

# HP Server Automation

for the HP-UX, IBM AIX, Red Hat Enterprise Linux, Solaris, and Windows<sup>®</sup> operating systems

Software Version: 9.13

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## User Guide: Database and Middleware Automation

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The following table indicates changes made to this document since the last released edition.

### Document Changes

| Chapter   | Version | Changes  |
|---|---------|--|
| All   | 9.10    | Revised to reflect full integration with HP Server Automation version 9.10.  |
| <a href="#">Chapter 2</a>                               | 9.13    | Added a call wrapper example that uses Windows PowerShell (see <a href="#">Actions for Script Type Steps</a> on page 27).  |
| <a href="#">Chapter 2</a> and <a href="#">Chapter 3</a> | 9.13    | Updated instructions for pertinent procedures executed from the Environment and Run pages to specify “select” instead of “double-click.” This reflects navigational improvements to the web interface. |

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# 1 Introduction

This introduction includes the following information:

- [Purpose of this Guide](#) on page 9
- [What is Database and Middleware Automation?](#) on page 9
- [Audience](#) on page 10
- [Prerequisites](#) on page 10
- [System Requirements](#) on page 10
- [Related Documents](#) on page 13
- [Document Conventions](#) on page 11
- [Accessing HP DMA](#) on page 13
- [Summary of Chapters](#) on page 15

## Purpose of this Guide

This guide provides information about the Database and Middleware Automation (HP DMA) feature available in HP Server Automation (SA). For information about a specific HP DMA Solution Pack, see the *User Guide* for that Solution Pack.

## What is Database and Middleware Automation?

Database and Middleware Automation automates frequently performed data center tasks and processes that tend to be complex, manually intensive, and error-prone. It enables operations teams to automate the repair and maintenance of business critical applications, regardless of platform, version, or vendor.

HP DMA provides the following benefits:

- Automates routine IT life cycle tasks and procedures
- Reduces operational expenditures associated with data center management

HP DMA groups components into solution packs to address a specific data center task or process—for example: database patching, middleware provisioning, or database compliance. Solution packs are customizable to your unique data center environment. For more information, see [Chapter 4, Solutions](#), on page 69 of this guide.



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HP DMA version 9.10 is fully integrated with HP Server Automation (SA) version 9.10.

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## Audience

This guide is primarily intended for the following IT professionals:

- **Database administrators**, who are responsible for installing and maintaining database software and assuring compliance with security standards.
- **Application administrators**, who are responsible for installing and maintaining application server software (middleware).
- **Data center engineers**, who are responsible for improving the effectiveness and efficiency of data center operations through increased use of automation.
- **Data center operators**, who are responsible for executing automated data center tasks.

The following stakeholders also benefit by understanding how HP DMA works:

- **Data center administrators**, who are responsible for ensuring the secure and seamless operation of the data center and all its components.
- **Operations specialists**, who are responsible for ensuring that all business critical operations are secure, compliant with pertinent standards, and efficient.
- **SA administrators**, who are responsible for all HP Server Automation administration tasks. They control the privileges and permissions available to each user role, and they decide which servers are managed by SA. They may also be responsible for installing and updating SA.
- **Development team** members and managers, who design and implement applications that are eventually deployed in the data center.

## Prerequisites

HP DMA is part of HP Server Automation (SA). Refer to the *Quick Reference: SA Installation Requirements* for information about prerequisites required for SA.

To perform the various operations described in this guide, you must have the proper permissions. See [Setting Permissions](#) on page 222 for more information.

## System Requirements

HP DMA is installed with HP Server Automation (SA). See the *Quick Reference: SA Installation Requirements* and the *SA Standard / Advanced Installation Guide* for information about SA hardware and software requirements.

## Supported Target Platforms

For a list of the target server platforms supported by HP DMA, see [Supported HP DMA Platforms](#) on page 268. This is a subset of the managed server platforms supported by SA (see the *HP Server Automation Support and Compatibility Matrix* for more information).

## Firewalls and Ports

The DMA web interface requires port 4433. You must configure any firewalls protecting your SA Core Servers to allow this port to be open.

See “Open Ports” in the *SA Quick Reference: Installation Requirements* guide for information about which other ports need to be open on the SA Core (where HP DMA is running) and the SA managed servers (where the SA agent is running).

## Browsers

The following browsers are recommended for use with Database and Middleware Automation:






**Table 1 Recommended Browsers**

| Browser           | Versions     |
|-------------------|--------------|
| Chrome            | 6 or later   |
| Firefox           | 3.6 or later |
| Internet Explorer | 8, 9, or 10  |
| Safari            | 5 or later   |




## Document Conventions

This guide uses several typographical conventions to help explain how to use HP DMA.

**Table 2 Conventions**

| Convention  | Definition   |
|---|--|
| <b>Bold</b>   | Words in bold show items to select or click, such as menu items or buttons.  |
| Courier New   | Files, paths, and commands in Courier New style show items that are file names, path names, or commands.                     |
|  | This symbol means that the following information is read-only.   |
|  | This symbol appears within a green bar across the top of the screen and means that you have successfully completed a task.   |
|  | This symbol appears within a red bar across the top of the screen and means that you have not successfully completed a task. |
|  | Click this red “remove” icon to delete information adjacent to this sign.  |
|  | Click this green “add” icon to add information adjacent to this sign.  |

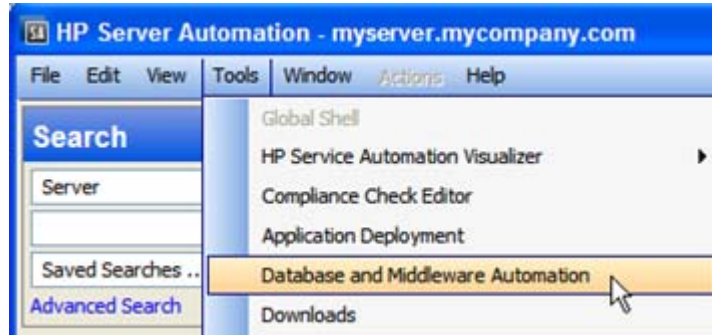
**Table 2 Conventions (cont'd)**

| <b>Convention</b>   | <b>Definition</b>  |
|---|--|
|  | Click this red “x” icon to perform a component delete and confirm your action.   |
|  | Click this blue question mark icon to view a helpful description about the current screen you are viewing.   |
|  | Where you see a filter box, you can perform a real-time filter. Type what you are searching for in the Filter field, and see the filter results display as you type. |

# Accessing HP DMA

There are two ways to access HP DMA:

- Method 1: In the SA Client, select **Tools ► Database and Middleware Automation** to open the HP DMA user interface (UI).



This menu item is only visible if you have permission to access HP DMA (see [Setting Permissions](#) on page 222).

- Method 2: You can also access HP DMA directly from a web browser by specifying the following URL:

`http://<SASlice>/dma/login`

Here, <SASlice> represents the host name or IP address of your SA Slice server.

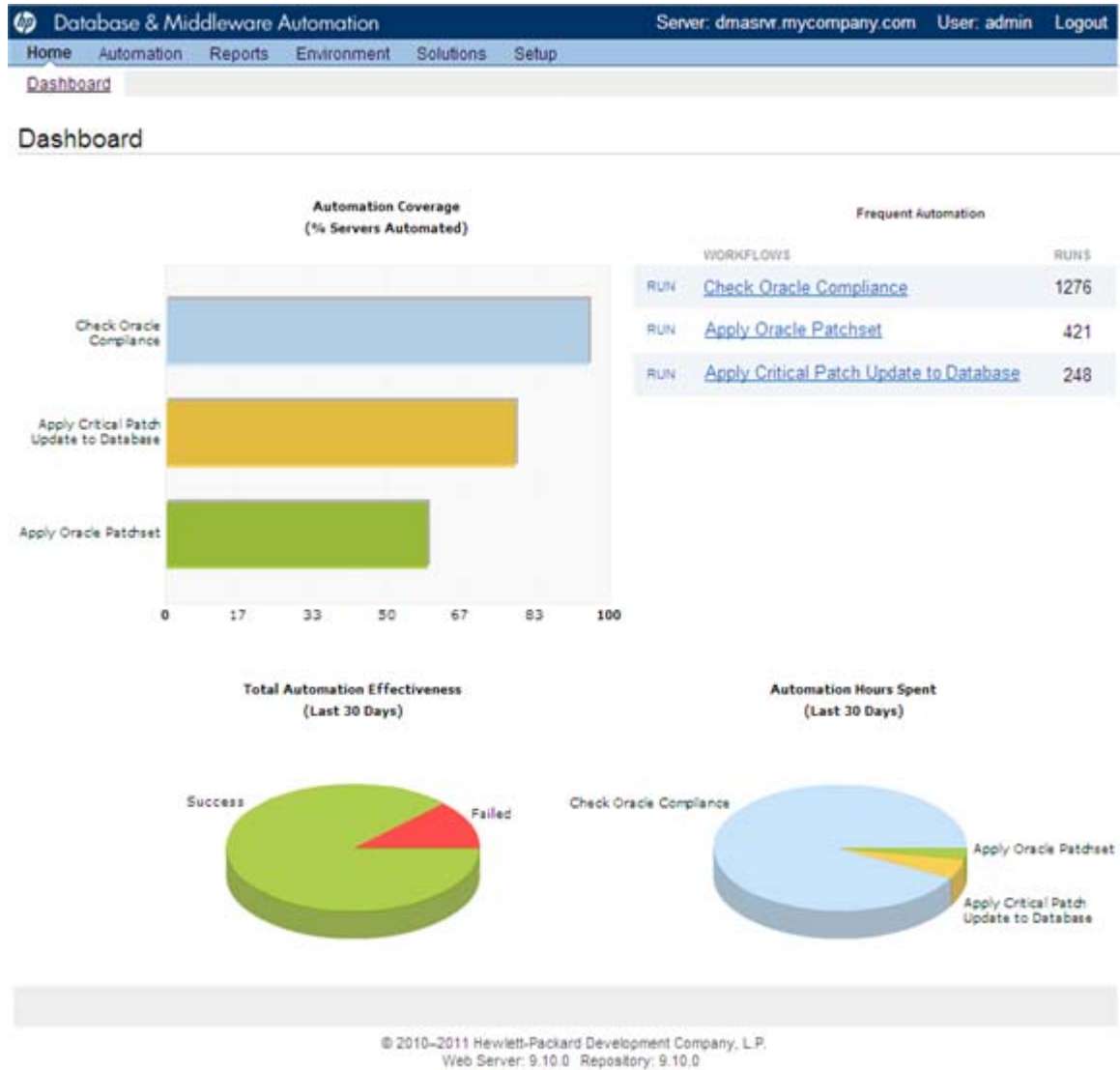
To log in to HP DMA, enter your SA user name and password. The HP DMA Dashboard screen opens, as shown in [Figure 1](#).

## Related Documents

HP DMA is part of HP Server Automation (SA). For more information about, refer to the following SA documents:

- *Managed Server Support Matrix*
- *Quick Reference: SA Installation Requirements*
- *Overview and Architecture Guide*
- *User Guide: Server Automation*
- *User Guide: Application Deployment Manager*

**Figure 1 HP DMA Dashboard Screen**



The HP DMA UI has the following functional areas:

- Automation: See [Chapter 2, Automation](#), on page 17 of this guide.
- Environment: See [Chapter 3, Environment](#), on page 53 of this guide.
- Solutions: See [Chapter 4, Solutions](#), on page 69 of this guide.
- Setup: See [Chapter 6, Administration \(Setup\)](#), on page 81 of this guide.

# Summary of Chapters

This guide contains the following chapters:

| <b>Chapter</b>   | <b>Description</b>   |
|--|--|
| <a href="#">Automation</a> on page 17                  | How to use HP DMA to automate repetitive or complicated data center tasks.   |
| <a href="#">Environment</a> on page 53                 | How to manage Organizations, which contain Servers, Instances, and Databases—targets for automated Workflows.                        |
| <a href="#">Solutions</a> on page 69                   | How to import and use Solution Packs, which group similar Workflows and Steps in a convenient package.                               |
| <a href="#">Roles and Permissions</a> on page 75       | How you can set role-based access for specific automation components and Organizations to precisely control who does what in HP DMA. |
| <a href="#">Administration (Setup)</a> on page 81      | How to administer role-based permissions and other settings from the Setup screen.   |
| <a href="#">Web Services Interface</a> on page 83      | How to use the Web Services API to interact with HP DMA.   |
| <a href="#">Supported HP DMA Platforms</a> on page 268 | An appendix listing all Server operating systems currently supported by HP DMA.  |





## 2 Automation

This chapter includes the following topics:

- [About HP DMA Automation](#) on page 17
- [Workflows](#) on page 18
- [Steps](#) on page 26
- [Understanding Parameters](#) on page 32
- [Functions](#) on page 40
- [Policies](#) on page 42
- [Deployments](#) on page 44
- [Run](#) on page 49
- [Console](#) on page 50
- [History](#) on page 51

### About HP DMA Automation

Automation provides the following benefits:

- Drives standardization in asset management across a data center.
- Empowers data center administrators to define and share best practices.
- Simplifies and automates common administrative tasks.
- Reduces human error when performing data center administration tasks. When common tasks are automated, the risk of human error is reduced, and consistency is driven across an enterprise.

HP DMA Workflows separate tasks into reusable Steps that provide a simple, holistic view of how data center administration tasks are performed. Workflows have the unique ability to run in any environment without any modifications to the underlying automation code.

# Workflows

A **Workflow** is a set of Steps used to accomplish a specific operational task or procedure—such as patching a database instance, installing middleware, or auditing all the instances in an organization for compliance with a security standard.

A Workflow is deployed to specific **targets**. There are three types of targets:

- Servers
- Instances
- Databases



---

HP DMA targets must be—or, in the case of instance and database targets, reside on—SA managed servers. In addition, these servers must have the DMA Agent Support policy. See [DMA Agent Support Policy](#) on page 66.

---

Workflow **Steps** contains the actual code used to perform a unit of work detailed in a Workflow. A Step is typically an executable script, although it can take other forms. Steps are linked together to form the business logic for a task or procedure. You can use a Workflow to perform a new business process by building on existing best practices and processes.

Workflow **documentation** should contain information required to understand not only how a procedure is executed, but also how that procedure has been qualified and tested. Workflow documentation encapsulates best practices into a shareable document that can be exported for IT auditors, change control boards, or training manuals for new data center administrators.

## Understanding the Workflow Execution Architecture

HP DMA controls the flow or progression of a Workflow through its component Steps. This limits the amount of memory that the SA agent running on the managed server requires.

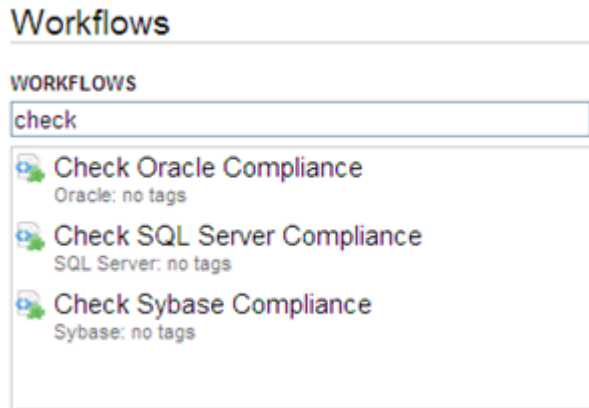
This procedure explains how HP DMA runs a Workflow:

- 1 HP DMA finds the first Workflow Step to execute.
- 2 HP DMA replaces all metadata, parameters, and header variables for this Workflow Step.
- 3 The SA agent executes that script and returns the output and errors as it executes.
- 4 When the script has completed, the SA agent sends the return code back to HP DMA.
- 5 Based on the value of the return code, HP DMA decides which Workflow Step to execute next.
- 6 HP DMA repeats [step 2](#) through [step 5](#) until the Workflow is completed.

## Searching for a Workflow

You can use a real-time filter to search for any Workflow by name, type, or tags. Type what you are searching for in the Workflows box, and see the filter results display as you type. The search string is not case-sensitive, as shown in [Figure 2](#).

**Figure 2 Real-Time Filter Feature**



The real-time filter feature is available throughout the HP DMA user interface (UI).

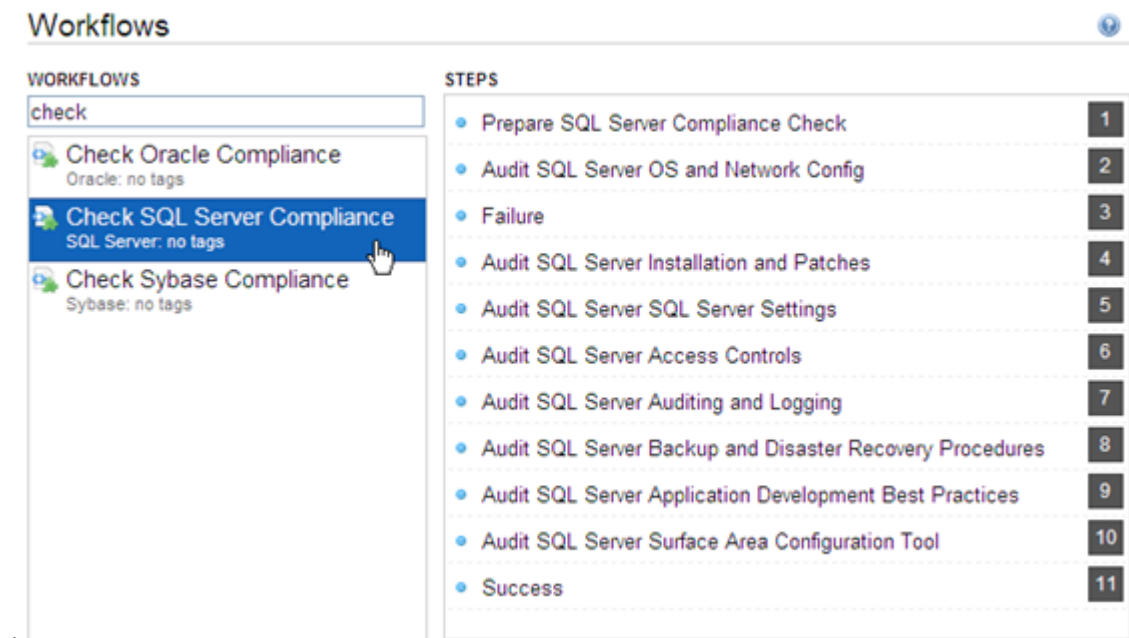
## Viewing an Existing Workflow

From the Automation > Workflows screen, you can view a list of existing Workflows and preview the steps included in any Workflow listed.

### Steps List

In the Workflows pane, point to the Workflow name. As you point to the Workflow, you can view the associated Steps in the Steps pane, as shown in [Figure 3](#).

**Figure 3 Example of Steps in a Workflow**



## Workflow Documentation

In the Workflows pane, click the Workflow that you want to view. The Documentation tab opens, as shown in [Figure 4](#).

Provided that the Workflow is deployable (not locked), you can modify the Workflow documentation to suit your environment. To open the documentation editor, click the **Edit** link in the lower right corner.

