HP Database and Middleware Automation

For Linux, AIX, and Solaris

Software Version: 10.10

Oracle Database Refresh

User Guide

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Document Changes

Chapter	Version	Changes
Title Page Legal Notices	10.01	Updated version number, software release date, document release date, and copyright date range.
Import the Solution Pack	10.01	Updated the HP DMA web user interface URL to reference the correct default port (8443) for SSL communication.
Title Page Legal Notices	10.10	Updated version number, software release date, document release date, and copyright date range.
Supported Products and Platforms	10.10	Added AIX to the list of supported operating systems.

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About HP DMA Solution Packs

HP Database and Middleware Automation (HP DMA) software automates administrative tasks like provisioning and configuration, compliance, patching, and release management for databases and application servers. When performed manually, these day-to-day operations are error-prone, time consuming, and difficult to scale.

HP DMA automates these daily, mundane, and repetitive administration tasks that take up 60-70% of a database or application server administrator's day. Automating these tasks enables greater efficiency and faster change delivery with higher quality and better predictability.

HP DMA provides role-based access to automation content. This enables you to better utilize resources at every level:

- End-users can deliver routine, yet complex, DBA and middleware tasks.
- Operators can execute expert level tasks across multiple servers including provisioning, patching, configuration, and compliance checking.
- Subject matter experts can define, enforce, and audit full stack automation across network, storage, server, database, & middleware.

An HP DMA workflow performs a specific automated task—such as provisioning database or application servers, patching database or application servers, or checking a database or application server for compliance with a specific standard. You specify environment-specific information that the workflow requires by configuring its parameters.

Related HP DMA workflows are grouped together in solution packs. When you purchase or upgrade HP DMA content, you are granted access to download specific solution packs.

Audience

This solution is designed for people who are responsible for the following types of tasks:

- Restoring a database from a database dump file
- Re-creating a database in a different environment—for example, moving a database from a traditional IT infrastructure to a private cloud
- Copying production data into a Dev/Test/Staging database environment for the purpose of application development or troubleshooting

Minimal Oracle Database knowledge is required to run these database refresh workflows using the default settings.

To customize this solution, however, you should be familiar with the following Oracle Database processes:

- Oracle database administration, including backup and restore procedures
- Oracle database migration
- Oracle Recovery Manager (RMAN) procedures
- Oracle Data Pump Export and Import utilities

You should also have hands-on experience upgrading or downgrading a large database (see the Reference Information on page 203 for links to pertinent Oracle Database documentation).

Document Map

The following table shows you how to navigate this guide:

Topic	Description
The Oracle Database Refresh Solution	General information about this solution, including what it contains and what it does.
Quick Start Tutorial	A step-by-step tutorial that shows you how to run a workflow.
Workflow Details	Information about the Oracle database refresh workflows included in this solution, including: prerequisites, how the workflows work, how to run them, sample scenarios, and a list of input parameters.
Reference Information	Links to current Oracle Database product documentation and additional HP DMA documentation.
Tips and Best Practices	Simple procedures that you can use to accomplish a variety of common HP DMA tasks.
Troubleshooting	Tips for solving common problems.

Important Terms

Here are a few basic HP DMA terms that you will need to know:

- In HP DMA, a **workflow** executes a process —such as installing a software product or checking a database instance for compliance with a specific security benchmark.
- A workflow consists of a sequence of **steps**. Each step performs a very specific task. Steps can be shared among workflows.
- Steps can have input and output **parameters**, whose values will be unique to your environment.

  If you provide correct values for the input parameters that each scenario requires, the workflow will be able to accomplish its objective.Output parameters from one step often serve as input parameters to another step.
- A **solution pack** contains a collection of related workflows and the steps, functions, and policies that implement each workflow.

  More precisely, solution packs contain **workflow templates**. These are read-only versions of the workflows that cannot be deployed. To run a workflow included in a solution pack, you must first create a deployable copy of the workflow template and then customize that copy for your environment.
- A **deployment** associates a workflow with the targets (servers, instances, or databases) where the workflow will run. To run a workflow, you execute a specific deployment. A deployment is associated with one workflow; a workflow can have many deployments, each with its own targets and parameter settings.
- The umbrella term **automation items** is used to refer to those items to which role-based permissions can be assigned. Automation items include workflows, deployments, steps, and policies.

  Organizations also have role-based permissions. Servers, instances, and databases inherit their role-based permissions from the organization in which the server resides.
- The **software repository** contains any files that a workflow might need to carry out its purpose (for example, software binaries or patch archives). If the files that a workflow requires are not in the software repository, they must be stored locally on each target server.

  When you are using HP DMA with HP Server Automation (HP SA), the software repository is the HP SA Software Library.
- An **organization** is a logical grouping of servers. You can use organizations to separate development, staging, and production resources—or to separate logical business units. Because user security for running workflows is defined at the organization level, organizations should be composed with user security in mind.

Additional terms are defined in the Glossary on page 221.

Chapter 1

The Oracle Database Refresh Solution

This guide describes the Oracle Database workflows included in the HP DMA Database Refresh solution pack.

You can use these workflows to implement a database refresh process. Database refresh involves moving the contents of a database in one Oracle instance into a database in another Oracle instance. This is useful, for example, if you want to move a database from a traditional IT infrastructure to a private cloud. It is also useful if you want to duplicate production data in a test environment for application development or troubleshooting purposes.

These workflows enable you to automate and simplify the following operations:

- Extracting all or some of the contents of a database into a file (or files)
- Loading a complete database or specific schemas from a file (or files)

You can perform these steps separately, or you can run a single bridged execution workflow that performs both steps.

Three of the workflows use Oracle Recovery Manager (RMAN), and six use the Oracle Data Pump utility. RMAN is generally faster, because it uses an image of the database. Data Pump uses SQL commands to import and export specific data objects. It is slower than RMAN but offers more flexibility. You can use the Data Pump workflows to import and export specific schemas or entire databases.

The Data Pump workflows support cross-platform database refresh. The RMAN workflows do not.

The HP DMA Oracle Database refresh solution contains the following workflows:

Workflow Name	Purpose
Extract Oracle Database via RMAN	Executes a full database backup using Oracle Recovery Manager (RMAN) for the purpose of performing a full database refresh.
Refresh Oracle Database via RMAN	Restores an Oracle database from a previously created RMAN backup set.
Extract and Refresh Oracle Database via RMAN	Uses RMAN to perform a full database backup of the SOURCE database followed by a full restore of the DESTINATION database.
Export Oracle Database via Data Pump	Performs a full database export using the Oracle Data Pump utility for the purpose of performing a full database refresh.
Refresh Oracle Database via Data Pump	Imports the contents of one or more previously created Data Pump export files.

Workflow Name	Purpose
Export and Refresh Oracle Database via Data Pump	Uses the Data Pump utility to export the contents of the SOURCE database and then import them into the DESTINATION database.
Export Oracle Schema via Data Pump	Exports the specified schemas from an Oracle database using the Data Pump utility.
Refresh Oracle Schema via Data Pump	Imports the specified schemas from one or more previously created Data Pump export files.
Export and Refresh Oracle Schema via Data Pump	Uses the Data Pump utility to export the specified schemas from a SOURCE database and import them into a DESTINATION database.

Although minimal Oracle Database knowledge is required to run these workflows using the default settings, the workflows are highly customizable and can support complex environment-specific deployment scenarios.

The remaining topics in this chapter provide the following contextual information about this solution:

- Supported Products and Platforms on the next page
- Prerequisites on the next page

Supported Products and Platforms

The Oracle Database database refresh workflows in this solution pack support the following database refresh scenarios on Linux, Solaris, and AIX platforms:

Source Version	Destination Version
Oracle Database Enterprise Edition version 11g	Oracle Database Enterprise Edition version 11g
Oracle Database Enterprise Edition version 10g	Oracle Database Enterprise Edition version 10g or 11g

Operating Systems

For specific operating system versions supported, see the *HP Database and Middleware Automation version 10.10 Support Matrix* available in the HP Software product manuals library located here: http://h20230.www2.hp.com/selfsolve/manuals

See Documentation Updates on page 3 for information about accessing the product manuals library.

Note: The Data Pump workflows in this solution pack can perform a cross-platform database refresh (from a supported version of Linux to a supported version of Solaris, and vice versa). The RMAN workflows cannot perform a cross-platform refresh.

Hardware Requirements

For HP DMA server hardware requirements, see the *HP DMA Installation Guide* and the *HP DMA Release Notes*.

HP Software Requirements

This solution can be used with HP DMA version 10.10 (or later).

Prerequisites

The following prerequisites must be satisfied before you can run the Oracle database refresh workflows in this solution pack:

1. The HP DMA client must be installed on all target servers.
2. The Target Directory must exist prior to the execution of the workflow. This directory can be local, or it can be a Network File System (NFS) mount point.

   Note: If you specify an NFS mount point, the pertinent NFS share must be available to the target server, and it must be mounted prior to running this workflow.
3. The specified Oracle Database user must have READ and WRITE permission for the specified Target Directory.
4. The Oracle Database software must be provisioned, and the database must exist in the target instance prior to workflow execution.

Chapter 2

Quick Start Tutorial

This tutorial shows you how to install a solution pack and run a simple workflow. There are five basic steps:

1. Import the Solution Pack on the next page
2. Create a Deployable Workflow on page 17
3. Create a Deployment on page 18
4. Run Your Workflow on page 19
5. View the Results on page 20

In this tutorial, default values will be used for most input parameters. Before executing these steps, make sure that these default values are suitable for your environment.

Note: See the Workflow Details included in this guide for descriptions of all available input parameters for your workflow, including default values.

The information presented in this tutorial assumes the following:

- HP DMA is installed and operational.
- At least one valid target is available.

Note: This tutorial is included in every HP DMA solution pack user guide. To skip directly to information about the Database Refresh workflows, see the Workflow Details.

Import the Solution Pack

The following instructions assume that you have purchased a license for the HP DMA solution pack that you want to import.

The HP DMA 10.10 solution packs are included on the HP DMA 10.10 installation media. They are located in the following folders:

- The `DMA_10.10_Server_and_Client` folder contains the Discovery solution pack.

  The Discovery solution pack is not automatically installed with HP DMA. You must import it if you want to use the discovery workflows.

- The `DMA_10.10_Database_Solution_Packs` folder contains all of the database solution packs (provisioning, advanced provisioning, patching, advanced patching, compliance, refresh, and release management).

- The `DMA_10.10_Middleware_Solution_Packs` folder contains all of the application server solution packs (provisioning, patching, configuration management, and release management).

Note: Always check to see if there are more recent versions of the HP DMA solution packs available online. Due to frequent releases, it is likely that the solution packs provided on the installation media have since been updated.

To install the solution pack:

1. Go to HP Live Network to view a list of the latest available HP DMA solution packs.
2. Download the pertinent solution pack file from HP Software Support Online.
3. Extract the ZIP file that contains your solution pack (for example: DBRefresh.zip).

   Note: This ZIP file may be included in a larger ZIP file that contains multiple solution packs.

4. On the system where you downloaded the solution pack, open a web browser, and go to the following address:

   `https://<HP_DMAserver>:8443/dma/login`

5. Log in to the HP DMA server using an account with Administrator capability.
6. On the Solutions > Installed tab, click the **Browse** button in the lower right corner. The Choose File dialog opens.

   Note: This button and the dialog that subsequently opens may have different names depending on the browser that you are using.

7. Locate and select the ZIP file that you extracted in step 3, and click **Open**.
8. Click **Import solution pack**.

Create a Deployable Workflow

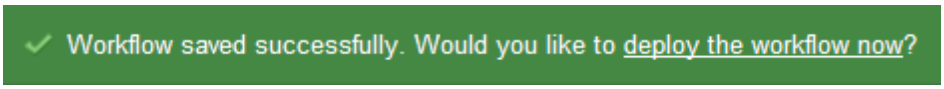
The workflow templates provided by HP in your solution pack are read-only and cannot be deployed. When you are viewing a read-only item in the HP DMA web UI, you will see the lock icon in the lower right corner:

Read-only workflows are not deployable. You can create a deployable workflow by making a copy of a workflow template.[1]

To create a deployable copy of the workflow template:

1. In the HP DMA web interface, go to Automation > Workflows.
2. From the list of workflows, select the workflow template that you want to use (for example, Export Oracle Database via Data Pump).
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)
   - Type – Either OS or the specific type of database (the correct type will be selected as a result of the copy)
   - Target level – Server, Instance, or Database (the correct target level will be selected as a result of the copy)
5. On the Roles tab, grant Read access to at least one user or group and Write access to at least one user or group.
6. Click **Save**.

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

7. Click the **deploy the workflow now** link in the green message bar.

[1] For more information about creating and customizing workflows, see the *HP DMA User Guide*. This document is available on the HP Software Product Manuals web site: http://h20230.www2.hp.com/selfsolve/manuals

Create a Deployment

Before you can run your new workflow, you must create a deployment. A deployment associates a workflow with one or more specific targets (servers, instances, or databases).

To create a 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 page.
   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 – From the drop-down list, select the deployable workflow that you just created.
   - Schedule – Frequency or date when the workflow will run. If you select None, the workflow will run only once when you explicitly tell it to run.
3. From the list of AVAILABLE servers on the left side of the Targets area, click the **ADD** link for the target (or targets) where the workflow will run.

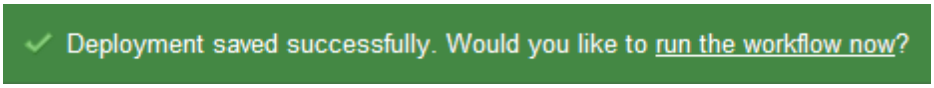
   Note: If you are running a bridged execution workflow, the targets that you select on the Deployment page will be included in the lists of available targets that you can choose from on the Run page.

   For more information about bridged execution workflows, see the *HP DMA User Guide*. This document is available on the HP Software Product Manuals web site: http://h20230.www2.hp.com/selfsolve/manuals
4. On the Parameters tab, specify values for the input parameters listed there.

   These are a subset of the required parameters for this workflow. Parameters that are not visible in the deployment will have default values.

   Note: See the Workflow Details included in this guide for descriptions of all available input parameters for your workflow, including default values.
5. If you do not want to explicitly enter the values here, you can create a policy that stores the values and then reference that policy in your deployment (see How to Use a Policy to Specify Parameter Values on page 214).
6. Click **Save**.

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

7. Click the **run the workflow now** link in the green message bar.

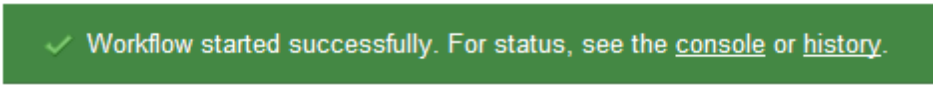
Run Your Workflow

Now you are ready to run your workflow against the server that you selected.

To run the 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 page.
   b. In the list of WORKFLOWS on the left side, select the workflow that you created.
   c. In the list of DEPLOYMENTS on the right side, select the deployment that you just created.
2. If you are running a single-target workflow, select the target (server, instance, or database) where you want to run the workflow.

   If you are running a bridged execution workflow, click the **SELECT** link to specify each target. The targets that are available to choose from here are the targets that you selected on the Deployment page.
3. Click the **Run workflow** button.
4. The following message is displayed:

5. To view the progress of your deployment, click the **console** link in the green message bar.

View the Results

While your workflow is running, you can watch its progress on the Automation > 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 SUCCESS, FAILURE, or FINISHED.

After the workflow has finished running, you can view a summary of your deployment on the History page. This page lists all the workflows that have run on this HP DMA server during the time period specified in the Filter box.

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:

- Step Output – any informational messages that were produced
- Step Errors – any errors that were reported
- Step Header – values assigned to any output parameters
- Connector Output – any informational messages related to the connection to your server management tool
- Connector Errors – any errors that were reported by the connector to your server management tool—if any errors were reported a red asterisk (*) appears on the tab

Chapter 3

Workflow Details

Each workflow included in this solution pack has a set of input parameters whose values will be unique to your environment. If you provide correct values for the parameters that each scenario requires, the workflow will be able to accomplish its objective.

Tip: Input parameters are described in the "Parameters" topic for each workflow.

There are two steps required to customize this solution:

1. Ensure that all required parameters are visible. You do this by using the workflow editor.

   To perform a simple database refresh, you can use the default values for most parameters. To use more advanced features of this solution, you will need to expose additional parameters.

2. Specify the values for those parameters. You do this when you create a deployment.

Note: Each of these steps is explained in greater detail in the "How to Use this Workflow" topic for each workflow.

The information presented here assumes the following:

- HP DMA is installed and operational.
- At least one suitable target server is available (see Supported Products and Platforms on page 14).
- You are logged in to the HP DMA web interface.
- You have permission to create, edit, and deploy copies of the workflows included in this solution pack.

Extract Oracle Database via RMAN

This workflow performs a full database backup using Oracle Recovery Manager (RMAN) for the purpose of performing a database refresh. The RMAN backup set files can be stored in the local file system or on a network share.

RMAN stores an image of the database. It optimizes both speed and space consumption, and it performs block-level corruption detection during both the backup and restore phases of a database refresh.

Note: You cannot use this workflow to perform a cross-platform database refresh (for example: Linux to Solaris). You must use the Oracle Data Pump workflows included in this solution pack if you want to perform a cross-platform refresh.

To use this workflow in your environment, see the following information:

Topic	Information Included
Prerequisites for this Workflow	List of prerequisites that must be satisfied before you can run this workflow
How this Workflow Works	Information about what the workflow does, including validation checks performed, steps executed, and a high-level process flow
How to Run this Workflow	Instructions for running this workflow in your environment
Sample Scenarios	Examples of typical parameter values for this workflow
Parameters for Extract Oracle Database via RMAN	List of input parameters for this workflow

Note: To view the steps included in this workflow, see the Steps for Extract Oracle Database via RMAN.

Prerequisites for this Workflow

Be sure that the following prerequisites are satisfied before you run the Extract Oracle Database via RMAN workflow:

1. The HP DMA client must be installed on all target servers.
2. The Target Directory must exist prior to the execution of the workflow. This directory can be local, or it can be a Network File System (NFS) mount point.

   Note: If you specify an NFS mount point, the pertinent NFS share must be available to the target server, and it must be mounted prior to running this workflow.

3. The specified Oracle Database user must have READ and WRITE permission for the specified Target Directory.
4. The Oracle Database software must be provisioned, and the database must exist in the target instance prior to workflow execution.

Note: For RMAN backup files, the destination database structure, database name, and Oracle SID must match that of the source.

For more information about prerequisites for Oracle Database, refer to the Oracle Database Product Documentation on page 203.

How this Workflow Works

This topic contains the following information about the Extract Oracle Database via RMAN workflow:

Overview

This workflow performs a full database backup using Oracle Recovery Manager (RMAN) for the purpose of performing a database refresh. You can instruct the workflow to store the RMAN backup set files in the local file system or on a network share.

You can use this workflow as part of a database refresh process. Database refresh involves moving the contents of a database in one Oracle instance into a database in another Oracle instance. This is useful, for example, if you want to move a database from a traditional IT infrastructure to a private cloud. It is also useful if you want to duplicate production data in a test environment for application development or troubleshooting purposes.

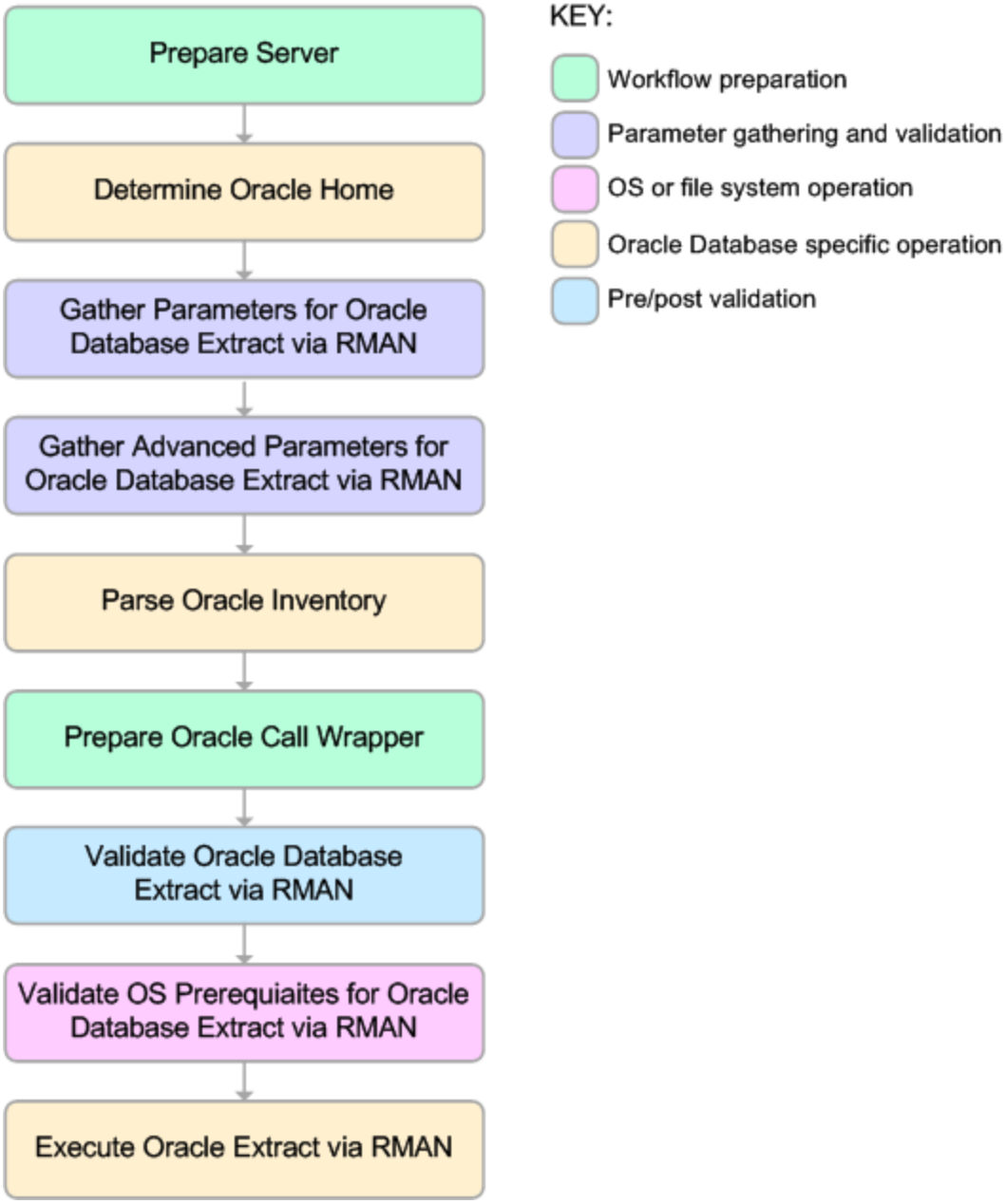
Validation Checks Performed

The workflow validates the following conditions:

1. The Oracle Home derived in the Determine Oracle Home step is a fully qualified path that exists on the target server.
2. The specified Target Directory exists, either locally or on a network share, and is writable.
3. The following system utilities are available: `ar`,`make`,`ls`,`nm`,`unzip`, and `mkdir`.
4. The workflow can connect to the Oracle SID derived in the Determine Oracle Home step.
5. All specified Ignorable Oracle Errors can safely be ignored.
6. The specified Tag Name parameter is not an empty string.
7. The specified Max Piece Size is at least 40 KByte and less than 16 TByte.

