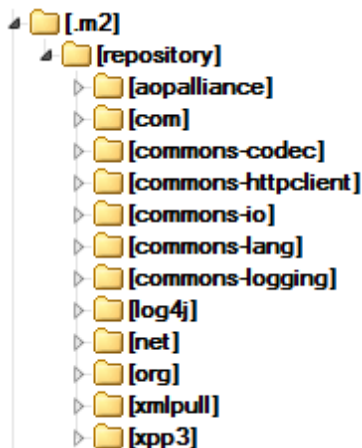
**Windows:** `%HOMEPATH%\m2\repository`.

**Linux:** `$HOME/.m2/repository`.

#### Note:

These files are located on the ISO in the **SDK folder**.

Following is an example of a directory structure, if the files were correctly extracted:



## Register the plugin archetype

- Open the command prompt and enter the following command:

```
mvn archetype:crawl
```

This updates the Maven archetype catalog under `$HOME/.m2/repository`.

## Creating a Plugin Using a Maven Archetype

### Create a sample project

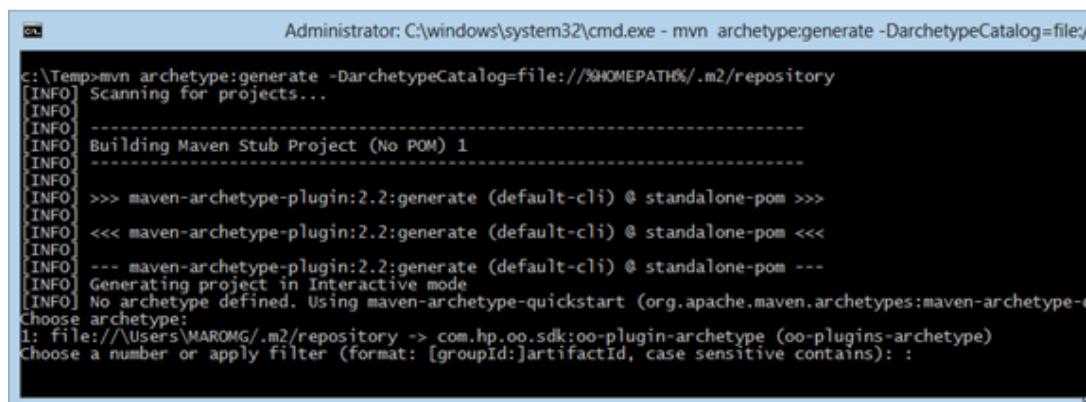
1. Go to the path where you want to create a sample plugin project, and enter the following command in the command line:

```
mvn archetype:generate -DarchetypeCatalog=file://$HOME/.m2/repository
```

**Note:** For Windows, use `%HOMEPATH%`.

This initiates the project creation. A list of archetypes found in the catalog appears. Press the number representing the archetype **com.hp.oo.sdk:oo-plugin-archetype** and then **Enter**.

In the example below, you would press **1**.



```
Administrator: C:\windows\system32\cmd.exe - mvn archetype:generate -DarchetypeCatalog=file:
c:\Temp>mvn archetype:generate -DarchetypeCatalog=file://%HOMEPATH%/.m2/repository
[INFO] Scanning for projects...
[INFO]
[INFO] -----
[INFO] Building Maven Stub Project (No POM) 1
[INFO] -----
[INFO]
[INFO] >>> maven-archetype-plugin:2.2:generate (default-cli) @ standalone-pom >>>
[INFO]
[INFO] <<< maven-archetype-plugin:2.2:generate (default-cli) @ standalone-pom <<<
[INFO]
[INFO] --- maven-archetype-plugin:2.2:generate (default-cli) @ standalone-pom ---
[INFO] Generating project in Interactive mode
[INFO] No archetype defined. Using maven-archetype-quickstart (org.apache.maven.archetypes:maven-archetype-
Choose archetype:
1: file://\Users\MAROMG/.m2/repository -> com.hp.oo.sdk:oo-plugin-archetype (oo-plugins-archetype)
Choose a number or apply filter (format: [groupId]:artifactId, case sensitive contains): :
```