For formatting information, click the **Help** link in the lower right corner.

**Figure 4 Example of Workflow Documentation**

**Check SQL Server Compliance**

Documentation Workflow Deployments Roles

Name: Check SQL Server Compliance  
Tags:  
Type: SQL Server  
Target level: Instance

Documentation:

**Purpose**  
Audit a SQL Server instance for compliance with the following Center for Internet Security (CIS) benchmark:  
Security Configuration Benchmark for Microsoft SQL Server 2005, version 1.2.0, January 2010

**Description**  
This workflow will audit an SQL Server instance using CIS Level 1 & 2 auditing. This audit check, run in conjunction with the reporting tool and CIS rule, identifies compliance related problems with a SQL Server instance.

**Parameters**

| Parameter       | Default | Required | Description   |
|-----------------|---------|----------|---|
| Excluded Checks | None    | No       | Comma separated list of CIS checks to skip for the specific step. Example: Surface Area Configuration Tool: Ad Hoc Remote Queries, Surface Area Configuration Tool: Database Mail |
| Latest Build    | None    | No       | The latest build of SQL Server 2005 according to Microsoft. An example value would be "5000" for SQL Server 2005 SP4.   |

[HELP](#) [PDF](#) [EDIT](#)

## Workflow Details

From the Documentation tab, click the Workflow tab to view the following information:

- A graphical representation of the Workflow logic
- A list of all available Steps, grouped by tag
- A table listing the Steps included in the Workflow and the parameters associated with each Step

Figure 5 Example of Workflow Details

**Check SQL Server Compliance**

Documentation | **Workflow** | Deployments | Roles

Steps grouped by tag →

Filter box

Workflow logic diagram


Information about the selected Step

Steps included in the Workflow

| Step | Name  | Required Result | Next |
|------|---|-----------------|------|
| 1    | <a href="#">Prepare SQL Server Compliance Check</a>       |                 | 2, 3 |
| ▶ 2  | <a href="#">Audit SQL Server OS and Network Config</a>    | 0               | 3, 4 |
| 3    | <a href="#">Failure</a>                                   |                 |      |
| ▶ 4  | <a href="#">Audit SQL Server Installation and Patches</a> | 0               | 3, 5 |
| ▶ 5  | <a href="#">Audit SQL Server SQL Server Settings</a>      | 0               | 3, 6 |
| ▶ 6  | <a href="#">Audit SQL Server Access Controls</a>          | 0               | 3, 7 |
| ▶ 7  | <a href="#">Audit SQL Server Auditing and Logging</a>     | 0               |      |

## Creating a New Workflow

- 1 On the Automation > Workflows screen, click **New Workflow**.  
The Documentation tab opens.
- 2 Specify the following information:
  - **Name:** A unique name for the Workflow.
  - **Tags:** Use this field as a keyword field. Use existing tags or create new ones so that you and others can easily find or filter for this Workflow in the future.
  - **Type:** Type of database or middleware software to which this Workflow pertains.
  - **Target Level:** This determines which types of targets you can select when you create a Deployment. Select Server, Instance, or Database.
  - **Documentation:** Use this field to document the function of this Workflow. You will likely develop the Workflow documentation in an iterative fashion as you refine the Workflow.
- 3 Add at least one Step to your Workflow using one or both of the following methods:
  - [Create a New Step](#) (see page 22)
  - [Add an Existing Step](#) (see page 23)

To delete a Step from a Workflow, click the “Remove”  button.
- 4 When you are finished adding and connecting steps, click **Save**.  
“Workflow Saved Successfully” displays in a green bar at the top of the Workflows screen.

## Create a New Step

You can use the New Step wizard to create a new Step “on the fly” while you are editing a Workflow. This is an alternative to creating a Step from the Automation > Steps page (see [Creating a New Step](#) on page 29).

To create a new step by using the New Step wizard:

- 1 Click the **New Step** link just below the Steps panel. The New Step wizard opens.
- 2 Specify the information that the wizard prompts you to provide. This will vary depending on the type of step that you are creating (script, email, or variable timer).
- 3 Click **Next** to advance through the wizard screens.
- 4 Click **Finish** when you have provided all required information.

The New Step wizard creates the Step and adds it to the Workflow after any existing steps.

## Add an Existing Step

To add an existing Step to a Workflow, you must first locate the Step and then place it in the appropriate spot in the Workflow. The following procedure assumes that the Workflow has been created, and that you are viewing the Workflow tab.

To add an existing Step to a Workflow:

- 1 In the Steps panel, click one of the tags to show the list of Steps that have that tag:

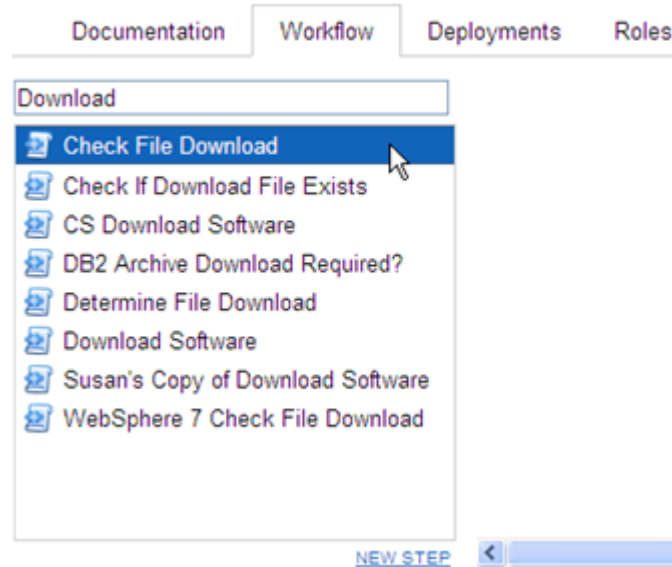
The screenshot shows the 'Database & Middleware Automation' interface. The 'New workflow' page is active, with the 'Workflow' tab selected. The 'Steps' panel is open, displaying a list of steps. The 'Check File Download' step is selected, and its details are shown in the 'NEW STEP' panel below. A red arrow points to the selected step in the list, and another red arrow points to the details panel.

When you select a Step here, information about that step appears here

| Step                | Name |
|---------------------|------|
| Check File Download |      |

Alternatively, you can type text into the filter box above the Steps panel, and any Steps whose names contain that text are listed:

## New workflow



- 2 Double-click a Step to add it to the Workflow.
- 3 In the Steps table below the diagram, modify the Required Result and Next values for this Step and any pertinent existing Steps so that the Workflow logic is correct.

Click in the Required Result or Next column to edit the value.

▶ Be sure to always include the built-in SUCCESS and FAILURE Steps in your Workflows (see [Built-In Steps](#) on page 30). Make sure that the final Step that the Workflow executes is either SUCCESS or FAILURE, depending on the outcome of the previous Steps.

▶ A Download Software Step is built into your HP DMA software. This Step enables you to download one or more files from the SA Library to a specified location on the target server. To locate this Step, on the Workflow tab, type “download” in the filter box. See [Download Software](#) on page 31 for additional information.

## Copying a Workflow

Copy is available from all the tabs in the Automation > Workflow area. Creating a copy of a Workflow saves time by enabling you to reuse information in a Workflow by renaming it without having to re-type the Workflow’s information.

To make a copy of a Workflow:

- 1 Click **Copy**.

The Documentation tab opens, and the Workflow name changes to “Copy of <Workflow name>.”

- 2 Make any changes to the copy.
- 3 Click **Save**.



## Exporting a Workflow

You can export a Workflow, and it is saved on the local file system as an SOP file.

When you export a Workflow, you export the Steps used in that Workflow, but you do not export the Functions.

To export a Workflow:

- 1 Go to Automation > Workflows.
- 2 Click the Workflow that you want to export.
- 3 Click **Export**.
- 4 A screen displays and allows you to select a location to which you want to save the Workflow.
- 5 Click **OK**.
- 6 Click **Save**.

## Importing a Workflow

You can import a Workflow that has been previously exported as an SOP file.

To import a Workflow:

- 1 On the Automation > Workflows page, click **Import Workflow**.  
The Import Workflow screen opens.
- 2 Click **Browse** to find the Workflow you want to import.
- 3 Click **Import**.

## Assigning Roles to a Workflow

Roles determine who can read or modify a Workflow. You can modify the roles settings for any Workflow that you have permission to write.

To assign roles to a Workflow.

- 1 Go to Automation > Workflows.
- 2 In the Workflows pane, point to the Workflow name.
- 3 Click the Workflow you want to view.  
The Documentation tab displays.
- 4 Click the **Roles** tab.  
The Roles tab displays.
- 5 Select or clear the **Read** or **Write** check boxes, depending on the permission you want to grant.
- 6 Click **Save**.

## Deleting a Workflow

You can delete a Workflow unless its status is “Read Only.”



---

If you delete a Workflow that has associated Deployments, the associated Deployments will be deleted automatically with the Workflow.

---

To delete a Workflow:

- 1 Go to Automation > Workflows.
- 2 Open the Workflow you want to delete.
- 3 Click and confirm delete.

## Steps

Steps are reusable automation components. They are assembled into Workflows that automate a task or system healing action. Steps can accept input parameters for customization and provide output for subsequent Steps to use.

### Searching for Steps

You can perform a real-time filter on any Step by name, type, or tags. Type what you are searching for in the Steps field, and the filter results will display as you type.

### Viewing a Step



---

Steps provided by HP are Read Only. You must copy a Step before you can modify it. See [Copying a Step](#) on page 30.

---

To view information about a specific step:

- 1 Go to Automation > Steps.

You can also access individual steps from the Steps tab on the Solutions screen or the list of steps associated with a Workflow.

- 2 In the Steps pane, point to the Step name that you want to view.

As you point to a Step, the Workflows that use that particular Step is shown in the Workflows pane.

- 3 Click the Step you want to view.

There are seven tabs that you can use to view information about this Step:

- [General Tab](#) (described on [page 27](#))
- [Action Tab](#) (described on [page 27](#))
- [Parameters Tab](#) (described on [page 28](#))
- [History Tab](#) (described on [page 29](#))

- [Workflows Tab](#) (described on [page 29](#))
- [Solutions Tab](#) (described on [page 29](#))
- [Roles Tab](#) (described on [page 29](#))

The General tab opens first. The Step name appears above the tabs.



In order to modify the properties of a Step, you must have Write permission for that Step (see [Roles Tab](#) on [page 29](#) and [Roles and Permissions](#) on [page 75](#)).

## General Tab

The General tab displays information about a Step. In the Properties area, you can view and edit the following information:

- Name: Step's name (must be unique).
- Tags: Use this field as a keyword field to type descriptive words about a Step's function, language, compliance, etc., so that you can easily find or filter for this Step.
- Type: Determines where or at what level a Step is executed.
- Category: Specifies the type of Step. There are three Step categories:
  - Script: Executes the code on the Action tab.
  - Email: Sends an email to the specified email address.
  - Variable Timer: Type the number of minutes you want to wait before the Workflow proceeds to the next Step.

The Category setting determines which options are available on the Action tab.

You can only specify the Category field when you are creating a new Step. You cannot edit the Category field after a Step has been saved.

In the Documentation area, you can view or edit documentation that is related to the Step.

## Action Tab

The Action tab enables you to view and specify the action that a Step takes when that Step is used in a Workflow. The options available on the Action tab reflect the Category type specified on the General tab.

### Actions for Script Type Steps

For a Script type Step, you must specify two things:

- Call wrapper – the location of the interpreter that executes the script. For example:

```
/bin/ksh
```

```
/usr/bin/perl
```

```
powershell -ExecutionPolicy unrestricted -File, cscript /E VBS
```



If you install Windows PowerShell on a managed server, and you want to use it as a DMA call wrapper, you must restart the SA agent on that server. To do this, restart the Opware Agent service.

You can also specify the following built-in call wrappers:

- `jython`: Runs the script using the built-in python interpreter shipped with HP DMA.
- `SQL`: Runs the code as SQL against the database (SQL only, no DML/DDL).
- `osql`: Runs the code as TSQL against the database (MSSQL only).
- Code – the script to run using the Call wrapper.

You can type or paste the script into the Code box, or you can use one of the following tools:

- The Insert Function tool inserts a reference to an existing function at the beginning of the Code field. To insert a function, follow these Steps:
  - a Click the **Insert Function** link in the lower left corner.
  - b In the Insert Function dialog box, select the function that you want to insert.
  - c Click **Insert function** (or click **X** to cancel).
- The Import Script tool replaces any information in the Code field with the contents of a file that you specify. To import a script, follow these Steps:
  - a Click the **Import Script** link.
  - b Click **Browse** to locate the script you want to import.
  - c Click **Open** to import the script (or click **X** to cancel).

### Actions for Email Type Steps

For an Email type Step, you must specify three things:

- To – email address to which the email message will be sent.
- Subject – subject of the email message.
- Message – content (body) of the email message.

### Actions for Variable Timer Type Steps

For a Variable Timer type Step, you must specify one option: the Delay. This is the number of minutes that you want the Workflow to wait before executing the next Step.

## Parameters Tab

Parameters enable you to pass information into or out of a Step. You set the input to a value, and the output parameter is set within the code (see [Understanding Parameters](#) on page 32). Script Steps can have both input and output parameters. All other Step types can only have input parameters.

- Input Parameters

The Parameters tab defines the variables that a Workflow sets when running a Step so that the Step can run against different objects and still be reusable. For example, in a database backup, the directory where the backup should be placed would be a good candidate for an input parameter so that both development and production database backups could use the Step without modification.

- Output Parameters

Script type Steps enable you to define output parameters as well as input parameters. Steps use output parameters to provide information to be used by downstream Steps. For example, if a Step determines the location of the Oracle home directory on a target server, it can add that location to its set of output parameters for subsequent Steps to use.



If you want to remove a parameter from a Step, you can click the **Remove** link for that parameter. If that parameter is associated with a Workflow, however, you cannot remove it, and the Remove link is not available.

## History Tab

Every time that a Step is saved, a new entry is added to the table on the History tab. The entry shows you when the Step was saved, by whom it was saved, and any comments that were entered when it was saved. If you click an entry in the table, the action information for that version of the step is displayed in the Details area.

## Workflows Tab

The Workflows tab shows you a list of the Workflows that use this Step. To view or edit information pertaining to a particular Workflow, click the name of that Workflow.

## Solutions Tab

The Solution tab shows you a list of the Solution Packs that include this Step. To view information about a particular Solution Pack, click the name of that Solution Pack. For more information, see [Solutions](#) on page 69

## Roles Tab

The Roles tab shows you which SA user groups and individual users have Write permission for the Step.

Permissions settings for baseline Steps (Steps that are shipped with HP DMA) cannot be changed, even by an administrator. To change permissions for any other Step, select or clear the check boxes to grant or revoke Write access.

If there is a “—” in the Write column, None of the roles have Write access to the Step. For more information on changing permissions as an administrator, see [Permission Settings](#) on page 82.

## Creating a New Step

You do not need any special permissions to create new steps. To use your new step in a Workflow, however, you must have permission to Create Workflows (see [Roles and Permissions](#) on page 75).

To create a new step:

- 1 Go to Automation > Steps.
- 2 Click **New Step**.
- 3 Specify the following information on the General tab:

- Name: Unique name of the Step.
  - Tags: Use this field as a keyword field, to type descriptive words about a Step's function, language, compliance, etc. so that you can easily find or filter for this Step.
  - Type: Helps you decide where or at what level to run a Step.
  - Category: Specifies the type of Step.
- 4 Specify the information required on the Action tab:
    - For a Script type Step, specify the Call wrapper and Code (see [Actions for Script Type Steps](#) on page 27).
    - For an Email type Step: specify the email address, subject, and content (see [Actions for Email Type Steps](#) on page 28).
    - For a Variable Timer type Step, specify the Delay (see [Actions for Variable Timer Type Steps](#) on page 28).
  - 5 *Optional:* In the Documentation area, add documentation that describes the Step that you are creating—for example: describe its purpose, dependencies, parameters, and return codes.
  - 6 *Optional:* Specify any parameters that this step uses (see [Parameters Tab](#) on page 28).
  - 7 *Optional:* Specify who is allowed to modify this step (see [Roles Tab](#) on page 29).
  - 8 Click **Save**.

## Copying a Step

Since Steps provided by HP are read-only, you must first copy a Step before you can modify it. You do not need any special permissions in order to copy a step. To use your copied step in a Workflow, however, you must have permission to Create Workflows (see [Roles and Permissions](#) on page 75).

- 1 Go to Automation > Steps.
- 2 Click a Step that you want to modify.
- 3 Click **Copy**.
- 4 Specify a unique name for the copy.
- 5 Modify the Step to suit your objective.
- 6 Click **Save** in the lower right corner.

## Built-In Steps

There are three utility Steps that are provided with your HP DMA software:

- [Success](#) on page 31
- [Failure](#) on page 31
- [Download Software](#) on page 31

You can use these Steps to build Workflows. If you need to customize the Steps, you can make copies and then modify those copies.



---

It is good practice to always include a SUCCESS step and a FAILURE step in your Workflows. The final step that a Workflow executes should be either SUCCESS or FAILURE, depending on the return code of the previous Step.

---

## Success

This Step is intended to be used as the terminal Step in a Workflow when the Workflow has successfully executed the previous Steps. A Workflow may contain multiple Success Steps depending on its branching logic. After the Success Step executes, the Console and History pages indicate that the Workflow execution status is SUCCESS.

## Failure

This Step is intended to be used as the terminal Step in a Workflow when a Step in the Workflow has failed. Typically, there will only be one Failure Step in the Workflow—but you can have multiple Failure Steps, depending on the Workflow’s branching logic. After the Failure Step executes, the Console and History pages indicate that the Workflow execution status is FAILURE.

## Download Software

This Step enables you to conveniently transfer a group of files from the SA Software Library to a target server. This is useful, for example, when you are using an HP DMA Workflow to install software on one or more target servers.

This Step has the following parameters:

**Table 3 Download Software Parameters**

| Parameter        | Type   | Required | Description  |
|------------------|--------|----------|--|
| FileNames        | input  | yes      | Comma delimited list of files to download.                         |
| TargetDir        | input  | yes      | Directory on the target server where the files will be downloaded. |
| Downloaded Files | output | n/a      | Comma delimited list of files that were downloaded                 |

You must specify both input parameters. You can use the output parameter in downstream Workflow Steps.

This Step has the following dependencies:

- You must first add any files that will be transferred to the SA Software Library. Import these files into a well-known location within the SA folder hierarchy. Choose and create a folder path that works in your environment. For example:

`/Opware/Tools/Database & Middleware Automation/Repository`

- After choosing a location within the SA folder hierarchy, use the Actions ► Import Software menu item (or right-click within the newly created folder) to add packages into the Library.

When importing files, you can choose to set the file type and platform appropriately—for example, if you intend to use these packages elsewhere within SA—or simply select Unknown and OS Independent, respectively.

For more information about importing packages, see the *SA User Guide: Software Management*.

- File names must be unique. When referencing files in this Step's FileNames input parameter, specify a comma-separated list of the uploaded file names. Note that it is important to specify the actual file names, not the SA package names.