Steps Executed

The Extract Oracle Database via RMAN workflow includes the following steps. Each step must complete successfully before the next step can start. If a step fails, the workflow reports a failure, and all subsequent steps are skipped.



Process Flow

This workflow performs the following tasks:

1. Determines the target server platform type, and identifies the server call wrapper.
2. Determines the Oracle Home path by reading the `oratab` file.
3. Gathers all required and optional parameters.
4. Determines the OS owner of the Oracle Home directory.
5. Prepares the instance call wrapper based on the specified Oracle User.
6. Validates all parameter values specified or derived.
7. Performs the RMAN backup.

How to Run this Workflow

The following instructions show you how to customize and run the Extract Oracle Database via RMAN workflow in your environment.

The workflow provides default values for some parameters. These default values are usually sufficient for a "typical" installation. You can override the defaults by specifying parameter values in the deployment. You can also expose additional parameters in the workflow, if necessary, to accomplish more advanced scenarios. Any parameters not explicitly specified in the deployment will have the default values listed in Parameters for Extract Oracle Database via RMAN on page 31

Note: Before following this procedure, review the Prerequisites for this Workflow, and ensure that all requirements are satisfied.

To use the Extract Oracle Database via RMAN workflow:

1. Create a deployable copy of the workflow (see Create a Deployable Workflow on page 17).
2. Determine the values that you will specify for the following parameters: show

Parameter Name	Default Value	Required	Description
Oracle User	oracle	required	Oracle user that owns the ORACLE_HOME on the target Oracle database server. This user will perform the RMAN backup.
Target Directory	no default	required	Directory where the RMAN backup files will be placed. This directory must exist prior to workflow execution. The specified Oracle User must have READ and WRITE permissions for this directory. This directory must be accessible to the target database server.

Note: This is the minimum set of parameters required to run this workflow. You may need to expose additional parameters depending on your provisioning objectives.

See Parameters for Extract Oracle Database via RMAN on page 31 for detailed descriptions of all input parameters for this workflow, including default values.

3. In the workflow editor, expose any additional parameters that you need (see How to Expose Additional Workflow Parameters on page 213). You will specify values for those parameters when you create the deployment.
4. Save the changes to the workflow (click **Save** in the lower right corner).
5. Create a new deployment (see Create a Deployment on page 18 for instructions).
6. On the Parameters tab, specify values for the required parameters listed in step 2 and any additional parameters that you have exposed.You do not need to specify values for those parameters whose default values are appropriate for your environment.
7. On the Targets tab, specify one or more targets for this deployment.

8. Save the deployment (click **Save** in the lower right corner).
9. Run the workflow using this deployment (see Run Your Workflow on page 19 for instructions).

To verify the results:

The workflow will complete and report SUCCESS on the Console if it has run successfully. If an error occurs during workflow execution, the error is logged, and the workflow terminates in the FAILURE state.

Sample Scenarios

This topic shows you how to use various parameters to achieve the following database backup scenarios in your environment using the Extract Oracle Database via RMAN workflow:

Scenario 1: Create a Backup Set on the Local File System

This is the simplest RMAN extract scenario. In this example, the backup set is stored on the local file system. The parameters shown here are visible by default.

Parameter Name	Example Value	Description
Oracle User	oracle	Oracle user that owns the ORACLE_HOME on the target Oracle database server. This user will perform the RMAN backup.
Target Directory	`/var/bckp/April2012/rman_04032012`	Directory where the RMAN backup files will be placed. This directory must exist prior to workflow execution. The specified Oracle User must have READ and WRITE permissions for this directory. This directory must be accessible to the target database server.

Be sure that the default values for all remaining parameters are appropriate for your environment (see Parameters for Extract and Refresh Oracle Database via RMAN on page 57).

Scenario 2: Create a Backup Set on a Network Share

In this example, the backup set is stored on a network share. The parameters shown here are visible by default.

Parameter Name	Example Value	Description
Oracle User	oracle	Oracle user that owns the ORACLE_HOME on the target Oracle database server. This user will perform the RMAN backup.
Target Directory	`myfileserver.mycompany.com:/uo1/nfs_share`	Directory where the RMAN backup files will be placed. This directory must exist prior to workflow execution. The specified Oracle User must have READ and WRITE permissions for this directory. This directory must be accessible to the target database server.

Be sure that the default values for all remaining parameters are appropriate for your environment (see Parameters for Extract and Refresh Oracle Database via RMAN on page 57).

Scenario 3: Create a Backup Set Using Non-Default Parameters

In this example, the backup set is stored on the local file system. The first two parameters listed are visible by default; the remaining parameters must be exposed in the workflow so that they are available in the deployment (see How to Expose Additional Workflow Parameters on page 213).

Parameter Name	Example Value	Description
Oracle User	oracle	Oracle user that owns the ORACLE_HOME on the target Oracle database server. This user will perform the RMAN backup.
Target Directory	`/var/bckp/April2012/rman_04032012`	Directory where the RMAN backup files will be placed. This directory must exist prior to workflow execution. The specified Oracle User must have READ and WRITE permissions for this directory. This directory must be accessible to the target database server.
Ignorable Oracle Errors	ORA-39083, ORA-00959, ORA-01917, ORA-01918, ORA-01435	Comma delimited list of Oracle errors to ignore while executing the RMAN backup. The workflow always ignores ORA-39083, ORA-00959,ORA-01917,ORA-01918,ORA-01435,ORA-00942,ORA-31693, and ORA-20000. The workflow generates a warning but does not fail if it encounters LRM-00101, ORA-39000, ORA-31640, ORA-27037, ORA-31641, or ORA-27038.
Max Piece Size	2G	Maximum size (in MB) of an RMAN backup set piece (physical file).
Tag Name	FULL DATABASE BACKUP,FULLDB-BACKUP,ARCHIVED LOGS BACKUP,DMA REFRESH	A text string assigned to this backup.
Temporary File Location	`/var/temp/rman_temp_files`	Location to store temporary files while the workflow is running.

Be sure that the default values for all remaining parameters are appropriate for your environment (see Parameters for Extract and Refresh Oracle Database via RMAN on page 57).

Parameters for Extract Oracle Database via RMAN

The following tables describe the required and optional input parameters for this workflow. Some of these parameters may not be initially visible in a deployment (see How to Expose Additional Workflow Parameters on page 213). For most parameters, if you do not specify a value for a parameter, a default value is assigned.

Parameters whose values are derived in one step and consumed by another step are not shown here.

Parameters Defined in this Step: Gather Parameters for Oracle Database Extract via RMAN

Parameter Name	Default Value	Required	Description
Oracle User	oracle	required	Oracle user that owns the ORACLE_HOME on the target Oracle database server. This user will perform the RMAN backup.
Target Directory	no default	required	Directory where the RMAN backup files will be placed. This directory must exist prior to workflow execution. The specified Oracle User must have READ and WRITE permissions for this directory. This directory must be accessible to the target database server.

Additional Parameters Defined in this Step: Gather Advanced Parameters for Oracle Database Extract via RMAN

Parameter Name	Default Value	Required	Description
Ignorable Oracle Errors	ORA-31684,ORA-39111,ORA-39151,ORA-31685,ORA-00001,RMAN-00571,RMAN-00569,RMAN-03002,RMAN-06054	optional	Comma delimited list of Oracle errors to ignore while executing the RMAN backup. The workflow always ignores ORA-39083, ORA-00959,ORA-01917,ORA-01918,ORA-01435,ORA-00942,ORA-31693, and ORA-20000. The workflow generates a warning but does not fail if it encounters LRM-00101, ORA-39000, ORA-31640, ORA-27037, ORA-31641, or ORA-27038.
Max Piece Size	1048576	optional	Maximum size (in MB) of an RMAN backup set piece (physical file).
Tag Name	DMA Refresh	optional	A text string assigned to this backup.

Additional Parameters Defined in this Step: Gather Advanced Parameters for Oracle Database Extract via RMAN (continued)

Parameter Name	Default Value	Required	Description
Temporary File Location	no default	optional	Location to store temporary files while the workflow is running.

Additional Parameter Defined in this Step: Parse Oracle Inventory

Parameter Name	Default Value	Required	Description
Inventory Files	see description	optional	Comma separated list of Oracle inventory file names (with absolute paths). If not specified, set to the appropriate default value for the target server operating system. Defaults are: Solaris: `/var/opt/oracle/oraInst.loc` Linux: `/etc/oraInst.loc` Windows: `%ProgramFiles%\Oracle\Inventory`

Refresh Oracle Database via RMAN

This workflow restores an Oracle database from a previously created RMAN backup set. The backup set files can be located in the local file system or on a network share.

Note: You cannot use this workflow to perform a cross-platform database refresh (for example: Linux to Solaris). You must use the Oracle Data Pump workflows included in this solution pack if you want to perform a cross-platform refresh.

To use this workflow in your environment, see the following information:

Topic	Information Included
Prerequisites for this Workflow	List of prerequisites that must be satisfied before you can run this workflow
How this Workflow Works	Information about what the workflow does, including validation checks performed, steps executed, and a high-level process flow
How to Run this Workflow	Instructions for running this workflow in your environment
Sample Scenarios	Examples of typical parameter values for this workflow
Parameters for Refresh Oracle Database via RMAN	List of input parameters for this workflow

Note: To view the steps included in this workflow, see the Steps for Refresh Oracle Database via RMAN.

Prerequisites for this Workflow

Be sure that the following prerequisites are satisfied before you run the Refresh Oracle Database via RMAN workflow:

1. The HP DMA client must be installed on all target servers.
2. The Target Directory must exist prior to the execution of the workflow. This directory can be local, or it can be a Network File System (NFS) mount point.

   Note: If you specify an NFS mount point, the pertinent NFS share must be available to the target server, and it must be mounted prior to running this workflow.

3. The specified Oracle Database user must have READ and WRITE permission for the specified Target Directory.
4. The Oracle Database software must be provisioned, and the database must exist in the target instance prior to workflow execution.

Note: For RMAN backup files, the destination database structure, database name, and Oracle SID must match that of the source.

For more information about prerequisites for Oracle Database, refer to the Oracle Database Product Documentation on page 203.

How this Workflow Works

This topic contains the following information about the Refresh Oracle Database via RMAN workflow:

Overview

This workflow performs a full RMAN database restore from a previously created RMAN backup set. A backup set contains an image that incorporates data from the following sources:

- Data files
- Archived redo log files
- Control files
- Server parameter files

The backup set can be located in the local file system or on a network share.

You can use this workflow as part of a database refresh process. Database refresh involves moving the contents of a database in one Oracle instance into a database in another Oracle instance. This is useful, for example, if you want to move a database from a traditional IT infrastructure to a private cloud. It is also useful if you want to duplicate production data in a test environment for application development or troubleshooting purposes.

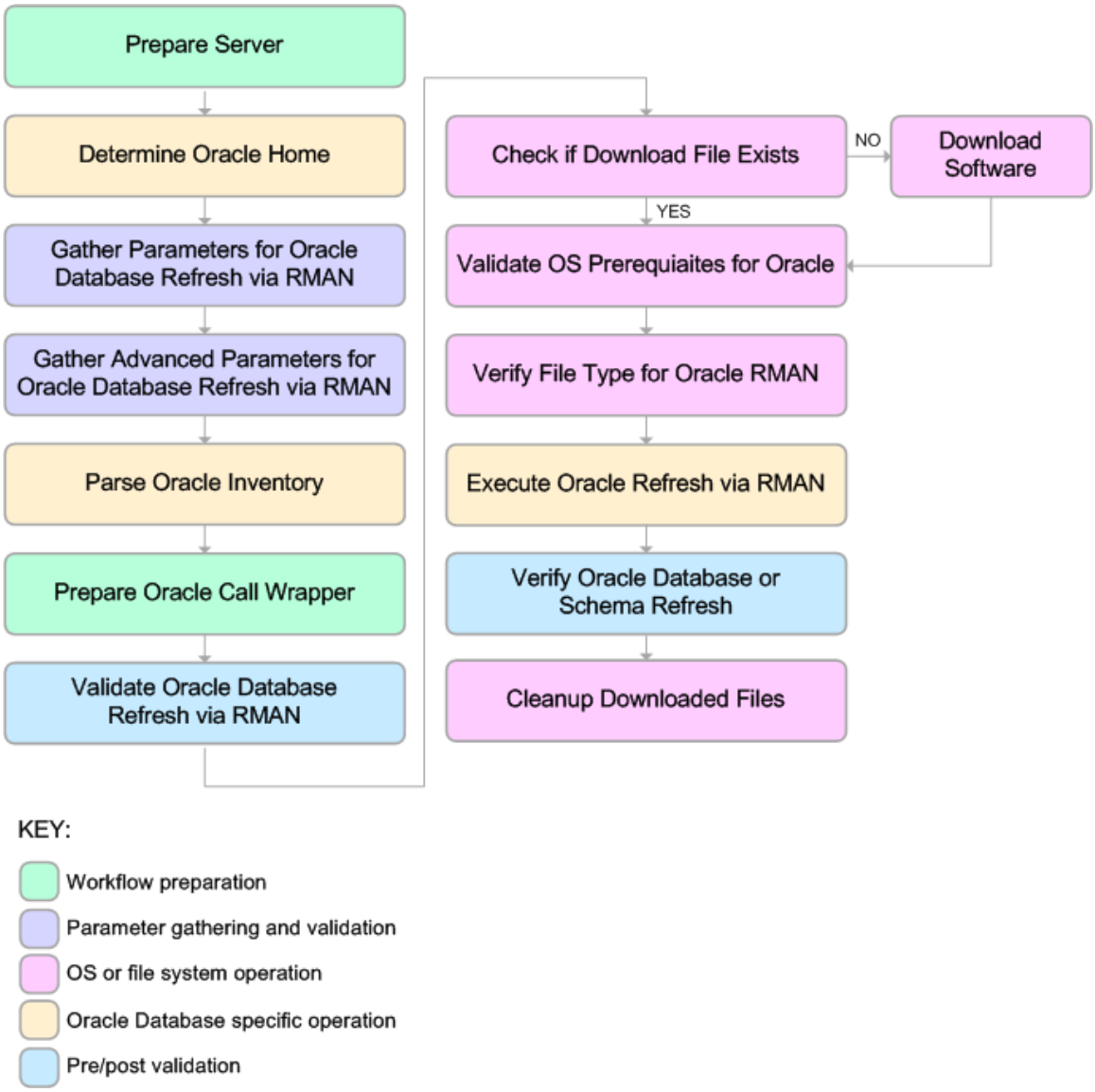
Validation Checks Performed

The workflow validates the following conditions:

1. The database to be restored is shut down.
2. The specified Target Directory exists, either locally or on a network share, and is writable.
3. The following system utilities are available: `ar`,`make`,`ls`,`nm`,`unzip`, and `mkdir`.
4. The specified Oracle Home exists and is, in fact, an Oracle home.
5. The workflow can connect to the specified Oracle SID in the specified Oracle Home.
6. The specified RMAN Archive Logs, RMAN Control File, and RMAN Data Files exist and have the proper format.
7. All specified Ignorable Oracle Errors can safely be ignored.
8. If a Verification SQL Script is specified, both that file and the Verification Result file exist.
9. The OS platform and Oracle Database version are supported by HP DMA.
10. Sufficient disk space is available to perform the database restore.

Steps Executed

The Refresh Oracle Database via RMAN workflow includes the following steps. Each step must complete successfully before the next step can start. If a step fails, the workflow reports a failure, and all subsequent steps are skipped.



Process Flow

This workflow performs the following tasks:

1. Determines the target server platform type, and identifies the server call wrapper.
2. Gathers all required and optional parameters.
3. Determines the OS owner of the Oracle Home directory.
4. Prepares the instance call wrapper based on the specified Oracle Account.
5. Validates all parameter values specified or derived.
6. Determines whether the RMAN backup set files already exist on the target server. If the files do not yet exist, the workflow downloads them from the software repository.
7. Determines whether sufficient disk space is available to restore the database from the backup set.
8. Verifies that the specified backup set files constitute a valid RMAN backup set.
9. Performs the RMAN restore.
10. Verifies that the database was successfully restored by ensuring that the following conditions are true:
    - The database is accessible.
    - Temporary tablespace has been created.
    - No tablespaces are in backup mode.
11. Runs the Verification SQL Script (if specified), and compares the result to the specified Verification Result file.
12. Removes any files downloaded to facilitate this restore.

How to Run this Workflow

The following instructions show you how to customize and run the Refresh Oracle Database via RMAN workflow in your environment.

The workflow provides default values for some parameters. These default values are usually sufficient for a "typical" installation. You can override the defaults by specifying parameter values in the deployment. You can also expose additional parameters in the workflow, if necessary, to accomplish more advanced scenarios. Any parameters not explicitly specified in the deployment will have the default values listed in Parameters for Refresh Oracle Database via RMAN on page 42

Note: Before following this procedure, review the Prerequisites for this Workflow, and ensure that all requirements are satisfied.

To use the Refresh Oracle Database via RMAN workflow:

1. Create a deployable copy of the workflow (see Create a Deployable Workflow on page 17).
2. Determine the values that you will specify for the following parameters:

Parameter Name	Default Value	Required	Description
Oracle Account	oracle	optional	Oracle user that owns the ORACLE_HOME on the target Oracle database server where the RMAN backup will be restored. This user will perform the RMAN restore. Required if inventory does not exist. Leave blank for windows.
RMAN Archive Logs	no default	required	Archived redo log files that were generated from the source database. These redo logs are applied as part of the RMAN restore. Separate multiple files with commas. Include the full path where each file is located. For example: `/home/oracle/DbRefresh/RMAN/archivelog_DB2_04n1lfnh.bak`
RMAN Control File	no default	required	Control File generated from the source database.
RMAN Data Files	no default	required	RMAN backup data files created from the source database where the RMAN backup was performed. Separate multiple files with commas.

Parameter Name	Default Value	Required	Description
Target Directory	no default	required	Directory on the target database server where the RMAN backup files will be downloaded. This directory must exist prior to workflow execution. The Oracle Account user must have READ and WRITE access to this directory.
Database ID	no default	required	Database ID of the source database used to create the RMAN backup files.

Note: This is the minimum set of parameters required to run this workflow. You may need to expose additional parameters depending on your provisioning objectives.

See Parameters for Refresh Oracle Database via RMAN on page 42 for detailed descriptions of all input parameters for this workflow, including default values.

3. In the workflow editor, expose any additional parameters that you need (see How to Expose Additional Workflow Parameters on page 213). You will specify values for those parameters when you create the deployment.
4. Save the changes to the workflow (click **Save** in the lower right corner).
5. Create a new deployment (see Create a Deployment on page 18 for instructions).
6. On the Parameters tab, specify values for the required parameters listed in step 2 and any additional parameters that you have exposed.You do not need to specify values for those parameters whose default values are appropriate for your environment.
7. On the Targets tab, specify one or more targets for this deployment.
8. Save the deployment (click **Save** in the lower right corner).
9. Run the workflow using this deployment (see Run Your Workflow on page 19 for instructions).

To verify the results:

The workflow will complete and report SUCCESS on the Console if it has run successfully. If an error occurs during workflow execution, the error is logged, and the workflow terminates in the FAILURE state.

Sample Scenarios

This topic shows you how to use various parameters to achieve the following database backup scenarios in your environment using the Refresh Oracle Database via RMAN workflow:

Scenario 1: Restore from a Backup Set on the Local File System

This is the simplest RMAN refresh scenario. In this example, the backup set is downloaded to the local file system. The parameters shown here are visible by default.

In this scenario, the Refresh Oracle Database via RMAN on page 33 workflow uses extracted files from an RMAN backup. These are files that were generated by using the Extract Oracle Database via RMAN on page 22 workflow or by using the RMAN backup utility. The Database ID parameter represents the Database Identification of the source Oracle database.

The workflow has additional input parameters that can be exposed and specified as needed. For example, you may want to use an encrypted RMAN backup file or increase the number of channels to speed up the refresh process.

Parameter Name	Example Value	Description
Oracle Account	oracle	The ORACLE_HOME to use if more than one home is found in the inventory file (or files).
RMAN Archive Logs	`/var/tmp/rman_dump/my_archivelog.bak`	Archived redo log files that were generated from the source database. These redo logs are applied as part of the RMAN restore. Separate multiple files with commas. Include the full path where each file is located. For example: `/home/oracle/DbRefresh/RMAN/archivelog_DB2_04n11fnh.bak`
RMAN Control File	`/var/tmp/rman_dump/my_controlfile.ora`	Control File generated from the source database.
RMAN Data Files	`/var/tmp/rman_dump/my_datafile.bkp`	RMAN backup data files created from the source database where the RMAN backup was performed. Separate multiple files with commas.
Target Directory	`/var/tmp/rman_dump`	Directory on the target database server where the RMAN backup files will be downloaded. This directory must exist prior to workflow execution. The Oracle Account user must have READ and WRITE access to this directory.
Database ID	1935744575	Database ID of the source database used to create the RMAN backup files.

Be sure that the default values for all remaining parameters are appropriate for your environment (see Parameters for Refresh Oracle Database via RMAN on page 42).

Scenario 2: Restore from a Backup Set on a Network Share

In this example, the backup set is downloaded to a network share. Restoring from a backup set stored on a network share alleviates the need to transfer files onto the target database servers.

The parameters shown here are visible by default. The workflow has additional parameters that can be modified to best fit any particular refresh scenario. For example, you can specify encryption parameters, ignore errors generated by the Oracle RMAN utility that do not affect the database refresh, or turn on and tune additional channels to speed up the refresh process.