2. During the archetype creation, enter the following details and press **Enter** after each one:
  - `groupId`: The group id for the resulting Maven project. `acmeGroup` is used in the example below.
  - `artifactId`: The artifact id for the resulting Maven project. `acmeArtifact` is used in the example below.
  - `package`: The package for the files in the project. The default for this option is the same as the `groupId`.

```

Define value for property 'groupId': : acmeGroup
Define value for property 'artifactId': : acmeArtifact
[INFO] Using property: version = 1.0.0
Define value for property 'package': acmeGroup: :
Confirm properties configuration:
groupId: acmeGroup
artifactId: acmeArtifact
version: 1.0.0
package: acmeGroup
Y: :

```

The build finishes and a project is created.

```

[INFO] -----
[INFO] BUILD SUCCESS
[INFO] -----
[INFO] Total time: 18.112s
[INFO] Finished at: Mon Jun 17 21:17:50 IDT 2013
[INFO] Final Memory: 13M/490M
[INFO] -----
c:\Temp>

```

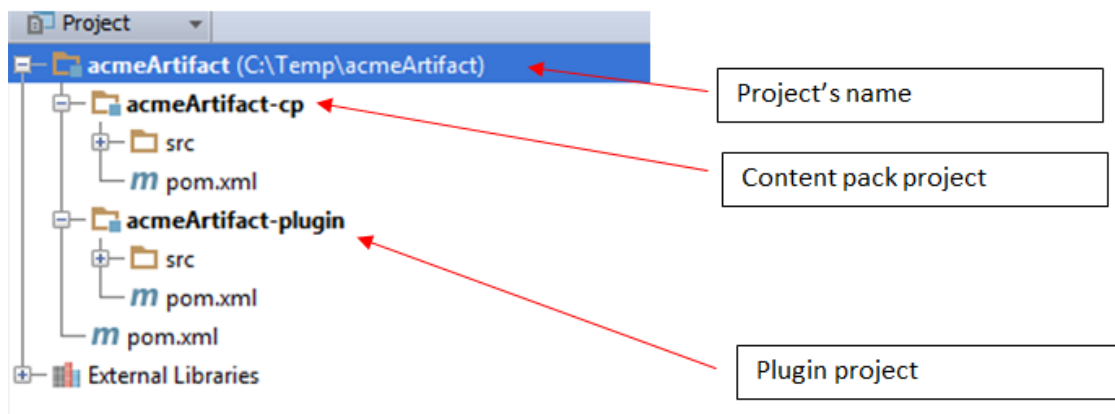
## Open the project in a Java IDE

The previous step created a new Java project with a Maven-based model.

Open this project in a Java IDE application.

The project contains two modules that have the same prefix as the provided artifact ID. One of the projects is a content pack project and the other is a plugin project.

For example:



### Parent project

In the illustrated example, the parent project is called **acmeArtifact**.

By default it contains two modules—one a content pack and the other a plugin. This project is meant to group **@Actions** and their relevant operations and flows into a single content pack.

For example, if you were developing an Office integration, you might create several plugin projects—one for each Office version. But there would be a single content pack project containing the operations and flows. This is the recommended best practice.

### Plugin project

In the example, the plugin project is called **acmeArtifact-plugin**.

This module contains the `@Actions`. When you are building this project (with Maven), the code inside is compiled and the resulting JAR file can be opened in Studio, and operations can be created from the `@Actions` inside.

Inside this module, a sample `@Action` can be found. You can delete it and write your own.