This Step has the following return codes:

**Table 4 Download Software Return Codes**

| Return Code | Meaning   |
|-------------|---|
| 0           | All files were successfully downloaded.                   |
| 1           | A fatal error occurred while files were being downloaded. |
| 9           | One or more files were successfully downloaded.           |

## Understanding Parameters

You create parameters at the Step level, and then you assign values at either the Workflow level or the Deployment level. The following topics provide examples that illustrate how parameters are created and then used at various levels.

- [Creating Parameters](#) on page 32
- [Assigning Values to Parameters](#) on page 35
- [Using Parameters](#) on page 38

Figure 6 shows an example of a Step whose purpose is to validate all the input parameters required for the Workflow. This Step provides output parameters that are consumed by the subsequent Steps in the Workflow.

## Creating Parameters

You can add, modify, and remove parameters for any Step for which you have Write permission (see [Roles and Permissions](#) on page 75).

To create a new parameter:

- 1 Go to Automation > Steps.
- 2 Select the Step that you want to modify (or create a new Step).
- 3 Use the **New Parameter** link to add input parameters, and if applicable for a Script type Step, output parameters. Specify the following information:
  - Name: A unique name (within this Step) for the parameter.
  - Value: The default value of this parameter.
  - Description: Information that indicates the purpose of this parameter and how its value should be specified. For example:



Required: Unique node name that cannot contain any of the following special characters / \ \* , : ; = + ? | < > & % ' " [ ] > # \$ ^ { }. If you plan to federate into an existing cell later, make sure that the node name is unique within that cell.

- 4 Click **Save**.

Figure 6 Automation > Steps > Parameters Tab

Database & Middleware Automation Server: myserver.mycompany.com User: admin Logout

Home Automation Reports Environment Solutions Setup

Workflows Steps Functions Policies Deployments Run Console History

### Copy of Validate Apply Critical Patch Update to Home

General Action **Parameters** History Workflows Solutions Roles

Input parameters

| Name                    | Value                              | Description   |        |
|-------------------------|------------------------------------|---|--------|
| CPU Archive             | /tmp/p7592354_10203_LINUX.zip      | *Required: Fully qualified pathname of the Critical Patch Update Archive file.                          | REMOVE |
| Call Wrapper            |                                    | *Required: Jython call wrapper required to run as the user.   | REMOVE |
| OCM Response File       |                                    | *Optional: Full pathname of the Oracle Configuration Manager (OCM) response file.                       | REMOVE |
| OPatch Archive          | /tmp/p6880880_102000_LINUX.zip     | *Optional: Fully qualified pathname of the OPatch Archive file required for this Critical Patch Update. | REMOVE |
| Oracle Home             | /opt/app/oracle/product/10.2.0/DB2 | *Required: The ORACLE_HOME directory for this instance.   | REMOVE |
| Patch Archive Location  | /var/tmp                           | Location where patch will be unzipped   | REMOVE |
| Patch Download Location | /var/tmp                           | Path to download patch if file not found  | REMOVE |

[NEW PARAMETER](#)

Output parameters

| Name                    | Description  |        |
|-------------------------|--|--------|
| Archive Location        | Directory location the CPU archive will be extracted to.   | REMOVE |
| CPU Archive             | Fully qualified pathname of the Critical Patch Update Archive file.                              | REMOVE |
| CPU Archive Path        | Fully qualified pathname of the Critical Patch Update Archive file downloaded for this instance. | REMOVE |
| Empty Mapping           | An empty parameter to be mapped to later steps.  | REMOVE |
| File List               | A comma separated list of files used in the workflow.  | REMOVE |
| Ignore SIDs             | Comma separated list of Oracle Instances (SIDs) to ignore for patching.                          | REMOVE |
| OCM Response File       | Full pathname of the Oracle Configuration Manager (OCM) response file.                           | REMOVE |
| OPatch Archive          | Fully qualified pathname of the OPatch Archive file required for this Critical Patch Update.     | REMOVE |
| OPatch Archive Path     | Fully qualified pathname of the OPatch Archive file downloaded for this instance.                | REMOVE |
| OPatch Version          | The current version of OPatch as an integer (eg. 10.2.0.4.2 = 1002000).                          | REMOVE |
| Oracle Home             | The ORACLE_HOME directory for this instance.   | REMOVE |
| Oracle Version          | The current version of Oracle as determined by sqlplus -V  | REMOVE |
| Patch Archive Location  | Location where patch will be unzipped  | REMOVE |
| Patch Download Location | Path to download patch if file not found   | REMOVE |

[NEW PARAMETER](#)

X DELETE
Copy Save or CANCEL

## Assigning Values to Parameters

Parameters are defined in Steps, but their values are assigned at the Workflow level, the Deployment level, or with a Run action.

Parameters whose values are assigned at the Workflow level typically either have constant values or values that are determined at execution time using custom fields. For example, a parameter's value may change based on the Organization. In this case, the parameter remains consistent, but the value assigned to that parameter changes.

To assign parameter values at the Workflow level, go to the Automation > Workflows > Workflow tab.

Once you go to the Workflow tab, view the Workflow table located below the Workflow diagram. If the Step contains an Input parameter, there is an arrow next to each Step that, when clicked, displays the “values” that can be associated with that Step's parameters (see [Figure 7](#)).



---

When you are working with parameters at the Deployment level or with a Run action the parameters are not as static as parameters that you would set at the Workflow level. If you know that you have a value that changes often, do not assign it at the Workflow level—assign it, instead, at the Deployment level. For more information, see [Using Parameters](#) on page 38.

---

**Figure 7 Workflow Tab with Step Parameters Displayed**

The screenshot displays the 'Workflow' tab for a process titled 'Copy of Apply Critical Patch Update to Home'. The workflow diagram shows a sequence of steps: 1. Prepare Oracle Call Wrapper, 2. Validate Apply Critical Patch Update to Home, 3. Failure, 4. Check If Download File Exists, 5. Download Software, 6. Check to Patch OPatch, 7. Failure, 8. Conditional Unzip, 9. Conditional Unzip, 10. Failure, and 11. Process Oracle Patch Readmes. Below the diagram, a table provides details for steps 1 and 2.

| Step | Name   | Required Result | Next |
|------|--|-----------------|------|
| 1    | Prepare Oracle Call Wrapper                  |                 | 2, 3 |
| 2    | Validate Apply Critical Patch Update to Home | 0               | 3, 4 |

The 'Validate Apply Critical Patch Update to Home' step parameters are listed below:

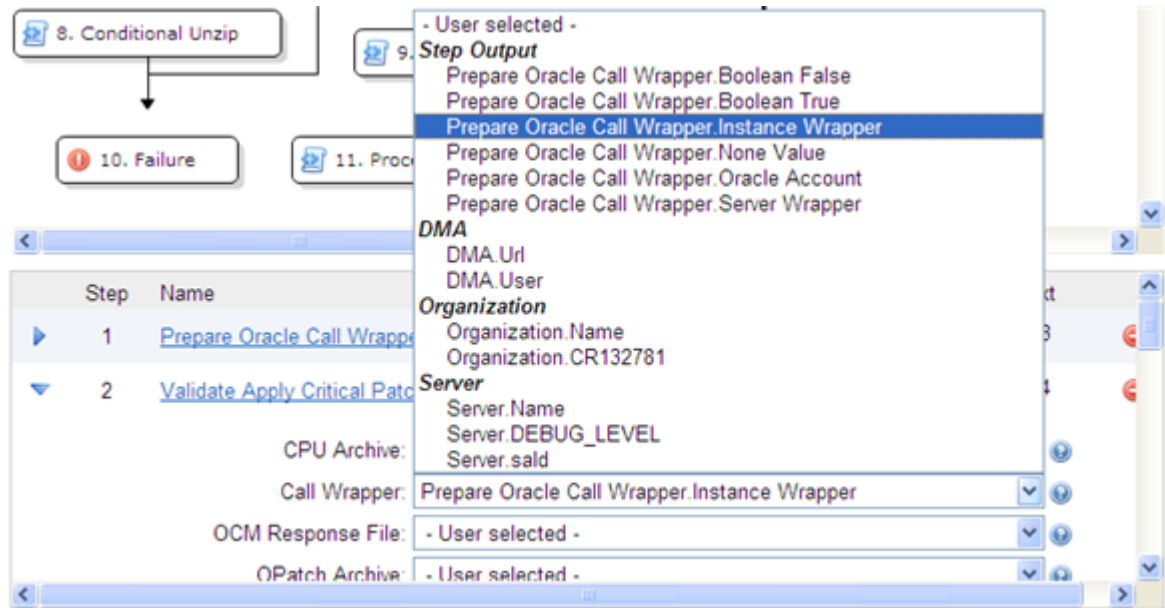
- CPU Archive: - User selected -
- Call Wrapper: Prepare Oracle Call Wrapper.Instance Wrapper
- OCM Response File: - User selected -
- OPatch Archive: - User selected -
- Oracle Home: - User selected -

The “Values” drop-down list associated with each input parameter contains built-in metadata and any user-defined custom fields.

If a prior Step in the Workflow contains an output parameter, that output parameter will be included in the “Values” drop-down list. If it is applicable to assign output parameters, then they will display in the list as well. In order to view an output parameter in the “Values” drop-down list, the Step must be used in a Workflow.

In [Figure 8](#), for example, the output parameters of the Prepare Oracle Call Wrapper Step are available to provide values for the input parameters of the Validate Apply Critical Patch Update to Home Parameters Step. The DMA, Organization, and Server metadata items are also available.

**Figure 8 Automation > Workflow Tab: Parameter “Values” Drop-Down List**



If you assign an output parameter from a previous Step to an input parameter at the Workflow level, that input parameter does not appear in the Deployment parameters list. All parameters that are not either assigned to a custom field or mapped at the Workflow level will be modifiable at the Deployment level. Any parameter that is not set in the Workflow or at the Deployment level will use the default value assigned for that Step.

To assign values to parameters at the Workflow level:

- 1 Go to Automation > Workflows.
- 2 Perform one of the following tasks:
  - Click **New Workflow** to create a Workflow.
  - Select an existing editable Workflow.
- 3 Go to the Workflow tab.

The Steps in the Workflow display in the Workflow table, below the Workflow diagram. The arrows to the left of each Step expand that Step to display any parameters associated with the step, as shown in Figure 7. If a Step has no input parameters, the arrow does not appear.

- A numeric value in the Required Result column is the return code that must be received from at least one parent node in order for that Step to run.
  - You can use the Next field to reorder your Workflow’s Steps.
- 4 Click the arrow next to each Step. The input or output parameter “values” display in a drop-down list. Assign a value from the “Values” list (as shown in Figure 8) to the desired parameter.
  - 5 Click **Save**.

The Workflow screen opens, and the message “Workflow saved successfully. Would you like to deploy the Workflow now?” displays.

To proceed, see [Deployments](#) on page 44.

## Using Parameters

There are three levels at which you can assign parameter values: Workflow, Deployment, and Run.

Parameter values should be assigned at the Deployment level when the value is specific to the targets that are part of the Deployment. For example, you may wish to use the same Workflow with production and development servers, but you need to use a different parameter value for each environment. This can be accomplished by creating one Deployment of that Workflow for production servers, and a second Deployment for development servers. This allows you to set the same parameter differently for the each set of targets.



---

If you assign a value to a parameter at the Workflow level, that parameter does not display at the Deployment level, so it cannot be overridden.

---

To assign parameter values at the Deployment level:

- 1 Perform one of the following actions:
  - Click the **... Would you like to deploy the Workflow now** link at the top of the page (this is available immediately after you save a Workflow).
  - Create new Deployment (see [Creating a New Deployment](#) on page 45).
- 2 On the Attributes tab, specify the following:
  - Name: Type a unique Deployment name.
  - Workflow: If you clicked the link in [step 1](#), the Workflow name is pre-populated. If you are creating a new deployment, select a Workflow from the list.  
  
Click **View Workflow** if you need to see the Workflow for which you are creating a Deployment.
  - Schedule (optional): Select a Deployment schedule from the drop-down list (see [Scheduling a Deployment](#) on page 47).



---

On the Deployments > Parameters tab, if you select “Enter at runtime” and try to save a Deployment with a schedule, you cannot save until you clear the check box or unschedule the Deployment.

---

- 3 Add the targets from the available pool.
- 4 Go to the Parameters tab.

You can assign built-in custom fields, user-defined custom fields, and policy attributes in this list. You will not see any output parameters, however; mapping output to input parameters is only possible in the Workflow editor.

If you create a Deployment and then add parameters to your Step, any newly-created parameters display in the Deployment parameter list and contain the default value assigned in the Step editor.

Deployment parameters can contain three different types of values.

- Static text
- Custom fields (built-in or user created)
- Policy attributes

As you type in the value that you want, HP DMA uses pattern matching to try and find custom fields and policy attributes that match the value that you entered into the box. You can select the desired value from the drop-down, or type the desired value completely.

---

▶ In order to obtain a complete list of all custom fields and policy attributes that are usable with this Deployment, type “.” (period) in the text-box.

---

▶ To replace all parameter values with their default values assigned at the Step level, click **Restore Defaults**.

---

5 Click **Save**.

The Deployment screen opens, and the message “Deployment saved successfully. Would you like to run the Workflow now?” displays. For more information, see [Run](#) on page 49.

## Using Metadata and Policies from a Workflow Step

You can use metadata from any Workflow Step type by using the **`\${Object.Attribute}`** syntax.

For example, the ``${Instance.Password}`` metadata variable would be replaced at run-time with the actual password for the instance on which this Workflow Step was executed.

For example, if the password for a given instance were `password`, the script

```
var password = `${Instance.Password}`
```

would be replaced with

```
var password = "password"
```

at run-time.

You can also replace user-defined metadata using these conventions.

## Using Parameters from a Workflow Step

You can reference a parameter from a Workflow Step using the **`\${ParameterName}`** convention. Use a parameter to change the way that this Workflow Step runs prior to run-time.

For example, if you have a Parameter called `InstallDirectory` with a default value of `/opt/app/oracle`, the script

```
var installDir = `${InstallDirectory}`
```

would be replaced with

```
var installDir = "/opt/app/oracle"
```

at run-time.



## Using Header Information from a Workflow Step

You can use input from another Workflow Step by using the **#{Header.Variable}** convention. Use an input header when passing information from one Step to another, such as the **ORACLE\_HOME** or other variables.

For example, say that a Workflow contains two Workflow Steps. The first Step finds the **ORACLE\_HOME** variable, and the second Step performs an Oracle Refresh. The Oracle Refresh Workflow Step requires the **ORACLE\_HOME** variable in order to execute.

## Functions

Functions are reusable pieces of code that can be included in automation Steps. Any common routine or operation that multiple Steps perform is a good candidate for a Function. Functions can be tagged with keywords indicating the language in which they are written and the operating system with which they work.

Functions are “injected” into the Step code just prior to Step execution.

### Searching for a Function

You can use a real-time filter to locate a Function by name or by tags. Type what you are searching for in the Functions field, and the filter results will display as you type.

### Viewing/Opening a Function

From the Automation > Functions screen, you can view all existing Functions as well as preview a Function’s code.

To view or modify a particular Function, select its name in the Functions list.



---

Some functions are Read Only.

---

### Creating a Function

- 1 Go to Automation > Functions.
- 2 Click **New function**.  
The General tab opens.
- 3 Specify a unique Name for the Function.
- 4 *Optional:* Specify any Tags or Documentation in the appropriate areas.
- 5 Click the **Code** tab.
- 6 Type or paste new code in the Code area.
- 7 Click **Save**.



---

Functions must contain script code. You cannot save a Function without script code.

---



## Copying a Function

- 1 Go to Automation > Functions.
- 2 Select a Function.
- 3 Click **Copy**.
- 4 Type a new name for Function.
- 5 Click **Save**.

## Modifying a Function

Before you modify a Function, make sure that no Workflows that use this Function are running. If a Workflow uses a Function in multiple steps, and that Function is modified after the Workflow starts running, the Function code will be different in later Steps than it was in earlier Steps. This is because the Function code is “injected” into the Step just prior to Step execution.

To modify a Function:

- 1 Go to Automation > Functions.
- 2 Select the Function that you want to modify.
- 3 Edit the desired information.
- 4 Click **Save**.



---

You cannot modify read-only Functions.

---

## Deleting a Function

Because Functions are imported at runtime, it is possible to delete a Function that is used by Steps—this would break those Steps. HP DMA does not check to determine whether a Function is being used before deleting it.

To delete a Function:

- 1 Go to Automation > Functions
- 2 Select function to delete.
- 3 Click and confirm delete.



---

You cannot delete read-only Functions.

---

# Policies

Policies are reusable sets of attributes that can be used as parameter values in Deployments. Deployments can reference Policy attributes to change the automation behavior. Policies provide values for input parameters. They can contain fixed values or reference custom fields.

Policies enable HP DMA to manage groups of hundreds or thousands of servers at a time without the need to configure each individual server. For example, you could create a Web Server Policy that defines what every web server in your data center looks like. This Policy might contain the following attributes:

- Software List
- Root Password
- Apache User ID
- Apache User Password

The Software List attribute would be a list of software that must be installed on every web server. This might include openssl, apache, perl, etc.

## Policy Attribute Types

Policies have three different types of attributes:

- Text: This is a simple text value that users can view while deploying and running automation.
- Password: This is a simple text value. However, the value is masked (obfuscated) when displayed so that users cannot see the value.
- List: This is a free-form text field that can contain comma-delimited lists of values or other large text data not suitable for a Text type attribute.

## Policy Roles

When you create a Policy, you can specify which users and user groups are allowed to Read or Write that Policy. Read permission enables the user who is deploying a Workflow to access the Policy attributes when specifying parameter values. Write permission enables the user to modify the Policy.

## Built-In Policies

HP DMA comes with several built-in Policies, including the Discovery Policy (see [link to “Discovering Instances and Database”](#)). You can modify the attributes values for these Policies, but you cannot add or remove attributes. You can, however, make a copy of a built-in Policy and then customize that copy.

## Creating a New Policy

You can create and use Policies to provide values for various Deployment scenarios.

To create a new Policy:

- 1 Go to Automation > Policies.
- 2 Click **New Policy**.
- 3 Type a unique Name for your Policy.
- 4 In the Attributes area, perform the following actions for each attribute you want to add:
  - a Specify a unique name (within the Policy).
  - b From the drop-down list, select this attribute's type: Text, List, or Password. See [Policy Attribute Types](#) on page 42 for details.
  - c Click **Add**.
  - d Specify the value of the attribute.
- 5 *Optional*: On the Roles tab, select the Read box for any users or user groups that you want to be able to use this Policy to provide parameter values in a Deployment. Select the Write box for any users or groups that you want to be able to modify this Policy (add or remove attributes).
- 6 Click **Save**.

## Extracting a Policy

You can automatically create a reusable Policy that provides values for all input parameters associated with a Workflow. This is a convenient way to create a Policy.