Parameter Name	Example Value	Description
Oracle Account	oracle	The ORACLE_HOME to use if more than one home is found in the inventory file (or files).
RMAN Archive Logs	`/var/tmp/rman_dump/my_archivelog.bak`	Archived redo log files that were generated from the source database. These redo logs are applied as part of the RMAN restore. Separate multiple files with commas. Include the full path where each file is located. For example: `/home/oracle/DbRefresh/RMAN/archivelog_DB2_04n11fnh.bak`
RMAN Control File	`/var/tmp/rman_dump/my_controlfile.ora`	Control File generated from the source database.
RMAN Data Files	`/var/tmp/rman_dump/my_datafile.bkp`	RMAN backup data files created from the source database where the RMAN backup was performed. Separate multiple files with commas.
Target Directory	`myfileserver.mycompany.com:/uo1/nfs_share`	Directory on the target database server where the RMAN backup files will be downloaded. This directory must exist prior to workflow execution. The Oracle Account user must have READ and WRITE access to this directory.
Database ID	1935744575	Database ID of the source database used to create the RMAN backup files.

Be sure that the default values for all remaining parameters are appropriate for your environment (see Parameters for Refresh Oracle Database via RMAN on the next page).

Parameters for Refresh Oracle Database via RMAN

The following tables describe the required and optional input parameters for this workflow. Some of these parameters may not be initially visible in a deployment (see How to Expose Additional Workflow Parameters on page 213). For most parameters, if you do not specify a value for a parameter, a default value is assigned.

Parameters whose values are derived in one step and consumed by another step are not shown here.

Parameters Defined in this Step: Gather Parameters for Oracle Database Refresh via RMAN

Parameter Name	Default Value	Required	Description
Inventory Files	see description	optional	Comma separated list of Oracle inventory file names (with absolute paths). If not specified, set to the appropriate default value for the target server operating system. Defaults are: Solaris: `/var/opt/oracle/oraInst.loc` Linux: `/etc/oraInst.loc` Windows: `%ProgramFiles%\Oracle\Inventory`
Oracle Account	oracle	optional	Oracle user that owns the ORACLE_HOME on the target Oracle database server where the RMAN backup will be restored. This user will perform the RMAN restore. Required if inventory does not exist. Leave blank for windows.
Oracle Home	no default	optional	The ORACLE_HOME to use if more than one home is found in the inventory file (or files).
Oracle SID	no default	required	The Oracle System ID (SID) of the target database.
RMAN Archive Logs	no default	required	Archived redo log files that were generated from the source database. These redo logs are applied as part of the RMAN restore. Separate multiple files with commas. Include the full path where each file is located. For example: `/home/oracle/DbRefresh/RMAN/archivelog_DB2_04n1lfnh.bak`
RMAN Control File	no default	required	Control File generated from the source database.

Parameters Defined in this Step: Gather Parameters for Oracle Database Refresh via RMAN (continued)

Parameter Name	Default Value	Required	Description
RMAN Data Files	no default	required	RMAN backup data files created from the source database where the RMAN backup was performed. Separate multiple files with commas.
Target Directory	no default	required	Directory on the target database server where the RMAN backup files will be downloaded. This directory must exist prior to workflow execution. The Oracle Account user must have READ and WRITE access to this directory.

Additional Parameters Defined in this Step: Gather Advanced Parameters for Oracle Database Refresh via RMAN

Parameter Name	Default Value	Required	Description
Ignorable Oracle Errors	ORA-31684,ORA-39111,ORA-39151,ORA-31685,ORA-00001,RMAN-06497,RMAN-00571,RMAN-00569,RMAN-03002,RMAN-06054	optional	Comma delimited list of Oracle errors to ignore while executing the RMAN restore. The workflow always ignores ORA-39083, ORA-00959,ORA-01917,ORA-01918,ORA-01435,ORA-00942,ORA-31693, and ORA-20000. The workflow generates a warning but does not fail if it encounters LRM-00101, ORA-39000, ORA-31640, ORA-27037, ORA-31641, or ORA-27038.
Verification Result	no default	optional	Name (with absolute path) of a text file containing the expected results of the SQL queries included in the Verification SQL Script. This parameter is required if you provide a Verification SQL Script. Be sure to run the Verification SQL Script on the SOURCE database before running this workflow, and copy the results into this file. You must provide this file in a location where the workflow can access it.

Additional Parameters Defined in this Step: Gather Advanced Parameters for Oracle Database Refresh via RMAN (continued)

Parameter Name	Default Value	Required	Description
Verification SQL Script	no default	optional	Name (with absolute path) of a text file containing a SQL script that verifies the following: • The import operation was successful. • No data is missing. You must provide this file in a location where the workflow can access it. The expected results of the queries included in this script must be provided in the Verification Result file.

Additional Parameters Defined in this Step: Verify File Type for Oracle RMAN

Parameter Name	Default Value	Required	Description
RMAN Tags	FULL DATABASE BACKUP,FULLDB-BACKUP,ARCHIVED LOGS BACKUP,DMA REFRESH	optional	Tags to search for in the specified RMAN backup files. Separate multiple tags with commas. You can assign a tag when you perform an RMAN backup on the source database (see Extract Oracle Database via RMAN on page 22).

Additional Parameters Defined in this Step: Execute Oracle Refresh via RMAN

Parameter Name	Default Value	Required	Description
Database ID	no default	required	Database ID of the source database used to create the RMAN backup files.

Extract and Refresh Oracle Database via RMAN

This workflow performs a database refresh using Oracle Recovery Manager (RMAN) to first perform a full database backup on the SOURCE database and then perform a full database restore on the DESTINATION database.

RMAN stores an image of the database. It optimizes both speed and space consumption, and it performs block-level corruption detection during both the backup and restore phases of a database refresh.

Note: You cannot use this workflow to perform a cross-platform database refresh (for example: Linux to Solaris). You must use the Oracle Data Pump workflows included in this solution pack if you want to perform a cross-platform refresh.

To use this workflow in your environment, see the following information:

Topic	Information Included
Prerequisites for this Workflow	List of prerequisites that must be satisfied before you can run this workflow
How this Workflow Works	Information about what the workflow does, including validation checks performed, steps executed, and a high-level process flow
How to Run this Workflow	Instructions for running this workflow in your environment
Sample Scenarios	Examples of typical parameter values for this workflow
Parameters for Extract and Refresh Oracle Database via RMAN	List of input parameters for this workflow

Note: To view the steps included in this workflow, see the Steps for Extract and Refresh Oracle Database via RMAN.

Prerequisites for this Workflow

Be sure that the following prerequisites are satisfied before you run the Extract and Refresh Oracle Database via RMAN workflow:

1. The HP DMA client must be installed on all target servers.
2. The Target Directory must exist prior to the execution of the workflow. This directory can be local, or it can be a Network File System (NFS) mount point.

   Note: If you specify an NFS mount point, the pertinent NFS share must be available to the target server, and it must be mounted prior to running this workflow.
3. The specified Oracle Database user must have READ and WRITE permission for the specified Target Directory.
4. The Oracle Database software must be provisioned, and the database must exist in the target instance prior to workflow execution.

For more information about prerequisites for Oracle Database, refer to the Oracle Database Product Documentation on page 203.

How this Workflow Works

This topic contains the following information about the Extract and Refresh Oracle Database via RMAN workflow:

Overview

This workflow performs a database refresh using Oracle Recovery Manager (RMAN) to first perform a full database backup on the SOURCE database and then perform a full database restore on the DESTINATION database.

RMAN stores an image of the database. It optimizes both speed and space consumption, and it performs block-level corruption detection during both the backup and restore phases of a database refresh.

Note: You cannot use this workflow to perform a cross-platform database refresh (for example: Linux to Solaris). You must use the Oracle Data Pump workflows included in this solution pack if you want to perform a cross-platform refresh.

Validation Checks Performed

The workflow first validates the following conditions for the SOURCE database:

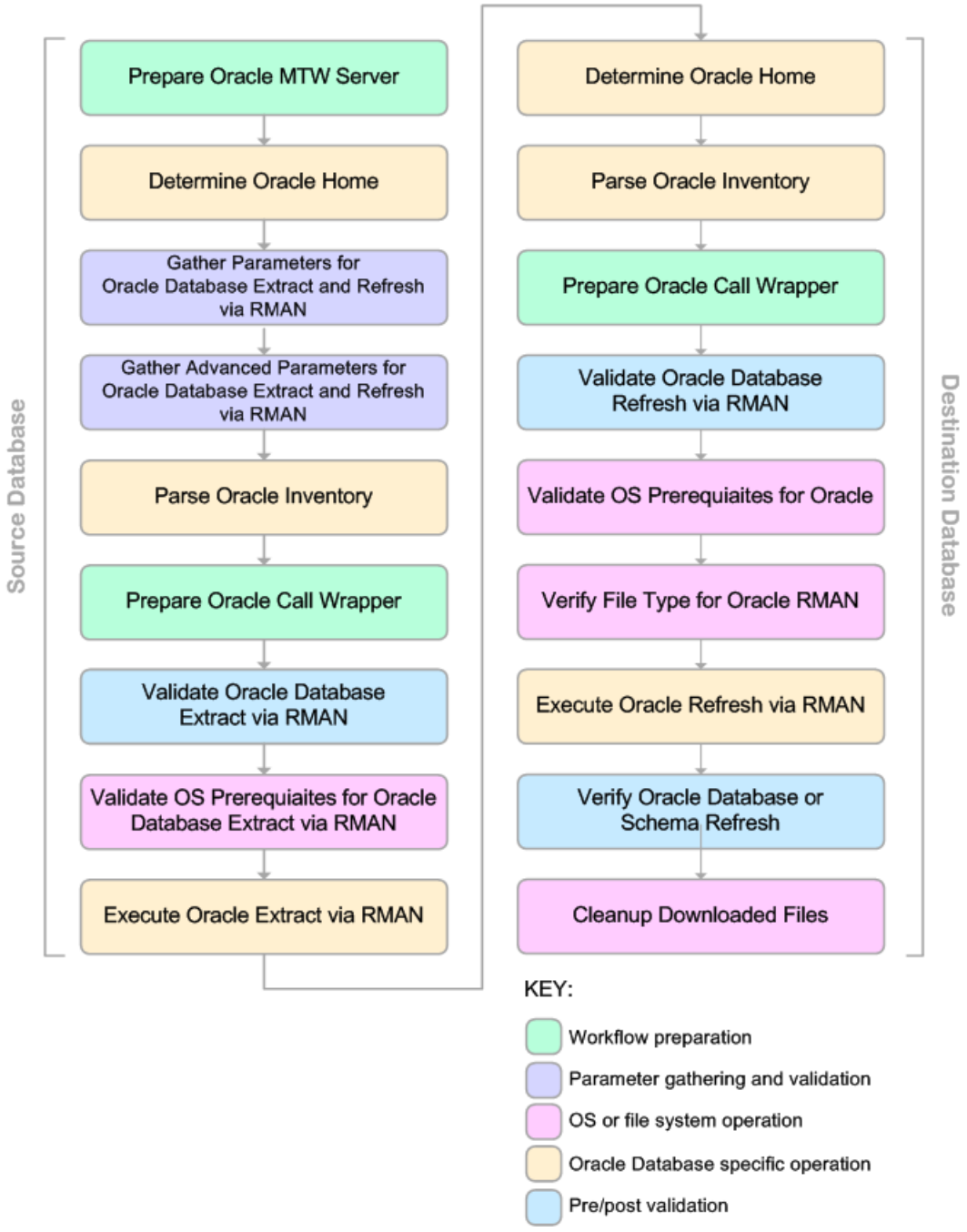
1. The Oracle Home derived in the Determine Oracle Home step is a fully qualified path that exists on the target server.
2. The specified Target Directory exists, either locally or on a network share, and is writable.
3. The following system utilities are available: `ar`,`make`,`ls`,`nm`,`unzip`, and `mkdir`.
4. The workflow can connect to the Oracle SID derived in the Determine Oracle Home step.
5. All specified Ignorable Oracle Errors can safely be ignored.
6. The specified Tag Name parameter is not an empty string.
7. The specified Max Piece Size is at least 40 KByte and less than 16 TByte.

The workflow validates the following conditions for the DESTINATION database:

1. The database to be restored is shut down.
2. The specified Target Directory exists, either locally or on a network share, and is writable.
3. The following system utilities are available: `ar`,`make`,`ls`,`nm`,`unzip`, and `mkdir`.
4. The specified Oracle Home exists and is, in fact, an Oracle home.
5. The workflow can connect to the specified Oracle SID in the specified Oracle Home.
6. The specified RMAN Archive Logs, RMAN Control File, and RMAN Data Files exist and have the proper format.
7. All specified Ignorable Oracle Errors can safely be ignored.
8. If a Verification SQL Script is specified, both that file and the Verification Result file exist.
9. The OS platform and Oracle Database version are supported by HP DMA.
10. Sufficient disk space is available to perform the database restore.

Steps Executed

The Extract and Refresh Oracle Database via RMAN workflow includes the following steps. Each step must complete successfully before the next step can start. If a step fails, the workflow reports a failure, and all subsequent steps are skipped.



Process Flow

This workflow first performs the following tasks on the SOURCE database:

1. Determines the target server platform type, and identifies the server call wrapper.
2. Determines the Oracle Home path by reading the `oratab` file.
3. Gathers all required and optional parameters.
4. Determines the OS owner of the Oracle Home directory.
5. Prepares the instance call wrapper based on the specified Oracle User.
6. Validates all parameter values specified or derived.
7. Performs the RMAN backup.

The workflow then performs the following tasks on the DESTINATION database:

1. Determines the OS owner of the Oracle Home directory.
2. Prepares the instance call wrapper based on the specified Oracle Account.
3. Validates all parameter values specified or derived.
4. Determines whether the RMAN backup set files already exist on the target server. If the files do not yet exist, the workflow downloads them from the software repository.
5. Determines whether sufficient disk space is available to restore the database from the backup set.
6. Verifies that the specified backup set files constitute a valid RMAN backup set.
7. Performs the RMAN restore.
8. Verifies that the database was successfully restored by ensuring that the following conditions are true:
   - The database is accessible.
   - Temporary tablespace has been created.
   - No tablespaces are in backup mode.
9. Runs the Verification SQL Script (if specified), and compares the result to the specified Verification Result file.
10. Removes any files downloaded to facilitate this restore.

How to Run this Workflow

The following instructions show you how to customize and run the Extract and Refresh Oracle Database via RMAN workflow in your environment.

The workflow provides default values for some parameters. These default values are usually sufficient for a "typical" installation. You can override the defaults by specifying parameter values in the deployment. You can also expose additional parameters in the workflow, if necessary, to accomplish more advanced scenarios. Any parameters not explicitly specified in the deployment will have the default values listed in Parameters for Extract and Refresh Oracle Database via RMAN on page 57

Note: Before following this procedure, review the Prerequisites for this Workflow, and ensure that all requirements are satisfied.

To use the Extract and Refresh Oracle Database via RMAN workflow:

1. Create a deployable copy of the workflow (see Create a Deployable Workflow on page 17).
2. Determine the values that you will specify for the following parameters: show

Parameter Name	Default Value	Required	Description
ALL - Target Directory	no default	required	Directory where the RMAN backup files will be placed on the SOURCE database server and subsequently downloaded on DESTINATION database server. This directory must be the same on both the SOURCE and DESTINATION servers. The directory must exist on both servers before the workflow runs, and it must be accessible to the Oracle Account user.
EXPORT - Oracle User	no default	required	Oracle user that owns the ORACLE_HOME on the SOURCE Oracle database server. This user will perform the RMAN backup.
IMPORT - Oracle Account	no default	optional	Oracle user that owns the ORACLE_HOME on the DESTINATION database server. This user will perform the RMAN restore.

Note: This is the minimum set of parameters required to run this workflow. You may need to expose additional parameters depending on your provisioning objectives.

See Parameters for Extract and Refresh Oracle Database via RMAN on page 57 for detailed descriptions of all input parameters for this workflow, including default values.

3. In the workflow editor, expose any additional parameters that you need (see How to Expose Additional Workflow Parameters on page 213). You will specify values for these parameters when you create the deployment.
4. Save the changes to the workflow (click **Save** in the lower right corner).

5. Create a new deployment (see Create a Deployment on page 18 for instructions).
   a. On the Targets tab, select all the target servers—both source and destination—that will participate in this database refresh. The targets that you select here will be available in the Target Parameters drop-down menus on the Run page (see step 7).
   b. On the Parameters tab, specify values for the required parameters listed in step 2 and any additional parameters that you exposed in step 3.You do not need to specify values for those parameters whose default values are appropriate for your environment.
6. Save the deployment (click **Save** in the lower right corner).
7. Run the workflow using this deployment (see Run Your Workflow on page 19 for instructions).

   On the Run page, select the following targets from the respective drop-down menus:

Parameter Name	Default	Description
Source	no default	Instance that contains the database whose contents will be extracted.
Destination	no default	Instance where the database will be restored.

To verify the results:

The workflow will complete and report SUCCESS on the Console if it has run successfully. If an error occurs during workflow execution, the error is logged, and the workflow terminates in the FAILURE state.

Sample Scenarios

This topic shows you how to use various parameters to achieve the following database backup scenarios in your environment using the Extract and Refresh Oracle Database via RMAN workflow:

Scenario 1: Store the Backup Set on the Local File System

This is the simplest RMAN extract and refresh scenario. In this example, the backup set is stored on the local file system of the SOURCE database server. The backup set files are then downloaded to the same location in the local file system of the DESTINATION database server. The parameters shown here are visible by default.

Parameter Name	Example Value	Description
ALL - Target Directory	`/var/bckp/April2012/rman_04032012`	Directory where the RMAN backup files will be placed on the SOURCE database server and subsequently downloaded on DESTINATION database server. This directory must be the same on both the SOURCE and DESTINATION servers. The directory must exist on both servers before the workflow runs, and it must be accessible to the Oracle Account user.
EXPORT - Oracle User	oracle	Oracle user that owns the ORACLE_HOME on the SOURCE Oracle database server. This user will perform the RMAN backup.
IMPORT - Oracle Account	oracle	Oracle user that owns the ORACLE_HOME on the DESTINATION database server. This user will perform the RMAN restore.

Be sure that the default values for all remaining parameters are appropriate for your environment (see Parameters for Extract and Refresh Oracle Database via RMAN on page 57).

Scenario 2: Store the Backup Set on a Network Share

In this example, the backup set is stored on a network share that both the SOURCE and DESTINATION database servers can access. The parameters shown here are visible by default.

Parameter Name	Example Value	Description
ALL - Target Directory	`myfileserver.mycompany.com:/uo1/nfs_share`	Directory where the RMAN backup files will be placed on the SOURCE database server and subsequently downloaded on DESTINATION database server. This directory must be the same on both the SOURCE and DESTINATION servers. The directory must exist on both servers before the workflow runs, and it must be accessible to the Oracle Account user.
EXPORT - Oracle User	oracle	Oracle user that owns the ORACLE_HOME on the SOURCE Oracle database server. This user will perform the RMAN backup.
IMPORT - Oracle Account	oracle	Oracle user that owns the ORACLE_HOME on the DESTINATION database server. This user will perform the RMAN restore.

Be sure that the default values for all remaining parameters are appropriate for your environment (see Parameters for Extract and Refresh Oracle Database via RMAN on page 57).

Scenario 3: Create a Backup Set Using Non-Default Parameters

In this example, the backup set is stored on the local file systems. The first two parameters listed are visible by default; the remaining parameters must be exposed in the workflow so that they are available in the deployment (see How to Expose Additional Workflow Parameters on page 213).

Parameter Name	Example Value	Description
ALL - Target Directory	`myfileserver.mycompany.com:/uo1/nfs_share`	Directory where the RMAN backup files will be placed on the SOURCE database server and subsequently downloaded on DESTINATION database server. This directory must be the same on both the SOURCE and DESTINATION servers. The directory must exist on both servers before the workflow runs, and it must be accessible to the Oracle Account user.
EXPORT - Oracle User	oracle	Oracle user that owns the ORACLE_HOME on the SOURCE Oracle database server. This user will perform the RMAN backup.
IMPORT - Oracle Account	oracle	Oracle user that owns the ORACLE_HOME on the DESTINATION database server. This user will perform the RMAN restore.
ALL - Ignorable Oracle Errors	ORA-39083, ORA-00959, ORA-01917, ORA-01918, ORA-01435	Comma delimited list of Oracle errors to ignore while executing the RMAN extract and restore operations. The workflow always ignores ORA-39083, ORA-00959,ORA-01917,ORA-01918,ORA-01435,ORA-00942,ORA-31693, and ORA-20000. The workflow generates a warning but does not fail if it encounters LRM-00101, ORA-39000, ORA-31640, ORA-27037, ORA-31641, or ORA-27038.
EXPORT - Max Piece Size	524288	Maximum size (in MB) of an RMAN backup set piece (physical file).
EXPORT - Tag Name	FULL DATABASE BACKUP,FULLDB-BACKUP,ARCHIVED LOGS BACKUP,DMA REFRESH	A text string assigned to this backup.

Parameter Name	Example Value	Description
EXPORT - Temporary File Location	`/var/temp/ rman_temp_files`	Location to store temporary files while the workflow is running.
IMPORT - Verification Result	`/var/temp/ dbrefresh_ver_result.xml`	Name (with absolute path) of a text file containing the expected results of the SQL queries included in the Verification SQL Script. This parameter is required if you provide a Verification SQL Script. Be sure to run the Verification SQL Script on the SOURCE database before running this workflow, and copy the results into this file. You must provide this file in a location where the workflow can access it.
IMPORT - Verification SQL Script	`/var/temp/ dbrefresh_ver.sql`	Name (with absolute path) of a text file containing a SQL script that verifies the following: • The import operation on the DESTINATION database server was successful. • No data is missing. You must provide this file in a location where the workflow can access it. The expected results of the queries included in this script must be provided in the Verification Result file.

Be sure that the default values for all remaining parameters are appropriate for your environment (see Parameters for Extract and Refresh Oracle Database via RMAN on the next page).

Parameters for Extract and Refresh Oracle Database via RMAN

The following tables describe the required and optional input parameters for this workflow. Some of these parameters may not be initially visible in a deployment (see How to Expose Additional Workflow Parameters on page 213). For most parameters, if you do not specify a value for a parameter, a default value is assigned.

Parameters whose values are derived in one step and consumed by another step are not shown here.