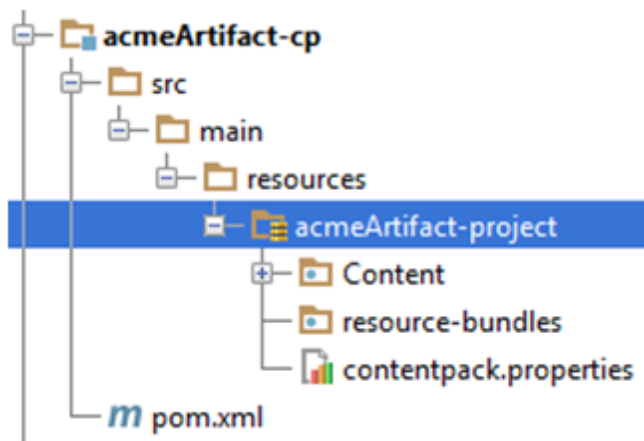
### Content pack project

In the example, the content pack project is called **acmeArtifact-cp**.

This module represents the content pack. It includes any plugin modules upon which it is dependent, for example, **acmeArtifact-plugin**, as well as any flows, operations, and configuration items defined within it.

### Use Studio to edit the content pack module

The content pack module contains a Studio project that can be opened and edited in Studio. You can import the project folder (in our example, the **acmeArtifact-project** folder) into Studio in order to edit the project.



If you create flows, operations, or configuration items inside the project, you will be able to build this project with Maven. The resulting JAR file will be a content pack that can then be deployed into Central or reopened in Studio by another user.

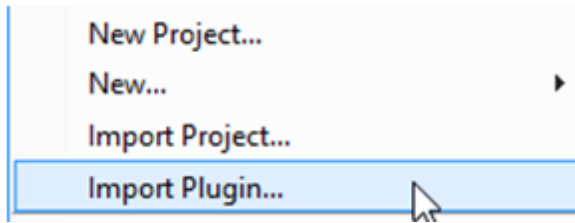
### Create operations inside the project from the plugin module

If you want to create operations from plugins that are part of the same **acmeArtifact** project (for example, from **acmeArtifact-plugin**), follow the following steps:

1. Import the **acmeArtifact-project** project into Studio.
2. Using Maven, build the **acmeArtifact-plugin** module.



3. Import the plugin into Studio.



The path for the plugin is the path of the **acmeArtifact-plugin.jar** file under the local Maven repository.

4. In Studio, create a new operation, and select the plugin in the Create Operations dialog box.

## Use Maven to create the content pack

If you want to use Maven to create the content pack, rather than Studio, you can add a dependency in the POM file for the **acmeArtifact-cp** module:

```
<plugin>
  <groupId>${sdk.group}</groupId>
  <artifactId>oo-contentpack-maven-plugin</artifactId>
  <version>${sdk.version}</version>
  <dependencies>
    <dependency>
      <groupId>${project.groupId}</groupId>
      <artifactId>acmeArtifact-plugin</artifactId>
      <version>${project.version}</version>
    </dependency>
  </dependencies>
  <executions>
    <execution>
      <id>generate-contentpack-plugin</id>
      <phase>process-sources</phase>
      <goals>
        <goal>generate-contentpack</goal>
      </goals>
    </execution>
  </executions>
  <configuration>
    <destinationFolder>${project.build.outputDirectory}</destinationFolder>
    <artifactItems>
      <artifactItem>
        <groupId>${project.groupId}</groupId>
        <artifactId>acmeArtifact-plugin</artifactId>
        <version>${project.version}</version>
      </artifactItem>
    </artifactItems>
  </configuration>
</plugin>
```

## Developing @Actions

An @Action is a method in a class; it can be any method in any class. This method is also referred to as an extension.

An @Action is invoked during flow execution, when an operation using that @Action is executed.

### "Hello World!" Example

To mark a method as @Action, annotate it with `@com.hp.oo.sdk.content.annotations.Action`. The following is a simple "Hello World!" @Action example:

```
public class MyActions {
    @Action
    public void sayHello() {
        System.out.println("Hello World!");
    }
}
```

By default, the created @Action is named after the method that defines it. In the "Hello World!" example, the @Action name is `sayHello`. The @Action name is used in the operation's definition. The operation is the means to expose an @Action to Studio and to flow authors. Each operation points to a specific groupId, artifactId, version, and @Action name (GAV+@Action name).

