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Enterprise

HPE Database and Middleware Automation

Premium Edition

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Windows and Linux

User Guide

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Chapter 1: Introduction

The HPE Database and Middleware Automation Premium Edition (DMA Premium) converts and runs HPE DMA workflows so users can run them as flows in HP Operations Orchestration (HP OO). Hence, DMA Premium extends HP OO capabilities, automating administrative and maintenance tasks without requiring installation of either the HP Server Automation infrastructure or the HPE DMA Server, both of which are required in a traditional DMA environment.

DMA Premium features simplify enablement of self-service cloud environments and improve time-to-value by leveraging key functionalities between HP OO and HP Cloud Service Automation (HP CSA).

Specifically, the DMA Premium Database Content Pack, delivered as DMA Premium, enables HP CSA to seamlessly provide a Database-as-a-Service (DBaaS) capability to end-users, without requiring end-user expertise with database technologies. For example, the DMA Premium database flows enable the following automated task features:

- Install database software
- Manage MS SQL and Oracle code releases
- Manage JBoss, WebSphere, and WebLogic code releases

There is no overlap between the DMA Premium Database Content Pack and the HP OO Database Content Pack functionality. Instead, DMA Premium serves to enhance and extend existing HP OO capabilities.

DMA Premium supports the following database and middleware solutions:

- Oracle 11g R2 and 12c
- MS SQL Server Database 2012 and 2014
- My SQL 5.6, Enterprise Edition
- IBM WebSphere
- Oracle WebLogic Server 11g and 12c versions
- JBoss

DMA Premium is supported on HP Operations Orchestration 10.20 or later.

Chapter 2: Overview

This guide walks you through the process of installing the Database and Middleware Automation Premium in HP Operations Orchestration (HP OO), and then executing and customizing the HPE DMA Premium flows. This guide also provides pertinent reference information to use the DMA Premium more effectively. The following sections are included:

Section	Description
"Requirements"	This section identifies all of the requirements for using DMA Premium.
"Architecture" <ul style="list-style-type: none">• "Development/test environment"• "Production environment"• "Anatomy of an HPE DMA flow"	This section describes the basic architecture and concepts of DMA Premium, as well as key terms and behaviors in the context of typical installations of HP OO.
"Installation" <ul style="list-style-type: none">• "Contents of DMA Premium"• "Importing DMA Premium Content Packs into HP OO Studio"• "Preparing the HPE DMA Premium Client"• "Setting up System Properties for HPE DMA Premium flows"• "Promoting DMA Premium Content Packs into HP OO Central"	This section describes how to install the main components of DMA Premium and how to set up HP OO System Properties.
"Flow Execution" <ul style="list-style-type: none">• "Setting Flow Inputs"• "Example execution"• "Validating HPE DMA Premium flows in a development/test environment"• "Running HPE DMA Premium flows in a production environment"	This section describes how to run an HPE DMA flow in either HP OO Studio or HP OO Central.
"Customization" <ul style="list-style-type: none">• "Structure of HPE DMA flows"• "Customizing HPE DMA Premium flows"• "Customizing the HPE DMA Premium Client"	This section describes how to customize the HPE DMA Premium flows and the HPE DMA Premium Client.
" Configuring and Running an HPE	This section describes how to set up and run a typical DMA

Section	Description
DMA Premium Flow - Example	Premium flow in HP OO Studio.
<p>"Reference Material"</p> <ul style="list-style-type: none"> • "HPE DMA Premium flows" • "Additional documentation" • "Comparison of HPE DMA Premium and HP OO uses" 	This section provides additional reference materials about the HPE DMA Premium flows that are available, where to find additional documentation, and a comparison of using the flows in either HPE DMA or HP OO.

Chapter 3: Requirements

The following items are required to use the Database and Middleware Automation Premium (DMA Premium) in HP Operations Orchestration:

- License for HP Operations Orchestration version 10.20 or later
- HP OO Studio and/or HP OO Central installed
- HP OO Base Content Pack (1.4.3 or later) loaded
- License for DMA Premium or Database and Middleware Automation
- HPE DMA installation media available
- Before running any DMA Premium flows in HP OO Central/RAS (on Windows), you must be logged in and running the service using Administrator privileges.
- Pertinent Oracle or MS SQL binaries available—depending upon which HPE DMA Premium flows you plan to run
 - Repositories:
 - HPE DMA OO Client (DMA Runtime)
 - Software repository

You need repositories to store the HPE DMA Premium Client scripts and software binaries (such as database software and patches). Depending on your specific setup, repositories can be a file server (for example, a Linux machine, which supports remote folder access) or server management software.

Note that this file server cannot be a FTP server because neither DMA Premium Client flows nor DMA Premium remote copy functionality supports FTP or HTTP access and downloads to the binaries. The HPE DMA Premium Client should not be the same as the software repository.

- *Recommended:* A Python Integrated Development Environment (IDE) that supports Python 2.5 and later—to add customized steps and functions to the HPE DMA Premium Client. There are a number of commercial and open source Python IDEs available, such as PyCharm.
- *Recommended:* Target managed servers with the required operating systems—for additional information see "[HPE DMA Premium flows](#)"
- *Recommended:* A version control system

Chapter 4: Architecture

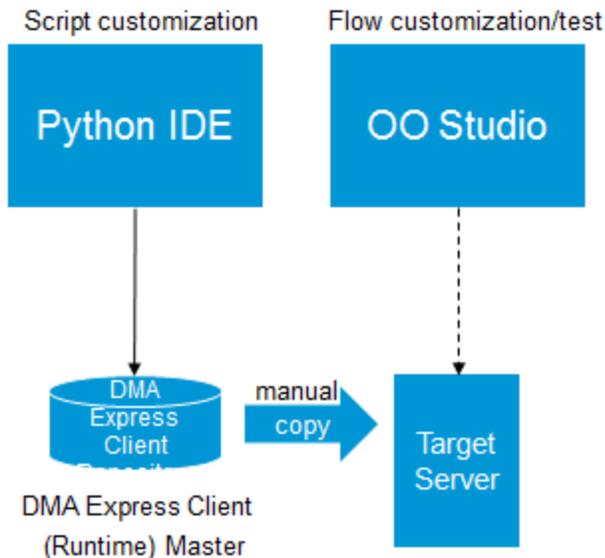
This section describes the basic architecture and concepts of the HPE DMA Premium flow, as well as key terms and behaviors in the context of typical installations of HP OO.

Development/test environment

You should set up and use a development/test environment to:

- Test the delivered flows in your environment before running them in production
- Customize the delivered flows before using in production (optional)
- Customize the runtime before using in production (optional)

Example of development/test architecture



The following components are found in the diagram:

- Python Integrated Development Environment (IDE): HPE recommends using a Python IDE if you want to add customized steps and functions to the HPE DMA Premium Client (DMA Runtime).
- HP OO Studio: The HP OO development environment. Here you can customize and validate HPE DMA Premium flows the same way as any other HP OO flow.
- HPE DMA Premium Client: The HPE DMA Premium Client stores the HPE DMA scripts. Depending on your specific setup, the repository can be a file server, or server management software. The flows in the DMA Premium can be customized to work with a wide array of repositories.
- Target Server: Any virtual or physical server supported by the HPE DMA Premium flows included in the DMA Premium (this does not include physical servers such as AIX).