To extract a Policy:

- 1 Go to Automation > Workflows.
- 2 Select the Workflow that you want to work with.
- 3 Click the **Extract Policy** link at the bottom of the screen.
- 4 Specify values for each attribute listed.
- 5 *Optional*: Add any new attributes that you want to use.
- 6 *Optional*: Remove any attributes that you do not want to use.
- 7 *Optional*: On the Roles tab, select the Read box for any users or user groups that you want to be able to use this Policy to provide parameter values in a Deployment. Select the Write box for any users or groups that you want to be able to modify this Policy (add or remove attributes).
- 8 Click **Save**.



---

Extracted Policies only use Text type attributes. Therefore, passwords are not obfuscated when you specify them in an extracted Policy.

---

## Where is a Policy in Use?

- 1 Go to Automation > Policies.
- 2 Select a Policy.
- 3 Click the **Deployments** tab to see where the Policy is in use.

## Deleting a Policy

- 1 Go to Automation > Policies.
- 2 Select a Policy.
- 3 Click the **Deployments** tab to see where the Policy is in use. You cannot delete a Policy if it is being used. If the Policy is being used, follow these steps for each Deployment listed:
  - a Select the Deployment.
  - b Click the Parameters tab.
  - c Change any parameter values that reference this Policy so that this Policy is no longer referenced by the Deployment.

The **Delete** button on the Policy page will be activated after you disassociate the Policy from all Deployments.

- 4 Click the **Delete** button in the lower left corner of the Policy page.

## Assigning Policies to Roles

To change permissions for a Policy, select (or clear) the check boxes to grant (or revoke) Read and Write access. For more information on changing permissions as an administrator, see [Permission Settings](#) on page 82.

- 1 Go to Automation > Policies.
- 2 In the Policies pane, click the policy that you want to view.  
The Attributes tab displays.
- 3 Click the **Roles** tab.
- 4 Select or clear the **Read** or **Write** check boxes as appropriate.
- 5 Click **Save**.

## Deployments

Deployments associate a Workflow with a target environment in which the Workflow runs. Servers, instances, and databases can be managed in groups of hundreds per Deployment. Using custom fields and Policies, you can customize a Workflow's behavior for groups of targets in the Deployment. For example, you can create a CIS Compliance Workflow that validates whether or not servers are configured securely. Then you can create a Development Deployment to manage your development servers and a Production Deployment to manage the production servers.

A Deployment appropriately customizes a Workflow's behavior for each set of Servers on which it runs. When you assign a Workflow to a Deployment, the pool of available targets for the Deployment are determined by that Workflow's target level and type.

## Searching for Deployments

There are two views for the Deployments screen. You can search for Deployment by Workflow or by Target (drop-down list in the upper- right corner of the screen). You can also filter by name.

## Viewing Deployments

From the Automation > Deployments screen, you can view all existing Workflows. In the Deployments pane, you can view each Workflow's associated Deployments.

- 1 Go to Automation > Deployments.
- 2 In the Workflows pane, hover the mouse over the name of a Workflow.  
All Deployments associated with that Workflow are then listed in the Deployments pane.
- 3 In the Deployments pane, click the Deployment that you want to see.

## Creating a New Deployment

- 1 Go to Automation > Deployments.
- 2 Click **New Deployment**.
- 3 Specify the Deployment properties:
  - Name: Type a unique Deployment name.
  - Workflow: Associate the Deployment with a Workflow.  
Read-only Workflows cannot be used in Deployments and will not be available in the drop-down list. You must first make a copy of a read-only Workflow before you can use it in a Deployment.
  - Schedule: Select default schedule or create a custom schedule (see [Scheduling a Deployment](#) on page 47).
  - Targets: Add or remove targets individually or as a group.
  - Roles: (*Optional*) Specify any users or user groups that you want to be able to Read, Write, or Execute this Deployment.
- 4 Click **Save**.



---

You can run the Workflow from the current Deployment by clicking on the “Would you like to run the Workflow now?” link.

---

## Editing Deployment Attributes

- 1 Go to Automation > Deployments.
- 2 Select a Workflow, and then click the associated Deployment that you want to view.

- 3 Edit the Deployment properties.
- 4 Click **Save**.



---

You can run the Workflow from the current Deployment by clicking on the “Would you like to run the Workflow now?” link.

---

## Viewing Parameters Associated with a Deployment

You can view parameters in multiple areas:

- Automation > Steps: Select a Step, and click the Parameters tab.
- Automation > Workflows: Select a Workflow, go to the Workflow tab, and expand one of the Steps in the table by clicking the arrow to the left of the Step’s name.

You can see the parameters for each Step within the Workflow. “User selected” is the default. If you map to an output parameter or to built-in metadata at the Workflow level, the parameter is not available for editing at the Deployment or Run level.

- Automation > Deployments: Select a Deployment, and click the Parameters tab.
- Automation > Run: Select a Workflow and then a Deployment.

The parameters are read-only unless “Enter at runtime” is selected in the Deployment.

- Solutions > Installed: Select a Solution, go to the Steps tab, select a Step, and then go to the Parameters tab for that Step

## Editing Parameters Associated with a Deployment

- 1 Go to Automation > Deployments.
- 2 Select a Workflow, and then click the associated Deployment that you want to view.
- 3 Click the **Parameters** tab.
- 4 Perform one of the following actions for each parameter that you want to edit:
  - Free-form text entry: Type or paste text.
  - Select a value: Type a “.” in the field to view a list of all built-in metadata, custom metadata, and Policies available.
  - **Enter at runtime**: Select this check box if you want to enter a parameter when you run the Workflow.

If any Deployment parameters are set to be runtime, you cannot give the Deployment a schedule.
  - Click **Restore Defaults** to restore the values that you specified at the Step level.

If you modify a parameter value at the Step level after that Step was associated with a Deployment, you must click **Restore Defaults** in order to modify the parameter value at the Deployment level.
- 5 Click **Save**.



---

You can run the Workflow from the current Deployment by clicking on the “Would you like to run the Workflow now?” link.

---

## Deleting a Deployment



If you delete a Workflow that has associated Deployments, the associated Deployments will be deleted automatically with the Workflow.

- 1 Go to Automation > Deployments.
- 2 Select a Workflow, and then click the associated Deployment you want to Delete.
- 3 Click **Delete** and then confirm the delete.

## Assigning Deployments to Roles

To change permissions for a Deployment, select (or clear) the check boxes to grant (or revoke) Read, Write, or Execute access. For more information about changing permissions as an administrator, see [Permission Settings](#) on page 82.

- 1 Go to Automation > Deployments.
- 2 Select a Workflow, and then click the associated Deployment that you want to work with.
- 3 Click the **Roles** tab.
- 4 Select or clear the **Read**, **Write**, or **Execute** check boxes as appropriate.
- 5 Click **Save**.

## Scheduling a Deployment

HP DMA enables you to schedule a Deployment. This is useful, for example, if you want the Discovery Workflow to run periodically in your environment (see [Discovery](#) on page 58).

You can use one of the following pre-defined schedules, or you can specify a custom schedule.

**Table 5 Pre-Defined Deployment Schedules**

| Schedule    | When the Workflow Runs   |
|-------------|--|
| None        | When you click <b>Run</b> .  |
| Every hour  | Every hour at the top of the hour (for example: 06:00, 07:00, 08:00, and so on). |
| Twice a day | Every day at 11:15 and 23:15 UTC.  |
| Once a day  | Every day at 2:45 UTC.   |

Custom schedules are specified using standard `cron` expressions. For example, the following custom schedule would run the Workflow at 11:45 PM Coordinated Universal Time (UTC—also known as Greenwich Mean Time, or GMT) every Saturday:

**Custom Schedule**

Minutes (0-59): 45

Hours (0-23): 23

Days of month (1-31): \*

Months (1-12): \*

Weekdays (sun-sat or 0-6): 6

Set schedule

The following instructions show you how to schedule an existing Deployment. You can also schedule a Deployment as you create it.

To schedule a Deployment:

- 1 Go to Automation > Deployments.
- 2 In the Workflows column, select the Workflow associated with the Deployment that you want to schedule.
- 3 In the Deployments column, select the Deployment that you want to schedule.
- 4 From the **Schedule** drop-down menu, do one of the following things:
  - Select one of the pre-defined schedules described in [Table 5](#).
  - Select **Custom**, and specify the schedule using a cron expression.
- 5 Click **Save**.

## Deployment Considerations

Deployments with “Enter at runtime” parameter values cannot be scheduled.

If a Smart Group is associated with a scheduled Deployment, that Smart Group will be evaluated each time that this Deployment runs (see [Smart Groups](#) on page 58).

If the schedule is removed from an existing Deployment, any Workflows that are running as part of a previously scheduled Deployment will finish, but no new ones will start until a new schedule is set.

## User Considerations

A scheduled Deployment is run by the user who most recently saved that Deployment. This user name is displayed on the Automation > Console and Automation > History screens.

## Permissions Considerations

You must have permission to Read, Write, and Execute a Deployment in order to schedule it.

In a scheduled Deployment, the Workflow is run by the user who most recently modified the Deployment. If that user’s Run permission is revoked after the Deployment is scheduled, the Deployment will not run—although it will continue to be scheduled, and a log message will be generated at each scheduled run time.



## Timing and Concurrency Considerations

All schedules use the Coordinated Universal Time (UTC) time zone.

When a Workflow runs as part of a scheduled Deployment, a separate “job” is created for each target server, instance, and database—and a separate line appears on the Console and History screens. These separate jobs run concurrently. This is the same behavior that occurs if the Deployment is run manually.

If the Workflow takes longer to run on a given target (server, instance, or database) than the interval between Deployments, scheduled Deployments for that target will be skipped. If the scheduled Deployment runs the Workflow on multiple targets, HP DMA will skip only those targets where the Workflow is still running.

If a scheduled Deployment for a target is skipped, a job is created for that target but the Workflow does not actually run. The job will show that the Deployment for that target was skipped because another Workflow was still running.

There is no limit on the number of scheduled Deployments. Too many Deployments executing simultaneously, however, can cause performance problems.

## Special Considerations for Multiple SA Core Implementations

In a multiple slice environment:

- Only one slice will run the scheduled Deployment.
- Which slice will run the Deployment is not known to HP DMA.

In a multi-master environment:

- Only the master/slave where the Deployment was saved will run the Deployment.

In other words, the schedule information will be sent to all master/slaves, but only the master/slave where the Deployment was saved will run the Deployment. If this master/slave fails, no other master/slave will run the Deployment

- If the Deployment is changed, only the master/slave where the change was saved will run the Deployment. This may not be the same master/slave as the original.

For example, if the Deployment were originally scheduled on master/slave A, it will run on A. However, if a user on master/slave B then changes the Deployment, the Deployment will now run on one of the slices in B and no longer on any of the slices in A.

## Run

To “run” a Workflow, you specify a Deployment and one or more targets. If the Deployment contains runtime-specified parameters, they can be entered, otherwise the previously configured parameter values will be displayed.

There are several ways that you can run a Workflow:

- From within a Workflow or a Deployment: After you create, edit, and then save a Workflow or a Deployment, click the “Would you like to run the Workflow now?” link.
- From the Automation > Run screen.

To run a Workflow from the Run screen:

- 1 Go to Automation > Run.
- 2 Select a Workflow, a Deployment, and the target (or targets) on which you want to run the Workflow.
- 3 Provide values for any “Enter at runtime” parameters.  
All other parameter values will be displayed for you to review before executing the Workflow. It is not possible to change non-runtime parameter values at this time.  
Any Workflow with “Enter at runtime” parameters cannot be scheduled (see [Scheduling a Deployment](#) on page 47). Workflows with “Enter at runtime” parameters must be executed manually using Automation > Run.
- 4 Click **Run Workflow**.
- 5 Go to the Console or History screen to view information about the Workflow’s progress.

## Console

The Console provides a real-time view of what automation is currently running on servers in your environment. In the output area, you can see “started” and “completed” as each Step completes. Output and error messages from the running Steps can be used to debug problems in the automation code.

While the Workflow is running, its status indicator on the Console says RUNNING. After the Workflow finishes, its status indicator changes to one of the final states listed here:

**Table 6 Workflow Status Indicators**

| Status    | Description  |
|-----------|--|
| RUNNING   | The Workflow is currently executing.   |
| SUCCESS   | The Workflow completed execution, and it completed with conditions that the Workflow author considered to be successful. The “Success” step was the last step executed.  |
| FAILURE   | The Workflow completed execution, but the conditions in which it completed constitute a failure according to the Workflow author. The “Failure” step was the last step executed.   |
| FINISHED  | The Workflow ran to completion, but neither success nor failure was indicated. In this case, the last step executed was neither “Success” nor “Failure.”   |
| CANCELLED | The Workflow was interrupted when someone clicked the “Cancel Workflow” button. The Workflow was either in the middle of or had just completed the last step listed in the Output area.  |
| SKIPPED   | This status pertains only to scheduled Deployments. It indicates that the Workflow was scheduled to run, but the execution was skipped. This would happen, for example, or if a previous execution of this Workflow were still running on this target. |

After some time, completed Workflows are removed from the Console view—unless it has been selected to view details. All completed Workflows can be found in the History view.

To view the progress of a Workflow in the Console:

- 1 Go to Automation > Console.
- 2 Search for the desired Workflow using the Filter box.
- 3 Click the Workflow that you want to see. The Steps appear in the left pane as they are executed.
- 4 Click a Step in the Output area to view the progress of and output from that Step in the right pane.

## History

The History screen provides an audit trail of who ran automation on which servers in your environment. It also provides a useful debugging tool for troubleshooting Steps and Workflows. Output and error messages are captured from all Steps in Workflows that are running or have finished running. History information for a Step is added after that Step is complete.

**Figure 9 Workflow History**

| Workflow  | Started         | Run by   | Server               | Instance | Database | Status  |
|---|-----------------|----------|----------------------|----------|----------|---------|
| Remote File Copy<br>RemoteFileCopy_RemoteFileCopyLinux_Linux_Common_0_Latest      | 16 May<br>16:53 | autotest | test02.mycompany.com |          |          | SUCCESS |
| Delete Directory<br>DeleteDirectory_DeleteDirectoryLinuxNeg_Linux_Common_0_Latest | 16 May<br>16:48 | autotest | test01.mycompany.com |          |          | FAILURE |
| Delete Directory<br>DeleteDirectory_DeleteDirectoryLinux_Linux_Common_0_Latest    | 16 May<br>16:43 | autotest | test02.mycompany.com |          |          | SUCCESS |
| Unzip File<br>UnzipFile_UnzipFileLinuxNeg_Linux_Common_0_Latest                   | 16 May<br>16:38 | autotest | test01.mycompany.com |          |          | FAILURE |
| Unzip File<br>UnzipFile_UnzipFileLinux_Linux_Common_0_Latest                      | 16 May<br>16:33 | autotest | test02.mycompany.com |          |          | SUCCESS |

**Output** | Errors | Header

Remote File Copy  
22:53:11 - 22:54:20 Exit: 0  
Copying a file from /tmp/myfile.txt to test02.mycompany.com:/var/tmp  
Copied from /tmp/myfile.txt to test02.mycompany.com:/var/tmp.

Success  
22:54:20 - 22:54:20 Exit: 0  
The workflow succeeded.

To view the Workflow execution history:

- 1 Go to Automation > History.
- 2 Search for the desired Workflow using the Filter box.
- 3 Click a Workflow to view the history on the Output, Errors, or Header tabs.



---

Click any Step name within the these tabs to view specific Step details.

---

## Output Tab

The Output tab tells you which Step you are at within a running Workflow. If the Output tab states: “No Steps have finished running” this means that the Workflow has started but no Steps have completed.

## Errors Tab

The Errors tab displays any errors that occur during a Workflow execution.

## Header Tab

The Header tab is only applicable for Script Steps, where it displays data using the Function.

# 3 Environment

This chapter contains the following topics:

- [Dashboard](#) on page 53
- [Smart Groups](#) on page 58
- [Discovery](#) on page 58
- [Custom Fields](#) on page 64
- [Roles](#) on page 66
- [DMA Agent Support Policy](#) on page 66

## Dashboard

The Environment > Dashboard presents a list of the objects that HP DMA can currently use in automation. Environments contain the following hierarchy of objects:

- [Organizations](#) on page 53
- [Servers](#) on page 54
- [Instances](#) on page 55
- [Databases](#) on page 57

The operations available for each object are explained in this section.

## Organizations

An Organization is a logical grouping of servers. You can use Organizations to separate dev/stage/prod resources or to separate logical business units.

Because user security for running Workflows is defined at the Organization level, Organizations should be broken into units with user security in mind. You can specify which Organizations a user can run Workflows against. See [Roles and Permissions](#) on page 75 for more information.

### Navigating through the Organization Browser

The Environment screen contains two parts: the Organization browser is on the top, and the object editor is on the bottom.

To open the object editor, select an object in the Organization browser. There you will be able to view specific properties for that object. If you have the necessary permissions, you will also be able to modify values and add additional objects to the object hierarchy.

## Creating an Organization

The Default Organization is built in to the software. All other Organizations must be explicitly created.

To create an Organization:

- 1 Go to Environment > Dashboard.
- 2 Click **New Organization**.  
The Properties tab displays.
- 3 Specify a unique Name for the Organization.
- 4 Add the Servers, Instances, and Databases that you want the Organization to include.

## Deleting an Organization

Before you can delete an Organization, you must delete any Server objects that it contains. An Organization must be empty before it can be deleted.

To delete an Organization:

- 1 Go to Environment > Dashboard.
- 2 In the Organization browser, select the Organization that you want to delete.
- 3 Click **Delete**, and confirm.

## Servers

The next object in the Environment hierarchy is the Server.

Servers cannot be used as HP DMA targets until you add them to an Organization.

All SA managed servers that have the DMA Agent Support software policy are available to add (see [DMA Agent Support Policy](#) on page 66). The easiest way to ensure that Servers have this policy is to use the Application Deployment feature in SA to attach and remediate it (see “Using HP DMA with Application Deployment” in the *SA User Guide: Application Deployment Manager*).

As previously mentioned, all SA managed servers that have the DMA Agent Support software policy are available to add (see [DMA Agent Support Policy](#) on page 66).



---

The [Viewing Server Information](#) topic contains explicit instructions for navigating to the Server in the Organization browser. The subsequent topics assume that the Server is visible.

---

## Viewing Server Information

- 1 Go to Environment > Dashboard.
- 2 In the Organization browser, select the Organization to which the Server belongs.  
The list of Servers that belong to that Organization appears in the Organization browser.
- 3 Select the Server that you want to view.

This opens the Server editor. The editor contains several tabs that separate the Server properties into logical groupings.’

## Adding a Server to an Organization

- 1 In the Organization browser, select the Organization to which the Server will belong.
- 2 Click the **Add servers** button.

The “Add servers to organizations” dialog opens. It contains a list of the SA managed servers that have the DMA Agent Support Policy (see [DMA Agent Support Policy](#) on page 66) and are not already included in an Organization.

You can use the Search filter to reduce the number of servers listed. The first 500 SA managed servers whose names contain the string specified in the Search box are listed. To filter the list of servers, specify text in this box, and then click **Search**.

- 3 Select the Server (or Servers) that you want to add.
- 4 Click the **Add** button. The “Add servers to organizations” dialog closes.
- 5 Click **Save**.