You can customize the @Action name and provide a name that is different from the method name. You can do this using the @Action annotation value parameter. The following code defines the same "Hello World!" @Action, but names it `my-hello-action`:

```
public class MyActions {
    @Action("my-hello-action")
    public void sayHello() {
        System.out.println("Hello World!");
    }
}
```

### Passing Arguments to @Actions

An @Action is exposed to the flow context and can request parameters from it. The flow context holds the state of the flow. For example, consider the following @Action, which adds two numbers and prints the result to the console:

```
@Action
public void sum(int x, int y){
    System.out.println(x+y);
}
```

Parameters are taken from the context by name. The `sum` method requests two integer parameters `x` and `y` from the context. When invoking the @Action, HP Operations Orchestration assigns the value of `x` and `y` from the context to the method arguments with the same name.

Just like with @Action, it is possible to customize parameter names and request that HP Operations Orchestration resolves the value while using a custom name. In the following example,

the `sum` method requests that the context `op1` parameter is assigned to the `x` argument and `op2` to the `y` argument:

```
@Action
public void sum(@Param("op1") int x, @Param("op2") int y){
    System.out.println(x+y);
}
```

The classes **ResponseNames**, **ReturnCodes**, **InputNames**, and **OutputNames**, under the **com.hp.oo.sdk.content.constants** package, include commonly used constants, which you can use in the `@Action`. For example, input names such as `HOST`, `USERNAME`, `PASSWORD`, `PORT`, and so on, or response names such as `SUCCESS`, `FAILURE`, `NO_MORE`, and so on.

## Return Values

An `@Action`, like any Java method, can also return a single value. The returned value is considered the return result of the `@Action` and is used as `return result` in the operation. It is also possible for an `@Action` to return multiple results to the operation. This is done by returning a `Map<String, String>`, where the `Map` key is the name of the result, and the associated value is the result value. Returning a `Map<String, String>` is a way for an `@Action` to pass multiple outputs to the operation at runtime.

## Adding @Action Annotations

`@Action` annotations are used to generate new operations in the Studio. When generating an `@Action` based operation, the new operation's initial attributes (description, inputs, outputs, responses) are taken from the `@Action` annotations definitions.

When developing plugins, you must correctly annotate the actions that return only a single value. The annotation has to declare an output with the special name `singleResultKey`. There is a constant `ActionExecutionGoal.SINGLE_RESULT_KEY` that assists you, for example:

```
@Action(name = "modulo-ten",
    description = "returns the last digit",
    outputs = @Output(ActionExecutionGoal.SINGLE_RESULT_KEY),
    responses = @Response(text = ResponseNames.SUCCESS,
        field = OutputNames.RETURN_RESULT,
        value = "0", matchType = MatchType.ALWAYS_MATCH,
        responseType = ResponseType.RESOLVED)
    )
public int moduloTen(@Param("number") int number) {
    return number % 10;
}
```

**Note:** It is important that you use `@Action` annotations; otherwise, operations created from these `@Actions` are harder to use.

## Annotations

Adding metadata means adding or setting the relevant annotations and their attributes. The following table describes the `@Action`, `@Output`, `@Response` and `@Param` annotations:

### Action

#### Attributes:

- `value` (optional): the name of the `@Action`
- `description` (optional)
- `Output[]` (optional): array of outputs (see below)
- `Response[]` (optional): array of responses (see below)

#### Comments:

You have two options for setting the name of the `@Action`:

1. The `value` attribute:

```
@Action("af1Ping")
public void ping(...)
```

or

```
@Action(value="af1Ping")
public void ping(...)
```

2. The method name:

```
@Action
public void ping(...)
```

The names are checked in the above order. The first one checked is the `value` attribute. If it doesn't exist, the method name is selected.