Parameters Defined in this Step: Gather Parameters for Oracle Database Extract and Refresh via RMAN

Parameter Name	Default Value	Required	Description
ALL - Target Directory	no default	required	Directory where the RMAN backup files will be placed on the SOURCE database server and subsequently downloaded on DESTINATION database server. This directory must be the same on both the SOURCE and DESTINATION servers. The directory must exist on both servers before the workflow runs, and it must be accessible to the Oracle Account user.
EXPORT - Inventory Files	see description	optional	Comma separated list of Oracle inventory file names (with absolute paths) on the SOURCE database server. Defaults are: Solaris: `/var/opt/oracle/oraInst.loc` Linux: `/etc/oraInst.loc` Windows: `%ProgramFiles%\Oracle\Inventory`
EXPORT - Oracle User	no default	required	Oracle user that owns the ORACLE_HOME on the SOURCE Oracle database server. This user will perform the RMAN backup.
EXPORT - Target Directory	no default	optional	Directory accessible to the SOURCE database server where the RMAN backup files will be saved. This directory must exist before the workflow runs. The Oracle Account user must have READ and WRITE permissions for this directory. This directory must be also be accessible to the DESTINATION database server.
IMPORT - Inventory Files	no default	optional	Comma separated list of Oracle inventory file names (with absolute paths) on the DESTINATION database server.
IMPORT - Oracle Account	no default	optional	Oracle user that owns the ORACLE_HOME on the DESTINATION database server. This user will perform the RMAN restore.

Parameters Defined in this Step: Gather Parameters for Oracle Database Extract and Refresh via RMAN (continued)

Parameter Name	Default Value	Required	Description

Server Wrapper	jython	required	Command that will be used to construct the call wrapper. The workflow uses the call wrapper to execute subsequent steps as either the OS administrative user or the Oracle user who owns the pertinent ORACLE_HOME. For example:
			`sudo su - root /opt/hp/dma/client/bin/jython.sh`
			`sudo su - sysdba /opt/hp/dma/client/bin/jython.sh`

Additional Parameters Defined in this Step: Gather Advanced Parameters for Oracle Database Extract and Refresh via RMAN

Parameter Name	Default Value	Required	Description
ALL - Ignorable Oracle Errors	ORA-31684,ORA-39111,ORA-39151,ORA-31685,ORA-00001,RMAN-06497,RMAN-00571,RMAN-00569,RMAN-03002,RMAN-06054	optional	Comma delimited list of Oracle errors to ignore while executing the RMAN extract and restore operations. The workflow always ignores ORA-39083, ORA-00959,ORA-01917,ORA-01918,ORA-01435,ORA-00942,ORA-31693, and ORA-20000. The workflow generates a warning but does not fail if it encounters LRM-00101, ORA-39000, ORA-31640, ORA-27037, ORA-31641, or ORA-27038.
EXPORT - Max Piece Size	1048576	optional	Maximum size (in MB) of an RMAN backup set piece (physical file).
EXPORT - Tag Name	DMA Refresh	optional	A text string assigned to this backup.
EXPORT - Temporary File Location	no default	optional	Location to store temporary files while the workflow is running.

Additional Parameters Defined in this Step: Gather Advanced Parameters for Oracle Database Extract and Refresh via RMAN (continued)

Parameter Name	Default Value	Required	Description
IMPORT - Verification Result	no default	optional	Name (with absolute path) of a text file containing the expected results of the SQL queries included in the Verification SQL Script. This parameter is required if you provide a Verification SQL Script. Be sure to run the Verification SQL Script on the SOURCE database before running this workflow, and copy the results into this file. You must provide this file in a location where the workflow can access it.
IMPORT - Verification SQL Script	no default	optional	Name (with absolute path) of a text file containing a SQL script that verifies the following: • The import operation on the DESTINATION database server was successful. • No data is missing. You must provide this file in a location where the workflow can access it. The expected results of the queries included in this script must be provided in the Verification Result file.

Export Oracle Database via Data Pump

This workflow performs a full database export using the Oracle Data Pump utility for the purpose of performing a database refresh. The Data Pump Export files can be stored in the local file system or on a network share. You can use this workflow to implement a cross-platform database refresh (for example: Linux to Solaris).

Data Pump uses SQL commands to import and export specific data objects. It is slower than the Oracle Recovery Manager (RMAN) but offers more flexibility.

The workflow automatically detects which ORACLE_HOME and ORACLE_SID to use when performing the Data Pump export. You can specify the encryption mode, compression level, and file size to use for the export—be sure to use the same settings for the subsequent import.

You have the option of providing a Data Pump parameter file or entering the parameters on the Deployment page. In either case, the parameter values are validated prior to the Data Pump export. If you do not provide a parameter file, the workflow creates one based on the parameter values that you specify on the Deployment page. If you do not specify a value for a particular parameter, the default value is used (see Parameters for Export Oracle Database via Data Pump on page 74).

To use this workflow in your environment, see the following information:

Topic	Information Included
Prerequisites for this Workflow	List of prerequisites that must be satisfied before you can run this workflow
How this Workflow Works	Information about what the workflow does, including validation checks performed, steps executed, and a high-level process flow
How to Run this Workflow	Instructions for running this workflow in your environment
Sample Scenarios	Examples of typical parameter values for this workflow
Parameters for Export Oracle Database via Data Pump	List of input parameters for this workflow

Note: To view the steps included in this workflow, see the Steps for Export Oracle Database via Data Pump.

Prerequisites for this Workflow

Be sure that the following prerequisites are satisfied before you run the Export Oracle Database via Data Pump workflow:

1. The HP DMA client must be installed on all target servers.
2. The Target Directory must exist prior to the execution of the workflow. This directory can be local, or it can be a Network File System (NFS) mount point.

   Note: If you specify an NFS mount point, the pertinent NFS share must be available to the target server, and it must be mounted prior to running this workflow.

3. The specified Oracle Database user must have READ and WRITE permission for the specified Target Directory.
4. The Oracle Database software must be provisioned, and the database must exist in the target instance prior to workflow execution.

Note: For Data Pump workflows, you must specify the same Content and Encryption Password settings for the export and any subsequent import operations.

For more information about prerequisites for Oracle Database, refer to the Oracle Database Product Documentation on page 203.

How this Workflow Works

This topic contains the following information about the Export Oracle Database via Data Pump workflow:

Overview

This workflow performs a full database export using the Oracle Data Pump utility for the purpose of performing a database refresh. The Data Pump Export files can be stored in the local file system or on a network share. You can use this workflow to implement a cross-platform database refresh (for example: Linux to Solaris).

Data Pump uses SQL commands to import and export specific data objects. It is slower than the Oracle Recovery Manager (RMAN) but offers more flexibility.

The workflow automatically detects which ORACLE_HOME and ORACLE_SID to use when performing the Data Pump export. You can specify the encryption mode, compression level, and file size to use for the export—be sure to use the same settings for the subsequent import.

You have the option of providing a Data Pump parameter file or entering the parameters on the Deployment page. In either case, the parameter values are validated prior to the Data Pump export. If you do not provide a parameter file, the workflow creates one based on the parameter values that you specify on the Deployment page. If you do not specify a value for a particular parameter, the default value is used (see Parameters for Export Oracle Database via Data Pump on page 74).

You can use this workflow as part of a database refresh process. Database refresh involves moving the contents of a database in one Oracle instance into a database in another Oracle instance. This is useful, for example, if you want to move a database from a traditional IT infrastructure to a private cloud. It is also useful if you want to duplicate production data in a test environment for application development or troubleshooting purposes.

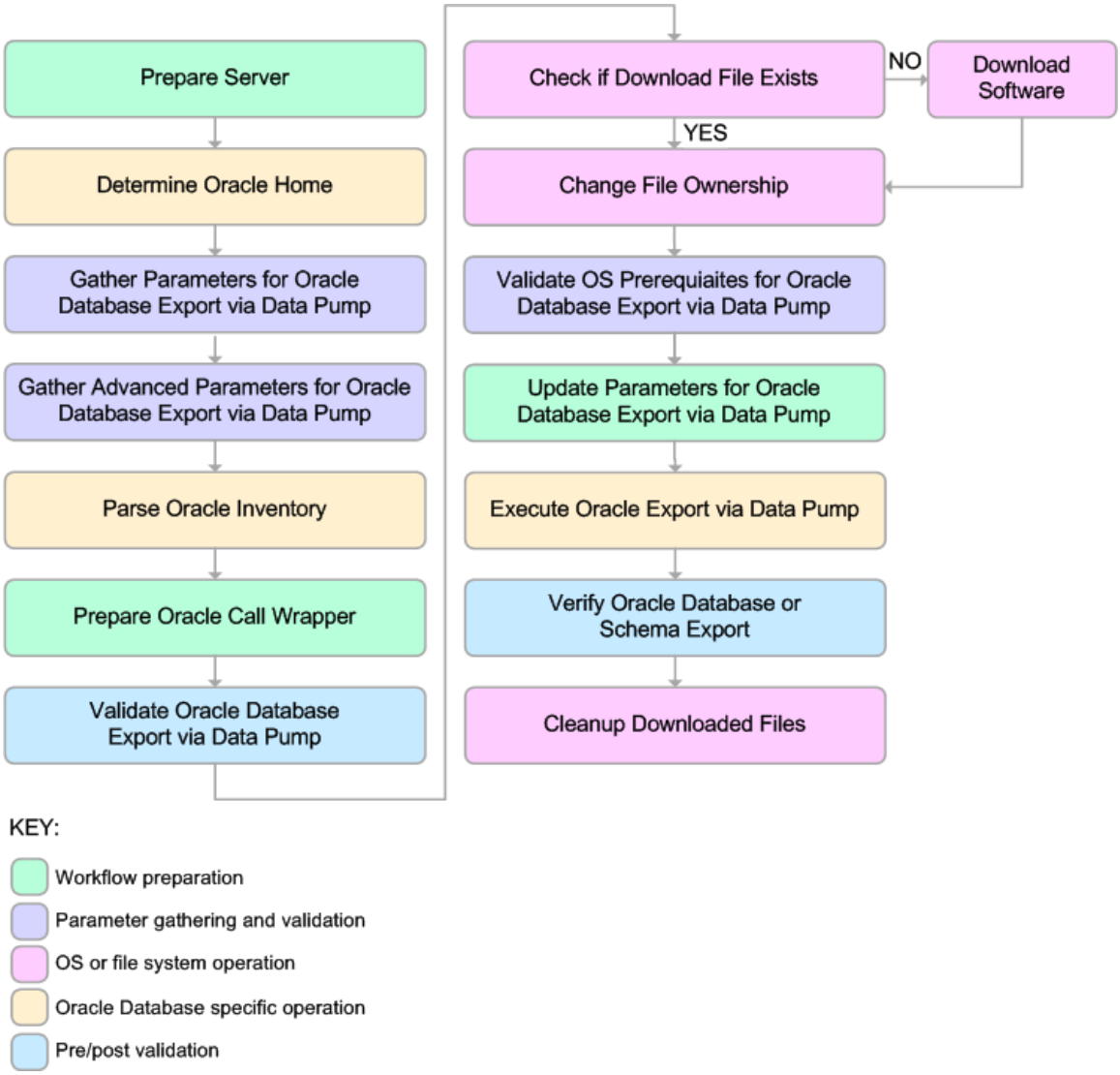
Validation Checks Performed

The workflow validates the following conditions:

1. The Oracle DB User user can connect to and query the database specified in the Oracle SID.
2. Oracle Database version 10.2 (or later) is installed at the specified (or automatically detected) Oracle Home.
3. For Oracle Database version 11.2 (or later), the Oracle DB User has DATAPUMP_EXP_FULL_DATABASE permission. For earlier supported versions, the Oracle DB User has EXP_FULL_DATABASE permission.
4. The operating system on the target server is a supported HP DMA platform.
5. A temporary directory required for file storage can be created on the target server.
6. The specified Ignorable Oracle Errors are, in fact, valid error codes.
7. The specified Data Pump Export File is a valid path and file name.
8. If a Data Pump Parameter file is specified, the file exists in the specified location.
9. If a Data Pump Parameter file is not specified, at least one schema is specified.
10. The specified Target Directory exists, either locally or on a network share, or it can be created.
11. The directory names included in the Do Not Remove list (if any) are valid.

Steps Executed

The Export Oracle Database via Data Pump workflow includes the following steps. Each step must complete successfully before the next step can start. If a step fails, the workflow reports a failure, and all subsequent steps are skipped.



Process Flow

This workflow performs the following tasks:

1. Determines the target server platform type, and identifies the server call wrapper.
2. Determines the Oracle Home path and Oracle SID by reading the `oratab` file.
3. Gathers all required and optional parameters.
4. Determines the OS owner of the Oracle Home directory.
5. Prepares the instance call wrapper based on the specified Oracle User.
6. Validates all parameter values specified or derived.
7. Downloads the Data Pump Parameter File (if specified) from the software repository.
8. Creates a Data Pump parameter file (or updates the existing parameter file) using values specified on the Deployment page. If you do not specify a value for a particular parameter, the default value is used.
9. Performs the Data Pump Export operation.
10. Verifies that the database is back online after the export:
    - No corrupted blocks exist.
    - No files are in backup mode.
    - Temporary table space is available.
11. Verifies that the Data Pump Export File exists in the Target Directory.
12. Removes any temporary files and directories used to perform the export.

How to Run this Workflow

The following instructions show you how to customize and run the Export Oracle Database via Data Pump workflow in your environment.

The workflow provides default values for most parameters. These default values are usually sufficient for a "typical" export. You can override the defaults by specifying parameter values in the deployment. You can also expose additional parameters in the workflow, if necessary, to accomplish more advanced scenarios. Any parameters not explicitly specified in the deployment will have the default values listed in Parameters for Export Oracle Database via Data Pump on page 74

Note: Before following this procedure, review the Prerequisites for this Workflow, and ensure that all requirements are satisfied.

To use the Export Oracle Database via Data Pump workflow:

1. Create a deployable copy of the workflow (see Create a Deployable Workflow on page 17).
2. Determine the values that you will specify for the following parameters:

Parameter Name	Default Value	Required	Description
Data Pump Parameter File	no default	optional	Name of the Data Pump Export parameter file that you provide. If you do not specify the absolute path to the Parameter File, the workflow will look for the file in the Target Directory. If you do not specify a Parameter File, default Data Pump Export settings will be used for parameters not specified in the deployment.
Oracle Account	no default	optional	Oracle user that owns the ORACLE_HOME on the target Oracle database server. Required if an inventory file does not exist. Leave blank for Windows.
Target Directory	no default	required	Directory where the RMAN backup files will be placed. This directory must exist prior to workflow execution. The specified Oracle User must have READ and WRITE permissions for this directory. This directory must be accessible to the target database server.

Note: This is the minimum set of parameters required to run this workflow. You may need to expose additional parameters depending on your provisioning objectives.

See Parameters for Export Oracle Database via Data Pump on page 74 for detailed descriptions of all input parameters for this workflow, including default values.

3. In the workflow editor, expose any additional parameters that you need (see How to Expose Additional Workflow Parameters on page 213). You will specify values for those parameters when you create the deployment.
4. Save the changes to the workflow (click **Save** in the lower right corner).

5. Create a new deployment (see Create a Deployment on page 18 for instructions).
6. On the Parameters tab, specify values for the required parameters listed in step 2 and any additional parameters that you have exposed.You do not need to specify values for those parameters whose default values are appropriate for your environment.
7. On the Targets tab, specify one or more targets for this deployment.
8. Save the deployment (click **Save** in the lower right corner).
9. Run the workflow using this deployment (see Run Your Workflow on page 19 for instructions).

To verify the results:

The workflow will complete and report SUCCESS on the Console if it has run successfully. If an error occurs during workflow execution, the error is logged, and the workflow terminates in the FAILURE state.

Sample Scenarios

This topic shows you how to use various parameters to achieve the following database backup scenarios in your environment using the Export Oracle Database via Data Pump workflow:

Scenario 1: Perform an Export Using Default Settings and Store Export File Locally

This is the simplest Data Pump export scenario. In this example, the export file is stored on the local file system. The parameters shown here are visible by default.

In this scenario, the Data Pump Parameter File is not specified. The workflow will create its own parameter file using default values. The Oracle Account parameter is also not specified; it will be obtained from the Oracle inventory file (typically `oratab`).

The Target Directory will hold the Data Pump Export file (or files), which can subsequently be used to perform a database refresh on another target.

Parameter Name	Example Value	Description
Target Directory	`/var/DPExport/Full/May2012`	Directory where the Data Pump dump and Parameter files will be staged on the target database server. This directory must be known to the Oracle instance.

Be sure that the default values for all remaining parameters are appropriate for your environment (see Parameters for Export Oracle Database via Data Pump on page 74).

Scenario 2: Perform an Export Using Default Settings and Store Export File on a Network Share

This scenario is identical to Scenario 1, except that the Data Pump Export file will be stored on a network share. This eliminates the need to move files from one server to another. Data Pump Export files that are placed in a shared network directory can readily be used as an input to the Refresh Oracle Database via Data Pump workflow.

Parameter Name	Example Value	Description
Target Directory	`myfileserver.mycompany.com:/uo1/nfs_share`	Directory where the Data Pump dump and Parameter files will be staged on the target database server. This directory must be known to the Oracle instance.

Be sure that the default values for all remaining parameters are appropriate for your environment (see Parameters for Export Oracle Database via Data Pump on page 74).

Scenario 3: Perform an Export Using Non-Default Parameters

The Export Oracle Database via Data Pump workflow provides many parameters that can be modified to suit your needs. For example, the Data Pump Export file generated by the workflow can be compressed, encrypted, or divided into standard-sized pieces. You can also tell the workflow to ignore specific Oracle errors that might arise during the export but would have no bearing on its outcome.

In this example, the Data Pump Export file is stored on the local file system. The first three parameters listed are visible by default; the remaining parameters must be exposed in the workflow so that they are available in the deployment (see How to Expose Additional Workflow Parameters on page 213).

Parameter Name	Example Value	Description
Data Pump Parameter File	`/var/DPExport/Parms/myDPparameters.par`	Name of the Data Pump Export parameter file that is updated (or created) by this step. If you do not specify a Parameter File, default Data Pump Export settings will be used for parameters not specified in the deployment.
Oracle Account	oracle	Oracle user that owns the ORACLE_HOME on the target Oracle database server where the Data Pump export will be performed. Required if inventory does not exist. Leave blank for windows.
Target Directory	`/var/DPExport/Output/Full/May2012`	Directory where the Data Pump dump and Parameter files will be staged on the target database server. This directory must be known to the Oracle instance.

Parameter Name	Example Value	Description
Compression	DATA_ONLY	Items that will be compressed in the Data Pump Export dump file set. Valid settings are ALL, NONE, DATA_ONLY, METADATA_ONLY. • DATA_ONLY: Compress only the table row data (must also specify DATA_ONLY or ALL for the Content parameter). • METADATA_ONLY: Compress only the database object definitions (must also specify METADATA_ONLY or ALL for the Content parameter). • ALL: Compress both the table row data and the database object definitions in the dump file set (must also specify ALL for the Content parameter). • NONE: Nothing is compressed in the dump file set. You must specify the same Compression setting for the export and any subsequent import operations. DATA_ONLY and ALL compression settings are only supported in Oracle Database Enterprise Edition version 11g. You must enable the Oracle Advanced Compression option to use these settings.

Parameter Name	Example Value	Description
Content	DATA_ONLY	What to include in the Data Pump Export dump file set. Valid settings are ALL, DATA_ONLY, or METADATA_ONLY. • DATA_ONLY: Include only table row data. Do not include database object definitions. • METADATA_ONLY: Include only database object definitions. Do not include table row data. If you specify METADATA_ONLY, any index or table statistics later imported from the dump file set will be locked after the import. • ALL: Include both table row data and database object definitions in the dump file set. You must specify the same Content setting for the export and any subsequent import operations.

Parameter Name	Example Value	Description
Encryption Mode	PASSWORD	This setting determines how the dump file set will be encrypted and how it can later be decrypted during a subsequent Data Pump Import operation. Valid values are PASSWORD, TRANSPARENT, and DUAL. • PASSWORD: Data Pump Export uses the Encryption Password to encrypt the dump file set. You must specify the same Encryption Password to perform a subsequent import. • TRANSPARENT: The Oracle encryption wallet is used to encrypt the dump file set using the Secure Sockets Layer (SSL) protocol. The encryption wallet must also be used to decrypt the dump file set during a subsequent import. You cannot specify an Encryption Password if you specify TRANSPARENT mode. • DUAL: During a subsequent import operation, the dump file set can either be decrypted transparently using the Oracle encryption wallet, or it can be decrypted by using the same Encryption Password that was used for the export. DUAL and TRANSPARENT mode are only supported in Oracle Database Enterprise Edition version 11g. **Note:** To use DUAL or TRANSPARENT mode, you must enable Oracle Advanced Security.

Parameter Name	Example Value	Description
Encryption Password	myencpwd **Tip:** To avoid having to re-enter passwords whenever they change, you can create a policy to provide them to the workflow (see How to Use a Policy to Specify Parameter Values on page 214).	Key used to ensure that any encrypted column data, metadata, or table data is re-encrypted before it is written to the dump file set. If you do not specify an Encryption Password—or specify TRANSPARENT for the Encryption Mode—data will be written to the dump files in clear text form. Note the following: • If you specify an Encryption Password for the export, and the Encryption Mode is PASSWORD, you must specify the same Encryption Password for any subsequent import operations. • The Encryption Password is required when Encryption Mode is PASSWORD or DUAL. • The Encryption Password is not valid when Encryption Mode is TRANSPARENT. • If you specify an Encryption Password but do not specify the Encryption Mode, the mode defaults to PASSWORD. This parameter is only supported in Oracle Database Enterprise Edition version 11g.
File Size	16GB	Maximum size (in MByte) of each dump file in the dump file set. If any file in the dump file set reaches this size, that file is closed, and Data Pump attempts to create a new file. Specify an integer and one of the following units: B (bytes), KB (kilobytes), MB (megabytes), GB (gigabytes), or TB (terabytes). The default unit is bytes. The minimum valid file size is 4 kilobytes; the maximum valid file size is 16 terabytes. The actual size of a dump file may be slightly smaller depending on the size of the internal blocks used.

Parameter Name	Example Value	Description
Oracle DB User	siteadmin	Database user account (if other than sysdba) that will be used to perform the Data Pump Export. **Note:** For Oracle Database 11g R2, this user must have the DATAPUMP_EXP_FULL_DATABASE role, or the workflow will fail. For earlier versioins, the user must have the EXP_FULL_DATABASE role.
Oracle DB User Password	siteadminpwd **Tip:** To avoid having to re-enter passwords whenever they change, you can create a policy to provide them to the workflow (see How to Use a Policy to Specify Parameter Values on page 214).	Password for the Oracle DB User. This is required when this user is not sysdba.
Ignorable Oracle Errors	ORA-39083, ORA-00959, ORA-01917, ORA-01918, ORA-01435	Comma delimited list of Oracle errors to ignore while executing the Data Pump Export.
Temporary File Location	`/var/temp/DP_temp_files`	The location where all temporary output files will be placed. This directory will be removed at the completion of the workflow.