## Deleting a Server

Deleting a Server deletes all Instance and Database objects associated with that Server. It also deletes any Deployments that reference this Server.

To delete a Server object:

- 1 In the Organization browser, select the Organization to which the Server belongs.
- 2 Select the Server name. The Server editor opens.
- 3 Click **Delete**, and confirm.

## Instances

The next object in the Environment hierarchy is the Instance. A Server is allowed to host multiple Instances, but this is rarely done. An Instance can be associated with multiple Servers, as is the case with Oracle Real Application Clusters (RAC).



---

The [Viewing Instance Information](#) topic contains explicit instructions for navigating to the Instance in the Organization browser. The subsequent topics assume that the Instance is visible.

---

## Viewing Instance Information

- 1 Go to Environment > Dashboard.
- 2 In the Organization browser, select the Organization to which the Server belongs.  
The list of Servers that belong to that Organization appears in the Organization browser.
- 3 Select the Server that hosts this Instance.  
The list of Instances hosted by this Server appears in the Organization browser.
- 4 Select the Instance that you want to view.

This opens the Instance editor. The editor contains several tabs that separate the Instance properties into logical groupings.

## Creating a New Instance

You can add new Instances from the Server editor. Instances are not available as targets until you create them manually or discover them automatically (see [Discovery](#) on page 58).

To create a new Instance object:

- 1 In the Organization browser, select the pertinent Server name. The Server editor opens.
- 2 Click **New instance**. The
- 3 Edit the Instance properties.
  - General
    - Name: This is a required property.
    - Type: Type of database instance (for example: Oracle, DB2, or SQL Server).
    - ASM: Only for Oracle instances. Select ASM (Automatic Storage Manager) if the Instance maintains its own file system.
  - Connection
    - User
    - Password
    - Host
    - Port
    - Domain (for Windows authentication)
  - Servers
  - Databases
- 4 Click **Save**.

## Associating a Server with an Instance

If more than one Server is associated with an Instance—such as in an Oracle RAC configuration—you can add that Server by using the Instance editor.

The Server must already be present in the Organization. The **ADD SERVER** link simply associates the Server with this Instance. You cannot add a new Server to the Organization by using this button.

To associate an additional Server with an Instance:

- 1 In the Organization browser, select the Instance name. The Instance editor opens.
- 2 In the Servers box, click the **ADD SERVER** link. The Add Servers dialog opens.
- 3 Select the Server (or Servers) that you want to add.
- 4 Click **Add**. The Add Servers dialog closes.
- 5 Click **Save**.



## Deleting an Instance

Deleting an Instance also deletes any Database objects associated with that Instance. It also deletes any Deployments that reference this Instance.

To delete an Instance object:

- 1 In the Organization browser, select the Instance name. The Instance editor opens.
- 2 Click **Delete**, and confirm.

## Databases

The final object in the Environment hierarchy is the Database. A database is typically associated with a single Instance. Depending on its type, however, an Instance may be associated with multiple Databases.



---

The [Viewing Database Information](#) topic contains explicit instructions for navigating to the Database in the Organization browser. The subsequent topics assume that the Database is visible.

---

## Viewing Database Information

- 1 Go to Environment > Dashboard.
- 2 In the Organization browser, select the Organization to which the pertinent Server belongs.  
The list of Servers that belong to that Organization appears in the Organization browser.
- 3 Select the Server that hosts this Instance.  
The list of Instances hosted by this Server appears in the Organization browser.
- 4 Select the Instance with which this Database is associated.  
The list of Databases associated with this Instance appears in the Organization browser.
- 5 Select the Database that you want to view.  
This opens the Database editor. The editor contains several tabs that separate the Database properties into logical groupings.

## Creating a New Database

Databases are not available as targets until you create them manually or discover them automatically (see [Discovery](#) on page 58).

To create a new Database object:

- 1 In the Organization browser, select the Instance that you want to work with.
- 2 To create a new Database object for this Instance, click **New database**.
- 3 In the Database Editor, specify the Name of the new Database.
- 4 Click **Save**.

## Associate an Existing Database Object with an Instance

- 1 In the Organization browser, select the Instance that you want to work with. The Instance editor opens.
- 2 Click the **ADD DATABASE** link. The “Add Database” dialog opens.
- 3 Select the Database (or Databases) that you want to add.
- 4 Click **Add**. The “Add Databases” dialog closes.
- 5 Click **Save**.

## Deleting a Database

Deleting a Database object also deletes any Deployments that reference that Database.

To delete a Database object:

- 1 In the Organization browser, select the Database that you want to delete.
- 2 Click **Delete**, and confirm.

## Smart Groups

Smart groups are dynamic groups of Servers, Instances, or Databases defined by some criteria. As information about the object changes, its membership in the groups is re-evaluated. For example, if a server has a custom field called `sshd_running` set to true, it may belong to an SSH Group of servers. When `sshd_running` for this server turns false, it is no longer in the SSH Group.

Grouping Servers by dynamic criteria is useful for automation. A Deployment can contain a list of static Servers that the Workflow can run on as well as a list of smart groups. Deploying a Workflow to the SSH Group allows the flow to run only on Servers with ssh enabled. You do not need to update the Deployment each time `sshd` is started and stopped. The smart group takes care of that for you.

Each smart group is assigned to a role for Roles Based Access Control. A user can only create smart groups for roles they are assigned to. The role acts as the master Server list that the smart group will filter on. The role must give the user both Read and Deploy permission on an Organization for that Organization’s Servers to be used in the smart group.

## Discovery

HP DMA provides a special Discovery Workflow that you can use to automatically discover SQL Server and Oracle instances and databases residing on your SA managed servers. You can run the Discovery Workflow manually, or you can set up a scheduled Deployment to run it periodically.

## Authentication Settings

There are four authentication settings that you must specify before you can successfully run the Discovery Workflow:

**Table 7** Discovery Authentication Settings

| Name                   | Required | Default       | Description   |
|------------------------|----------|---------------|---|
| Trust SSL Certificates | No       | False         | If “False” and the HP DMA server is not configured with an SSL certificate signed by a Certificate Authority (CA)—or a certificate that was manually added to a keystore—the Discovery Workflow will fail.<br><br>If “True,” this step will trust any SSL certificate used to connect to the HP DMA server. This should only be used in a test environment. |
| Web Service User       | Yes      | User selected | The SA user who will run the Discovery Workflow. This user must be capable of modifying the managed environment through the Discovery web service API.  |
| Web Service Password   | Yes      | User selected | The password for the SA user who will run the Discovery Workflow.   |
| Web Service URL        | Yes      | User selected | URL for the Discovery web service API. For example:<br><br><code>https://SA001.mycompany.com:4433/dma</code>  |

You can specify these settings two different ways:

- Define an HP DMA Policy that specifies these settings, and then reference that policy in your Deployment. This is the recommended approach.
- Specify explicit parameter values in your Deployment. This method is not recommended for production environments.



If you explicitly specify your user name and password in the Deployment, the password is not obfuscated—it will be displayed in clear text in the HP DMA UI. If you do not want your password to be visible, [Use a Policy to Specify the Authentication Settings](#) instead.

Instructions for specifying the authentication settings are provided in the four [Discovery Process](#) steps.

## Discovery Workflow Updates

The Discovery Workflow is provided with your SA software in the form of the HP Server Automation Discovery Solution Pack. Your SA support agreement enables you to download updates to this Solution Pack free of charge. Be sure to check with HP periodically to ensure that you have the latest version.



---

The following instructions apply only to an update. Do not attempt to import the same version of the Discovery solution pack that you already have. This will cause an error.

---

To update the Discovery Solution Pack:

- 1 Download the ZIP file containing the HP Server Automation Discovery Solution Pack. If the solution pack is packaged in an ISO, first extract the ZIP file from the ISO.
- 2 Open the HP DMA UI (see [Accessing HP DMA](#) on page 13).
- 3 On the Solutions > Installed tab, click the **Browse** button in the lower right corner. The Choose File dialog opens.
- 4 Browse to and select the ZIP file that you downloaded, and click **Open**.
- 5 Click **Import solution pack**.

For more information about importing solution packs, see [Solutions](#) on page 69.

## Discovery Process

There are four steps required to run the Discovery Workflow:

- [Create a Deployable Workflow](#) on page 60
- [Create a Discovery Deployment](#) on page 62
- [Run the Workflow](#) on page 63
- [View the Results](#) on page 63

Basic instructions for each step are provided here. For more detailed information, see [Workflows](#) on page 18.

### Create a Deployable Workflow

The Workflow template provided by HP in your solution pack cannot be deployed. To use it, you must first create your own copy.

To create a deployable copy of the Workflow template:

- 1 Go to the Automation > Workflows area.
- 2 From the list of Workflows, select the Discovery Workflow template.
- 3 Click the **Copy** button in the lower left corner.
- 4 On the Documentation tab, specify the following:
  - Name – Name that will appear in the list of available Workflows.
  - Tags – Keywords that you can use later to search for this Workflow (optional).
  - Target level – Must be Server.
- 5 On the Roles tab, grant Read permission to the groups whom you want to be able to view this Workflow. Also grant Write permission to the groups who will be able to modify your copy of the Workflow.

Only those groups who have Access Database & Middleware Automation permission will be displayed on the Roles tab. By default, full permissions are granted to all groups to which you—the creator of this copy of the Workflow—belong.

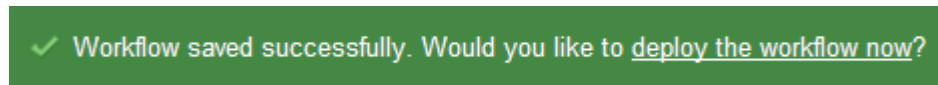
- 6 Make sure that **User Selected** is specified for each parameter (this is the default):

| Step | Name                               | Required Result   | Next |
|------|------------------------------------|-------------------|------|
| ▼ 1  | <a href="#">Discover Databases</a> |                   | 2, 3 |
|      | Trust SSL Certificates:            | - User selected - | ▼ ⓘ  |
|      | Web Service Password:              | - User selected - | ▼ ⓘ  |
|      | Web Service URL:                   | - User selected - | ▼ ⓘ  |
|      | Web Service User:                  | - User selected - | ▼ ⓘ  |

You will specify the authentication settings when you create the Deployment.

- 7 Click the **Save** button (located in the lower right corner).

Your new Workflow now appears in the list of available Workflows, and the following message is displayed:



- 8 Click the **deploy the Workflow now** link in the green message area.

For more information about creating and working with Workflows, see [Workflows](#) on page 18.

## Use a Policy to Specify the Authentication Settings

Instead of explicitly specifying the Discovery authentication settings in the Deployment, you can use a policy to supply this information. This approach has the following advantages:

- The Web Services Password is obfuscated (never displayed in clear text).
- The policy can be used in any Deployment.

To create a policy to provide authentication settings:

- 1 Go to the Automation > Policies page.
- 2 From the list of policies, select the Discovery policy.
- 3 In the Web Service Password box, type your SA password. The characters are obfuscated.
- 4 In the Web Service URL box, type the following:  

```
https://<SASlice>/dma
```

 where <SASlice> is the fully qualified host name or IP address of your SA Slice Server.
- 5 In the Web Service User box, type your SA user name.
- 6 Go to the Roles tab.
- 7 Grant Read and Write permission to any additional users and groups who will be using this policy.  
 By default, any groups that you belong to will have Read and Write permission.
- 8 Click the **Save** button (lower right corner).



When you create your Discovery Deployment, be sure to use this policy to specify values for each of the authentication parameters. See [Create a Discovery Deployment](#).

## Create a Discovery Deployment

Before you can run your new Workflow, you must create a Deployment. A Deployment associates a Workflow with one or more specific HP DMA targets (in this case, Servers).

To create a Discovery Deployment:

- 1 If you do not see the green message bar—for example, if you navigated to another page after you created your copy of the Workflow template—follow these steps:
  - a Go to the Automation > Deployments area.
  - b In the lower right corner, click **New Deployment**.
- 2 Specify the following:
  - Name – Name that will appear in the list of available Deployments.
  - Workflow – The Workflow that you just created.
  - Schedule – Frequency with which the Workflow will run. If you select None, the Workflow will run only once when you explicitly tell it to run. See [Scheduling a Deployment](#) on page 47 for more information.
- 3 From the list of AVAILABLE smart groups on the left side of the Targets area, add the smart groups where the Workflow will run. Any smart groups that you add appear in the SELECTED list on the right side.

For information about composing smart groups, see [Smart Groups](#) on page 58.

You can also add Organizations or Servers instead of smart groups. If you add individual Servers, however, you will then have to update this Deployment whenever new Servers are added to the environment. If you use a properly configured smart group, new Servers will be automatically added to your scheduled Deployments when they are added to HP DMA.

- 4 Go to the Parameters tab.
- 5 Specify the authentication parameters.

If you defined an authentication policy (see [Use a Policy to Specify the Authentication Settings](#) on page 61), specify the values from that policy:

Web Service Password:   
Required: Password for the discovery web service API.

Web Service URL:   
Required: URL for the discovery web service API.

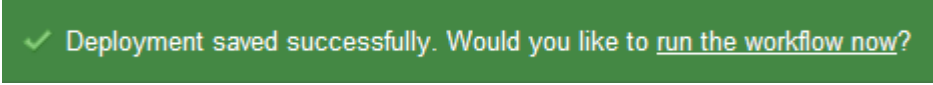
Web Service User:   
Required: User capable of modifying the managed environment through the discovery web service API.

Type the first few characters of the name of the policy (in this case, Discovery) in each text box, and a list of choices appears. You can also type a dot “.” to get a list of all available Policy items. Select the appropriate item for each parameter.

If you did not define an authentication policy, you can type in explicit values here. The Web Service Password will not, however, be obfuscated if you do this—it will be clear text.

6 Click **Save**.

Your new Deployment now appears in the list of available Workflows, and the following message is displayed:



✓ Deployment saved successfully. Would you like to [run the workflow now?](#)

7 Click the **run the Workflow now** link in the green message area.

## Run the Workflow

Now you are ready to run the Discovery Workflow against the targets that you selected.

To run the Discovery Workflow:

- 1 If you do not see the green message bar—for example, if you navigated to another page after you created your Deployment—follow these steps:
  - a Go to the Automation > Run area.
  - b In the list of WORKFLOWS on the left side, select the Workflow that you created.
  - c In the list of DEPLOYMENTS in the center, select the Deployment that you just created.
- 2 In the list of targets on the left side, select the check box for each target where you want to run the Workflow.
- 3 Click the **Run Workflow** button in the lower right corner.

The following message is displayed.



✓ Workflow started successfully. For status, see the [console](#) or [history](#).

To view the progress of your Deployment, click the **console** link in the green message area.

## View the Results

While your Workflow is running, you can watch its progress on the Console page.

To view the progress of the Workflow as the Deployment proceeds, click the Workflow name in the upper box on the Console page.

To view the outcome of a specific step, select that step in the left box in the Output area. Informational messages are displayed in the right box, and the values of any output parameters are listed.

While the Workflow is running, its status indicator on the Console says RUNNING. After the Workflow finishes, its status indicator changes to one of the final states listed in [Table 6](#) on page 50.

To view step-by-step results, select the row in the table that corresponds to your Deployment. The tabs below the table show you information about each step in the Workflow. This includes the start and end time for each step, the exit code, and the following information:

- Output tab – any informational messages that were produced
- Errors tab – any errors that were reported
- Header tab – values assigned to any output parameters

After the Workflow runs, you can view a summary on the History page (see [History](#) on page 51). This page lists all the Workflows that have run on this server during the time period specified in the Filter box.

## Confirm the Discovery

You can view the results of the Discovery Workflow on the Environment screen.

To view the instances and databases detected on a specific server:

- 1 In the Organization browser, select the Organization to which the Server belongs.
- 2 Select the Server. Any Instances detected are listed in the next column.
- 3 Select an Instance. Any Databases detected are listed in the right-most column.

## Custom Fields

Custom fields are primarily used to customize Workflows or show information about the environment. Custom fields can be used in Workflow Steps to automatically apply values that are specific to an Organization, Server, Instance, Database. As an example, you can have a custom field that identifies a Database as “Production” or “Test” and then use this field in Workflows to choose between different behavior for the different types of Database.



---

When you define a custom field for any item in the environment (Organization, Server, Instance, or Database), all other items of that type will also have that custom field. For example, if you create a custom field called Oracle Home for an Instance target, all Instance targets will have a custom field called Oracle Home—whether or not they actually represent Oracle instances. Except for the original item, the custom field will be blank (it will not have a value). Blank custom fields have no effect.

---

## Viewing Custom Fields

From the Environment > Custom Fields screen, you can view all existing custom fields associated with an Organization, a Server, an Instance, or a Database. You can also see and define the Custom Fields, if any, that are associated with a specific object. See [Assigning Values to Custom Fields](#) on page 65.



The Usage area shows you which Workflows or Deployments use a particular custom field.

## Searching for Custom Fields



You can perform a real-time filter on any custom field. Type what you are searching for in the **Custom Fields** box, and see the filter results display as you type.



## Creating Custom Fields

- 1 Go to Environment > Custom Fields.
- 2 Click **New field**.
- 3 Specify the following information on the Attributes tab:
  - Name: A unique name for this custom field.
  - Object: Organization, Server, Instance, or Database.
  - Type: Text, Multi-line text, or List
  - Options: Only available if the custom field is of type List.
    - Use the “Add option”  button to add options.
    - Use the “Delete option”  button to delete options.
- 4 To define the custom field you just created, see [Assigning Values to Custom Fields](#) on page 65.
- 5 Click **Save**.

## Editing Custom Fields

- 1 Go to Environment > Custom Fields.
- 2 Click the custom field you want to edit.
- 3 Modify the following information on the Attributes tab:
  - Name
  - Object: Cannot be changed for existing custom fields as changing this state could result in broken automation.
  - Type: Cannot be changed for existing custom fields as changing this state could result in broken automation.
  - Options: Only available if the custom field is of type List.
    - Use the “Add option”  button to add options.
    - Use the “Delete option”  button to delete options.

Options can be reordered with drag-and-drop.
- 4 Click **Save**.

## Assigning Values to Custom Fields

- 1 Go to Environment > Dashboard.
- 2 Select the object (Organization, Server, Instance, or Database) for which you want to view the Custom Fields.
- 3 Click the Custom Fields tab to assign values to the custom fields that you created in [Creating Custom Fields](#) on page 65.
- 4 Specify the values in the custom field boxes.
- 5 Click **Save**.

## Removing Custom Fields

You cannot delete a Custom Field that is in use. You must first remove any references to a Custom Field before you can delete it.

To delete a Custom Field:

- 1 Go to Environment > Custom Fields.
- 2 Select the custom field that you want to delete.
- 3 Click **Delete**, and confirm.

## Roles

Roles based access can be assigned to Organizations by the owner of the Organization.

- If you have Read permission for an Organization, you can see the Servers, Instances, and Databases in that Organization.
- If you have Execute permission for an Organization, you can run Workflows in that Organization.
- If you have Write permission for an Organization, you can modify the properties of the Organization and the Servers, Instances, and Databases that it contains.