### Param

#### Attributes:

- `value`: the name of the input
- `required` (optional): by default is `false`
- `encrypted` (optional): by default is `false`
- `description` (optional)

#### Comments:

This is important not only for the `@Action` data, but also for execution.

Inputs give an operation or flow the data needed to act upon. Each input is mapped to a variable. You can create an input for a flow, operation, or step.

In Studio, inputs can be:

- Set to a specific value
- Obtained from information gathered by another step
- Entered by the person running the flow, at the start of the flow

See the *HP OO 10 Studio Authoring Guide* for more information and see ["Passing Arguments to @Actions" on page 10](#) for details on the execution functionality.

## Output

### Attributes:

- `value`: the name of the output
- `description` (optional)

### Comments:

In order for the operation in Studio to have multiple outputs, the `@Action` itself has to declare them. Assigning values to multiple outputs can be achieved by creating an `@Action` whose return value is a `Map<String, String>`.

In order for the operation in studio to have only one output, the `@Action` itself has to declare it in the return value, and use the `SINGLE_RESULT_KEY` for binding.

The output is the data produced by an operation or flow. For example, success code, output string, error string, or failure message.

In Studio, the different kinds of operation outputs include:

- Raw result: the entire returned data (return code, data output, and error string).
- The primary and other outputs, which are portions of the raw result.

See the *HP OO 10 Studio Authoring Guide* for more information.

## Response

### Attributes:

- `text`: the text displayed by each response transition
- `field`: the field to evaluate
- `value`: the expected value in the `field`
- `description`: (optional)

- `isDefault`: Indicates whether this is the default response. The default value is `false`. Only one response in a `@Action` can have this set to `true`.
- `mathType` : The type of matcher to activate against the value. For example if we defined (`field = fieldName, value = 0, matchType = COMPARE_GREATER`) this means that this response will be chosen if the field `fieldName` will have a value greater than `0`.
- `responseType`: The type of the response (`Success, Failure, Diagnosed, No_Action` or `Resolve_By_Name`).
- `isOnFail`: Indicates whether this is the On-Fail response. The default value is `false`. Only one response in a `@Action` can have this set to `true`.
- `ruleDefined`: Indicates whether or not this response has a rule defined. Responses that have no rules defined can be used as the default response. There should be only one response without a rule defined in a single `@Action`.

#### Comments:

A response is the possible outcome of an operation or flow. The response contains a single rule: `field matches value`.

See the *HP OO 10 Studio Authoring Guide* for more information.

## @Action Data Definition Example

```
@Action(value = "afIPing",
        description = "perform a dummy ping",
        outputs = {@Output(value = RETURN_RESULT, description = "returnResult description"),
                  @Output(RETURN_CODE),
                  @Output("packetsSent"),
                  @Output("packetsReceived"),
                  @Output("percentagePacketsLost"),
                  @Output("transmissionTimeMin"),
                  @Output("transmissionTimeMax"),
                  @Output("transmissionTimeAvg")},
        responses = {@Response(text = "success", field = RETURN_CODE, value = PASSED),
                    @Response(text = "failure", field = RETURN_CODE, value = FAILED)})

public Map<String, String> doPing(
    @Param(value = "targetHost",
           required = true,
           encrypted = false,
           description = "the host to ping") String targetHost,
    @Param("packetCount") String packetCount,
    @Param("packetSize") String packetSize) {
    ...
}
```

## Testing Extensions

### *Testing Extensions as Part of the Project Build*

As an `@Action` is a simple Java method, it is possible to test it using standard Java test tools such as JUnit, leveraging the normal lifecycle phases of a Maven project.

As the `@Action` itself is a regular method, it does not require invoking any HP Operations Orchestration components. The invocation can be a direct Java method invocation in the test case.