Be sure that the default values for all remaining parameters are appropriate for your environment (see Parameters for Export Oracle Database via Data Pump on the next page).

Parameters for Export Oracle Database via Data Pump

The following tables describe the required and optional input parameters for this workflow. Some of these parameters may not be initially visible in a deployment (see How to Expose Additional Workflow Parameters on page 213). For most parameters, if you do not specify a value for a parameter, a default value is assigned.

Parameters whose values are derived in one step and consumed by another step are not shown here.

Parameters Defined in this Step: Gather Parameters for Oracle Database Export via Data Pump

Parameter Name	Default Value	Required	Description
Data Pump Export File	see description	optional	Name (absolute path) of the Data Pump Export dump file (or files) that will be created from an existing Oracle database. The default is: *Target Directory*\Oracle SID.dmp
Data Pump Parameter File	no default	optional	Name of the Data Pump Export parameter file that you provide. If you do not specify the absolute path to the Parameter File, the workflow will look for the file in the Target Directory. If you do not specify a Parameter File, default Data Pump Export settings will be used for parameters not specified in the deployment.
Inventory Files	see description	optional	Comma separated list of Oracle inventory file names (with absolute paths). If not specified, set to the appropriate default value for the target server operating system. Defaults are: Solaris: /var/opt/oracle/oraInst.loc Linux: /etc/oraInst.loc Windows: %ProgramFiles%\Oracle\Inventory
Oracle Account	no default	optional	Oracle user that owns the ORACLE_HOME on the target Oracle database server. Required if an inventory file does not exist. Leave blank for Windows.
Oracle Home	no default	optional	The ORACLE_HOME to use if more than one home is found in the inventory file (or files).
Oracle SID	no default	required	The Oracle System ID (SID) of the target database.

Parameters Defined in this Step: Gather Parameters for Oracle Database Export via Data Pump (continued)

Parameter Name	Default Value	Required	Description

Server Wrapper	jython	required	Command that will be used to construct the call wrapper. The workflow uses the call wrapper to execute subsequent steps as either the OS administrative user or the Oracle user who owns the pertinent ORACLE_HOME. For example:
			`sudo su - root /opt/hp/dma/client/bin/jython.sh`
			`sudo su - sysdba /opt/hp/dma/client/bin/jython.sh`

Target Directory	no default	required	Directory where the Data Pump Export dump file set and the Parameter file will be staged on the target database server. This directory must be known to the Oracle instance.

Parameters Defined in this Step: Gather Advanced Parameters for Oracle Database Export via Data Pump

Parameter Name	Default Value	Required	Description
Compression	ALL	optional	Items that will be compressed in the Data Pump Export dump file set. Valid settings are ALL, NONE, DATA_ONLY, METADATA_ONLY. • DATA_ONLY: Compress only the table row data (must also specify DATA_ ONLY or ALL for the Content parameter). • METADATA_ONLY: Compress only the database object definitions (must also specify METADATA_ONLY or ALL for the Content parameter). • ALL: Compress both the table row data and the database object definitions in the dump file set (must also specify ALL for the Content parameter). • NONE: Nothing is compressed in the dump file set. You must specify the same Compression setting for the export and any subsequent import operations. DATA_ONLY and ALL compression settings are only supported in Oracle Database Enterprise Edition version 11g. You must enable the Oracle Advanced Compression option to use these settings.

Parameters Defined in this Step: Gather Advanced Parameters for Oracle Database Export via Data Pump (continued)

Parameter Name	Default Value	Required	Description
Content	ALL	optional	What to include in the Data Pump Export dump file set. Valid settings are ALL, DATA_ONLY, or METADATA_ONLY. • DATA_ONLY: Include only table row data. Do not include database object definitions. • METADATA_ONLY: Include only database object definitions. Do not include table row data. If you specify METADATA_ONLY, any index or table statistics later imported from the dump file set will be locked after the import. • ALL: Include both table row data and database object definitions in the dump file set. You must specify the same Content setting for the export and any subsequent import operations.

Parameters Defined in this Step: Gather Advanced Parameters for Oracle Database Export via Data Pump (continued)

Parameter Name	Default Value	Required	Description
Encryption Mode	Default depends on the other encryption settings. Assuming that ENCRYPTION is true: • If Encryption Password is specified, and the Oracle encryption wallet is open, default is DUAL. • If Encryption Password is specified, and the wallet is closed, default is PASSWORD. • If Encryption Password is not specified, and the wallet is open, default is TRANSPARENT. • If Encryption Password is not specified, and the wallet is closed, the Data Pump Export operation returns an error.	optional	This setting determines how the dump file set will be encrypted and how it can later be decrypted during a subsequent Data Pump Import operation. Valid values are PASSWORD, TRANSPARENT, and DUAL. • PASSWORD: Data Pump Export uses the Encryption Password to encrypt the dump file set. You must specify the same Encryption Password to perform a subsequent import. • TRANSPARENT: The Oracle encryption wallet is used to encrypt the dump file set using the Secure Sockets Layer (SSL) protocol. The encryption wallet must also be used to decrypt the dump file set during a subsequent import. You cannot specify an Encryption Password if you specify TRANSPARENT mode. • DUAL: During a subsequent import operation, the dump file set can either be decrypted transparently using the Oracle encryption wallet, or it can be decrypted by using the same Encryption Password that was used for the export. DUAL and TRANSPARENT mode are only supported in Oracle Database Enterprise Edition version 11g. **Note:** To use DUAL or TRANSPARENT mode, you must enable Oracle Advanced Security.

Parameters Defined in this Step: Gather Advanced Parameters for Oracle Database Export via Data Pump (continued)

Parameter Name	Default Value	Required	Description
Encryption Password	no default	optional	Key used to ensure that any encrypted column data, metadata, or table data is re-encrypted before it is written to the dump file set. If you do not specify an Encryption Password—or specify TRANSPARENT for the Encryption Mode—data will be written to the dump files in clear text form. Note the following: • If you specify an Encryption Password for the export, and the Encryption Mode is PASSWORD, you must specify the same Encryption Password for any subsequent import operations. • The Encryption Password is required when Encryption Mode is PASSWORD or DUAL. • The Encryption Password is not valid when Encryption Mode is TRANSPARENT. • If you specify an Encryption Password but do not specify the Encryption Mode, the mode defaults to PASSWORD. This parameter is only supported in Oracle Database Enterprise Edition version 11g.
File Size	200MB	optional	Maximum size (in MByte) of each dump file in the dump file set. If any file in the dump file set reaches this size, that file is closed, and Data Pump attempts to create a new file. Specify an integer and one of the following units: B (bytes), KB (kilobytes), MB (megabytes), GB (gigabytes), or TB (terabytes). The default unit is bytes. The minimum valid file size is 4 kilobytes; the maximum valid file size is 16 terabytes. The actual size of a dump file may be slightly smaller depending on the size of the internal blocks used.

Parameters Defined in this Step: Gather Advanced Parameters for Oracle Database Export via Data Pump (continued)

Parameter Name	Default Value	Required	Description
Full	YES	optional	Set to YES to perform a full Data Pump Export (data and metadata); set to NO to export schemas (metadata). **Caution:** The workflow sets the value of this parameter. Do not modify the mapping for this parameter that is defined in the workflow.
Ignorable Oracle Errors	ORA-31684,ORA-39111,ORA-39151,ORA-31685,ORA-00001,RMAN-00571,RMAN-00569,RMAN-03002,RMAN-06054	optional	Comma delimited list of Oracle errors to ignore while executing the Data Pump Export.
Metrics	YES	optional	If you specify YES, the number of objects exported and the elapsed time required for the export operation to complete are recorded in the Data Pump log file. Valid values are YES or NO.
Oracle DB User	no default	optional	Database user account (if other than sysdba) that will be used to perform the Data Pump Export. **Note:** For Oracle Database 11g R2, this user must have the DATAPUMP_EXP_FULL_DATABASE role, or the workflow will fail. For earlier versioins, the user must have the EXP_FULL_DATABASE role.
Oracle DB User Password	/ as sysdba	optional	Password for the Oracle DB User. This is required when this user is not sysdba.

Refresh Oracle Database via Data Pump

This workflow imports a full Oracle database from a previously created Data Pump Export file (or files). The files can be located in the local file system or on a network share. You can use this workflow to implement a cross-platform database refresh (for example: Linux to Solaris).

Data Pump uses SQL commands to import and export specific data objects. It is slower than the Oracle Recovery Manager (RMAN) but offers more flexibility.

The workflow automatically detects which ORACLE_HOME and ORACLE_SID to use when performing the Data Pump import. You must specify the same encryption mode and password, compression level, and file size that was used for the export.

You have the option of providing a Data Pump parameter file or entering the parameters on the Deployment page. In either case, the parameter values are validated prior to the Data Pump import. If you do not provide a parameter file, the workflow creates one based on the parameter values that you specify on the Deployment page. If you do not specify a value for a particular parameter, the default value is used (see Parameters for Refresh Oracle Database via Data Pump on page 97).

To use this workflow in your environment, see the following information:

Topic	Information Included
Prerequisites for this Workflow	List of prerequisites that must be satisfied before you can run this workflow
How this Workflow Works	Information about what the workflow does, including validation checks performed, steps executed, and a high-level process flow
How to Run this Workflow	Instructions for running this workflow in your environment
Sample Scenarios	Examples of typical parameter values for this workflow
Parameters for Refresh Oracle Database via Data Pump	List of input parameters for this workflow

Note: To view the steps included in this workflow, see the Steps for Refresh Oracle Database via Data Pump.

Prerequisites for this Workflow

Be sure that the following prerequisites are satisfied before you run the Refresh Oracle Database via Data Pump workflow:

1. The HP DMA client must be installed on all target servers.
2. The Target Directory must exist prior to the execution of the workflow. This directory can be local, or it can be a Network File System (NFS) mount point.

   Note: If you specify an NFS mount point, the pertinent NFS share must be available to the target server, and it must be mounted prior to running this workflow.
3. The specified Oracle Database user must have READ and WRITE permission for the specified Target Directory.
4. The Oracle Database software must be provisioned, and the database must exist in the target instance prior to workflow execution.

Note: For Data Pump workflows, you must specify the same Content and Encryption Password settings for the export and any subsequent import operations.

For more information about prerequisites for Oracle Database, refer to the Oracle Database Product Documentation on page 203.

How this Workflow Works

This topic contains the following information about the Refresh Oracle Database via Data Pump workflow:

Overview

This workflow imports a full Oracle database from a previously created Data Pump Export file (or files). The files can be located in the local file system or on a network share. You can use this workflow to implement a cross-platform database refresh (for example: Linux to Solaris).

Data Pump uses SQL commands to import and export specific data objects. It is slower than the Oracle Recovery Manager (RMAN) but offers more flexibility.

The workflow automatically detects which ORACLE_HOME and ORACLE_SID to use when performing the Data Pump import. You must specify the same encryption mode and password, compression level, and file size that was used for the export.

You have the option of providing a Data Pump parameter file or entering the parameters on the Deployment page. In either case, the parameter values are validated prior to the Data Pump import. If you do not provide a parameter file, the workflow creates one based on the parameter values that you specify on the Deployment page. If you do not specify a value for a particular parameter, the default value is used (see Parameters for Refresh Oracle Database via Data Pump on page 97).

You can use this workflow as part of a database refresh process. Database refresh involves moving the contents of a database in one Oracle instance into a database in another Oracle instance. This is useful, for example, if you want to move a database from a traditional IT infrastructure to a private cloud. It is also useful if you want to duplicate production data in a test environment for application development or troubleshooting purposes.

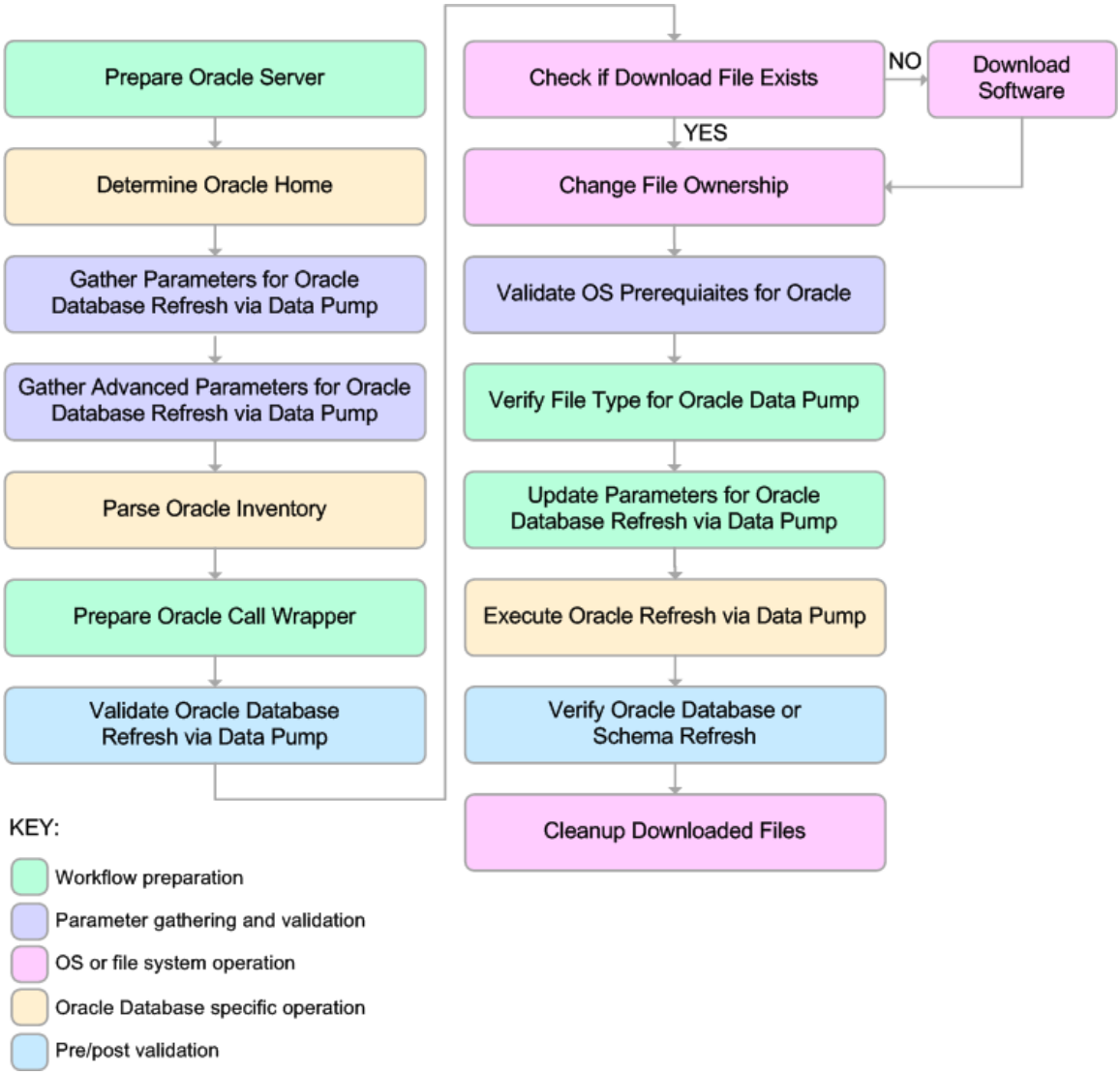
Validation Checks Performed

The workflow validates the following conditions:

1. The specified Oracle DB User can connect to and query the database specified in the Oracle SID.
2. Oracle Database version 10.2 (or later) is installed at the specified (or automatically detected) Oracle Home.
3. The Oracle DB User has permission to perform a full database export using the Data Pump utility. The Oracle Database user must have EXP_FULL_DATABASE permission.
4. A temporary directory required for file storage can be created on the target server.
5. The specified Ignorable Oracle Errors are, in fact, valid error codes.
6. The specified Data Pump Export File is a valid path and file name.
7. If a Data Pump Parameter file is specified, the file exists in the specified location.
8. The specified Target Directory exists, either locally or on a network share, and is writable.
9. The directory names included in the Do Not Remove list (if any) are valid.
10. The operating system on the target server is a supported HP DMA platform.
11. The specified Data Pump Export File was, indeed, created by Data Pump.

Steps Executed

The Refresh Oracle Database via Data Pump workflow includes the following steps. Each step must complete successfully before the next step can start. If a step fails, the workflow reports a failure, and all subsequent steps are skipped.



Process Flow

This workflow performs the following tasks:

1. Determines the target server platform type, and identifies the server call wrapper.
2. Determines the Oracle Home path and Oracle SID by reading the `oratab` file.
3. Gathers all required and optional parameters.
4. Determines the OS owner of the Oracle Home directory.
5. Prepares the instance call wrapper based on the specified Oracle User.
6. Validates all parameter values specified or derived.
7. Downloads the Data Pump Parameter File, SQL Verification Script, and SQL Verification Results (if specified) from the software repository.
8. Creates a Data Pump parameter file (or updates the existing parameter file) using values specified on the Deployment page. If you do not specify a value for a particular parameter, the default value is used.
9. Performs the Data Pump Import operation.
10. Checks the Import Log File to ensure that it does not contain any unexpected errors.
11. Verifies that the database is online after the import:
    - No corrupted blocks exist.
    - No files are in backup mode.
    - Temporary table space is available.
12. Runs the SQL Verification Script (if provided), and compares the results to the SQL Verification Results (must be provided if the script is provided).
13. Removes any temporary files and directories used to perform the import.

How to Run this Workflow

The following instructions show you how to customize and run the Refresh Oracle Database via Data Pump workflow in your environment.

The workflow provides default values for most parameters. These default values are usually sufficient for a "typical" export. You can override the defaults by specifying parameter values in the deployment. You can also expose additional parameters in the workflow, if necessary, to accomplish more advanced scenarios. Any parameters not explicitly specified in the deployment will have the default values listed in Parameters for Refresh Oracle Database via Data Pump on page 97

Note: Before following this procedure, review the Prerequisites for this Workflow, and ensure that all requirements are satisfied.

To use the Refresh Oracle Database via Data Pump workflow:

1. Create a deployable copy of the workflow (see Create a Deployable Workflow on page 17).
2. Determine the values that you will specify for the following parameters:

Parameter Name	Default Value	Required	Description
Data Pump Export Files	no default	required	Comma-separated list of Data Pump Export dump files included in the dump file set that will be used for this Data Pump Import. If only one file is specified, no comma is required.
Data Pump Parameter File	no default	optional	Name of the Data Pump Export parameter file that you provide. If you do not specify the absolute path to the Parameter File, the workflow will look for the file in the Target Directory. If you do not specify a Parameter File, default Data Pump Export settings will be used for parameters not specified in the deployment.
Oracle Account	no default	optional	Oracle user that owns the ORACLE_HOME on the target Oracle database server. Required if an inventory file does not exist. Leave blank for Windows.
Target Directory	no default	required	Directory where the RMAN backup files will be placed. This directory must exist prior to workflow execution. The specified Oracle User must have READ and WRITE permissions for this directory. This directory must be accessible to the target database server.

Note: This is the minimum set of parameters required to run this workflow. You may need to expose additional parameters depending on your provisioning objectives.

See Parameters for Refresh Oracle Database via Data Pump on page 97 for detailed descriptions of all input parameters for this workflow, including default values.

3. In the workflow editor, expose any additional parameters that you need (see How to Expose Additional Workflow Parameters on page 213). You will specify values for those parameters when you create the deployment.
4. Save the changes to the workflow (click **Save** in the lower right corner).
5. Create a new deployment (see Create a Deployment on page 18 for instructions).
6. On the Parameters tab, specify values for the required parameters listed in step 2 and any additional parameters that you have exposed.You do not need to specify values for those parameters whose default values are appropriate for your environment.
7. On the Targets tab, specify one or more targets for this deployment.
8. Save the deployment (click **Save** in the lower right corner).
9. Run the workflow using this deployment (see Run Your Workflow on page 19 for instructions).

To verify the results:

The workflow will complete and report SUCCESS on the Console if it has run successfully. If an error occurs during workflow execution, the error is logged, and the workflow terminates in the FAILURE state.

Sample Scenarios

This topic shows you how to use various parameters to achieve the following database backup scenarios in your environment using the Refresh Oracle Database via Data Pump workflow:

Scenario 1: Perform a Schema Import Using Default Settings and a Network Share Target Directory

This is the simplest Data Pump import scenario. In this example, the export file has been stored on a network share. The parameters shown here are visible by default.

In this scenario, the Data Pump Parameter File is not specified. The workflow will create its own parameter file using default values.

Parameter Name	Example Value	Description
Data Pump Export Files	`april302012export.dmp`	Comma-separated list of Data Pump Export dump files included in the dump file set that will be used for this Data Pump Import. If only one file is specified, no comma is required.
Oracle Account	`sysdba`	Oracle user that owns the ORACLE_HOME on the target Oracle database server where the Data Pump import will be performed. Required if inventory does not exist. Leave blank for windows.
Schema	`hr,sh,oe`	Tables that will be excluded from the import. For additional information, see the Update System Tables parameter (set in the Gather Advanced Parameters for Oracle Database Refresh via Data Pump step). This parameter is derived by the workflow. Under most circumstances, you should not change its mapping or its value.
Target Directory	`myfileserver.mycompany.com:/uo1/nfs_share`	Directory where the Data Pump dump and Parameter files will be staged on the target database server. This directory must be known to the Oracle instance.

Be sure that the default values for all remaining parameters are appropriate for your environment (see Parameters for Refresh Oracle Database via Data Pump on page 97).

Scenario 2: Perform a Schema Import Using a Parameter File that is Stored in the Software Repository

In this scenario, a Data Pump parameter file is used to specify all the Data Pump Import options—including the schemas that will be imported. In this case, the Data Pump Export file is located on a network share.

Parameter Name	Example Value	Description
Data Pump Export Files	`april302012export.dmp`	Comma-separated list of Data Pump Export dump files included in the dump file set that will be used for this Data Pump Import. If only one file is specified, no comma is required.
Data Pump Parameter File	`myDPparameters.par`	Name of the Data Pump Import parameter file that you provide. If you do not specify the absolute path to the Parameter File, the workflow will look for the file in the Target Directory. If you do not specify a Parameter File, default Data Pump Import settings will be used for parameters not specified in the deployment.
Oracle Account	`sysdba`	Oracle user that owns the ORACLE_HOME on the target Oracle database server where the Data Pump import will be performed. Required if inventory does not exist. Leave blank for windows.
Target Directory	`myfileserver.mycompany.com:/uo1/nfs_share`	Directory where the Data Pump dump and Parameter files will be staged on the target database server. This directory must be known to the Oracle instance.