From the Roles tab, you can view the permissions for a specific Organization. If you have permission to Manage Database & Middleware Automation, you can assign access permissions to specific users or user groups for any Organization except Default. See [Permission Settings](#) on page 82 for more information.

To view the role-based permissions granted for an Organization:

- 1 Go to Environment > Dashboard.
- 2 Select the Organization whose role-based access permissions you want to see.
- 3 Click the **Roles** tab.

## DMA Agent Support Policy



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The policy discussed in this section is an HP Server Automation (SA) software policy, not an HP DMA automation Policy.

---

Before you can run an HP DMA Workflow on an SA managed server, that server must have a special SA software policy called DMA Agent Support. This policy installs the files and software needed for HP DMA Workflow execution. It is provided with your SA software, and it is located in the following Library folder:

```
/Opware/Tools/Database & Middleware Automation
```

## Supported Platforms

The DMA Agent Support policy runs on the platforms listed in [Appendix B, Supported HP DMA Platforms](#), on page 268.

## Policy Updates

If the DMA Agent Support policy is updated, be sure to remediate your target Servers against that policy by using the SA client. This will ensure that all Servers have the latest policy updates.

For more information, see “Remediating Servers with Software Policies” in the *SA User Guide: Software Management*.

## Servers and Organizations

Only those SA managed servers that have the DMA Agent Support policy (attached and remediated) are available to add to Organizations.

If you detach the DMA Agent Support policy and then attempt to run a Workflow from HP DMA, the Workflow will fail. HP DMA does not re-attach the policy.



## 4 Solutions

This chapter contains the following topics:

- [Understanding Solution Packs](#) on page 69
- [Working With Solution Packs](#) on page 71

### Understanding Solution Packs

A Solution Pack is a set of HP DMA Workflows and Steps that address a specific process or problem. Solution Packs are imported into HP DMA and can be deployed in five to ten minutes. Each Solution Pack contains the following items:

- Workflow Templates for commonly-recurring IT administration tasks
- Workflow Steps to provide an automation library
- Policies that define desired automation behavior
- Documentation that defines best practices followed in the Workflow Templates

For information about available Solution Packs, contact your HP Software sales representative.

#### Installed Screen

You can view all installed Solution Packs from the Solutions > Installed screen.

#### History Screen

You can view a recursive history of Solution Pack activity on the Solutions > History screen, shown in [Figure 10](#).

**Figure 10 Solutions > History Screen**

| Solution Pack                               | Operation | Version  | User          | Date         |
|---|-----------|----------|---------------|--------------|
| SQL Server Compliance Audit and Remediation | Install   | 6.1.8    | Administrator | 29 Sep, 2010 |
| SQL Server Compliance Audit and Remediation | Remove    | 6.1.8    | Administrator | 29 Sep, 2010 |
| SQL Server Compliance Audit and Remediation | Remove    | 6.1.8    | Administrator | 29 Sep, 2010 |
| SQL Server Compliance Audit and Remediation | Install   | 6.1.8    | Administrator | 29 Sep, 2010 |
| Sybase Migration                            | Install   | 6.1.22.1 | Administrator | 11 Aug, 2010 |
| Sybase Migration                            | Remove    | 6.1.21   | Administrator | 11 Aug, 2010 |
| Sybase Migration                            | Install   | 6.1.21   | Administrator | 09 Aug, 2010 |
| Sybase Migration                            | Remove    | 6.1.20   | Administrator | 09 Aug, 2010 |
| Sybase Migration                            | Install   | 6.1.20   | Administrator | 06 Aug, 2010 |
| Sybase Migration                            | Remove    | 6.1.14   | Administrator | 06 Aug, 2010 |
| Oracle Compliance Audit and Remediation     | Install   | 6.1.2    | Administrator | 02 Aug, 2010 |
| Sybase Migration                            | Install   | 6.1.14   | Administrator | 28 Jul, 2010 |

## Searching for a Solution

You can perform a real-time filter on any Solution Pack name or version. Type what you are searching for in the filter box, and see the filter results display as you type.

## Viewing a Solution

The HP DMA Solutions screen enables you to view the contents of a Solution Pack. From the Installed tab, you can view all the Solution Packs that your company already owns, as well as detailed information about each item contained and used within each Solution Pack.

- 1 In the Solutions pane, point to the Solution Pack name. As you point to the Solution Pack, the following information is displayed in the Details pane:
  - Name
  - Version
  - Targets
  - Installed
  - Description
- 2 Click the Solution that you want to view.

Click through the following tabs to view the selected Solution's components, associations, and implementation details:

- General tab: Provides Solution Pack description, active version, and associated usage notes.

- Policies tab: Displays the policies associated with the Solution. See [Policies](#) on page 42.
- Workflows tab: Displays the Workflows associated with the Solution. See [Workflows](#) on page 18.
- Steps tab: Displays the Steps associated with the Solution. See [Steps](#) on page 26.

## Working With Solution Packs

Once you purchase a Solution Pack, you can import the Solution Pack into your environment.

### Installing/Upgrading a Solution

If you need to purchase a new Solution Pack—or a more recent version of a Solution Pack that you already own becomes available—you must import the new or updated Solution Pack.

To import a Solution Pack:

- 1 Download the ZIP file containing the Solution Pack.  
If the solution pack is packaged in an ISO, first extract the ZIP file from the ISO.
- 2 Open the HP DMA UI (see [Accessing HP DMA](#) on page 13).
- 3 On the Solutions > Installed tab, click the **Browse** button in the lower right corner. The Choose File dialog opens.
- 4 Browse to and select the ZIP file that you downloaded, and click **Open**.
- 5 Click **Import solution pack**.
- 6 View the installed solution:
  - Go to Solutions > Installed tab to view the installed Solution.
  - Go to Solutions > History tab to view a recursive history of Solution Pack activity.

### Versioning and Importing Solution Packs

You may not import a Solution Pack with a lower version than your currently existing Solution Pack. To return to a previous Solution Pack, you must use the Rollback feature. See [Rolling Back a Solution](#) on page 72.

If you import two Solution Packs with shared components, the shared component is only imported once, and the higher-versioned component takes precedence over the lower-versioned component. For example, if you import Solution Pack 1 with Step version 1 and Solution Pack 2 with Step version 2, and they share the Step, the shared Step is only imported once and the higher-versioned Step takes precedence and is shared between the two Solution Packs.




---

Steps are the only components that can be shared across Solution Packs. This fact is particularly important when you are removing Solution Packs. See [Removing a Solution](#) on page 73.

---

## Modifying a Solution

You may need to modify an installed Solution Pack to fit your company's needs. Solution Packs are fully-supported by HP, but modifications to Solution Pack contents are supported by the customer who implements the modifications.

It is a best practice to make a copy of any Workflow, Step, or Policy that you wish to modify.

To make a copy of a Solution Pack item:

- 1 Go to the Solutions > Installed screen.
- 2 Select the Solution Pack that you want to work with.
- 3 Select the Workflow, Step, or Policy tab.
- 4 Select the specific Workflow, Step, or Policy that you want to modify.
- 5 Click **Copy**.
- 6 Specify a unique Name for the copy.
- 7 Modify the copy to suit your objective.
- 8 Click **Save**.

## Rolling Back a Solution

You can roll a Solution Pack back to its previous state after an import or an upgrade.

Roll back a Solution Pack import if you discover that you accidentally overwrote a necessary version of a Solution Pack or if you encounter any issues with a newly-imported Solution Pack. The most recently-installed Solution Pack is removed when you perform a rollback.

For example, if you import version 1, then you import version 2, and then you perform a rollback, all Solution Pack components are reset to version 1, regardless of any modifications you may have made to version 2.

You can only have one version of a specific Solution Pack on your system at any given time. If you want to modify an installed Solution Pack, you have to copy it and give it an original name. See [Modifying a Solution](#) on page 72.

If you roll back a Solution Pack that has only been imported once, the end result is the same as if you had deleted that Solution Pack. For example, if you initially import version 3, and then perform a rollback, HP DMA removes version 3, because there is not another previously-existing version to which you can roll back.

If an upgrade was performed on a Solution Pack after another Solution Pack was deleted, the rollback ignores the removed Solution Pack in the rollback sequence. Similarly, if the last action was to delete a Solution Pack, the rollback ignores the removed Solution Pack in the rollback sequence.



---

The rollback operation simply “undoes” the most recent Solution Pack import operation performed. It does not enable you to roll back a specify Solution Pack version.

---

To roll back a solution:

- 1 Go to Solutions > History.
- 2 Click **Rollback**.



## Removing a Solution

You may remove a previously-installed Solution Pack from the Installed Solution Pack list.

If you roll back a Solution Pack whose version is the only version installed on your system, the History list will display a “Remove” as the Operation.



---

Remember that Steps are the only components that can be shared across Solution Packs. If a Step is shared with another Solution Pack that you are removing, once you remove the Solution Pack, that shared Step remains in the system.

---

To remove a Solution Pack:

- 1 Go to Solutions > Installed.
- 2 Select the Solution Pack that you want to remove.
- 3 Click **Delete**, and confirm.



---

Deleting a Solution Pack or selecting Rollback both display as a Remove operation on the History screen.

---



# 5 Roles and Permissions

This chapter describes the permissions you need to use and administer HP DMA. It includes the following topics:

- [Permissions Overview](#) on page 75
- [Types of Permissions](#) on page 76
- [Managed Servers and Groups Permission](#) on page 76
- [Device Group Permissions](#) on page 77
- [Database and Middleware Automation Access Permissions](#) on page 78
- [Role-Based Database and Middleware Automation Permissions](#) on page 79



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See the *SA Administration Guide* for additional information about setting global permissions.

---

## Permissions Overview

HP DMA provides very finely grained role-based access control over the following things:

- Who can access HP DMA
- Who can view, modify, or deploy to a specific Organization
- Who can view or modify a specific Workflow
- Who can create a Workflow
- Who can modify a specific Step
- Who can view, modify, or execute a specific Deployment
- Who can view or modify a specific Policy
- Who can administer HP DMA, including setting permissions for all these items

Permissions are the mechanism used to establish this control. Permissions can help you precisely manage the capabilities of individual SA users and SA user groups.

# Types of Permissions

There are four types of permissions that affect what you can see and access in HP DMA:

- **Managed Servers and Groups Permission**

The Managed Servers and Groups permission determines whether you can view managed servers and device groups. You need this capability in order to add servers to Organizations. This permission is set by the SA system administrator.

- **Device Group Permissions**

These permissions determine which device groups you can access. You need access to a device group in order to add servers in that device group to HP DMA Organizations. Device Group permissions are set by the SA system administrator.

- **Database and Middleware Automation Access Permissions**

These permissions determine whether you can access HP DMA, whether you can create Workflows, and whether you have administrator privileges within the HP DMA UI.

These permissions are set by the SA system administrator.

- **Role-Based Database and Middleware Automation Permissions**

In addition to these SA permissions, there are permissions administered within HP DMA that control access to Workflows, Deployments, Steps, Policies, and Organizations.

These permissions can be set by the user who created the item or any user who has Write permission for that item. They can also be set by the HP DMA administrator.

A description of the minimum permissions needed to accomplish common HP DMA tasks is provided in this chapter. For a more comprehensive discussion of permissions, see the *SA Administration Guide*.

## Managed Servers and Groups Permission

If you need to populate Organizations with servers, you must have the ability to view and manage servers and groups.

This permission is granted by the SA system administrator using the SA Web Client. The Managed Servers and Groups setting is located on the Features tab for any user group.

**Figure 11 Where to Set Managed Servers and Groups Permission**



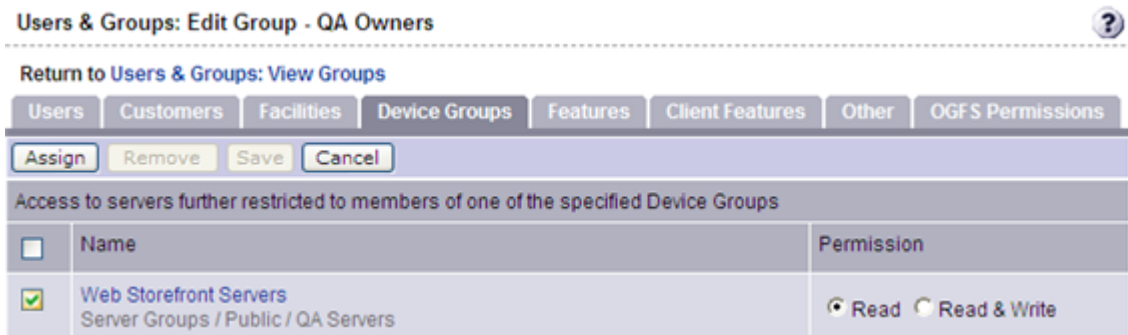
This permission can also be set from the Administration screen in the SA Client.

## Device Group Permissions

If you need to populate Organizations with Servers, you must also have Read access to the device groups that contain the SA managed Servers that you will use. A QA Owner, for example, would require Read access to the QA Servers device group.

These permissions are granted by the SA system administrator using the SA Web Client. They are located on the Device Groups tab for any user group.

**Figure 12 Where to Set Read or Write Access to Device Groups**



In this example, only servers in the QA Servers device group would be listed in the “Add servers to organization” dialog for members of the QA Owners user group.



Settings on the Facilities and Customers tabs can also affect access to device groups.

## Database and Middleware Automation Access Permissions

The following permissions determine whether you can access HP DMA and what you can do within the HP DMA UI. These permissions are granted by the SA system administrator using the SA Web Client.

- **Access Database and Middleware Automation** – This permission enables you to launch HP DMA and browse HP DMA Workflows from the Application Deployment UI (see “Using HP DMA with Application Deployment” in the *SA User Guide: Application Deployment Manager*).

With this permission you can:

- View Organizations for which you have Read access.
- Edit Organizations and associated objects for which you have Write access.
- Run Workflows against target in Organizations for which you have Deploy access.

If you do not have this permission, the Database and Middleware Automation menu item does not appear on the Tools menu in the SA Client, and you cannot log in to HP DMA by using a web browser.

There are additional permissions for specific Organizations, Workflows, Steps, Deployments, and Policies (see [Role-Based Database and Middleware Automation Permissions](#) on page 79).

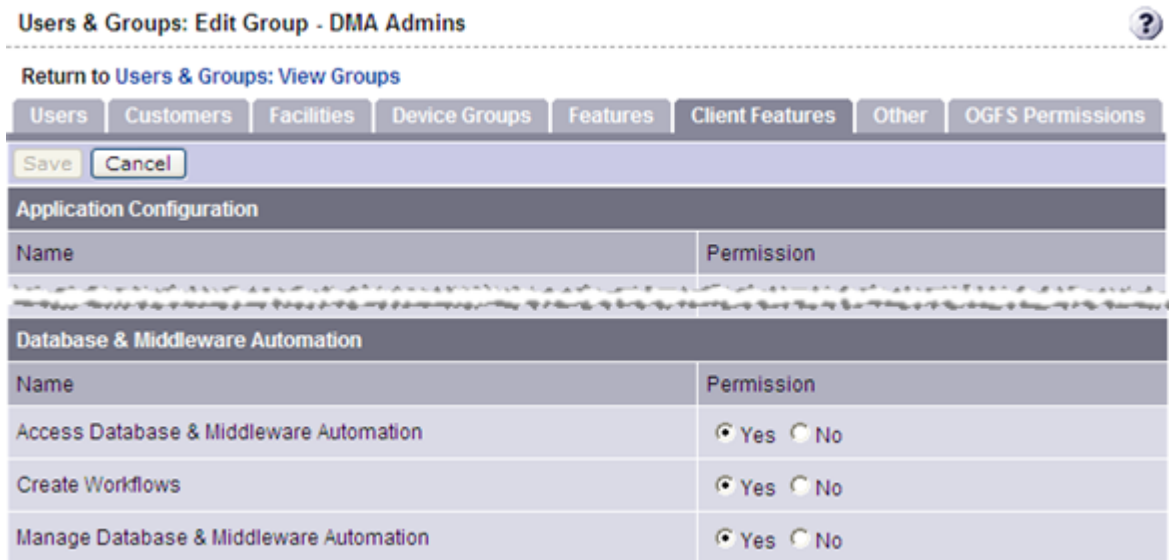
- **Create Workflows** — This permission enables you to create or copy HP DMA Workflows. Each Workflow also has its own Read/Write permissions.
- **Manage Database and Middleware Automation** – This permission enables you to act as the HP DMA administrator.

With this permission you can:

- Access the HP DMA Setup screen (see [Administration \(Setup\)](#) on page 81).
- Create or modify any HP DMA Organization
- Grant users and user groups access to specific Workflows, Steps, Deployments, Policies, and Organizations.
- Configure the Outgoing Email and Workflow Thread Pool settings.

The HP DMA permissions are located at the very bottom of the Client Features tab in the SA Web Client. They can also be set in the Administration screen of the SA Client.

**Figure 13 Where to Set Access Permissions for HP DMA**



## Role-Based Database and Middleware Automation Permissions

There are five items that have role-based permissions in the HP DMA UI:

**Table 8 HP DMA Role-Based Permissions**

| Item          | Read | Write | Execute | Deploy |
|---------------|------|-------|---------|--------|
| Workflows     | yes  | yes   | n/a     | n/a    |
| Deployments   | yes  | yes   | yes     | n/a    |
| Steps         | n/a  | yes   | n/a     | n/a    |
| Policies      | yes  | yes   | n/a     | n/a    |
| Organizations | yes  | yes   | n/a     | yes    |



In HP DMA, you will only see Servers that reside in Organizations for which you have Read permission. In order to add a Server to an Organization, you must have Read permission for the pertinent SA device group and Access Database & Middleware Automation permission.



Permissions for each item are set by the user who creates the item—or by any user who has Write permission for the item. They can also be set by the HP DMA administrator.

If you want other users to be able to access a particular item that you create, you must explicitly grant them permission to do so. You can do this on the Roles tab for that item. [Figure 14](#), for example, shows the Roles tab for a Workflow.

**Figure 14 Where to Set Workflow Permissions**

Copy of Discovery

Documentation Workflow Deployments **Roles**

| Role  | Read                                | Write                               |
|---|-------------------------------------|-------------------------------------|
|  <a href="#">DMA Workflow Authors</a><br>Group | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
|  <a href="#">DMA Admins</a><br>Group           | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
|  <a href="#">DMA DB2 Provisioning</a><br>Group | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
|  <a href="#">DMA Users</a><br>Group            | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
|  <a href="#">G1</a><br>Group                   | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
|  <a href="#">Superusers</a><br>Group           | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |

[READ ALL](#) [WRITE ALL](#)

The users and groups available on the Roles tab are a subset of the SA users and groups that are maintained in the SA Web Client (or on the Administration tab in the SA Client). Only those groups and individual users who have Access Database & Middleware Automation permission appear in the list (see [Database and Middleware Automation Access Permissions](#) on page 78).

The following instructions show you how to set the permissions for a Workflow. The procedure for the other types of items is similar.