### *Testing Extensions Independently from the Command Line*

Once they are packaged into a plugin, you can invoke extensions from the command line for test purposes. The following is an `@Action` example:

```
public class TestActions {
    @Action
    public int sum(@Param("op1") int x, @Param("op2") int y){
        return x+y;
    }
}
```

Suppose the `TestActions` class is in a plugin with the following `groupId`, `artifactId` and `version (GAV)`: **com.mycompany:my-actions:1.0**

You can invoke the `sum @Action` from the command line as follows:

```
mvn com.mycompany:my-actions:1.0:execute -Daction=sum -Dop1=1 -Dop2=3 -X
```

The result of this command is a long trace. The `-X` option is required to see log messages. Towards the end of the trace you can see:

```
[DEBUG] Configuring mojo 'com.mycompany:my-actions:1.0::execute' with basic configurator -->
[DEBUG]   (f) actionName = sum
[DEBUG]   (f) session = org.apache.maven.execution.MavenSession@21cfa61c
[DEBUG] -- end configuration --
[DEBUG] Action result: action result = 4
```

## .NET Extensions

In order to create content using .NET actions, you need to:

1. Create a DLL file containing the implementation of the desired `@Actions`, just like in version 9.x. The `@Action` class should implement an `IAction` interface.
2. Deploy the created DLL, including referenced libraries, to the local Maven repository, using `mvn install:install-file`. For more information on installing artifacts that were not built by Maven, see <http://maven.apache.org/plugins/maven-install-plugin/usage.html>
3. Generate an HP OO Maven plugin, wrapping the .NET action. To do this, you need to:

- a. Create a **pom.xml** file. For POM references, see <http://maven.apache.org/pom.html>.
- b. Under `<dependencies>`, add a list containing all the required DLLs. Define all DLL artifacts using `<type>dll</type>`.
- c. Run the `mvn install` command from the folder containing the **pom.xml** file. This is considering that the Maven **bin** folder is contained in the system path.

The result is the Maven plugin, placed in the target folder and installed to the local Maven repository. The target folder location is relative to the current folder.

The content of the **pom.xml** is:

```
<?xml version="1.0" encoding="UTF-8"?>
<project xmlns="http://maven.apache.org/POM/4.0.0"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xsi:schemaLocation="http://maven.apache.org/POM/4.0.0 http://maven.apache.org/xsd/maven-4.0.0.xsd">
  <modelVersion>4.0.0</modelVersion>

  <groupId>[my plugin groupId]</groupId>
  <artifactId>[my plugin artifactId]</artifactId>
  <version>[my plugin version]</version>

  <packaging>maven-plugin</packaging>

  <properties>
    <oo-sdk.version>[THE LATEST HP_OO_SDK_VERSION]</oo-sdk.version>
    <oo-dotnet.version>[THE LATEST HP_OO_DOTNET_VERSION]</oo-dotnet.version>
  </properties>

  <dependencies>
    <!-- required dependencies -->
    <dependency>
      <groupId>com.hp.oo</groupId>
      <artifactId>oo-dotnet-action-plugin</artifactId>
      <version>${oo-sdk.version}</version>
    </dependency>

    <dependency>
      <groupId>com.hp.oo</groupId>
      <artifactId>oo-dotnet-legacy-plugin</artifactId>
      <version>${oo-dotnet.version}</version>
      <type>dll</type>
    </dependency>

    <dependency>
      <groupId>${project.groupId}</groupId>
      <artifactId>IAction</artifactId>
      <version>9.0</version>
      <type>dll</type>
    </dependency>
    <!-- end of required dependencies -->

    <dependency>
      <groupId>[groupId-1]</groupId>
      <artifactId>[artifactId-1]</artifactId>
      <version>[version-1]</version>
```



```

        <type>dll</type>
    </dependency>

    <dependency>
        <groupId>[groupId-2]</groupId>
        <artifactId>[artifactId-2]</artifactId>
        <version>[version-2]</version>
        <type>dll</type>
    </dependency>
...

    <dependency>
        <groupId>[groupId-n]</groupId>
        <artifactId>[artifactId-n]</artifactId>
        <version>[version-n]</version>
        <type>dll</type>
    </dependency>
</dependencies>

<build>
    <plugins>
        <plugin>
            <groupId>com.hp.oo</groupId>
            <artifactId>oo-action-plugin-maven-plugin</artifactId>
            <version>${oo-sdk.version}</version>
            <executions>
                <execution>
                    <id>generate plugin</id>
                    <phase>process-sources</phase>
                    <goals>
                        <goal>generate-dotnet-plugin</goal>
                    </goals>
                </execution>
            </executions>
        </plugin>
    </plugins>
</build>
</project>