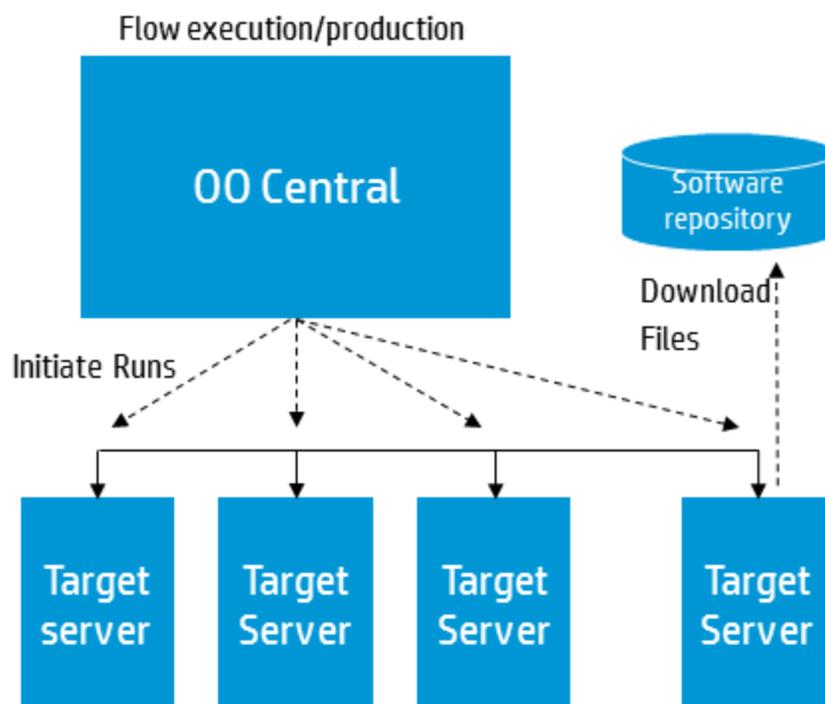
Note: In the development/test environment, HP OO Studio should be used (rather than HP OO Central). Any required product binaries should be available on the target server. To simplify developing or testing flows, only a single target server is necessary.

Production environment

You should set up and use a production environment to:

- Run previously tested flows
- Take advantage of scale and run on multiple target servers
- Perform repetitive database functions

Example of production architecture



The following components are found in the diagram:

- **HP OO Central:** The HP OO central server, which runs HPE DMA Premium flows in a production environment by operators.
- **Software Repository:** The software repository stores the software binaries—such as database software and patches—required as inputs to the HPE DMA Premium flows in a common, accessible location. The software repository is a file server that can be accessed by the target server. The flows in DMA Premium can be customized to work with a Linux machine, which acts as the file repository.
- **Target Server(s):** Any virtual or physical server managed using the HPE DMA Premium flows included in DMA Premium (this does not include physical servers such as AIX).

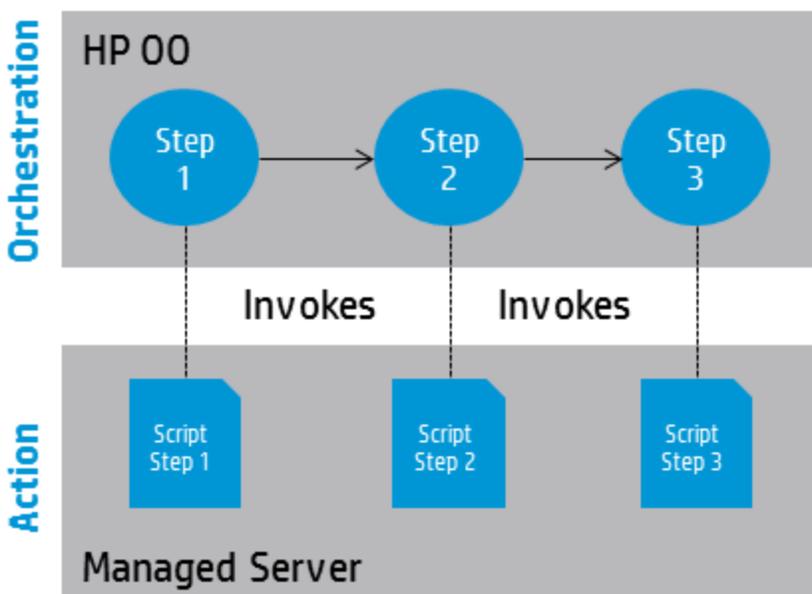
Note: In the production environment, operators should run flows in HP OO Central (rather than HP OO Studio). Any required product binaries should be available in the software repository that is accessible by all of the target servers.

Anatomy of an HPE DMA flow

A fundamental entity in HP OO is the flow, which is a simple sequence of steps. There are two levels of abstraction that distinguish an HPE DMA Premium flow from a typical HP OO flow:

- The Orchestration layer provides the fundamental steps and their sequence. The logic of HP OO flows is directed by the parameter mapping between steps. The steps use 'remote execution' to call scripts that reside on a target managed server.
- The Action layer provides the scripts that contain the details. The Jython scripts execute OS-level and API-level operations, parse results, and handle dependencies and potential error scenarios. The use of scripts simplifies the HPE DMA Premium flows and improves the performance. The scripts are referred to as the HPE DMA Premium Client (DMA Runtime).

In the following diagram, each circle in the HP OO flow represents an HP OO step and each rectangle represents a script that is invoked on a target managed server.



Action scripts contain a significant amount of built-in logic. An example is the script "DMA Remote Copy". This script triggers the download mechanism by iterating through a list of files, logging into the software repository where the binaries are located, and then downloading the files.

If you want to develop or customize flows in HP OO Studio, you may need to work in both the Orchestration and Action layers.

Chapter 5: Installation

This section describes how to install the main components of DMA Premium and set up the HP OO System Properties. The DMA Premium Database Content Pack, DMA Premium Middleware Content Pack, and DMA Premium Utilities Content Pack must be loaded into HP OO— HPE DMA Premium Client (DMA Runtime) is automatically installed on each target when each flow runs. Generally you should work with the HPE DMA Premium flows in HP OO Studio first and then, after you validate and customize the flows, promote them to HP OO Central.

This section includes:

- ["Contents of DMA Premium"](#)
- ["Importing DMA Premium Content Packs into HP OO Studio"](#)
- ["Preparing the HPE DMA Premium Client"](#)
- ["Setting up System Properties for HPE DMA Premium flows"](#)
- ["Promoting DMA Premium Content Packs into HP OO Central"](#)

Contents of DMA Premium

DMA Premium software is delivered electronically/online and located in a compressed file (.zip format).

You can extract this zip file on a supported system (preferably Linux) by using the following command:

```
unzip <pathname>A8B34-15001.zip
```

where <pathname> is the local path of the downloaded zip file.