To grant a user or group permission to access a specific Workflow:

- 1 Go to Automation > Workflows.
- 2 From the list of available Workflows, select the Workflow that you want to work with.
- 3 Go to the Roles tab.
- 4 In the table, do the following things:
  - Select Read for groups and individual users that you want to be able to view this Workflow.
  - Select Write for groups and users that you want to be able to modify the Workflow.
- 5 Click the **Save** button in the lower right corner.



Users with permission to Manage Database & Middleware Automation can set permissions for all Workflows, Deployments, Steps, Policies, and Organizations from the Setup > Permissions screen. See [Permission Settings](#) on page 82 for more information.



# 6 Administration (Setup)

This chapter describes the administrative settings that you can modify if you have permission to Manage Database & Middleware Automation (see [Roles and Permissions](#) on page 75). It contains the following topics:

- [Configuration Settings](#) on page 81
- [Workflow Settings](#) on page 81



Most SA administrative settings—including those that determine which users and groups can access which SA managed servers—are managed by the HP Server Automation administrator outside of HP DMA. For more information, refer to the *SA Administration Guide*.

## Configuration Settings

There are two types of configuration settings available:

- [Mail Settings](#) on page 81
- [Workflow Settings](#) on page 81

To access these settings, go to Setup > Configuration.

### Mail Settings

The mail settings are used to send outgoing email messages when an Email Step is executed in a Workflow. There are two settings:

- **Server:** SMTP Server that sends outgoing e-mails.
- **Sender:** The “From” address, which is customizable to avoid possible issues with spam blockers.

The mail settings are located on the Mail tab on the Setup > Configuration screen.

### Workflow Settings

You can adjust the Thread Pool setting to optimize the performance of HP DMA. This setting determines the number of Steps that can run simultaneously—the higher the setting, the more Steps can run in parallel. The default (and recommended) value is 48. The optimal value depends on the capabilities of your HP DMA server, the number of managed servers with which it interacts, the nature of your Workflows, and the traffic on your network. If you have a large number of Workflows running simultaneously on a regular basis, increase this setting.

This setting is located on the Workflow tab on the Setup > Configuration screen.

# Permission Settings

HP DMA provides finely grained role-based access so that you can carefully control the specific capabilities that individual users and user groups have within HP DMA.

The following procedure shows you how to set the role-based access permissions. An overview is provided in [Roles and Permissions](#) on page 75.

To grant access permissions to a user or user group:

- 1 Go to Setup > Permissions.
- 2 Select the user or user group to whom you want to grant permissions.
- 3 Go to one of the tabs:
  - Deployments
  - Workflows
  - Steps
  - Policies
  - Organizations
- 4 Select the pertinent boxes to grant Read, Write, Execute (applicable only to Deployments), and/or Deploy (applicable only to Organizations) permission to the selected user or group.

You can use the **ALL** links (for example, **READ ALL** or **WRITE ALL**) below the permissions box to grant the pertinent permission to all users and groups.

If an item has a “—” in one of the columns instead of a check box, that means that this permission is not applicable to that item. For example, you cannot grant Write permission to a read-only Step or Workflow.

- 5 Click **Save**.

# 7 Web Services Interface

All web services in HP DMA are written in a Representational State Transfer (REST) style. This means that all services are implemented using standard HTTP features and are easily accessible from every programming language. Special care is taken with the HTTP status codes that the services return to the caller as well as the HTTP methods (GET, POST, PUT, DELETE).

Each API feature is exposed as a URL representing some resource. For example, the list of running Workflows is accessed via `http://server_name/dma/api/sop/running`.

Access to the web service URLs is controlled with HTTP Basic authentication. The user name and password provided in the Authentication header is a standard SA user (the same credentials that you use to log in to HP DMA using a web browser).

This chapter contains the following topics:

- [Running Workflows](#) on page 83
- [Environment Discovery](#) on page 87

## Running Workflows

Workflows can be started using a web service interface. Running Workflows' status can also be queried using this interface.

URL `http://server_name/dma/api/sop/running`

### POST

Starts the execution of the Workflow defined in the request body.

- Request Body

The body of the request must be URL form encoded. This is the same format that a web browser uses to submit forms on a web page. For example:

```
Workflow=Backup%20Database&Deployment=Production&server=dev
&instance=db1
```

- Parameters

Italicized parameters are required.

- *Workflow* – the name of the Workflow to execute
- *Deployment* – the name of the Deployment to execute
- *server* – the target server to run the Workflow on
- *instance* – the database instance to run against

- database – the database to run against
- params – any runtime parameters the Workflow requires to run
- Example usage:

The UNIX curl command is an easy way to test the web service.

```
curl -u user1:pass1 -d Workflow="Backup Database"
-d Deployment=Production -d server=prod1
http://server_name/dma/api/sop/running
```

- Status Codes
  - 201 Created – returned when the Workflow has started successfully. The Location HTTP header is set in the response to the URL of the running Workflow.
  - 400 Bad Request – returned when the Workflow could not start because parameters are missing from the request.
  - 401 Unauthorized – returned when the user name and password credentials sent in the Authorization header are incorrect.
  - 405 Method Not Allowed – returned for accessing the URL with any method other than POST or GET.

## GET

Returns an Atom XML feed of the running Workflows.

- Example usage:

```
curl -u user1:pass1 http://server_name/dma/api/sop/running
<feed xmlns='http://www.w3.org/2005/Atom' xmlns:sop='http://
www.hp.com/datapal/api/sop'>
  <id>http://server_name/dma/api/sop/running</id>
  <author><name>HP DMA</name></author>
  <updated>2008-12-31T23:56:24.249Z</updated>
  <title>Active Workflows</title>
  <link rel='self' type='application/atom+xml' href='http://
server_name/dma/api/sop/running' />
  <entry>
    <id>http://server_name/dma/api/sop/running/Workflow/1230763715789</
id>
    <published>2008-12-31T23:39:13.374Z</published>
    <updated>2008-12-31T23:40:24.180Z</updated>
    <title>Backup Database</title>
    <link rel='alternate' type='application/atom+xml' href='http://
server_name/dma/api/sop/running/Workflow/1230763715789' />
    <link rel='alternate' type='text/html' href='http://server_name/
sop/Workflow/view/19787' />
    <sop:target server='loki' />
    <sop:status state='Waiting' />
  </entry>
</feed>
```

- Status Codes
  - 200 OK – returned when the Atom feed is sent successfully.
  - 401 Unauthorized – returned when the user name and password credentials sent in the Authorization header are incorrect.
  - 405 Method Not Allowed – returned for accessing the URL with any method other than POST or GET.

URL [http://server\\_name/dma/api/sop/running/Workflow/ID](http://server_name/dma/api/sop/running/Workflow/ID)

## GET

Returns an Atom XML feed of a Workflow's Steps. Each entry contains a link to the Step's resource and it's current state.

- Example usage:

```
curl -u user1:pass1 http://server_name/dma/api/sop/running/Workflow/1230763715789
<feed xmlns='http://www.w3.org/2005/Atom' xmlns:sop='http://www.hp.com/datapal/api/sop'>
  <id>http://server_name/dma/api/sop/running/Workflow/1230763715789</id>
  <author><name>HP DMA</name></author>
  <updated>2008-12-31T23:40:24.180Z</updated>
  <title>Backup Database</title>
  <link rel='self' type='application/atom+xml' href='http://server_name/dma/api/sop/running/Workflow/1230763715789' />
  <link rel='alternate' type='text/html' href='http://server_name/sop/Workflow/view/19787' />
  <entry>
    <id>http://server_name/dma/api/sop/running/Workflow/1230763715789/Step/1230763715789</id>
    <published>2008-12-31T23:39:13.386Z</published>
    <updated>2008-12-31T23:39:44.197Z</updated>
    <title>A test Step</title>
    <link rel='alternate' type='application/atom+xml' href='http://server_name/dma/api/sop/running/Workflow/1230763715789/Step/1230763715789' />
    <link rel='alternate' type='text/html' href='http://server_name/sop/Step/view/19224' />
    <sop:status state='Finished' rc='0' />
  </entry>
  <entry>
    <id>http://server_name/dma/api/sop/running/Workflow/1230763715789/Step/1230763715788</id>
    <published>2008-12-31T23:39:44.197Z</published>
    <updated>2008-12-31T23:40:04.185Z</updated>
    <title>A test Step</title>
    <link rel='alternate' type='application/atom+xml' href='http://server_name/dma/api/sop/running/Workflow/1230763715789/Step/1230763715788' />
    <link rel='alternate' type='text/html' href='http://server_name/sop/Step/view/19224' />
```

```

    <sop:status state='Finished' rc='0' />
  </entry>
</feed>

```

- Status Codes

- 200 OK – returned when the Atom feed is sent successfully.
- 401 Unauthorized – returned when the user name and password credentials sent in the Authorization header are incorrect.
- 404 Not Found – returned when the Workflow has completed and is no longer available in the API.
- 405 Method Not Allowed – returned for accessing the URL with any method other than POST or GET.

URL [http://server\\_name/dma/api/sop/running/Workflow/ID/Step/ID](http://server_name/dma/api/sop/running/Workflow/ID/Step/ID)

## GET

Returns an Atom XML feed of a Step's output. Each entry contains the Step's stdout and stderr output messages.

- Example usage:

```

curl -u user1:pass1 http://server_name/dma/api/sop/running/Workflow/ID/
Step/1230763715789
<feed xmlns='http://www.w3.org/2005/Atom' xmlns:sop='http://
www.hp.com/datapal/api/sop'>
  <id>http://server_name/dma/api/sop/running/Workflow/1230763715789/
Step/1230763715789</id>
  <author><name>HP DMA</name></author>
  <updated>2008-12-31T23:39:44.197Z</updated>
  <title>A test Step</title>
  <link rel='self' type='application/atom+xml'
href='http://server_name/dma/api/sop/running/Workflow/1230763715789/
Step/1230763715789' />
  <link rel='alternate' type='text/html' href='http://server_name/sop/
Step/view/19224' />
  <entry>
    <id>http://server_name/dma/api/sop/running/Workflow/1230763715789/
Step/1230763715789/stdout</id>
    <published>2008-12-31T23:39:13.386Z</published>
    <updated>2008-12-31T23:39:44.042Z</updated>
    <title>Standard Output</title>
    <content>Test output on stdout</content>
  </entry>
  <entry>
    <id>http://server_name/dma/api/sop/running/Workflow/1230763715789/
Step/1230763715789/stderr</id>
    <published>2008-12-31T23:39:13.386Z</published>
    <updated>2008-12-31T23:39:13.085Z</updated>
    <title>Standard Error</title>
    <content></content>
  </entry>
  <sop:status state='Finished' rc='0' />

```

</feed>

- Status Codes
  - 200 OK – returned when the Atom feed is sent successfully.
  - 401 Unauthorized – returned when the user name and password credentials sent in the Authorization header are incorrect.
  - 404 Not Found – returned when the Workflow has completed and is no longer available in the API.
  - 405 Method Not Allowed – returned for accessing the URL with any method other than POST or GET.

## Environment Discovery

The environment web service API can be used to query environmental information from HP DMA. The API provides access to Organizations, Servers, Instances, and Databases as well as their custom fields. This can be used to populate a third-party CMDB. New objects can be created and updated through this API as well which enables third-parties to populate HP DMA with discovered objects.

URL [http://server\\_name/dma/api/env/organization](http://server_name/dma/api/env/organization)

### GET

Returns an Atom XML feed of the organizations in HP DMA.

- Example Usage:

```
curl -u user1:pass1 http://server_name/dma/api/env/organization
<feed xmlns='http://www.w3.org/2005/Atom' xmlns:env='http://
www.hp.com/datapal/api/env'>
  <id>http://server_name/dma/api/env/organization</id>
  <author><name>HP DMA</name></author>
  <updated>2008-12-31T23:40:32Z</updated>
  <title>HP DMA Organizations</title>
  <link rel='self' type='application/atom+xml' href='http://
server_name/dma/api/env/organization' />
  <entry>
    <id>http://server_name/dma/api/env/organization/10676</id>
    <published>2008-12-31T23:40:32Z</published>
    <updated>2008-12-31T22:39:38Z</updated>
    <title>HP Software</title>
    <link rel='self' type='application/atom+xml' href='http://
server_name/dma/api/env/organization/10676' />
    <link rel='edit' type='application/atom+xml' href='http://
server_name/dma/api/env/organization/10676' />
    <link rel='alternate' type='text/html' href='http://server_name/
env' />
  </entry>
</feed>
```

- Status Codes
  - 200 OK – returned when the Atom feed was returned successfully.
  - 401 Unauthorized – returned when the user name and password credentials sent in the Authorization header are incorrect.
  - 405 Method Not Allowed – returned for accessing the URL with any method other than POST or GET.

## POST

Creates a new organization in the HP DMA repository (only users with Manage Database & Middleware Automation permission can create organizations).

- Request Body
 

The body of the request must be an Atom XML <entry> object. The entry should be formatted like the GET example above.
- Status Codes
  - 201 Created – returned when the Workflow has started successfully. The Location HTTP header is set in the response to the URL of the running Workflow.
  - 400 Bad Request – returned when the Workflow could not start because parameters are missing from the request.
  - 401 Unauthorized – returned when the user name and password credentials sent in the Authorization header are incorrect.
  - 405 Method Not Allowed – returned for accessing the URL with any method other than POST or GET.

URL [http://server\\_name/dma/api/env/organization/ID](http://server_name/dma/api/env/organization/ID)

## GET

Returns an Atom XML feed of the organization data and its servers.

- Example Usage:

```
curl -u user1:pass1 http://server_name/dma/api/env/organization/10676
<feed xmlns='http://www.w3.org/2005/Atom' xmlns:env='http://
www.hp.com/datapal/api/env'>
  <id>http://server_name/dma/api/env/organization/10676</id>
  <author><name>HP DMA</name></author>
  <updated>2008-12-31T23:42:29Z</updated>
  <title>HP Software</title>
  <link rel='self' type='application/atom+xml' href='http://
server_name/dma/api/env/organization/10676' />
  <env:organization name='HP_Software'>
    <env:custom-field name='test 1' value='SOME VALUE 1' />
    <env:custom-field name='test 2' value='SOME VALUE 2' />
  </env:organization>
</entry>
  <id>http://server_name/dma/api/env/server/10681</id>
  <published>2008-12-31T23:42:29Z</published>
  <updated>2008-12-31T22:39:40Z</updated>
```



```

        <title>server_name</title>
        <link rel='self' type='application/atom+xml' href='http://
server_name/dma/api/env/server/10681' />
        <link rel='edit' type='application/atom+xml' href='http://
server_name/dma/api/env/server/10681' />
        <link rel='alternate' type='text/html' href='http://server_name/
env' />
    </entry>
</feed>

```

- Status Codes
  - 200 OK – returned when the Atom feed was returned successfully.
  - 401 Unauthorized – returned when the user name and password credentials sent in the Authorization header are incorrect.
  - 404 Not Found – returned if the specified organization does not exist.
  - 405 Method Not Allowed – returned for accessing the URL with any method other than POST or GET.

## PUT

Updates an organization with new information.

- Request Body
 

The body of the request must be an Atom XML <entry> object. The entry should be formatted like the GET example above.
- Status Codes
  - 200 OK – returned when the organization was updated successfully
  - 400 Bad Request – returned when the organization entry is missing information.
  - 401 Unauthorized – returned when the user name and password credentials sent in the Authorization header are incorrect.
  - 404 Not Found – returned if the specified organization does not exist.
  - 405 Method Not Allowed – returned for accessing the URL with any method other than PUT or GET

URL [http://server\\_name/dma/api/env/server/ID](http://server_name/dma/api/env/server/ID)

## GET

Returns an Atom XML feed of the server data and its instances.

- Example Usage:
 

```

curl -u user1:pass1 http://server_name/dma/api/env/server/10681
<feed xmlns='http://www.w3.org/2005/Atom' xmlns:env='http://
www.hp.com/datapal/api/env'>
  <id>http://server_name/dma/api/env/server/10681</id>
  <author><name>HP DMA</name></author>
  <updated>2008-12-31T23:45:48Z</updated>
  <title>server_name</title>

```

```

    <link rel='self' type='application/atom+xml' href='http://
server_name/dma/api/env/server/10681' />
    <link rel='edit' type='application/atom+xml' href='http://
server_name/dma/api/env/server/10681' />
    <link rel='parent' type='application/atom+xml' href='http://
server_name/dma/api/env/organization/10676' />
    <env:server name='server_name' os='linux' os-version=''>
      <env:network-interface dns-name='server_name.example.com'
ip-address='192.168.6.159' />
      <env:custom-field name='Server Data' value='Test 1----' />
      <env:custom-field name='Server Data 2' value='Test 2-' />
    </env:server>
  <entry>
    <id>http://server_name/dma/api/env/instance/22692</id>
    <published>2008-12-31T23:45:48Z</published>
    <updated>2008-12-31T23:45:36Z</updated>
    <title>db2inst1</title>
    <link rel='self' type='application/atom+xml' href='http://
server_name/dma/api/env/instance/22692' />
    <link rel='edit' type='application/atom+xml' href='http://
server_name/dma/api/env/instance/22692' />
    <link rel='alternate' type='text/html' href='http://server_name/
env' />
  </entry>
</feed>

```

- Status Codes

- 200 OK – returned when the Atom feed was returned successfully
- 401 Unauthorized – returned when the user name and password credentials sent in the Authorization header are incorrect.
- 404 Not Found – returned if the specified server does not exist.
- 405 Method Not Allowed – returned for accessing the URL with any method other than POST, PUT or GET

## POST

Creates a new server in the HP DMA repository.

- Request Body

The body of the request must be an Atom XML <entry> object. The entry should be formatted like the GET example above.

- Status Codes

- 201 Created – returned when the server was created successfully
- 400 Bad Request – returned when the server entry is missing information.
- 401 Unauthorized – returned when the user name and password credentials sent in the Authorization header are incorrect.
- 404 Not Found – returned if you attempt to create a server in an organization that does not exist.
- 405 Method Not Allowed – returned for accessing the URL with any method other than POST, PUT or GET

## PUT

Updates a server with new information.

- Request Body

The body of the request must be an Atom XML `<entry>` object. The entry should be formatted like the GET example above.

- Status Codes

- 200 OK – returned when the server was updated successfully
- 400 Bad Request – returned when the server entry is missing information.
- 401 Unauthorized – returned when the user name and password credentials sent in the Authorization header are incorrect.
- 404 Not Found – returned if the specified server does not exist.
- 405 Method Not Allowed – returned for accessing the URL with any method other than POST, PUT or GET

URL [http://server\\_name/dma/api/env/instance/ID](http://server_name/dma/api/env/instance/ID)

## GET

Returns an Atom XML feed of the instance data and its databases.