```

In the following example:

- The POM file is named **example.pom.xml**.
- The **my-dotnet-actions.dll** contains the desired @Actions.
- The generated Maven plugin is **com.example:my-dotnet-plugin:1.0**.

```

<?xml version="1.0" encoding="UTF-8"?>
<project xmlns="http://maven.apache.org/POM/4.0.0"
    xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
    xsi:schemaLocation="http://maven.apache.org/POM/4.0.0 http://maven.apache.org/xsd/maven-4.
0.0.xsd">

```

```

    <modelVersion>4.0.0</modelVersion>
    <groupId>com.example</groupId>
    <artifactId>my-dotnet-plugin</artifactId>
    <version>1.0</version>

```

```

<packaging>maven-plugin</packaging>

<properties>
  <oo-sdk.version>2.190</oo-sdk.version>
  <oo-dotnet.version>1.30</oo-dotnet.version>
</properties>

<dependencies>
  <!-- required dependencies -->
  <dependency>
    <groupId>com.hp.oo</groupId>
    <artifactId>oo-dotnet-action-plugin</artifactId>
    <version>${oo-sdk.version}</version>
  </dependency>
  <dependency>
    <groupId>com.hp.oo</groupId>
    <artifactId>oo-dotnet-legacy-plugin</artifactId>
    <version>${oo-dotnet.version}</version>
    <type>dll</type>
  </dependency>
  <dependency>
    <groupId>${project.groupId}</groupId>
    <artifactId>IAAction</artifactId>
    <version>9.0</version>
    <type>dll</type>
  </dependency>
  <!-- end of required dependencies -->
  <dependency>
    <groupId>com.example</groupId>
    <artifactId>my-dotnet-actions</artifactId>
    <version>1.0</version>
    <type>dll</type>
  </dependency>
</dependencies>

<build>
  <plugins>
    <plugin>
      <groupId>com.hp.oo</groupId>
      <artifactId>oo-action-plugin-maven-plugin</artifactId>
      <version>${oo-sdk.version}</version>
      <executions>
        <execution>
          <id>generate plugin</id>
          <phase>process-sources</phase>
          <goals>
            <goal>generate-dotnet-plugin</goal>
          </goals>
        </execution>
      </executions>
    </plugin>
  </plugins>
</build>
</project>

```

## Legacy Actions

In order to create content using legacy actions, you need to:

1. Verify that you have a JAR containing the implementation of the desired actions, just like in version 9.x. The action class should implement an IAction interface.
2. Deploy the JAR, including referenced libraries, to the local Maven repository, using `mvn install:install-file`. For more information on installing artifacts that were not built by Maven, see <http://maven.apache.org/plugins/maven-install-plugin/usage.html>
3. Generate an HP OO Maven plugin, wrapping the legacy actions library. To do this, you need to:
  - a. Create a **pom.xml** file. For POM references, see <http://maven.apache.org/pom.html>.
  - b. Under `<dependencies>`, add a list containing all the required JARs.
  - c. Run the `mvn install` command from the folder containing the **pom.xml** file. This is considering that the Maven **bin** folder is contained in the system path.

The result is the Maven plugin, placed in the target folder and installed to the local Maven repository. The target folder location is relative to the current folder.