If you want to unzip the files in a specified folder/directory, then use the following command :

```
unzip -d <folder/directory name> <pathname>A8B34-15001.zip
```

The master .zip file contains the following folders for each of following content packs, as well as licensing information and product documentation:

- **DMA_Premium_10.40.000.000_Client_Solution_Pack** (also known as DMA Runtime)
Includes all of the HPE DMA Premium flows for the DMA Premium Client
- **DMA_Premium_10.40.000.000_Database_Content_Pack**
Includes all of the HPE DMA Premium flows for databases
- **DMA_Premium_10.40.000.000_Documentation**
Includes the HPE DMA Premium 10.40 documentation
- **DMA_Premium_10.40.000.000_Middleware_Content_Pack**
Includes all of the HPE DMA Premium flows for Middleware
- **DMA_Premium_10.40.000.000_Util_Content_Pack**
Includes a set of utilities for use with HPE DMA Premium Edition
- **DMA_Premium_10.40.000.000_Open_Source_Licenses.zip**
Includes all of the HPE DMA Premium Open Source license information
- **readme.txt**

For additional details about the flows in each Content Pack, see "HPE DMA Premium Flows" in ["Reference Material" on page 32](#).

Importing DMA Premium Content Packs into HP OO Studio

Generally you will first use the DMA Premium Content Packs in HP OO Studio. Later, when you are satisfied with your flows there, you can promote them to HP OO Central (see ["Promoting DMA Premium Content Packs into HP OO Central"](#)).

For details about how to import HP OO Content Packs, see "Importing Content Packs to a Project" in the *HP Operations Orchestration Studio Authoring Guide* and "Deploying a Content Pack" in the *HP Operations Orchestration Central User Guide*, available on the HP Software Support web site: <https://softwaresupport.hp.com/>

The HPE DMA-supplied Content Packs can be imported into HP OO Studio just like any other HP OO Content Pack:

1. If not already installed, import the HP OO Base Content Pack (version 1.4.3 or later)
2. Import the HPE DMA Premium Edition Utilities included in the HPE DMA Premium Master zip file—DMA Premium Utilities 10.40.000.000.jar—into HP OO Studio.
3. Import the HPE DMA Middleware Content Pack that comes in the HPE DMA Master zip file—DMA Premium Middleware 10.40.000.000.jar—into HP OO Studio.
4. Import the HPE DMA Premium Database Content Pack that comes in the HPE DMA Master zip file—DMA Premium Database 10.40.000.000.jar—into HP OO Studio.

Setting up System Properties for HPE DMA Premium flows

Although not required, you should consider using HP OO System Properties to reduce the number of required inputs that must be entered for the HPE DMA Premium flows. However, before you can input values for System Properties, you must first set up a System Account.

Setting up the System Account

You can use HP OO Studio to edit or override values for the System Account packaged with the DMA Premium Database Content Pack. You must set the user name and password for the System Account before you can access the software repository server from which you download software bits.

To set up the login credentials for the System Account:

1. In HP OO Studio, click the Settings menu and select Studio Overrides.
2. In the Edit Studio Overrides dialog select System Account.
3. In the Add System Account dialog, specify DMA Premium Database 10.40.000.000 > Configuration > System Accounts > Source for the target Path.

The default target User Name is `root`. This is the user who logs in to the target and must be an account with administrative permissions. Enter and confirm the password.

4. Click OK.

For additional information, see "Managing Configuration Items" > "Managing System Properties" in the documents:

- *HP Operations Orchestration Studio Authoring Guide*
- *HP Operations Orchestration Central User Guide*

These documents are available on the HPE Software Support web site:

<https://softwaresupport.hp.com/>

Assigning System Properties

HPE DMA Premium flows can use HP OO System Properties to centralize standard flow inputs. The values for these system properties are preset and should not require modification; however, you can override them.

HP OO Input	Description
ExtendedTimeout	The duration for an extended processing timeout. The default value is 12,000,000 milliseconds (2 hours).
StandardTimeout	The duration for a standard processing timeout, The default value is 300,000 milliseconds (5 minutes).

Setting values for the System Properties can reduce the number of required inputs, improve usability, and make the HPE DMA Premium flows more user-friendly. HPE DMA Premium flows contain several inputs (a subset of the total number) that are typically set to the same values across many flows. Hence, ExtendedTimeout and StandardTimeout are good examples of inputs for a standard flow . If a server is particularly slow or there is going to be a very long processing period and you don't want the operation to time out, then you may wish to change the default values.

Important: When modifying the value for system properties, be careful, as they apply to *all* of the HPE DMA Premium flows. In other words, whenever you execute an HPE DMA Premium flow using the system account, it will pick up and use the properties defined here. These settings apply to your production environment only; you will need to reset them for each new project or environment.

TargetHost would not be a suitable candidate for a standard flow input because users typically need to run the flows on multiple targets. Again, carefully determine what inputs can be standardized for your environment.

Preparing the HPE DMA Premium Client

The DMA Premium Client is automatically installed as part of a subflow in each DMA Premium flow; this subflow runs as the first step in all DMA Premium flows, and copies and unzips the Client files on the target. Thus, all DMA Premium Client files must first be placed in the software repository so that they can be located and downloaded to the target(s).

The DMA Premium Client binaries are available in the DMA Premium 10.40 Client Solution Pack (located in the DMA Premium Master zip file). These files must be copied into the file server or software repository before you run any HP OO flows:

- dma_oo_client_bin_linux.zip
- dma_oo_client_bin_linux.zip.MD5
- dma_oo_client_bin_windows.zip
- dma_oo_client_bin_windows.zip.MD5

- dma_oo_client_code_linux.zip
- dma_oo_client_code_linux.zip.MD5
- dma_oo_client_code_windows.zip
- dma_oo_client_code_windows.zip.MD5

Rules and guidelines for DMA Premium Client binaries

Store the HPE DMA Premium Client compressed files in a common, accessible location in the software repository. Depending upon your specific setup, repositories can be a file server (for example, a Linux machine, which supports remote folder access) or server management software. Note that this file server cannot be a FTP server because neither DMA Premium Client flows nor DMA Premium remote copy functionality supports FTP or HTTP access and downloads to the binaries.

As a general guideline, assume that the HPE DMA Premium Client is a compressed file that needs to be copied to a target and then uncompressed into a specific directory tree.

The file server must be a Linux system, which acts as a file repository for all the binaries for both DMA Premium and HP OO.

The target server can be either a Linux or Windows machine.

In terms of cross-platform support, the step that performs the installation works for Linux-to-Linux or Linux-to-Windows machines where the former is the file server and the latter the target server.

Important: You must set up System account access before running any flows. For details, see "[Setting up System Properties for HPE DMA Premium flows](#)" on page 15.

HPE recommends using a repository and a version control system to properly maintain versions.

Promoting DMA Premium Content Packs into HP OO Central

When you are satisfied with the HPE DMA Premium flows that you customized in HP OO Studio, you can promote them to HP OO Central.

Important: HP OO Central/RAS services *must* be run as Administrator. This is a prerequisite to running any DMA Premium flows in OO Central.

For details about how to package a Content Pack in HP OO Studio so that it can be deployed and run, see "Exporting a Content Pack" in the *HP Operations Orchestration Studio Authoring Guide*.

For details about how to promote Content Packs in HP OO Central, see "Promoting Content Packs" in the *HP Operations Orchestration Central User Guide*.