- Example Usage:

```
curl -u user1:pass1 http://server_name/dma/api/env/instance/22692
<feed xmlns='http://www.w3.org/2005/Atom' xmlns:env='http://
www.hp.com/datapal/api/env'>
  <id>http://server_name/dma/api/env/instance/22692</id>
  <author><name>HP DMA</name></author>
  <updated>2008-12-31T23:47:28Z</updated>
  <title>db2inst1</title>
  <link rel='self' type='application/atom+xml' href='http://
server_name/dma/api/env/instance/22692' />
  <link rel='edit' type='application/atom+xml' href='http://
server_name/dma/api/env/instance/22692' />
  <link rel='parent' type='application/atom+xml' href='http://
server_name/dma/api/env/server/10681' />
  <env:instance name='db2inst1' type='DB2' asm='false'>
    <env:connection host='server_name' port='50000' windows-domain=''
username='rdc' />
  </env:instance>
</entry>
<entry>
  <id>http://server_name/dma/api/env/database/22708</id>
  <published>2008-12-31T23:47:28Z</published>
  <updated>2008-12-31T23:45:44Z</updated>
  <title>TEST</title>
  <link rel='self' type='application/atom+xml' href='http://
server_name/dma/api/env/database/22708' />
  <link rel='edit' type='application/atom+xml' href='http://
server_name/dma/api/env/database/22708' />
  <link rel='alternate' type='text/html' href='http://server_name/
env' />
</entry>
```

</feed>

- Status Codes
  - 200 OK – returned when the Atom feed was returned successfully
  - 401 Unauthorized – returned when the user name and password credentials sent in the Authorization header are incorrect.
  - 404 Not Found – returned if the specified server does not exist.
  - 405 Method Not Allowed – returned for accessing the URL with any method other than POST, PUT or GET

## POST

Creates a new instance in the HP DMA repository.

- Request Body

The body of the request must be an Atom XML <entry> object. The entry should be formatted like the GET example above.
- Status Codes
  - 201 Created – returned when the instance was created successfully
  - 400 Bad Request – returned when the instance entry is missing information.
  - 401 Unauthorized – returned when the user name and password credentials sent in the Authorization header are incorrect.
  - 404 Not Found – returned if the specified server does not exist.
  - 405 Method Not Allowed – returned for accessing the URL with any method other than POST, PUT or GET

## PUT

Updates an instance with new information.

- Request Body

The body of the request must be an Atom XML <entry> object. The entry should be formatted like the GET example above.
- Status Codes
  - 200 OK – returned when the instance was updated successfully
  - 400 Bad Request – returned when the instance entry is missing information.
  - 401 Unauthorized – returned when the user name and password credentials sent in the Authorization header are incorrect.
  - 404 Not Found – returned if the specified instance does not exist.
  - 405 Method Not Allowed – returned for accessing the URL with any method other than POST, PUT or GET

## URL [http://server\\_name/dma/api/env/database/ID](http://server_name/dma/api/env/database/ID)

### GET

Returns an Atom XML feed of the database data.

- Example Usage:

```
curl -u user1:pass1 http://server_name/dma/api/env/database/22708
<feed xmlns='http://www.w3.org/2005/Atom' xmlns:env='http://
www.hp.com/datapal/api/env'>
  <id>http://server_name/dma/api/env/database/22708</id>
  <author><name>HP DMA</name></author>
  <updated>2008-12-31T23:48:56Z</updated>
  <title>TEST</title>
  <link rel='self' type='application/atom+xml' href='http://
server_name/dma/api/env/database/22708' />
  <link rel='edit' type='application/atom+xml' href='http://
server_name/dma/api/env/database/22708' />
  <link rel='parent' type='application/atom+xml' href='http://
server_name/dma/api/env/instance/22692' />
  <env:database name='TEST'></env:database>
</feed>
```

- Status Codes

- 200 OK – returned when the Atom feed was returned successfully.
- 401 Unauthorized – returned when the user name and password credentials sent in the Authorization header are incorrect.
- 404 Not Found – returned if the specified database does not exist.
- 405 Method Not Allowed – returned for accessing the URL with any method other than POST, PUT or GET.

### POST

Creates a new database in the HP DMA repository.

- Request Body

The body of the request must be an Atom XML `<entry>` object. The entry should be formatted like the GET example above.

- Status Codes

- 201 Created – returned when the database was created successfully
- 400 Bad Request – returned when the database entry is missing information.
- 401 Unauthorized – returned when the user name and password credentials sent in the Authorization header are incorrect.
- 404 Not Found – returned if the specified instance does not exist.
- 405 Method Not Allowed – returned for accessing the URL with any method other than POST, PUT or GET

## PUT

Updates a database with new information.

- Request Body

The body of the request must be an Atom XML `<entry>` object. The entry should be formatted like the GET example above.

- Status Codes

- 200 OK – returned when the database was updated successfully.
- 400 Bad Request – returned when the organization entry is missing information.
- 401 Unauthorized – returned when the user name and password credentials sent in the Authorization header are incorrect.
- 404 Not Found – returned if the specified database does not exist.
- 405 Method Not Allowed – returned for accessing the URL with any method other than POST, PUT or GET.

# A Bridged Execution Workflows

This appendix discusses bridged execution workflows, an advanced automation feature available in HP Server Automation version 9.13 (and later versions).

## Overview

When a traditional HP DMA workflow runs, all of its steps are executed against a single target. If you specify multiple targets, a separate “run” of the entire workflow is executed on each target.

In a **bridged execution workflow**, different steps within that workflow can run on different targets.

## An Example

An example of a bridged execution workflow is a database refresh workflow that extracts the contents of a database on one target (the Source) and creates a new database with the same contents on another target (the Destination).

This type of workflow is useful if you want to clone a database—for example, to move it from a traditional IT infrastructure location into a private cloud, or to populate a test database with real production data.

## The Workflow

The workflow in [Figure 15](#) is a very simplified example of a database refresh workflow. This workflow uses two targets:

- The Source target is the database instance where the contents of a specific database will be exported.
- The Destination target is the database instance where those contents will be imported.



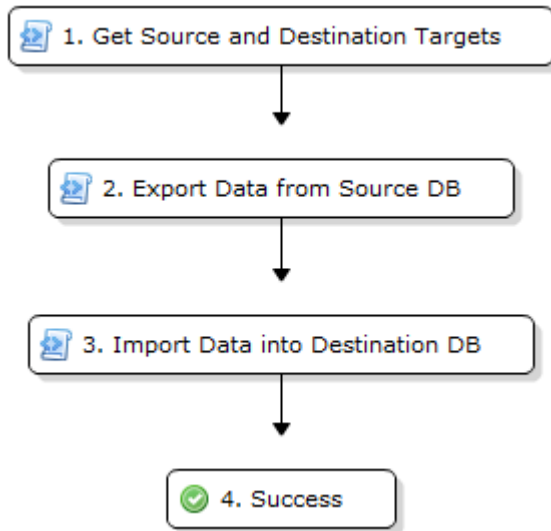
---

For the purpose of this simplified example, all other parameters have been removed.

---

All targets for a bridged execution workflow must have the same target level (Server, Instance, or Database) as the workflow itself. In this example, the target level is Instance.

**Figure 15 Simplified Database Refresh Workflow**



A bridged execution workflow requires special settings both in the steps and in the workflow to facilitate the orderly selection of targets at run time. The following topics explain how bridged execution workflows affect each phase and artifact in the automation process.

### Get Source and Destination Targets

The sole purpose of this step is to determine the targets for the subsequent steps. This step has two input parameters: Source and Destination.

| Step | Name   | Required Result   | Next |
|------|--|-------------------|------|
| ▼ 1  | <a href="#">Get Source and Destination Targets</a> |                   | 2    |
|      | Destination:                                       | - User selected - | ▼ ?  |
|      | Source:  | - User selected - | ▼ ?  |

Both input parameters must be set to - User selected - in the workflow.

The step also has two output parameters with the same names: Source and Destination.



It is important that the input and output parameters of this step have exactly the same names.

### Export Data from Source DB

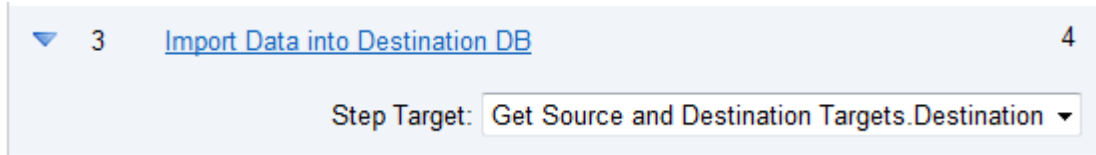
The purpose of this step is to export the contents of the Source database. Its Step Target parameter is mapped to the Source output parameter of the first step.

|     |  |   |   |
|-----|--|---|---|
| ▼ 2 | <a href="#">Export Data from Source DB</a> |   | 3 |
|     | Step Target:                               | Get Source and Destination Targets.Source | ▼ |



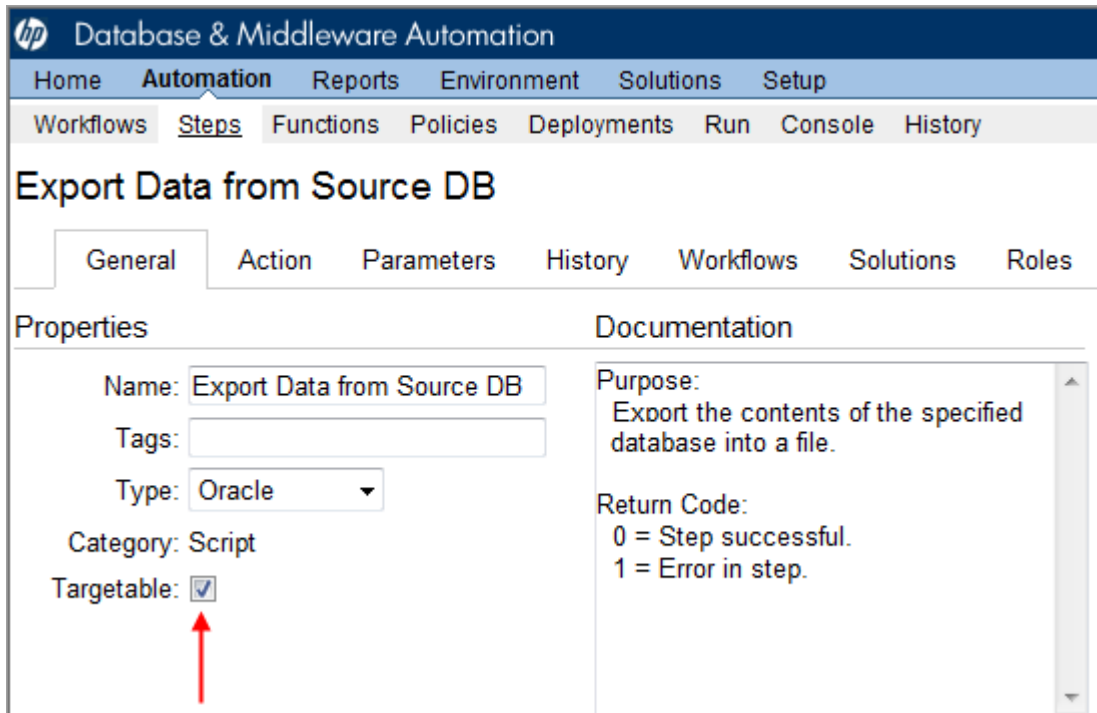
## Import Data into Destination DB

The purpose of this step is to import the data that was exported in the previous step into the Destination database. Its Step Target parameter is mapped to the Destination output parameter of the first step.

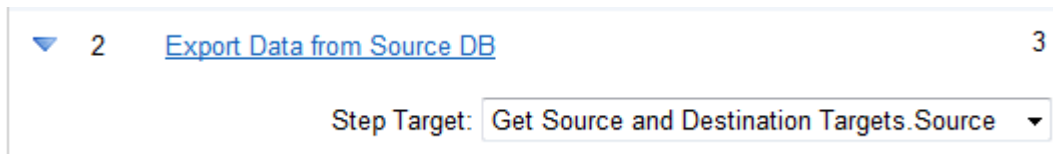


## Targetable Steps

The [Export Data from Source DB](#) and [Import Data into Destination DB](#) steps are both “targetable” steps. This means that the target for each step is specified at run time.



A targetable step has a special parameter called Step Target:



Step Target is only visible in the workflow editor. It does not appear on the Parameters tab in either the step or the deployment. Step Target must be mapped to an output parameter of a previous step.



**Best Practice:** As demonstrated in this example, the first step in a bridged execution workflow should gather the targets that subsequent steps will use. The Step Target parameter for each targetable step is then mapped to an output parameter of that first step.

## The Deployment

The process of creating a deployment for a multi-target workflow is similar to the process for a traditional workflow with one salient difference. When you create (or modify) a deployment for a bridged execution workflow, the targets that you select on the Deployment page determine the list of available targets in the Select Target dialog on the Run page.



The target parameters for the workflow (in this case, Source and Destination) do not appear on the Parameters tab in the deployment. This is because the targets must always be specified at run time in a bridged execution workflow. They cannot be specified in the deployment.

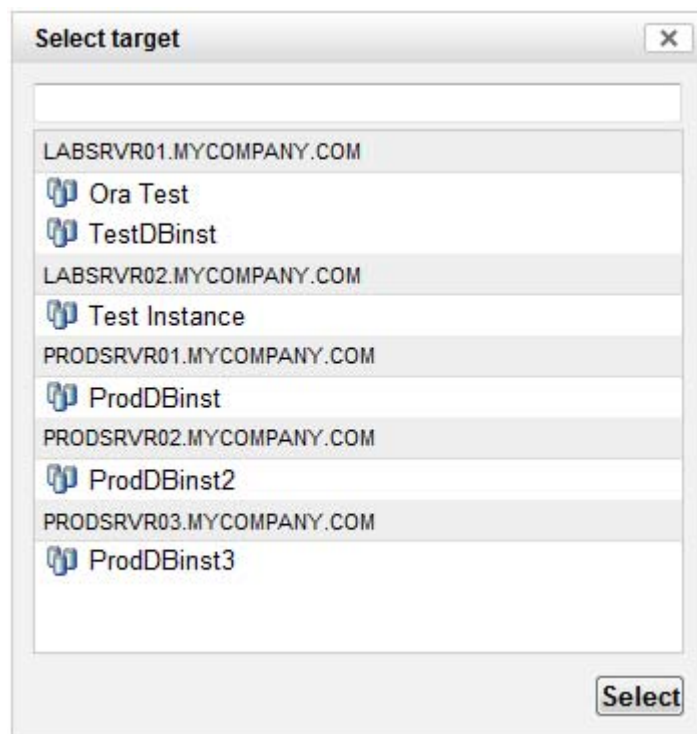
## The Run

For a bridged execution workflow, the Run page looks different than it does for a traditional workflow. [Figure 16](#) on page 100 shows the Run page for the simplified database refresh workflow prior to target selection.

Note the following:

- The [SELECT](#) links on the Run page enable you to specify each target required—in this case: Source, Destination, and Primary Target.

When you click a [SELECT](#) link, the Select Target dialog opens:



All available targets that you selected in the deployment are listed. You must select a single target from the list. If the list is long, you can filter it by typing characters in the text box at the top.

Select the target that you want to use, and click **Select**.

- The Primary Target is used by any steps in the workflow that are not targetable. In this particular workflow, there are no such steps.
- Until you select all the targets, the “Select targets” message is displayed in the lower right corner, and the **Run workflow** button is disabled.

After you select the targets, the Run Workflow button is enabled (see [Figure 17](#)).

## How to Run a Bridged Execution Workflow

The process of running a bridged execution workflow is the same as the process for a traditional workflow—until run time.

To run a bridged execution workflow:

- 1 On the Automation → Workflows page, create a deployable copy of the bridged execution workflow.
- 2 On the Automation → Deployments page, create a new (or modify an existing) deployment.  
Specify any parameter values that you want to use. Be sure to select any targets that you might want to specify at run time.
- 3 On the Automation → Run page, select your deployment.  
Click the **SELECT** link to specify each target used by the workflow.
- 4 Click **Run workflow** to execute the workflow.

## Additional Considerations

You cannot run bridged execution workflows from Application Deployment. You can only run them from Database and Middleware Automation.

A Database and Middleware Automation user will not see deployments for a bridged execution workflow unless that user has Read permission for the organization

Deployments for bridged execution workflows are only visible to users who have Read permission for the organization where one (or more) of the specified targets resides.

For a bridged execution workflow, the target listed on the upper pane of the Console and History pages corresponds to the specified Primary Target. You can find information about a specific target in the output details for the pertinent step.

Figure 16 Run Page Before Target Selection

The screenshot displays the HP Database & Middleware Automation interface. At the top, the header includes the HP logo, the text 'Database & Middleware Automation', and user information: 'Server: myserver User: admin Logout'. Below the header is a navigation menu with tabs for 'Home', 'Automation', 'Reports', 'Environment', 'Solutions', and 'Setup'. A secondary menu includes 'Workflows', 'Steps', 'Functions', 'Policies', 'Deployments', 'Run', 'Console', and 'History'. The main content area is titled 'Run Workflow' and features a search filter. A list of workflows is shown on the left, with 'Simplified Bridged Execution Workflow' selected and highlighted in blue. Below this, the workflow details are displayed, starting with 'Database Refresh Example: Simplified Bridged Execution Workflow'. The first step is 'Get Source and Destination Targets', which has a '1' in the right margin. Under this step, the 'Target Parameters' section contains three input fields: 'Primary Target', 'Destination', and 'Source', each with the text 'Target selection required' and a 'SELECT' button. The subsequent steps are 'Export Data from Source DB' (2), 'Import Data into Destination DB' (3), and 'Success' (4), all of which have 'No parameters.' listed below them. At the bottom of the workflow list, there are two buttons: 'Select targets' and 'Run workflow'. The footer contains copyright information: '© 2006–2012 Hewlett-Packard Development Company, L.P.' and version numbers: 'Web Server: 9.13.0 Repository: 9.10.0'.

Figure 17 Run Page After Target Selection

The screenshot displays the HP Database & Middleware Automation interface. At the top, the header includes the HP logo, the text 'Database & Middleware Automation', and user information: 'Server: myserver User: admin Logout'. Below the header is a navigation menu with tabs for 'Home', 'Automation', 'Reports', 'Environment', 'Solutions', and 'Setup'. A secondary menu below that includes 'Workflows', 'Steps', 'Functions', 'Policies', 'Deployments', 'Run', 'Console', and 'History'. The main content area is titled 'Run Workflow' and features a search filter. A list of workflows is shown on the left, with 'Simplified Bridged Execution Workflow' selected and highlighted in blue. Below this, the workflow details are displayed for 'Database Refresh Example: Simplified Bridged Execution Workflow'. The workflow consists of four steps:

- Get Source and Destination Targets** (Step 1):
  - Target Parameters:**
    - Primary Target:  [SELECT](#)
    - Destination:  [SELECT](#)
    - Source:  [SELECT](#)
- Export Data from Source DB** (Step 2): No parameters.
- Import Data into Destination DB** (Step 3): No parameters.
- Success** (Step 4): No parameters.

At the bottom of the workflow details, there is a 'Run workflow' button. The footer contains the copyright information: '© 2006–2012 Hewlett-Packard Development Company, L.P.' and version numbers: 'Web Server: 9.13.0 Repository: 9.10.0'.



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**Product name and version:** HP Database and Middleware Automation version 9.13

**Document title:** *SA User Guide: Database and Middleware Automation*

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