Be sure that the default values for all remaining parameters are appropriate for your environment (see Parameters for Refresh Oracle Database via Data Pump on page 97).

Scenario 3: Perform a Schema Import Using Non-Default Parameters

The Refresh Oracle Database via Data Pump workflow provides many parameters that can be modified to suit your needs. For example, the Data Pump Export file might have been compressed or encrypted. You can instruct Data Pump how to proceed if it finds existing data in the database. You can also tell the workflow to ignore specific Oracle errors that might arise during the import but would have no bearing on its outcome.

In this example, the Data Pump Export file is stored on a network share. The first three parameters listed are visible by default; the remaining parameters must be exposed in the workflow so that they are available in the deployment (see How to Expose Additional Workflow Parameters on page 213).

Parameter Name	Example Value	Description
Data Pump Export Files	`april302012export.dmp`	Comma-separated list of Data Pump Export dump files included in the dump file set that will be used for this Data Pump Import. If only one file is specified, no comma is required.
Oracle Account	`sysdba`	Oracle user that owns the ORACLE_HOME on the target Oracle database server where the Data Pump import will be performed. Required if inventory does not exist. Leave blank for windows.
Target Directory	`myfileserver.mycompany.com:/uo1/nfs_share`	Directory where the Data Pump dump and Parameter files will be staged on the target database server. This directory must be known to the Oracle instance.

Parameter Name	Example Value	Description
Compression	DATA_ONLY	Items that are compressed in the Data Pump Export dump file set. Valid settings are ALL, NONE, DATA_ONLY, METADATA_ONLY. • DATA_ONLY: Only the table row data is compressed (must also specify DATA_ONLY or ALL for the Content parameter). • METADATA_ONLY: Only the database object definitions are compressed (must also specify METADATA_ONLY or ALL for the Content parameter). • ALL: Both the table row data and the database object definitions in the dump file set are compressed (must also specify ALL for the Content parameter). • NONE: Nothing is compressed in the dump file set. You must specify the same Compression setting for the export and any subsequent import operations. DATA_ONLY and ALL compression settings are only supported in Oracle Database Enterprise Edition version 11g. You must enable the Oracle Advanced Compression option to use these settings.

Parameter Name	Example Value	Description
Content	DATA_ONLY	What is included in the Data Pump Export dump file set. Valid settings are ALL, DATA_ONLY, or METADATA_ ONLY. • DATA_ONLY: Only table row data is included. Database object definitions are not included. • METADATA_ONLY: Only database object definitions are included. Table row data is not included. If you specify METADATA_ONLY, any index or table statistics later imported from the dump file set will be locked after the import. • ALL: Both table row data and database object definitions are included in the dump file set. You must specify the same Content setting for the export and any subsequent import operations.

Parameter Name	Example Value	Description
Encryption Mode	PASSWORD	This setting indicates how the dump file set was encrypted and how it can be decrypted during the Data Pump Import operation. Valid values are PASSWORD, TRANSPARENT, and DUAL. • PASSWORD: Data Pump Export used the Encryption Password to encrypt the dump file set. You must specify the same Encryption Password to perform a subsequent import. • TRANSPARENT: The Oracle encryption wallet was used to encrypt the dump file set using the Secure Sockets Layer (SSL) protocol. The encryption wallet must also be used to decrypt the dump file set during a subsequent import. You cannot specify an Encryption Password if you specify TRANSPARENT mode. • DUAL: During the import operation, the dump file set can be decrypted either transparently using the Oracle encryption wallet or by using the same Encryption Password that was used for the export. DUAL and TRANSPARENT mode are only supported in Oracle Database Enterprise Edition version 11g. **Note:** To use DUAL or TRANSPARENT mode, you must enable Oracle Advanced Security.

Parameter Name	Example Value	Description
Encryption Password	myencpwd **Tip:** To avoid having to re-enter passwords whenever they change, you can create a policy to provide them to the workflow (see How to Use a Policy to Specify Parameter Values on page 214).	Key that was used to ensure that any encrypted column data, metadata, or table data was re-encrypted before it was written to the dump file set. If you did not specify an Encryption Password for the Data Pump Export operation—or specify TRANSPARENT for the Encryption Mode—data was written to the dump files in clear text form. Note the following: • If you specified an Encryption Password for the export, and the Encryption Mode is PASSWORD, you must specify the same Encryption Password for any subsequent import operations. • The Encryption Password is required when Encryption Mode is PASSWORD or DUAL. • The Encryption Password is not valid when Encryption Mode is TRANSPARENT. • If you specify an Encryption Password but do not specify the Encryption Mode, the mode defaults to PASSWORD. This parameter is only supported in Oracle Database Enterprise Edition version 11g.

Parameter Name	Example Value	Description
File Size	16GB	Maximum size (in MByte) of each dump file in the dump file set. Specify an integer and one of the following units: B (bytes), KB (kilobytes), MB (megabytes), GB (gigabytes), or TB (terabytes). The default unit is bytes. The minimum valid file size is 4 kilobytes; the maximum valid file size is 16 terabytes. The actual size of a dump file may be slightly smaller depending on the size of the internal blocks used.
Oracle DB User	siteadmin	Database user account (if other than sysdba) that will be used to perform the Data Pump Import. **Note:** For Oracle Database 11g R2, this user must have the DATAPUMP_IMP_FULL_DATABASE role, or the workflow will fail. For earlier versioins, the user must have the IMP_FULL_DATABASE role.
Oracle DB User Password	siteadminpwd **Tip:** To avoid having to re-enter passwords whenever they change, you can create a policy to provide them to the workflow (see How to Use a Policy to Specify Parameter Values on page 214).	Required only if the DB User Password is not '/ as sysdba'.
Ignorable Oracle Errors	ORA-39111,ORA-39151,ORA-31685	Comma delimited list of Oracle errors to ignore while executing the Data Pump Import.

Parameter Name	Example Value	Description
Table Exist Action	REPLACE	This parameter tells the Data Pump Import utility what to do if a table that it is attempting to import already exists in the database. Valid values are: • SKIP leaves the table unchanged (no rows are imported from the dump file). • APPEND adds the rows from the dump file and leaves the existing rows unchanged. • TRUNCATE deletes the existing rows from the table and adds the rows from the dump file. • REPLACE removes the existing table and recreates it from the dump file. **Note:** SKIP and REPLACE are not valid options if Content is DATA_ONLY.
Temporary File Location	`/var/temp/DP_temp_files`	Location to store temporary files while the workflow is running.

Be sure that the default values for all remaining parameters are appropriate for your environment (see Parameters for Refresh Oracle Database via Data Pump on the next page).

Parameters for Refresh Oracle Database via Data Pump

The following tables describe the required and optional input parameters for this workflow. Some of these parameters may not be initially visible in a deployment (see How to Expose Additional Workflow Parameters on page 213). For most parameters, if you do not specify a value for a parameter, a default value is assigned.

Parameters whose values are derived in one step and consumed by another step are not shown here.

Parameters Defined in this Step: Gather Parameters for Oracle Database Refresh via Data Pump

Parameter Name	Default Value	Required	Description
Data Pump Export Files	no default	required	Comma-separated list of Data Pump Export dump files included in the dump file set that will be used for this Data Pump Import. If only one file is specified, no comma is required.
Data Pump Parameter File	no default	optional	Name of the Data Pump Import parameter file that you provide. If you do not specify the absolute path to the Parameter File, the workflow will look for the file in the Target Directory. If you do not specify a Parameter File, default Data Pump Import settings will be used for parameters not specified in the deployment.
Inventory Files	see description	optional	Comma separated list of Oracle inventory file names (with absolute paths). If not specified, set to the appropriate default value for the target server operating system. Defaults are: Solaris: `/var/opt/oracle/oraInst.loc` Linux: `/etc/oraInst.loc` Windows: `%ProgramFiles%\Oracle\Inventory`
Oracle Account	no default	optional	Oracle user that owns the ORACLE_HOME on the target Oracle database server. Required if an inventory file does not exist. Leave blank for Windows.
Oracle Home	no default	optional	The ORACLE_HOME to use if more than one home is found in the inventory file (or files).
Oracle SID	no default	required	The Oracle System ID (SID) of the target database.

Parameters Defined in this Step: Gather Parameters for Oracle Database Refresh via Data Pump (continued)

Parameter Name	Default Value	Required	Description

Server Wrapper	jython	required	Command that will be used to construct the call wrapper. The workflow uses the call wrapper to execute subsequent steps as either the OS administrative user or the Oracle user who owns the pertinent ORACLE_HOME. For example:
			`sudo su - root /opt/hp/dma/client/bin/jython.sh`
			`sudo su - sysdba /opt/hp/dma/client/bin/jython.sh`

Target Directory	no default	required	Directory where the Data Pump Export dump file set and the Parameter file will be staged on the target database server. This directory must be known to the Oracle instance.

Parameters Defined in this Step: Gather Advanced Parameters for Oracle Database Refresh via Data Pump

Parameter Name	Default Value	Required	Description
Content	ALL	optional	What is included in the Data Pump dump file set that will be imported. Valid settings are ALL, DATA_ONLY, or METADATA_ONLY. • DATA_ONLY: Include only table row data. Do not include database object definitions. • METADATA_ONLY: Include only database object definitions. Do not include table row data. If you specify METADATA_ONLY, any index or table statistics later imported from the dump file set will be locked after the import. • ALL: Include both table row data and database object definitions in the dump file set. You must specify the same Content setting for the export and any subsequent import operations.

Parameters Defined in this Step: Gather Advanced Parameters for Oracle Database Refresh via Data Pump (continued)

Parameter Name	Default Value	Required	Description
Encryption Password	no default	optional	This setting determines how the dump file set that will be imported should be decrypted. Valid values are PASSWORD, TRANSPARENT, and DUAL. • PASSWORD: Data Pump Export used the Encryption Password to encrypt the dump file set. You must specify the same Encryption Password to perform a subsequent import. • TRANSPARENT: The Oracle encryption wallet was used to encrypt the dump file set using the Secure Sockets Layer (SSL) protocol. The encryption wallet must also be used to decrypt the dump file set during the import. You cannot specify an Encryption Password if you specify TRANSPARENT mode. • DUAL: The dump file set can either be decrypted transparently using the Oracle encryption wallet, or it can be decrypted by using the same Encryption Password that was used for the export. DUAL and TRANSPARENT mode are only supported in Oracle Database Enterprise Edition version 11g. **Note:** To use DUAL or TRANSPARENT mode, you must enable Oracle Advanced Security.
Ignorable Oracle Errors	ORA-31684,ORA-39111,ORA-39151,ORA-31685,ORA-00001	optional	Comma delimited list of Oracle errors to ignore while executing the Data Pump Import.
Oracle DB User	no default	optional	Database user account (if other than sysdba) that will be used to perform the Data Pump Import. **Note:** For Oracle Database 11g R2, this user must have the DATAPUMP_IMP_FULL_DATABASE role, or the workflow will fail. For earlier versioins, the user must have the IMP_FULL_DATABASE role.

Parameters Defined in this Step: Gather Advanced Parameters for Oracle Database Refresh via Data Pump (continued)

Parameter Name	Default Value	Required	Description
Oracle DB User Password	/ as sysdba	optional	Password for the Oracle DB User. This is required when this user is not sysdba.
Table Exist Action	SKIP	optional	This parameter tells the Data Pump Import utility what to do if a table that it is attempting to import already exists in the database. Valid values are: • SKIP leaves the table unchanged (no rows are imported from the dump file). • APPEND adds the rows from the dump file and leaves the existing rows unchanged. • TRUNCATE deletes the existing rows from the table and adds the rows from the dump file. • REPLACE removes the existing table and recreates it from the dump file. **Note:** SKIP and REPLACE are not valid options if Content is DATA_ONLY.
Update System Tables	FALSE	optional	Determines whether the system tables are updated during the Data Pump Import. If TRUE, all system tables will be included in the import. If FALSE, the SYS and SYSMGR tables are excluded from the import. This is useful, because importing these tables often generates numerous errors, each of which must otherwise be added to the Ignorable Oracle Errors list. You can explicitly specify a list of tables to be excluded from the import by using the Schema parameter in the Update Parameters for Oracle Database Refresh via Data Pump step.
Verification Result	no default	optional	Name (with absolute path) of a text file containing the expected results of the SQL queries included in the Verification SQL Script. This parameter is required if you provide a Verification SQL Script. Be sure to run the Verification SQL Script on the SOURCE database before running this workflow, and copy the results into this file. You must provide this file in a location where the workflow can access it.

Parameters Defined in this Step: Gather Advanced Parameters for Oracle Database Refresh via Data Pump (continued)

Parameter Name	Default Value	Required	Description
Verification SQL Script	no default	optional	Name (with absolute path) of a text file containing a SQL script that verifies the integrity of the database. You must provide this file in a location where the workflow can access it. The expected results of the queries included in this script must be provided in the Verification Result file.

Export and Refresh Oracle Database via Data Pump

This workflow performs a database schema refresh using the Oracle Data Pump Utility. It exports the contents of one or more specific schemas in one Oracle instance (the SOURCE) and imports them into a database in another Oracle instance (the DESTINATION). You can use this workflow to implement a cross-platform database refresh (for example: Linux to Solaris).

Data Pump uses SQL commands to import and export specific data objects. It is slower than the Oracle Recovery Manager (RMAN) but offers more flexibility.

The workflow automatically detects which ORACLE_HOME and ORACLE_SID to use when performing the Data Pump export and import operations.

You have the option of either providing Data Pump parameter files or entering the parameters on the Deployment page. In either case, the parameter values are validated prior to the Data Pump operation export and import operations. If you do not provide a parameter file, the workflow creates one based on the parameter values that you specify on the Deployment page. If you do not specify a value for a particular parameter, the default value is used (see Parameters for Export and Refresh Oracle Schema via Data Pump on page 194).

Note: This workflow is a bridged execution workflow. You specify the SOURCE and DESTINATION targets at run-time.

To use this workflow in your environment, see the following information:

Topic	Information Included
Prerequisites for this Workflow	List of prerequisites that must be satisfied before you can run this workflow
How this Workflow Works	Information about what the workflow does, including validation checks performed, steps executed, and a high-level process flow
How to Run this Workflow	Instructions for running this workflow in your environment
Sample Scenarios	Examples of typical parameter values for this workflow
Parameters for Export and Refresh Oracle Database via Data Pump	List of input parameters for this workflow

Note: To view the steps included in this workflow, see the Steps for Export and Refresh Oracle Database via Data Pump.

Prerequisites for this Workflow

Be sure that the following prerequisites are satisfied before you run the Export and Refresh Oracle Database via Data Pump workflow:

1. The HP DMA client must be installed on all target servers.
2. The Target Directory must exist prior to the execution of the workflow. This directory can be local, or it can be a Network File System (NFS) mount point.

   Note: If you specify an NFS mount point, the pertinent NFS share must be available to the target server, and it must be mounted prior to running this workflow.

3. The specified Oracle Database user must have READ and WRITE permission for the specified Target Directory.
4. The Oracle Database software must be provisioned, and the database must exist in the target instance prior to workflow execution.

Note: For Data Pump workflows, you must specify the same Content and Encryption Password settings for the export and any subsequent import operations.

For more information about prerequisites for Oracle Database, refer to the Oracle Database Product Documentation on page 203.

How this Workflow Works

This topic contains the following information about the Export and Refresh Oracle Database via Data Pump workflow:

Overview

This workflow performs a database schema refresh using the Oracle Data Pump Utility. It exports the contents of one or more specific schemas in one Oracle instance (the SOURCE) and imports them into a database in another Oracle instance (the DESTINATION). You can use this workflow to implement a cross-platform database refresh (for example: Linux to Solaris).

Data Pump uses SQL commands to import and export specific data objects. It is slower than the Oracle Recovery Manager (RMAN) but offers more flexibility.

The workflow automatically detects which ORACLE_HOME and ORACLE_SID to use when performing the Data Pump export and import operations.

You have the option of either providing Data Pump parameter files or entering the parameters on the Deployment page. In either case, the parameter values are validated prior to the Data Pump operation export and import operations. If you do not provide a parameter file, the workflow creates one based on the parameter values that you specify on the Deployment page. If you do not specify a value for a particular parameter, the default value is used (see Parameters for Export and Refresh Oracle Schema via Data Pump on page 194).

Note: This workflow is a bridged execution workflow. You specify the SOURCE and DESTINATION targets at run-time.

Validation Checks Performed

The workflow validates the following conditions on the SOURCE target:

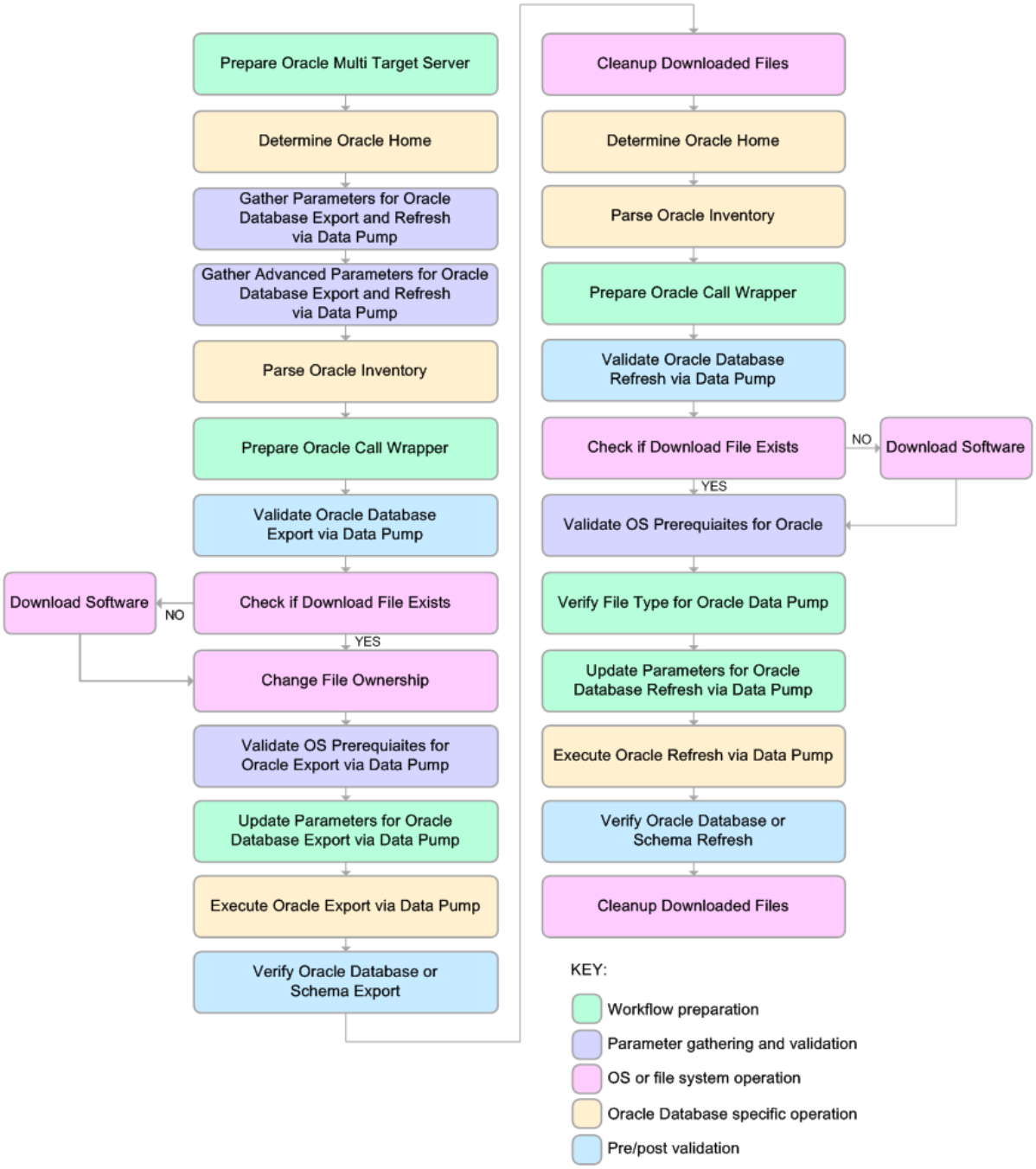
1. The specified Oracle DB User can connect to and query the database specified in the Oracle SID.
2. Oracle Database version 10.2 (or later) is installed at the specified (or automatically detected) Oracle Home.
3. The Oracle DB User has permission to perform a full database export using the Data Pump utility. The Oracle Database user must have EXP_FULL_DATABASE permission.
4. A temporary directory required for file storage can be created on the target server.
5. The specified Ignorable Oracle Errors are, in fact, valid error codes.
6. If a Data Pump Parameter file is specified, the file exists in the specified location.
7. The specified Target Directory exists, either locally or on a network share, and is writable.
8. The directory names included in the Do Not Remove list (if any) are valid.
9. The operating system on the target server is a supported HP DMA platform.

After the workflow successfully performs the Data Pump Export on the SOURCE target, it validates the following conditions on the DESTINATION target:

1. The specified Oracle DB User can connect to and query the database specified in the Oracle SID.
2. Oracle Database version 10.2 (or later) is installed at the specified (or automatically detected) Oracle Home.
3. The Oracle DB User has permission to perform a full database export using the Data Pump utility.
4. A temporary directory required for file storage can be created on the target server.
5. The specified Ignorable Oracle Errors are, in fact, valid error codes.
6. If a Data Pump Parameter file is specified, the file exists in the specified location.
7. The specified Target Directory exists, either locally or on a network share, and is writable.
8. The directory names included in the Do Not Remove list (if any) are valid.
9. The operating system on the target server is a supported HP DMA platform.

Steps Executed

The Export and Refresh Oracle Database via Data Pump workflow includes the following steps. Each step must complete successfully before the next step can start. If a step fails, the workflow reports a failure, and all subsequent steps are skipped.



Process Flow

This workflow performs the following tasks on the SOURCE target server:

1. Determines the target server platform type, and identifies the server call wrapper.
2. Determines the Oracle Home path and Oracle SID by reading the `oratab` file.
3. Gathers all required and optional parameters.
4. Determines the OS owner of the Oracle Home directory.
5. Prepares the instance call wrapper based on the specified Oracle User.
6. Validates all parameter values specified or derived.
7. Downloads the Data Pump Parameter File (if specified) from the software repository.
8. Creates a Data Pump parameter file (or updates the existing parameter file) using values specified on the Deployment page. If you do not specify a value for a particular parameter, the default value is used.
9. Performs the Data Pump Export operation.
10. Verifies that the database is back online after the export:
    - No corrupted blocks exist.
    - No files are in backup mode.
    - Temporary table space is available.
11. Verifies that the Data Pump Export File exists in the Target Directory.
12. Removes any temporary files and directories used to perform the export.