These documents are available on the HP Software Support web site: <https://softwaresupport.hp.com/>

Chapter 6: Flow Execution

You can run the HPE DMA Premium flows that are included in the DMA Premium Database Content Pack in either HP OO Studio or HP OO Central. HPE recommends running HPE DMA Premium flows first in HP OO Studio for testing and customization—before running in HP OO Central in a production environment for a larger scale and where there are more targets. HP OO flows run using the remote execution operation; they then contact the target and initiate action scripts on that target.

HPE DMA Premium flows have a set of standard inputs and each flow may have additional inputs. Please see the flow description for details about additional inputs.

Setting Flow Inputs

You must provide inputs for your flow to execute successfully and accomplish what you intend. These inputs fall into the following categories:

- **Standard required flow inputs**

Server target access information is required to access the target managed server (for example, hostname, username, or password).

Source Host system account information are the credentials for the software repository server and the values should be overwritten in HP OO Studio.

HP OO Parameter	Description
serverTarget	The hostname of the target. This is the server to be managed through running the flow.
downloadSourcePath	The absolute path of the DMA Premium Client binary folder (based on flows for either Windows or Linux).
downloadSourceHost	The hostname or IP-address of the target server to which the DMA Premium Client binaries should be copied from.

Note: Inputs that have common values across many flows can be assigned standard values. For more details, see ["Setting up System Properties for HPE DMA Premium flows"](#).

- **Other flow-specific required inputs**

These are required inputs that pertain to specific flows (for example, database configurations and environment information).

- **Flow-specific optional inputs**

These are for advanced configurations of the flow and HP OO does not prompt for them (default behavior).

Example execution

Following is an example run of the Oracle - Provision Database Software flow:

The screenshot displays the HP OO Studio interface during the execution of the Oracle - Provision Database Software flow. On the left, the Run Tree shows a sequence of steps, with the final step, 'Step [Resolved: success] (Complete)', highlighted. The Transition History on the right lists the execution of various steps, including 'Uncompress Archive Files', 'Verify Oracle Install Software', 'Create Oracle Home Directories', 'Execute Oracle Root Pre Script', 'Create Oracle Inventory Pointer', 'Update Oracle Installer Response', 'Execute Oracle Software Installer v2', 'Execute Oracle Install Root Script', 'Cleanup Downloaded Files v2', and 'Verify Provision Oracle Software'. The final transition, 'Run finished:Oracle-ProvisionDatabaseSoftware', is highlighted. The Step Result Inspector at the bottom shows the output for the 'Verify Provision Oracle Software' step, including information about the Oracle version and executables.

```
[INFO]: Verify Provision Oracle Software
[INFO]: check oracle executable
[INFO]: fetch oracle version
[INFO]: Oracle version 11.2.0.4.0 installation appears successful
[INFO]: Verify Provision Oracle Software
${Header.Start}
<?xml version="1.0" encoding="utf-8"?>
<Parameters>
  <Parameter name="Oracle Executable Size">239626683</Parameter>
  <Parameter name="SQLPlus Version">11.2.0.4.0</Parameter>
</Parameters>
${Header.Stop}
${Header.Start}
<?xml version="1.0" encoding="utf-8"?>
<Parameters>
  <Parameter name="Exit Code">0</Parameter>
</Parameters>
${Header.Stop}
```

HPE recommends using a repository and a version control system to properly maintain versions.

Validating HPE DMA Premium flows in a development/test environment

You should initially develop, customize, and validate flows in a development/test environment using HP OO Studio. Refer to "[Development/test environment](#)" for details about its architecture.

For more details, see "Validating Content" in the *HP Operations Orchestration Studio Authoring Guide*, available on the HPE Software Support web site: <https://softwaresupport.hp.com/>.

Running HPE DMA Premium flows in a production environment

After validating your flows in HP OO Studio, you can export them from HP OO Studio and promote them to HP OO Central. You then use HP OO Central for your production environment. Refer to "[Production environment](#)" for details about its architecture and components.

For more details, see "Running and Monitoring Flows" in the *HP Operations Orchestration Central User Guide*, available on the HPE Software Support web site: <https://softwaresupport.hp.com/>.

Flow Inputs - Downloading from SA

You can set the **downloadFromSA** parameter value to **True** for each of the HPE DMA Premium flows that require to download binaries, like patch files, from SA software repository as specified by the **saFolderPath** parameter. The required binaries must be available in the path specified by the **saFolderPath** parameter and SA agent must be available in the target. Only an "SAUser" System Account user can set the **downloadFromSA** parameter value to **True**. The "SAUser" System Account (from the DMA Premium Utility content pack) must be setup with the SA credentials using an OO Studio/OO Central override.

Chapter 7: Customization

Depending on your goals, you can customize the HPE DMA Premium flows included in the DMA Premium Database Content Pack and/or add custom steps and functions to the HPE DMA Premium Client (HPE DMA Runtime).

This section includes the following:

- ["Structure of HPE DMA flows"](#)
- ["Customizing HPE DMA Premium flows"](#)

Structure of HPE DMA flows

The Database and Middleware Automation Premium includes HPE DMA Premium flows and the HPE DMA Premium Client. The HPE DMA Premium flows use the HPE DMA Premium Client to initiate tasks and configuration changes on the managed server. As depicted in ["Anatomy of an HPE DMA flow"](#), the HPE DMA Premium flows implement the orchestration layer and the HPE DMA Premium Client implements the action layer.

Both layers can be used to customize HPE DMA Premium flows content or to create additional content. Please take special care when customizing the HPE DMA Premium Client:

- HPE recommends using a repository and a version control system to properly maintain versions.
- HP recommends only adding new elements into the prescribed directories. Overwriting existing elements or placing new elements into the wrong folders may cause unwanted side effects.

Customizing HPE DMA Premium flows

You can customize HPE DMA Premium flows just as you can with other HP OO flows. You can also create new HP OO flows using HPE DMA Premium flows as subflows and create new HPE DMA Premium flows by leveraging the HPE DMA Premium Client.

Before creating or customizing HPE DMA Premium flows, please review the delivered flows and the steps in the HPE DMA Premium Client. The HPE DMA Premium flows and the steps (python scripts) in the HPE DMA Premium Client closely depend on each other and should be treated as a single unit.

Note: HPE does not recommend changing the original HPE DMA Premium flows shipped with the DMA Premium Database Content Pack. Upon upgrade, all of the originally-delivered HPE DMA Premium flows will be overwritten while custom flows will be preserved. Instead, a best practice is to make copies of the HPE DMA Premium flows and then customize the copies.