The content of the **pom.xml** is:

```
<?xml version="1.0" encoding="UTF-8"?>
<project xmlns="http://maven.apache.org/POM/4.0.0"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xsi:schemaLocation="http://maven.apache.org/POM/4.0.0 http://maven.apache.org/xsd/maven-4.0.0.xsd">
  <modelVersion>4.0.0</modelVersion>

  <groupId>[my plugin groupId]</groupId>
  <artifactId>[my plugin artifactId]</artifactId>
  <version>[my plugin version]</version>

  <packaging>maven-plugin</packaging>

  <properties>
    <oo-sdk.version>[THE LATEST HP OO_SDK VERSION]</oo-sdk.version>
    <oo-dotnet.version>[THE LATEST HP OO_DOTNET VERSION]</oo-dotnet.version>
  </properties>

  <dependencies>
    <!-- required dependencies -->
    <dependency>
      <groupId>com.hp.oo</groupId>
      <artifactId>oo-legacy-action-plugin</artifactId>
      <version>${oo-sdk.version}</version>
    </dependency>
    <!-- end of required dependencies -->

    <dependency>
      <groupId>[groupId-1]</groupId>
      <artifactId>[artifactId-1]</artifactId>
      <version>[version-1]</version>
    </dependency>

    <dependency>
      <groupId>[groupId-2]</groupId>
      <artifactId>[artifactId-2]</artifactId>
```

```

        <version>[version-2]</version>
    </dependency>
...
    <dependency>
        <groupId>[groupId-n]</groupId>
        <artifactId>[artifactId-n]</artifactId>
        <version>[version-n]</version>
    </dependency>
</dependencies>

<build>
    <plugins>
        <plugin>
            <groupId>com.hp.oo</groupId>
            <artifactId>oo-action-plugin-maven-plugin</artifactId>
            <version>${oo-sdk.version}</version>
            <executions>
                <execution>
                    <id>generate plugin</id>
                    <phase>process-sources</phase>
                    <goals>
                        <goal>generate-legacy-plugin</goal>
                    </goals>
                </execution>
            </executions>
        </plugin>
    </plugins>
</build>
</project>

```

In the following example:

- The POM file is named **example.pom.xml**.
- The **my-legacy-actions.jar** contains the desired actions.
- The generated Maven plugin is **com.example:my-legacy-actions:1.0**.

```

<?xml version="1.0" encoding="UTF-8"?>
<project xmlns="http://maven.apache.org/POM/4.0.0"
    xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
    xsi:schemaLocation="http://maven.apache.org/POM/4.0.0 http://maven.apache.org/xsd/mav
en-4.0.0.xsd">
    <modelVersion>4.0.0</modelVersion>

    <groupId>com.example</groupId>
    <artifactId>my-legacy-actions-plugin</artifactId>
    <version>1.0</version>

    <packaging>maven-plugin</packaging>

    <properties>
        <oo-sdk.version>2.190</oo-sdk.version>
        <oo-dotnet.version>1.30</oo-dotnet.version>
    </properties>

    <dependencies>

```

```
<!-- required dependencies -->
<dependency>
  <groupId>com.hp.oo</groupId>
  <artifactId>oo-legacy-action-plugin</artifactId>
  <version>${oo-sdk.version}</version>
</dependency>
<!-- end of required dependencies -->

<dependency>
  <groupId>com.example</groupId>
  <artifactId>my-legacy-actions</artifactId>
  <version>1.0</version>
</dependency>

</dependencies>

<build>
  <plugins>
    <plugin>
      <groupId>com.hp.oo</groupId>
      <artifactId>oo-action-plugin-maven-plugin</artifactId>
      <version>${oo-sdk.version}</version>
      <executions>
        <execution>
          <id>generate plugin</id>
          <phase>process-sources</phase>
          <goals>
            <goal>generate-legacy-plugin</goal>
          </goals>
        </execution>
      </executions>
    </plugin>
  </plugins>
</build>
</project>
```