The workflow then performs the following tasks on the DESTINATION target server:

1. Determines the target server platform type, and identifies the server call wrapper.
2. Determines the Oracle Home path and Oracle SID by reading the `oratab` file.
3. Gathers all required and optional parameters.
4. Determines the OS owner of the Oracle Home directory.
5. Prepares the instance call wrapper based on the specified Oracle User.
6. Validates all parameter values specified or derived.
7. Downloads the Data Pump Parameter File, SQL Verification Script, and SQL Verification Results (if specified) from the software repository.
8. Creates a Data Pump parameter file (or updates the existing parameter file) using values specified on the Deployment page. If you do not specify a value for a particular parameter, the default value is used.
9. Performs the Data Pump Import operation.
10. Checks the Import Log File to ensure that it does not contain any unexpected errors.

11. Verifies that the database is online after the import:
    - No corrupted blocks exist.
    - No files are in backup mode.
    - Temporary table space is available.
12. Runs the SQL Verification Script (if provided), and compares the results to the SQL Verification Results (must be provided if the script is provided).
13. Removes any temporary files and directories used to perform the import.

How to Run this Workflow

The following instructions show you how to customize and run the Export and Refresh Oracle Database via Data Pump workflow in your environment.

The workflow provides default values for most parameters. These default values are usually sufficient for a "typical" export. You can override the defaults by specifying parameter values in the deployment. You can also expose additional parameters in the workflow, if necessary, to accomplish more advanced scenarios. Any parameters not explicitly specified in the deployment will have the default values listed in Parameters for Export and Refresh Oracle Database via Data Pump on page 121

Note: Before following this procedure, review the Prerequisites for this Workflow, and ensure that all requirements are satisfied.

To use the Export and Refresh Oracle Database via Data Pump workflow:

1. Create a deployable copy of the workflow (see Create a Deployable Workflow on page 17).
2. Determine the values that you will specify for the following parameters:

Parameter Name	Default Value	Required	Description
EXPORT - Data Pump Parameter File	no default	optional	Name of the Data Pump Export parameter file that you provide. If you do not specify the absolute path to the EXPORT- Data Pump Parameter File, the workflow will look for the file in the EXPORT - Target Directory. If you do not specify an EXPORT- Parameter File at all, default Data Pump Export settings will be used for parameters not specified in the deployment.
EXPORT - Oracle Account	no default	optional	Oracle user that owns the ORACLE_HOME on the SOURCE database server. Required if an inventory file does not exist. Leave blank for Windows.
EXPORT - Target Directory	no default	required	Staging directory path known to the SOURCE database server and shared with the DESTINATION database server. This is the path to the NFS mount point as known by the SOURCE database server.
IMPORT - Data Pump Parameter File	no default	optional	Name of the Data Pump Import parameter file that you provide. If you do not specify the absolute path to the Parameter File, the workflow will look for the file in the IMPORT - Target Directory. If you do not specify a Parameter File, default Data Pump Import settings will be used for parameters not specified in the deployment.
IMPORT - Oracle Account	no default	optional	Oracle user that owns the ORACLE_HOME on the DESTINATION database server. Required if an inventory file does not exist. Leave blank for Windows.

Parameter Name	Default Value	Required	Description
IMPORT - Target Directory	no default	required	Staging directory path known to the DESTINATION database server and shared with the SOURCE database server. This is the path to the NFS mount point as known by the DESTINATION database server.

Note: This is the minimum set of parameters required to run this workflow. You may need to expose additional parameters depending on your provisioning objectives.

See Parameters for Export and Refresh Oracle Database via Data Pump on page 121 for detailed descriptions of all input parameters for this workflow, including default values.

3. In the workflow editor, expose any additional parameters that you need (see How to Expose Additional Workflow Parameters on page 213). You will specify values for these parameters when you create the deployment.
4. Save the changes to the workflow (click **Save** in the lower right corner).
5. Create a new deployment (see Create a Deployment on page 18 for instructions).
   a. On the Targets tab, select all the target servers—both source and destination—that will participate in this database refresh. The targets that you select here will be available in the Target Parameters drop-down menus on the Run page (see step 7).
   b. On the Parameters tab, specify values for the required parameters listed in step 2 and any additional parameters that you exposed in step 3.You do not need to specify values for those parameters whose default values are appropriate for your environment.
6. Save the deployment (click **Save** in the lower right corner).
7. Run the workflow using this deployment (see Run Your Workflow on page 19 for instructions).

   On the Run page, select the following targets from the respective drop-down menus:

Parameter Name	Default	Description
Source	no default	Instance that contains the database whose contents will be exported.
Destination	no default	Instance where the database will be imported.

To verify the results:

The workflow will complete and report SUCCESS on the Console if it has run successfully. If an error occurs during workflow execution, the error is logged, and the workflow terminates in the FAILURE state.

Sample Scenarios

This topic shows you how to use various parameters to achieve the following database backup scenarios in your environment using the Export and Refresh Oracle Database via Data Pump workflow:

Scenario 1: Perform an Import Using Default Settings and a Network Share Target Directory

This is the simplest Data Pump database refresh scenario. In this example, the export file is stored on a network share to minimize data transfer overhead. The parameters shown here are visible by default.

In this scenario, the Data Pump Parameter File is not specified for either the export or the import. The workflow will create its own parameter files using default values. The Oracle Account parameter is also not specified; it will be obtained from the Oracle inventory file (typically `oratab`) on the SOURCE and DESTINATION target servers, respectively.

Parameter Name	Example Value	Description
EXPORT - Target Directory	`myfileserver.mycompany.com:/uo1/nfs_share`	Staging directory path known to the SOURCE database server and shared with the DESTINATION database server. This is the path to the NFS mount point as known by the SOURCE database server.
IMPORT - Target Directory	`myfileserver.mycompany.com:/uo1/nfs_share`	Staging directory path known to the DESTINATION database server and shared with the SOURCE database server. This is the path to the NFS mount point as known by the DESTINATION database server.

Be sure that the default values for all remaining parameters are appropriate for your environment (see Parameters for Export and Refresh Oracle Database via Data Pump on page 121).

Scenario 2: Perform an Import Using Non-Default Parameters

The Export and Refresh Oracle Database via Data Pump on page 102 workflow provides many parameters that can be modified to suit your needs. For example, you can compress or encrypt the Data Pump Export file. You can specify the type of content that should be refreshed, and you can instruct Data Pump about how to proceed if it finds existing data in the DESTINATION database. You can also tell the workflow to ignore specific Oracle errors that might arise during the export or the import but would have no bearing on its outcome.

Again in this scenario, the Data Pump Parameter File is not specified for either the export or the import. The workflow will create its own parameter files using default values. The Oracle Account parameter is also not specified; it will be obtained from the Oracle inventory file (typically `oratab`) on the SOURCE and DESTINATION target servers, respectively.

Here, the Data Pump Export file is stored on a network share to minimize data transfer overhead.

The first six parameters listed are visible by default; the remaining parameters must be exposed in the workflow so that they are available in the deployment (see How to Expose Additional Workflow Parameters on page 213).

Parameter Name	Example Value	Description
EXPORT - Target Directory	`myfileserver.mycompany.com:/uo1/nfs_share`	Staging directory path known to the SOURCE database server and shared with the DESTINATION database server. This is the path to the NFS mount point as known by the SOURCE database server.
IMPORT - Target Directory	`myfileserver.mycompany.com:/uo1/nfs_share`	Staging directory path known to the DESTINATION database server and shared with the SOURCE database server. This is the path to the NFS mount point as known by the DESTINATION database server.

Parameter Name	Example Value	Description
ALL - Content	DATA_ONLY	What to export and subsequently import. Valid settings are ALL, DATA_ONLY, or METADATA_ONLY. • DATA_ONLY: Include only table row data. Do not include database object definitions. • METADATA_ONLY: Include only database object definitions. Do not include table row data. If you specify METADATA_ONLY, any index or table statistics later imported from the dump file set will be locked after the import. • ALL: Include both table row data and database object definitions in the dump file set.

Parameter Name	Example Value	Description
EXPORT - Compression	DATA_ONLY	Items that will be compressed in the Data Pump Export dump file set. Valid settings are ALL, NONE, DATA_ONLY, METADATA_ONLY. • DATA_ONLY: Compress only the table row data (must specify DATA_ ONLY or ALL for the Content parameter). • METADATA_ONLY: Compress only the database object definitions (must specify METADATA_ONLY or ALL for the Content parameter). • ALL: Compress both the table row data and the database object definitions in the dump file set (must specify ALL for the Content parameter). • NONE: Nothing is compressed in the dump file set. You must specify the same Compression setting for the export and subsequent import operations. DATA_ONLY and ALL compression settings are only supported in Oracle Database Enterprise Edition version 11g. You must enable the Oracle Advanced Compression option to use these settings.

Parameter Name	Example Value	Description
EXPORT - Encryption Mode	PASSWORD	This setting determines how the dump file set will be encrypted and how it can later be decrypted during the subsequent import operation. Valid values are PASSWORD, TRANSPARENT, and DUAL. • PASSWORD: Data Pump Export uses the Encryption Password to encrypt the dump file set. You must specify the same Encryption Password to perform a subsequent import. • TRANSPARENT: The Oracle encryption wallet is used to encrypt the dump file set using the Secure Sockets Layer (SSL) protocol. The encryption wallet must also be used to decrypt the dump file set during a subsequent import. You cannot specify an Encryption Password if you specify TRANSPARENT mode. • DUAL: During a subsequent import operation, the dump file set can either be decrypted transparently using the Oracle encryption wallet, or it can be decrypted by using the same Encryption Password that was used for the export. DUAL and TRANSPARENT mode are only supported in Oracle Database Enterprise Edition version 11g. **Note:** To use DUAL or TRANSPARENT mode, you must enable Oracle Advanced Security.

Parameter Name	Example Value	Description
ALL - Encryption Password	myencpwd **Tip:** To avoid having to re-enter passwords whenever they change, you can create a policy to provide them to the workflow (see How to Use a Policy to Specify Parameter Values on page 214).	Key used to ensure that any encrypted column data, metadata, or table data is re-encrypted before it is written to the dump file set. If you do not specify an Encryption Password—or specify TRANSPARENT for the Encryption Mode in the Parameter File—data will be written to the dump files in clear text form. Note the following: • The Encryption Password is required when Encryption Mode is PASSWORD or DUAL. • The Encryption Password is not valid when Encryption Mode is TRANSPARENT. This parameter is only supported in Oracle Database Enterprise Edition version 11g
EXPORT - File Size	16GB	Maximum size of each dump file in the dump file set. If any file in the dump file set reaches this size, that file is closed, and Data Pump attempts to create a new file. Specify an integer and one of the following units: B (bytes), KB (kilobytes), MB (megabytes), GB (gigabytes), or TB (terabytes). The default unit is bytes. The minimum valid file size is 4 kilobytes; the maximum valid file size is 16 terabytes. The actual size of a dump file may be slightly smaller depending on the size of the internal blocks used.

Parameter Name	Example Value	Description
EXPORT - Oracle DB User	prodadmin	SOURCE database user account that will be used to perform the Data Pump Export. **Note:** For Oracle Database 11g R2, this user must have the DATAPUMP_EXP_FULL_DATABASE and DATAPUMP_EXP_FULL_DATABASE roles. For earlier versions, the user must have the EXP_FULL_DATABASE and EXP_FULL_DATABASE roles.
EXPORT - Oracle DB User Password	prodadminpwd **Tip:** To avoid having to re-enter passwords whenever they change, you can create a policy to provide them to the workflow (see How to Use a Policy to Specify Parameter Values on page 214).	Password for the SOURCE Oracle database user specified in the EXPORT-Oracle DB User parameter. This is required when this user is not sysdba.
IMPORT - Oracle DB User	testadmin	DESTINATION database user account that will be used to perform the Data Pump Import. **Note:** For Oracle Database 11g R2, this user must have the DATAPUMP_IMP_FULL_DATABASE and DATAPUMP_IMP_FULL_DATABASE roles. For earlier versions, the user must have the IMP_FULL_DATABASE and IMP_FULL_DATABASE roles.

Parameter Name	Example Value	Description
IMPORT - Oracle DB User Password	testadminpwd **Tip:** To avoid having to re-enter passwords whenever they change, you can create a policy to provide them to the workflow (see How to Use a Policy to Specify Parameter Values on page 214).	Password for the DESTINATION Oracle database user specified in the IMPORT- Oracle DB User parameter. This is required when this user is not sysdba.
ALL - Ignorable Oracle Errors	ORA-39111,ORA-39151,ORA-31685	Comma delimited list of Oracle errors to ignore while executing the export and subsequent import.
IMPORT - Table Exist Action	REPLACE	This parameter tells the Data Pump Import utility what to do if a table that it is attempting to import already exists in the database. Valid values are: • SKIP leaves the table unchanged (no rows are imported from the dump file). • APPEND adds the rows from the dump file and leaves the existing rows unchanged. • TRUNCATE deletes the existing rows from the table and adds the rows from the dump file. • REPLACE removes the existing table and recreates it from the dump file. **Note:** SKIP and REPLACE are not valid options if ALL - Content is DATA_ONLY.

Parameter Name	Example Value	Description
IMPORT - Verification Result	`/var/dp/sql_ver_results`	Name (with absolute path) of a text file containing the expected results of the SQL queries included in the Verification SQL Script. This parameter is required if you provide a Verification SQL Script. Be sure to run the Verification SQL Script on the SOURCE database before running this workflow, and copy the results into this file. You must provide this file in a location where the workflow can access it.
IMPORT - Verification SQL Script	`/var/dp/sql_ver_script`	Name (with absolute path) of a text file containing a SQL script that verifies the following on the DESTINATION database: • The import operation was successful. • No data is missing. You must provide this file in a location where the workflow can access it. The expected results of the queries included in this script must be provided in the Verification Result file.

Be sure that the default values for all remaining parameters are appropriate for your environment (see Parameters for Export and Refresh Oracle Database via Data Pump on page 121).

Scenario 3: Perform an Import Using Parameter Files that are Stored in the Software Repository

In this scenario,the Data Pump Parameter Files that contain all the non-default parameter settings for the import and export, respectively, are specified. The Oracle Account parameter is not specified; it will be obtained from the Oracle inventory file (typically `oratab`).

Parameter Name	Example Value	Description
EXPORT - Data Pump Parameter File	`DPExportParameters.par`	Name of the Data Pump Export parameter file that you provide. If you do not specify the absolute path to the EXPORT- Data Pump Parameter File, the workflow will look for the file in the EXPORT - Target Directory. If you do not specify an EXPORT- Parameter File at all, default Data Pump Export settings will be used for parameters not specified in the deployment.
EXPORT - Target Directory	`myfileserver.mycompany.com:/uo1/nfs_share`	Staging directory path known to the SOURCE database server and shared with the DESTINATION database server. This is the path to the NFS mount point as known by the SOURCE database server.
IMPORT - Data Pump Parameter File	`DPImportParameters.par`	Name of the Data Pump Import parameter file that you provide. If you do not specify the absolute path to the Parameter File, the workflow will look for the file in the IMPORT - Target Directory. If you do not specify a Parameter File, default Data Pump Import settings will be used for parameters not specified in the deployment.
IMPORT - Target Directory	`myfileserver.mycompany.com:/uo1/nfs_share`	Staging directory path known to the DESTINATION database server and shared with the SOURCE database server. This is the path to the NFS mount point as known by the DESTINATION database server.

Be sure that the default values for all remaining parameters are appropriate for your environment (see Parameters for Export and Refresh Oracle Database via Data Pump on the next page).

Parameters for Export and Refresh Oracle Database via Data Pump

The following tables describe the required and optional input parameters for this workflow. Some of these parameters may not be initially visible in a deployment (see How to Expose Additional Workflow Parameters on page 213). For most parameters, if you do not specify a value for a parameter, a default value is assigned.

Parameters whose values are derived in one step and consumed by another step are not shown here.

Parameters Defined in this Step: Gather Parameters for Oracle Database Refresh via Data Pump

Parameter Name	Default Value	Required	Description
EXPORT - Data Pump Parameter File	no default	optional	Name of the Data Pump Export parameter file that you provide. If you do not specify the absolute path to the EXPORT- Data Pump Parameter File, the workflow will look for the file in the EXPORT - Target Directory. If you do not specify an EXPORT- Parameter File at all, default Data Pump Export settings will be used for parameters not specified in the deployment.
EXPORT - Inventory Files	see description	optional	Comma-separated list of fully qualified Oracle inventory files on the SOURCE database server. Defaults are as follows: Solaris: `/var/opt/oracle/oraInst.loc` Linux: `/etc/oraInst.loc` Windows: `%ProgramFiles%\Oracle\Inventory`
EXPORT - Oracle Account	no default	optional	Oracle user that owns the ORACLE_HOME on the SOURCE database server. Required if an inventory file does not exist. Leave blank for Windows.
EXPORT - Target Directory	no default	required	Staging directory path known to the SOURCE database server and shared with the DESTINATION database server. This is the path to the NFS mount point as known by the SOURCE database server.
IMPORT - Data Pump Parameter File	no default	optional	Name of the Data Pump Import parameter file that you provide. If you do not specify the absolute path to the Parameter File, the workflow will look for the file in the IMPORT - Target Directory. If you do not specify a Parameter File, default Data Pump Import settings will be used for parameters not specified in the deployment.

Parameters Defined in this Step: Gather Parameters for Oracle Database Refresh via Data Pump (continued)

Parameter Name	Default Value	Required	Description
IMPORT - Inventory Files	see description	optional	Comma-separated list of fully qualified Oracle inventory files on the DESTINATION database server. Defaults are as follows: Solaris: `/var/opt/oracle/oraInst.loc` Linux: `/etc/oraInst.loc` Windows: `%ProgramFiles%\Oracle\Inventory`
IMPORT - Oracle Account	no default	optional	Oracle user that owns the ORACLE_HOME on the DESTINATION database server. Required if an inventory file does not exist. Leave blank for Windows.
IMPORT - Target Directory	no default	required	Staging directory path known to the DESTINATION database server and shared with the SOURCE database server. This is the path to the NFS mount point as known by the DESTINATION database server.

Server Wrapper	jython	required	Command that will be used to construct the call wrapper. The workflow uses the call wrapper to execute subsequent steps as either the OS administrative user or the Oracle user who owns the pertinent ORACLE_HOME. For example:
			`sudo su - root /opt/hp/dma/client/bin/jython.sh`
			`sudo su - sysdba /opt/hp/dma/client/bin/jython.sh`

Parameters Defined in this Step: Gather Advanced Parameters for Oracle Database Refresh via Data Pump

Parameter Name	Default Value	Required	Description
ALL - Content	ALL	optional	What to export and subsequently import. Valid settings are ALL, DATA_ONLY, or METADATA_ONLY. • DATA_ONLY: Include only table row data. Do not include database object definitions. • METADATA_ONLY: Include only database object definitions. Do not include table row data. If you specify METADATA_ONLY, any index or table statistics later imported from the dump file set will be locked after the import. • ALL: Include both table row data and database object definitions in the dump file set.
ALL - Encryption Password	no default	optional	Key used to ensure that any encrypted column data, metadata, or table data is re-encrypted before it is written to the dump file set. If you do not specify an Encryption Password—or specify TRANSPARENT for the Encryption Mode in the Parameter File—data will be written to the dump files in clear text form. Note the following: • The Encryption Password is required when Encryption Mode is PASSWORD or DUAL. • The Encryption Password is not valid when Encryption Mode is TRANSPARENT. This parameter is only supported in Oracle Database Enterprise Edition version 11g

Parameters Defined in this Step: Gather Advanced Parameters for Oracle Database Refresh via Data Pump (continued)

Parameter Name	Default Value	Required	Description
ALL - Ignorable Oracle Errors	ORA-31684,ORA-39111,ORA-39151,ORA-31685,ORA-00001,RMAN-00571,RMAN-00569,RMAN-03002,RMAN-06054	optional	Comma delimited list of Oracle errors to ignore while executing the export and subsequent import.
EXPORT - Compression	ALL	optional	Items that will be compressed in the Data Pump Export dump file set. Valid settings are ALL, NONE, DATA_ONLY, METADATA_ONLY. • DATA_ONLY: Compress only the table row data (must specify DATA_ONLY or ALL for the Content parameter). • METADATA_ONLY: Compress only the database object definitions (must specify METADATA_ONLY or ALL for the Content parameter). • ALL: Compress both the table row data and the database object definitions in the dump file set (must specify ALL for the Content parameter). • NONE: Nothing is compressed in the dump file set. You must specify the same Compression setting for the export and subsequent import operations. DATA_ONLY and ALL compression settings are only supported in Oracle Database Enterprise Edition version 11g. You must enable the Oracle Advanced Compression option to use these settings.
EXPORT - Data Pump Export File Name	no default	optional	Name of the Data Pump Export dump file (or files) that will be created from an existing Oracle database. A timestamp is appended to the file name (or names) that you specify. If you do not specify a file name, a default file name (or list of names) is generated.

Parameters Defined in this Step: Gather Advanced Parameters for Oracle Database Refresh via Data Pump (continued)

Parameter Name	Default Value	Required	Description
EXPORT - Encryption Mode	Default depends on the other encryption settings. Assuming that ENCRYPTION is true: • If Encryption Password is specified, and the Oracle encryption wallet is open, default is DUAL. • If Encryption Password is specified, and the wallet is closed, default is PASSWORD. • If Encryption Password is not specified, and the wallet is open, default is TRANSPARENT. • If Encryption Password is not specified, and the wallet is closed, the Data Pump Export operation returns an error.	optional	This setting determines how the dump file set will be encrypted and how it can later be decrypted during the subsequent import operation. Valid values are PASSWORD, TRANSPARENT, and DUAL. • PASSWORD: Data Pump Export uses the Encryption Password to encrypt the dump file set. You must specify the same Encryption Password to perform a subsequent import. • TRANSPARENT: The Oracle encryption wallet is used to encrypt the dump file set using the Secure Sockets Layer (SSL) protocol. The encryption wallet must also be used to decrypt the dump file set during a subsequent import. You cannot specify an Encryption Password if you specify TRANSPARENT mode. • DUAL: During a subsequent import operation, the dump file set can either be decrypted transparently using the Oracle encryption wallet, or it can be decrypted by using the same Encryption Password that was used for the export. DUAL and TRANSPARENT mode are only supported in Oracle Database Enterprise Edition version 11g. **Note:** To use DUAL or TRANSPARENT mode, you must enable Oracle Advanced Security.