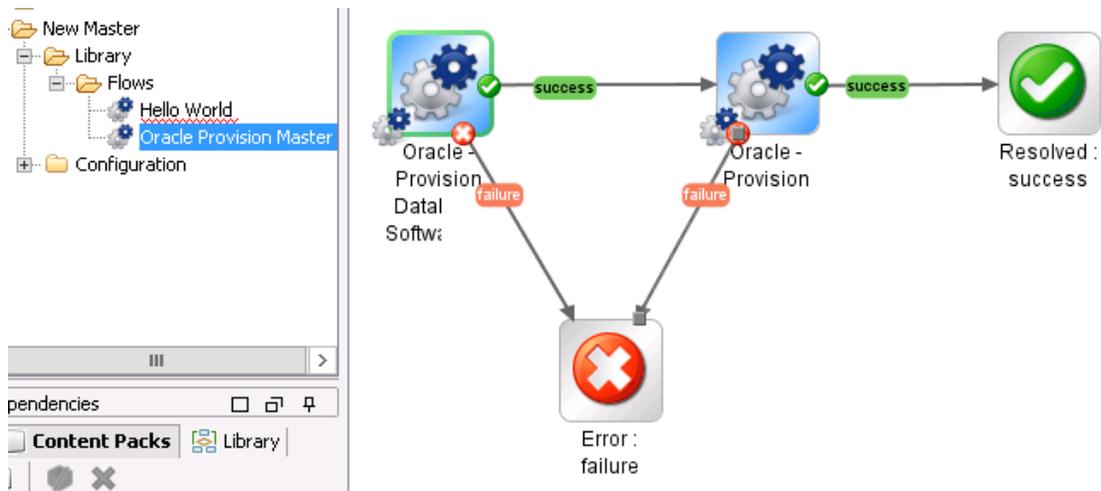
For details on using HP OO Studio to create and customize HP OO flows, see "Authoring a Flow - Basics" and "Advanced Authoring" in the *HP Operations Orchestration Studio Authoring Guide*, available at <https://softwaresupport.hp.com/>

Creating a Master flow

You can create a Master flow with HPE DMA Premium flows in the same way you would any Master flow in HP OO Studio:

1. Create a new Master flow.
2. Simply drag and drop one or more HPE DMA Premium flows into the new HP OO Master flow.
3. Map success and failure in the same way as any other flow developed in HP OO.

For example:



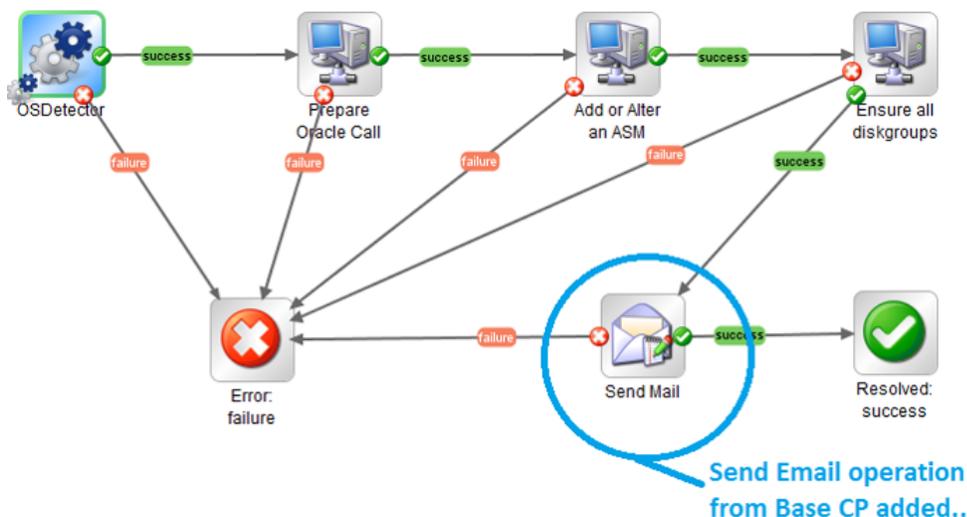
For additional information, see "Creating a Subflow Within a Flow" in the *HP Operations Orchestration Studio Authoring Guide*, available at <https://softwaresupport.hp.com/>

Adding a step to an HPE DMA Premium flow

You can add a step—either an existing HPE DMA or HP OO step—to an HPE DMA Premium flow in the same way you would any flow in HP OO Studio:

1. Make a copy of the desired HPE DMA Premium flow.
2. Add the desired operations or subflows as steps to the new flow.
3. Set the necessary transitions.
4. Define or provide any new inputs.

For example:



For additional information, see "Creating a Flow - Step-by-Step" in the *HP Operations Orchestration Studio Authoring Guide*, available at <https://softwaresupport.hp.com/>

Customizing the HPE DMA Premium Client

The HPE DMA Premium Client (HPE DMA Runtime) consists of steps and functions as well as a complete Jython/Java runtime environment. You can easily add custom steps and functions.

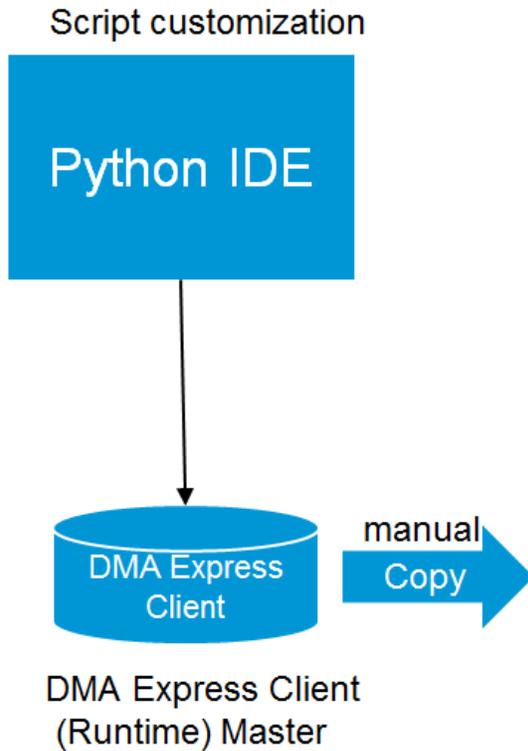
HPE recommends that you use a Python IDE to develop, customize, and test the action scripts—steps and functions—included in the HPE DMA Premium Client compressed files. You must extract the specific action scripts from the HPE DMA Premium Client compressed files, change the script as needed, and then repackage the HPE DMA Premium Client compressed files. Afterwards, you must redistribute the HPE DMA Premium Client to all target servers. To facilitate the customization of the HPE DMA Premium Client, HPE recommends using a repository and a version control system to properly maintain versions.

Note: HPE does **not** recommend modifying the steps and functions shipped with the DMA Premium Database Content Pack and DMA Premium Middleware Content Pack. Each step and function might be used by several HPE DMA Premium flows and a change might introduce side effects that impact other HPE DMA Premium flows. Also, future upgrades will overwrite all standard steps and functions while custom steps and functions will be preserved. Instead, HPE recommends making copies of the steps and functions and then customizing the copies.

For details, refer to the documentation for the specific Python IDE that you are using.

Adding a custom script to the HPE DMA Premium Client

You can customize HPE DMA Premium flows by adding or modifying steps that execute jython scripts on managed targets.



HPE DMA Premium Client changes:

1. Use your Python IDE to create your own custom script
2. Add the script to the steps folder in the HPE DMA Premium Client
3. Redistribute the script to the managed targets

HPE DMA Premium flow changes:

1. Use HP OO Studio to create an HP OO operation that executes the script—add a Remote Command operation in the same way as you would add any other step
2. Define inputs to execute (see ["Defining inputs to execute custom jython scripts"](#))
3. Add step results for output parameters (see ["Using script output values as step results"](#))

Defining inputs to execute custom jython scripts

You can customize the input values that describe how HPE DMA Premium flows are structured in HP OO.

Note: When making customizations, use camel case when entering your parameters.

Using HP OO Studio:

1. Go to Remote Command, which is located in the Base (1.4.3) Content Pack:



2. Click the Inputs tab
3. Set the following inputs:

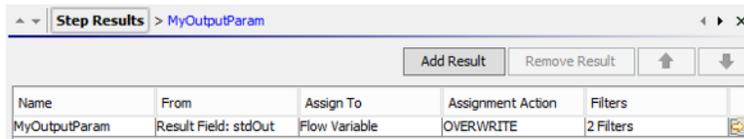
Input	Example 'From' value	Description
command	<code>\${jythonPath} \${stepsPath} RemoteCommandExample.py</code>	Concatenate: <ul style="list-style-type: none"> • Jython path: /opt/hp/dma/ooclient/bin/jython.sh • Step path: /opt/hp/dma/ooclient/steps/ • Script name
arguments	<code>'OracleAccount=oracle;OracleBase=/opt/app/oracle; OracleHome=/opt/app/oracle/product/11.2.0/dbhome_1; OracleSoftware=p13390677_112040_Linux-x86-64_1of7.zip, p13390677_112040_Linux-x86-64_2of7.zip; ServerTarget=dmataarget37.usa.hp.com;'</code>	Set the value as camelCase strings Parameters can be assigned from step context using <code>\${ParamName}</code>
host	<code>\${serverTarget}</code>	Hostname of target server
password	<code>\${serverTargetPassword}</code>	Password to be used on target server
username	<code>\${serverTargetUsername}</code>	Username to be used on target server
protocol	<code>\${protocol}</code>	OS-specific protocol to run command For example: ssh/wmi
timeout	<code>\${StandardTimeout}</code>	Time allowed before the step will exit as failure (in milliseconds)

Using script output values as step results

You can add the standard outputs required by HPE DMA Premium flows.

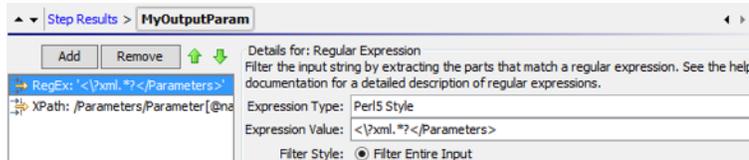
Using HP OO Studio:

1. Go to Step Results > Add Result. Define an output parameter name. Set the 'From' field to Result Field: stdout. For example:

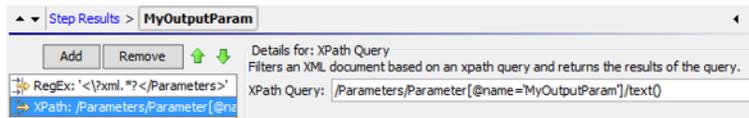


2. For this new parameter, click the arrow (🔍) in the bottom-right corner.
3. Add two filters to parse xml output from the script.

- a. RegEx filter, for example:



- b. XPath filter, for example:



Accessing step inputs and writing step outputs

When you write your own python scripts for the HPE DMA Premium Client, you will need to reference the inputs provided in the Remote Command arguments string and write values to stdout to be used as step results and output parameters.

There are many ways to handle the inputs and outputs in your customized scripts. The following examples are based on how inputs and outputs are implemented in HPE DMA scripts.

1. Create code to reference the inputs that are provided in the Remote Command arguments string, for example:

```
io_params = parametertools.parse_dma_params(sys.argv[1])

#### Parameter Inputs ####

ORACLE_HOME = io_params['Oracle Home'].strip()
ORACLE_BASE = io_params['Oracle Base'].strip()
ORACLE_ACCOUNT = io_params['Oracle Account'].strip()
```

2. Create code to write values—step results and/or output parameters—to stdout, for example:

```
parametertools.print_header({
    'Oracle Home': ORACLE_HOME,
    'Oracle Base': ORACLE_BASE,
    'Oracle Account': ORACLE_ACCOUNT
})
```

3. Copy the script to the steps directory.
4. Repackage and redistribute the HPE DMA Runtime to the managed targets.

Example of an operation using a custom script

Here is an example of the 'Hello World' operation using a script.

Hello World script

```

## World Example Script ###
import sys

sys.path.append('/opt/hp/dma/ooclient/functions')

import parametertools
import steplog
import os

outputs = {}

io_params = parametertools.parse_dma_params_for_oo(sys.argv[1])
helloworld = io_params['Hello World']

def main():
    steplog.info(helloworld)

outputs['Hello World'] = helloworld
parametertools.print_header(outputs)

#### Call to main() ####
if __name__ == '__main__':
    try:
        main()
    except StandardError, e:
        steplog.handle_exception(e)
    
```

Hello World operation input values

Inspector				
Step Name: Hello World				
Inputs Results Display Description Advanced Scriptlet				
Input	Required	Type	Assign From	Otherwise
host	<input checked="" type="checkbox"/>		<not assigned>	Use the constant: \${serverTarget}
username	<input type="checkbox"/>		<not assigned>	Use the constant: \${serverTargetUsername}
password	<input type="checkbox"/>		<not assigned>	Use the constant: \${serverTargetPassword}
protocol	<input checked="" type="checkbox"/>		<not assigned>	Use the constant: \${protocol}
timeout	<input type="checkbox"/>		<not assigned>	Use the constant: \${StandardTimeout}
command	<input checked="" type="checkbox"/>		<not assigned>	Use the constant: \${jythonPath} \${stepsPath}Hell...
arguments	<input type="checkbox"/>		<not assigned>	Use the constant: 'Hello World=\${helloworld}'

Input	Example 'From' value
host	\${Server Target}
username	\${Server Target Username}
password	\${Server Target Password}
protocol	\${protocol}
timeout	\${StandardTimeout}
command	\${jythonPath} \${stepsPath>HelloWorld.py
arguments	'Hello World=\${helloWorld}'

Setting Debug Level

You can specify debugLevel input parameter in any workflow to display debug messages on the console. The console displays the debug messages with a [DEBUG] tag. The INFO_DEBUG_LEVEL, debug value of 3, is set as default. You can modify the default debugLevel to 4 or 5 to turn on additional level of debug messages. The debugLevel value of 4 or 5 provides more debug information, helping you troubleshoot common issues. The following debug levels can be specified:

Debug Level	Debug Value	Description
ERROR_DEBUG_LEVEL	1	Displays all the error messages.
WARNING_DEBUG_LEVEL	2	Displays all the warning messages, as well as error messages,
SUCCESS_DEBUG_LEVEL	3	Displays all the success messages, as well as warning and error messages.
INFO_DEBUG_LEVEL	3	Displays all the information messages, as well as warning and error messages.
NOTICE_DEBUG_LEVEL	3	Displays all the notice messages, as well as warning and error messages.
DEBUG_DEBUG_LEVEL	4	Displays all the debug messages, as well as notice, information, success, warning, and error messages.
VERBOSE_DEBUG_LEVEL	5	Displays all the verbose messages, as well as debug, notice, information, success, warning, and error messages.

Chapter 8: Configuring and Running an HPE DMA Premium Flow - Example

This section describes how to configure and run a typical DMA Premium flow. For the purposes of this example, we will be configuring and running the Oracle Provision Database Software v2 flow.

Before starting, you must have HP OO Studio installed locally. Also, you should navigate to the folder where the HPE DMA Premium Content Packs are located and identify the flows and relevant Content Packs that you need to use. For additional details see ["Importing DMA Premium Content Packs into HP OO Studio" on page 15.](#)

Important: You must first have set up and logged in to the System Account. For details, see ["Setting up the System Account" in "Setting up System Properties for HPE DMA Premium flows" on page 15.](#)

HPE DMA Premium Edition Content Packs and Flows

Content Pack File Name	Available Platforms and Flows
DMA Premium Database 10.40.000.000.jar	<p>Oracle Flows</p> <p>Provisioning:</p> <ul style="list-style-type: none"> • Install or Configure ASMLib • Oracle - Drop Database • Oracle - Provision Client v2 • Oracle - Provision Database Software v2 • Oracle - Provision Database v2 • Oracle - Provision or Upgrade Grid Infrastructure • Oracle - Provision Pluggable Database • Oracle - Start or Stop Database <p>Release:</p> <ul style="list-style-type: none"> • Oracle - SQL Release <p>My SQL Flows</p> <p>Provisioning:</p> <ul style="list-style-type: none"> • MySQL - Create Database • MySQL - Drop Database • MySQL - Install Instance • MySQL - Start or Stop <p>MS SQL Flows</p> <p>Provisioning:</p>

HPE DMA Premium Edition Content Packs and Flows, continued

Content Pack File Name	Available Platforms and Flows
	<ul style="list-style-type: none"> • DB Release for SQL Server • MS SQL - Create Database • MS SQL - Drop Database • MS SQL - Install Standalone SQL Instance • MS SQL - Start or Stop Instance
DMA Premium Middleware 10.40.000.000.jar	<p><i>JBoss</i></p> <p>Code Release:</p> <ul style="list-style-type: none"> • JBoss - Code Release <p><i>WebSphere</i></p> <p>Code Release:</p> <ul style="list-style-type: none"> • WebSphere - Code Release <p><i>WebLogic</i></p> <p>Code Release:</p> <ul style="list-style-type: none"> • WebLogic - Code Release
DMA Premium Utilities 10.40.000.000.jar	<p><i>Utilities</i></p> <ul style="list-style-type: none"> • DMA CleanUp Code Base • DMA CleanUp JRE • DMA CleanUp Target • DMA CleanUp Unix Files • DMA CleanUp Windows Files • DMA Copy Linux Code • DMA Copy Linux JRE • DMA Copy Windows Code • DMA Copy Windows JRE • DMA Install Client • DMA Install Linux Client • DMA Install Windows Client • DMA OSDetector • DMA Remote Copy • DMA Remote Linux Copy • DMA Remote Windows Copy

For detailed descriptions of each DMA Premium flow, see ["HPE DMA Premium flows" on page 32](#).

To Configure and Run and HPE DMA Premium Flows in HP OO Studio:

1. In OO Studio, import the Content Pack containing the flow you need to configure and run. Here, we are importing the DMA Premium Database 10.40 Content Pack, which is named DMA Premium Database 10.40.jar, and contains the Oracle - Provision Database Software v2 flow.

After the Content Pack is successfully imported, it appears in the list of Content Packs:

2. Locate and select the flow you wish to set up and run. Because the flows are read-only, you must copy and paste the flow into a local directory. Here, we have created a new project, MyProject, in OO Studio and placed the flow there.
3. Select the flow and click the green Run icon . A dialog box with parameter fields appears. Enter the required parameter values:

Parameter Values for the Oracle - Provision Database Software v2 Flow

Parameter Name	Value
serverTarget	<hostname>
serverTargetUsername	root
serverTargetPassword	***** The server target password
cleanJRE	True, Yes, or False Case sensitive—any value other than True or Yes is treated as False
cleanCodeBase	True, Yes, or False Case sensitive—any value other than True or Yes is treated as False
downloadSourceHost	<hostname> The name of the file server repository hosting all the software (including DMA Premium Client binaries, Oracle software binaries, etc., that will be downloaded)
downloadSourcePath	/oo/software The path on the file server where the binaries are located
oracleAccount	oracle
oracleBase	/opt/app/oracle
oracleHome	/opt/app/oracle/product/11.2.0/dbhome_1
oracleSoftware	p13390677_112040_Linux-x86-64_1of7.zip, p13390677_112040_Linux-x86-64_2of7.zip
server.BecomeRoutine	su

4. Click **Continue**. As the flow runs, you can view its progress in the Run Tree and Transition History panes of OO Studio. When the flow completes, OO Studio displays a message indicating flow completion.

Chapter 9: Reference Material

The following reference material is available in this section:

- ["HPE DMA Premium flows"](#)
- ["Additional documentation"](#)
- ["Comparison of HPE DMA Premium and HP OO uses"](#)

HPE DMA Premium flows

The following HPE DMA Premium flows are included in the DMA Premium Database 10.40.000.000.jar:

Product	HPE DMA Premium flow
Oracle 11g R2 and 12c	Oracle - SQL Release
	Oracle - Patch Grid Infrastructure and Databases
	Oracle - Rollback Patch from Grid Infrastructure and Database
	Oracle - Configure Data Guard Broker Properties
	Oracle - Create Database Broker Configuration
	Oracle - Data Guard Broker Switchover
	Oracle - Provision Data Guard
	Install or Configure ASMLib
	Move ASM Datafiles
	Add or Alter an ASM Diskgroup
	Oracle - Provision or Upgrade Grid Infrastructure
	Oracle - Patch Home and Database
	Clone Oracle Home
	Migrate Oracle Home
	Oracle - Rollback Patch from Home and Databases
	Oracle - Upgrade Database
	Oracle - Provision Database
	Oracle - Provision Pluggable Database
	Oracle - Provision Database Software
	Oracle - Provision Client
	Oracle - Start or Stop Database
	Oracle - Drop Database
	Oracle - Export Database via Data Pump
	Oracle - Extract Database via RMAN
	Oracle - Refresh Database via Data Pump
Oracle - Refresh Database via RMAN	

Product	HPE DMA Premium flow
MS SQL Server Database 2012 and 2014	MS SQL - Install Standalone SQL Instance
	MS SQL - Start or Stop Instance
	MS SQL - Drop Database
	MS SQL - Create Database
	MS SQL-Upgrade Standalone SQL Instance
	MS SQL-Install Clustered SQL Instance
	MS SQL- Install Patch
	MS SQL - Rollback Patch
	MS SQL- Install Cluster Patch
	MS SQL- Backup Database
	DB Release for SQL Server
My SQL 5.6, Enterprise Edition	MySQL - Create Database
	MySQL - Drop Database
	MySQL - Install Instance
	MySQL - Start or Stop
	MySQL- Upgrade Instance
	MySQL- SQL Release

The following HPE DMA Premium flows are included in the DMA Premium Middleware 10.40.000.000.jar:

Product	HPE DMA Premium flow
IBM WebSphere 8 or WebSphere 8.5.x.	WebSphere - Code Release
	WebSphere 8 -Patch Network Cell
	Create Custom Node from Existing WebSphere 7 Install
	Create StandAlone From Existing WebSphere 7 Install
	Provision WebSphere 7 and Custom Node
	Provision WebSphere 7 and Deployment Manager
	Provision WebSphere 7 StandAlone Profile
	Provision WebSphere and Deployment Manager
	Provision WebSphere and Custom Node
	Provision WebSphere and Stand-Alone
	Provision WebSphere Custom Node Profile From Existing Install
	Provision WebSphere Stand-Alone Profile From Existing Install
WebLogic Server 11g and 12C	WebLogic - Code Release
	Increase WebLogic Domain Span
	Provision WebLogic Cluster
	WebLogic - Provision Weblogic Managed Servers
	WebLogic - Provision Weblogic Domain and Admin Server
	WebLogic - Provision Weblogic Software
	WebLogic - Provision Advanced Domain and Admin Server
	WebLogic - Create Trust and Identity Keystore
	WebLogic - Patch WebLogic Domain
JBoss Application Server	JBoss - Code Release
	JBoss - Patch Software
	JBoss - Rollback Patch Software
	JBoss - Provision Software
Apache Web Server	Apache - Provision Software
Tomcat Application Server	Tomcat - Provision Software

The following HPE DMA Premium flows are included in the DMA Premium Utilities 10.40.000.000.jar:

HPE DMA Premium flow	Utility Description
DMA CleanUp Code Base	Deletes the code base in the Windows target box.
DMA CleanUP JRE	Deletes the DMA Premium Client environment in the Windows target box. Also deletes the jre1.7, bin, lib, and jython folder. In cases where one of the folders does not exist, it goes ahead and deletes the others.
DMA CleanUp Target	Deletes the step code and the DMA Premium Client environment in the DMA target box. Note: This flow will delete the DMA Premium Client and code base separately. These subflows are independent of each other. If one of the files is not present, then it will go ahead and delete others. Deleting DMA Premium Client also deletes the jre1.7, bin, lib, and jython folder. Deleting the codebase also deletes the steps and functions folders.
DMA CleanUp Unix Files	Deletes the step code and the runtime environment in the Unix target box.
DMA CleanUp Windows Files	Deletes the step code and the runtime environment in the Windows target box.
DMA Copy Linux Code	Copies the steps and functions from the Linux file server to the Linux target server. You cannot run this OO subflow independently because it is a sub-flow of the DMA Install Linux Client flow.
DMA Copy Linux JRE	Copies the JRE and jython related files from the Linux file server to the Linux target server. You cannot run this OO subflow independently because it is a sub-flow of the DMA Install Windows Client flow.
DMA Copy Windows Code	Copies the steps and functions from the Linux file server to the Windows target server. You cannot run this OO subflow independently because it is a sub-flow of the DMA Install Windows Client flow.
DMA Copy Windows JRE	Copies the JRE and jython-related files from the Linux file server to the Windows target server. You cannot run this OO subflow independently because it is a sub-flow of the DMA Install Windows Client flow.
DMA Remote Copy	Installs the OO Runtime packs onto the target machine by copying them from a source host (file server) and extracting them onto the target. The OO Runtime packs should be present in the source host/file server before executing this flow.
DMA Install Client	Installs the DMA Client (for Windows and Linux) onto the target servers by copying the binaries from a file server (where the binaries are located in a shared folder) onto the target machine. Requirements: <ul style="list-style-type: none"> The OO installer should be version 10.2x

HPE DMA Premium flow	Utility Description
	<ul style="list-style-type: none"> • The file server where the binary will be should be a Linux machine • The following files must be present: <ul style="list-style-type: none"> • dma_oo* client files • The machine on which OO is installed should have the scp utility installed and accessible (Added in the PATH environment). • The target server user credentials should have the required permissions to copy the binary.
DMA Install Linux Client	<p>Installs the DMA Premium Client binaries on the Linux target server.</p> <p>The following files must be present in the file server (Linux) before you run any flows:</p> <ul style="list-style-type: none"> • dma_oo_client_bin_linux.zip • dma_oo_client_bin_linux.zip.MD5 • dma_oo_client_code_linux.zip • dma_oo_client_code_linux.zip .MD5
DMA Install Windows Client	<p>Installs the DMA Premium Client binaries on the Windows target server.</p> <p>The following files must be present in the file server (Windows) before you run any flows:</p> <ul style="list-style-type: none"> • dma_oo_client_bin_windows.zip • dma_oo_client_bin_windows.zip.MD5 • dma_oo_client_code_windows.zip • dma_oo_client_code_windows.zip .MD5
DMA OS Detector	Detects the OS running on the file server.
DMA Remote Copy	Installs the OO Runtime packs onto the target machine by copying them from a source host (file server) and extracting them onto the target.
DMA Remote Linux Copy	This utility installs the OO Runtime packs onto the Linux target machine by copying them from a source host (file server)—preferably Windows machine—and extracting them onto the target.
DMA Remote Windows Copy	This utility installs the OO Runtime packs onto the Windows target machine by copying them from a source host (file server)—preferably Windows machine—and extracting them onto the target.

Additional documentation

The following documents provide additional information and are available on the HP Software Support web site: <https://softwaresupport.hp.com/>. You need your HP Passport credentials to access them.

Documents for HP Operations Orchestration :

- *Installation Guide*
- *Studio Authoring Guide*
- *Central User Guide*
- *Concepts Guide*

Documentation for the HPE Database and Middleware Automation workflows:

- *HPE DMA Workflows for Oracle*

Comparison of HPE DMA Premium and HP OO uses

HPE Database and Middleware Automation provides two ways to execute its workflows (flows) for database and middleware lifecycle management, either within the HPE DMA platform or the HP Operations Orchestration (HP OO) platform. The following chart compares the features of each:

Traditional DMA Features	DMA Premium Features
Provides all HPE DMA lifecycle management functionality. Used by administration experts such as DBAs and Middleware administrators.	Provides database and middleware lifecycle management for common self-service use cases for the IT generalist, such as App developers, QA teams, etc.
Requires installation and configuration of an HP Server Automation and HPE DMA infrastructure.	Easier installation and faster time-to-value. Requires implementation only of an HP OO infrastructure. No HPE DMA or SA infrastructure is required.
Uses the SA platform and the HPE DMA platform and workflow engine.	Runs HPE DMA Premium flows directly in HP OO Studio or HP OO Central.
Implements centralized database and middleware management through the HPE DMA console.	Enables implementing a self-service cloud running standardized and pre-approved lifecycle management flows. HP Cloud Service Automation (HP CSA) is optional, but recommended for implementing catalog-based self-service.
Provides large-scale estate management of heterogeneous platform and versions.	Provides single environment, self-service management of homogenous platforms and versions.
Delivered as HPE DMA Workflows in HPE DMA Solution Packs.	Delivered as HPE DMA Premium flows in the DMA Premium Master zip file.
HPE DMA workflows and related step scripting code runs natively on each managed target.	HPE DMA workflow and step scripting code is wrapped in an HP OO flow construct and runs natively on each managed target. To simplify upgrading to traditional DMA, the shipped DMA Premium script code is identical to its traditional DMA script counterparts.

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Feedback on User Guide (Database and Middleware Automation Premium Edition10.40)

Just add your feedback to the email and click send.

If no email client is available, copy the information above to a new message in a web mail client, and send your feedback to hpe_dma_docs@hpe.com.

We appreciate your feedback!