Parameters Defined in this Step: Gather Advanced Parameters for Oracle Database Refresh via Data Pump (continued)

Parameter Name	Default Value	Required	Description
EXPORT - File Size	200M	optional	Maximum size of each dump file in the dump file set. If any file in the dump file set reaches this size, that file is closed, and Data Pump attempts to create a new file. Specify an integer and one of the following units: B (bytes), KB (kilobytes), MB (megabytes), GB (gigabytes), or TB (terabytes). The default unit is bytes. The minimum valid file size is 4 kilobytes; the maximum valid file size is 16 terabytes. The actual size of a dump file may be slightly smaller depending on the size of the internal blocks used.
EXPORT - Full	YES	optional	This parameter is set to YES to perform a full Data Pump Export (data and metadata) or NO to export schemas (metadata). **Caution:** The workflow sets the value of this parameter. Do not modify the mapping for this parameter that is defined in the workflow.
EXPORT - Metrics	YES	optional	If you specify YES, the number of objects exported and the elapsed time required for the export operation to complete are recorded in the Data Pump log file. Valid values are YES or NO.
EXPORT - Oracle DB User	no default	optional	SOURCE database user account that will be used to perform the Data Pump Export. **Note:** For Oracle Database 11g R2, this user must have the DATAPUMP_EXP_FULL_DATABASE and DATAPUMP_EXP_FULL_DATABASE roles. For earlier versions, the user must have the EXP_FULL_DATABASE and EXP_FULL_DATABASE roles.

Parameters Defined in this Step: Gather Advanced Parameters for Oracle Database Refresh via Data Pump (continued)

Parameter Name	Default Value	Required	Description
EXPORT - Oracle DB User Password	no default	required	Password for the SOURCE Oracle database user specified in the EXPORT- Oracle DB User parameter. This is required when this user is not sysdba.
IMPORT - Oracle DB User	no default	optional	DESTINATION database user account that will be used to perform the Data Pump Import. **Note:** For Oracle Database 11g R2, this user must have the DATAPUMP_IMP_FULL_DATABASE and DATAPUMP_IMP_FULL_DATABASE roles. For earlier versions, the user must have the IMP_FULL_DATABASE and IMP_FULL_DATABASE roles.
IMPORT - Oracle DB User Password	no default	required	Password for the DESTINATION Oracle database user specified in the IMPORT- Oracle DB User parameter. This is required when this user is not sysdba.
IMPORT - Table Exist Action	SKIP	optional	This parameter tells the Data Pump Import utility what to do if a table that it is attempting to import already exists in the database. Valid values are: • SKIP leaves the table unchanged (no rows are imported from the dump file). • APPEND adds the rows from the dump file and leaves the existing rows unchanged. • TRUNCATE deletes the existing rows from the table and adds the rows from the dump file. • REPLACE removes the existing table and recreates it from the dump file. **Note:** SKIP and REPLACE are not valid options if ALL - Content is DATA_ONLY.

Parameters Defined in this Step: Gather Advanced Parameters for Oracle Database Refresh via Data Pump (continued)

Parameter Name	Default Value	Required	Description
IMPORT - Update System Tables	FALSE	optional	Determines whether the system tables are updated during the Data Pump Import. If TRUE, all system tables will be included in the import. If FALSE, the SYS and SYSMGR tables are excluded from the import. This is useful, because importing these tables often generates numerous errors, each of which must otherwise be added to the Ignorable Oracle Errors list.
IMPORT - Verification Result	no default	optional	Name (with absolute path) of a text file containing the expected results of the SQL queries included in the Verification SQL Script. This parameter is required if you provide a Verification SQL Script. Be sure to run the Verification SQL Script on the SOURCE database before running this workflow, and copy the results into this file. You must provide this file in a location where the workflow can access it.
IMPORT - Verification SQL Script	no default	optional	Name (with absolute path) of a text file containing a SQL script that verifies the following on the DESTINATION database: • The import operation was successful. • No data is missing. You must provide this file in a location where the workflow can access it. The expected results of the queries included in this script must be provided in the Verification Result file.

Export Oracle Schema via Data Pump

This workflow exports a specific schema (or schemas) using the Oracle Data Pump utility for the purpose of performing a database refresh. The Data Pump Export files can be stored in the local file system or on a network share. You can use this workflow to implement a cross-platform database refresh (for example: Linux to Solaris).

Data Pump uses SQL commands to import and export specific data objects. It is slower than the Oracle Recovery Manager (RMAN) but offers more flexibility.

The workflow automatically detects which ORACLE_HOME and ORACLE_SID to use when performing the Data Pump export. You can specify the encryption mode, compression level, and file size to use for the export—be sure to use the same settings for the subsequent import.

You have the option of providing a Data Pump parameter file or entering the parameters on the Deployment page. In either case, the parameter values are validated prior to the Data Pump export. If you do not provide a parameter file, the workflow creates one based on the parameter values that you specify on the Deployment page. If you do not specify a value for a particular parameter, the default value is used (see Parameters for Export Oracle Schema via Data Pump on page 145).

The following tables describe the required and optional input parameters for this workflow. Some of these parameters may not be initially visible in a deployment (see How to Expose Additional Workflow Parameters on page 213). For most parameters, if you do not specify a value for a parameter, a default value is assigned.

To use this workflow in your environment, see the following information:

Topic	Information Included
Prerequisites for this Workflow	List of prerequisites that must be satisfied before you can run this workflow
How this Workflow Works	Information about what the workflow does, including validation checks performed, steps executed, and a high-level process flow
How to Run this Workflow	Instructions for running this workflow in your environment
Sample Scenarios	Examples of typical parameter values for this workflow
Parameters for Export Oracle Schema via Data Pump	List of input parameters for this workflow

Note: To view the steps included in this workflow, see the Steps for Export Oracle Schema via Data Pump.

Prerequisites for this Workflow

Be sure that the following prerequisites are satisfied before you run the Export Oracle Schema via Data Pump workflow:

1. The HP DMA client must be installed on all target servers.
2. The Target Directory must exist prior to the execution of the workflow. This directory can be local, or it can be a Network File System (NFS) mount point.

   Note: If you specify an NFS mount point, the pertinent NFS share must be available to the target server, and it must be mounted prior to running this workflow.

3. The specified Oracle Database user must have READ and WRITE permission for the specified Target Directory.
4. The Oracle Database software must be provisioned, and the database must exist in the target instance prior to workflow execution.

Note: For Data Pump workflows, you must specify the same Content and Encryption Password settings for the export and any subsequent import operations.

For more information about prerequisites for Oracle Database, refer to the Oracle Database Product Documentation on page 203.

How this Workflow Works

This topic contains the following information about the Export Oracle Schema via Data Pump workflow:

Overview

This workflow exports a specific schema (or schemas) using the Oracle Data Pump utility for the purpose of performing a database refresh. The Data Pump Export files can be stored in the local file system or on a network share. You can use this workflow to implement a cross-platform database refresh (for example: Linux to Solaris).

Data Pump uses SQL commands to import and export specific data objects. It is slower than the Oracle Recovery Manager (RMAN) but offers more flexibility.

The workflow automatically detects which ORACLE_HOME and ORACLE_SID to use when performing the Data Pump export. You can specify the encryption mode, compression level, and file size to use for the export—be sure to use the same settings for the subsequent import.

You have the option of providing a Data Pump parameter file or entering the parameters on the Deployment page. In either case, the parameter values are validated prior to the Data Pump export. If you do not provide a parameter file, the workflow creates one based on the parameter values that you specify on the Deployment page. If you do not specify a value for a particular parameter, the default value is used (see Parameters for Export Oracle Schema via Data Pump on page 145).

You can use this workflow as part of a database refresh process. Database refresh involves moving the contents of a database in one Oracle instance into a database in another Oracle instance. This is useful, for example, if you want to move a database from a traditional IT infrastructure to a private cloud. It is also useful if you want to duplicate production data in a test environment for application development or troubleshooting purposes.

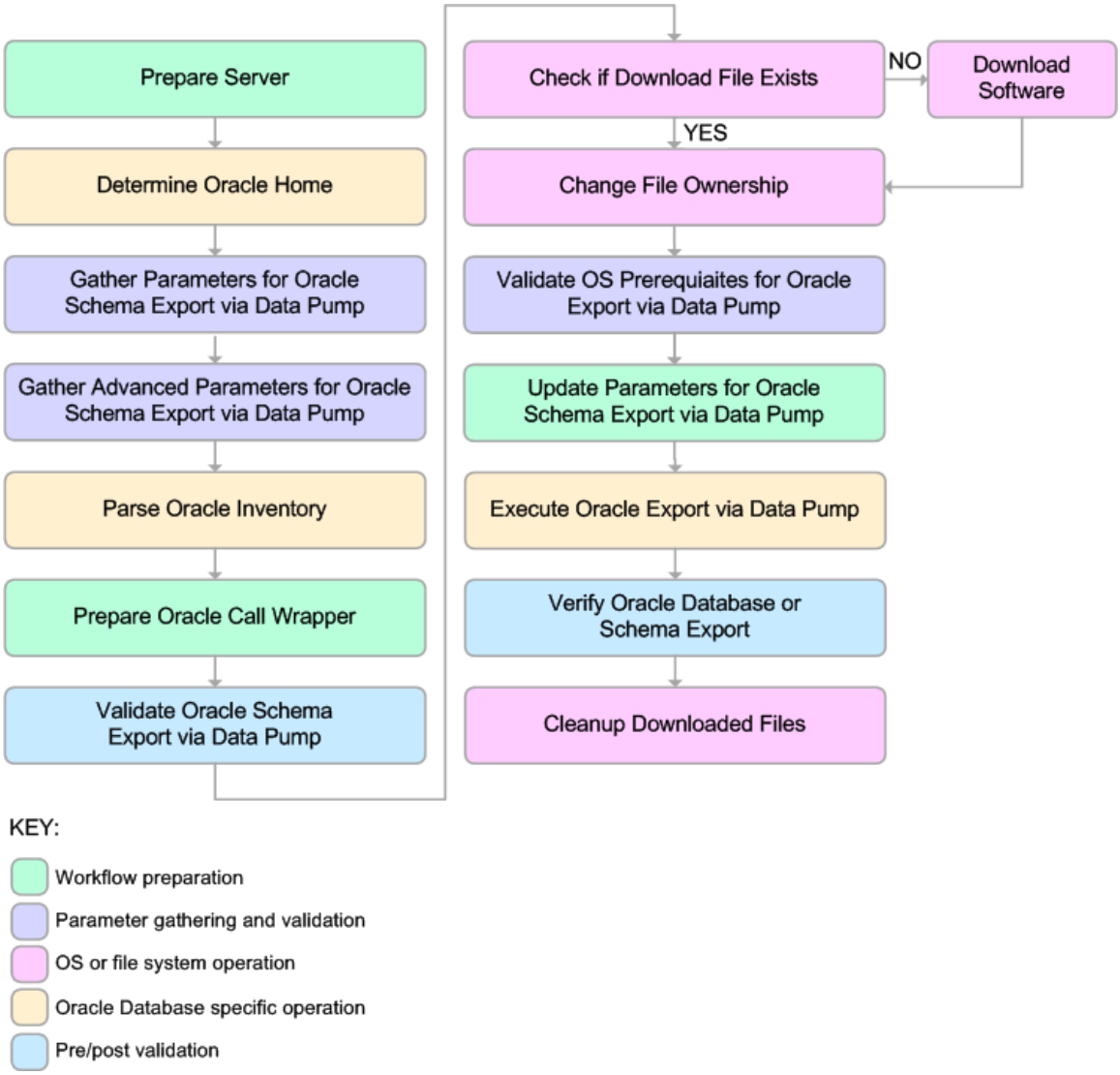
Validation Checks Performed

The workflow validates the following conditions:

1. The specified Oracle DB User can connect to and query the database specified in the Oracle SID.
2. Oracle Database version 10.2 (or later) is installed at the specified (or automatically detected) Oracle Home.
3. The Oracle DB User has permission to perform a full database export using the Data Pump utility. The Oracle User must have EXP_FULL_DATABASE permission.
4. A temporary directory required for file storage can be created on the target server.
5. The specified Ignorable Oracle Errors are, in fact, valid error codes.
6. If a Data Pump Parameter file is not provided, a schema (or multiple schemas) have been specified in the deployment.
7. The specified Data Pump Export File is a valid path and file name.
8. If a Data Pump Parameter file is specified, the file exists in the specified location.
9. The specified Target Directory exists, either locally or on a network share, and is writable.
10. The directory names included in the Do Not Remove list (if any) are valid.
11. The operating system on the target server is a supported HP DMA platform.

Steps Executed

The Export Oracle Schema via Data Pump workflow includes the following steps. Each step must complete successfully before the next step can start. If a step fails, the workflow reports a failure, and all subsequent steps are skipped.



Process Flow

This workflow performs the following tasks:

1. Determines the target server platform type, and identifies the server call wrapper.
2. Determines the Oracle Home path and Oracle SID by reading the `oratab` file.
3. Gathers all required and optional parameters.
4. Determines the OS owner of the Oracle Home directory.
5. Prepares the instance call wrapper based on the specified Oracle User.
6. Validates all parameter values specified or derived.
7. Downloads the Data Pump Parameter File (if specified) from the software repository.
8. Creates a Data Pump parameter file (or updates the existing parameter file) using values specified on the Deployment page. If you do not specify a value for a particular parameter, the default value is used.
9. Performs the Data Pump Export operation.
10. Verifies that the database is back online after the export:
    - No corrupted blocks exist.
    - No files are in backup mode.
    - Temporary table space is available.
11. Verifies that the Data Pump Export File exists in the Target Directory.
12. Removes any temporary files and directories used to perform the export.

How to Run this Workflow

The following instructions show you how to customize and run the Export Oracle Schema via Data Pump workflow in your environment.

The workflow provides default values for most parameters. These default values are usually sufficient for a "typical" schema export. You can override the defaults by specifying parameter values in the deployment. You can also expose additional parameters in the workflow, if necessary, to accomplish more advanced scenarios. Any parameters not explicitly specified in the deployment will have the default values listed in Parameters for Export Oracle Schema via Data Pump on page 145

Note: Before following this procedure, review the Prerequisites for this Workflow, and ensure that all requirements are satisfied.

To use the Export Oracle Database via Data Pump workflow:

1. Create a deployable copy of the workflow (see Create a Deployable Workflow on page 17).
2. Determine the values that you will specify for the following parameters:

Parameter Name	Default Value	Required	Description
Data Pump Parameter File	no default	optional	Name of the Data Pump Export parameter file that you provide. If you do not specify the absolute path to the Parameter File, the workflow will look for the file in the Target Directory. If you do not specify a Parameter File, default Data Pump Export settings will be used for parameters not specified in the deployment.
Oracle Account	no default	optional	Oracle user that owns the ORACLE_HOME on the target Oracle database server. Required if an inventory file does not exist. Leave blank for Windows.
Target Directory	no default	required	Directory where the Data Pump Export dump file set and the Parameter file will be staged on the target database server. This directory must be known to the Oracle instance.
Schema	no default	optional	Comma-separated list of schemas to export. This parameter is required if a Data Pump Parameter File is not specified.

Note: This is the minimum set of parameters required to run this workflow. You may need to expose additional parameters depending on your provisioning objectives.

See Parameters for Export Oracle Schema via Data Pump on page 145 for detailed descriptions of all input parameters for this workflow, including default values.

3. In the workflow editor, expose any additional parameters that you need (see How to Expose Additional Workflow Parameters on page 213). You will specify values for those parameters

when you create the deployment.

4. Save the changes to the workflow (click **Save** in the lower right corner).
5. Create a new deployment (see Create a Deployment on page 18 for instructions).
6. On the Parameters tab, specify values for the required parameters listed in step 2 and any additional parameters that you have exposed.You do not need to specify values for those parameters whose default values are appropriate for your environment.
7. On the Targets tab, specify one or more targets for this deployment.
8. Save the deployment (click **Save** in the lower right corner).
9. Run the workflow using this deployment (see Run Your Workflow on page 19 for instructions).

To verify the results:

The workflow will complete and report SUCCESS on the Console if it has run successfully. If an error occurs during workflow execution, the error is logged, and the workflow terminates in the FAILURE state.

Sample Scenarios

This topic shows you how to use various parameters to achieve the following database backup scenarios in your environment using the Export Oracle Schema via Data Pump workflow:

Scenario 1: Perform a Schema Export Using Default Settings and Store the Export File Locally

This is the simplest Data Pump schema export scenario. In this example, the export file is stored on the local file system. The parameters shown here are visible by default.

In this scenario, the Data Pump Parameter File is not specified. The workflow will create its own parameter file using default values. The Oracle Account parameter is also not specified; it will be obtained from the Oracle inventory file (typically `oratab`).

The Target Directory will hold the Data Pump Export file (or files), which can subsequently be used to perform a database refresh on another target.

Parameter Name	Example Value	Description
Target Directory	`/var/DPExport/schemas/June2012`	Directory where the Data Pump dump and Parameter files will be staged on the target database server. This directory must be known to the Oracle instance.
Schema	`hr,sh,oe`	Comma-separated list of schemas to export. This parameter is required if a Data Pump Parameter File is not specified.

Be sure that the default values for all remaining parameters are appropriate for your environment (see Parameters for Export Oracle Schema via Data Pump on page 145).

Scenario 2: Perform a Schema Export Using a Parameter File and Store the Export File on a Network Share

In this scenario, a Data Pump parameter file is used to specify all the Data Pump Export options, and the Oracle account is specified. In this case, the Data Pump Export file will be stored on a network share. This eliminates the need to move files from one server to another. Data Pump Export files that are placed in a shared network directory can readily be used as an input to the Refresh Oracle Schema via Data Pump on page 152 workflow.

Parameter Name	Example Value	Description
Data Pump Parameter File	`/var/DPExport/Parms/myDPparameters.par`	Name of the Data Pump Export parameter file that you provide. If you do not specify the absolute path to the Parameter File, the workflow will look for the file in the Target Directory. If you do not specify a Parameter File, default Data Pump Export settings will be used for parameters not specified in the deployment.
Oracle Account	`sysdba`	Oracle user that owns the ORACLE_HOME on the target Oracle database server. Required if an inventory file does not exist. Leave blank for Windows.
Target Directory	`myfileserver.mycompany.com:/uo1/nfs_share`	Directory where the Data Pump dump and Parameter files will be staged on the target database server. This directory must be known to the Oracle instance.

Be sure that the default values for all remaining parameters are appropriate for your environment (see Parameters for Export Oracle Schema via Data Pump on page 145).

Scenario 3: Perform an Export Using Non-Default Parameters

The Export Oracle Schema via Data Pump on page 129 workflow provides many parameters that can be modified to suit your needs. For example, the Data Pump Export file generated by the workflow can be compressed, encrypted, or divided into standard-sized pieces. You can also tell the workflow to ignore specific Oracle errors that might arise during the export but would have no bearing on its outcome.

In this example, the Data Pump Export file is stored on the local file system. The first three parameters listed are visible by default; the remaining parameters must be exposed in the workflow so that they are available in the deployment (see How to Expose Additional Workflow Parameters on page 213).

Parameter Name	Example Value	Description
Oracle Account	oracle	Oracle user that owns the ORACLE_HOME on the target Oracle database server. Required if an inventory file does not exist. Leave blank for Windows.
Target Directory	`/var/DPExport/Output/Full/May2012`	Directory where the Data Pump dump and Parameter files will be staged on the target database server. This directory must be known to the Oracle instance.
Schema	`hr,sh,oe`	Comma-separated list of schemas to export. This parameter is required if a Data Pump Parameter File is not specified.

Parameter Name	Example Value	Description
Compression	DATA_ONLY	Items that will be compressed in the Data Pump Export dump file set. Valid settings are ALL, NONE, DATA_ONLY, METADATA_ONLY. • DATA_ONLY: Compress only the table row data (must also specify DATA_ONLY or ALL for the Content parameter). • METADATA_ONLY: Compress only the database object definitions (must also specify METADATA_ONLY or ALL for the Content parameter). • ALL: Compress both the table row data and the database object definitions in the dump file set (must also specify ALL for the Content parameter). • NONE: Nothing is compressed in the dump file set. You must specify the same Compression setting for the export and any subsequent import operations. DATA_ONLY and ALL compression settings are only supported in Oracle Database Enterprise Edition version 11g. You must enable the Oracle Advanced Compression option to use these settings.

Parameter Name	Example Value	Description
Content	DATA_ONLY	What to include in the Data Pump Export dump file set. Valid settings are ALL, DATA_ONLY, or METADATA_ONLY. • DATA_ONLY: Include only table row data. Do not include database object definitions. • METADATA_ONLY: Include only database object definitions. Do not include table row data. If you specify METADATA_ONLY, any index or table statistics later imported from the dump file set will be locked after the import. • ALL: Include both table row data and database object definitions in the dump file set. You must specify the same Content setting for the export and any subsequent import operations.

Parameter Name	Example Value	Description
Encryption Mode	PASSWORD	This setting determines how the dump file set will be encrypted and how it can later be decrypted during a subsequent Data Pump Import operation. Valid values are PASSWORD, TRANSPARENT, and DUAL. • PASSWORD: Data Pump Export uses the Encryption Password to encrypt the dump file set. You must specify the same Encryption Password to perform a subsequent import. • TRANSPARENT: The Oracle encryption wallet is used to encrypt the dump file set using the Secure Sockets Layer (SSL) protocol. The encryption wallet must also be used to decrypt the dump file set during a subsequent import. You cannot specify an Encryption Password if you specify TRANSPARENT mode. • DUAL: During a subsequent import operation, the dump file set can either be decrypted transparently using the Oracle encryption wallet, or it can be decrypted by using the same Encryption Password that was used for the export. DUAL and TRANSPARENT mode are only supported in Oracle Database Enterprise Edition version 11g. **Note:** To use DUAL or TRANSPARENT mode, you must enable Oracle Advanced Security.

Parameter Name	Example Value	Description
Encryption Password	myencpwd **Tip:** To avoid having to re-enter passwords whenever they change, you can create a policy to provide them to the workflow (see How to Use a Policy to Specify Parameter Values on page 214).	Key used to ensure that any encrypted column data, metadata, or table data is re-encrypted before it is written to the dump file set. If you do not specify an Encryption Password—or specify TRANSPARENT for the Encryption Mode—data will be written to the dump files in clear text form. Note the following: • If you specify an Encryption Password for the export, and the Encryption Mode is PASSWORD, you must specify the same Encryption Password for any subsequent import operations. • The Encryption Password is required when Encryption Mode is PASSWORD or DUAL. • The Encryption Password is not valid when Encryption Mode is TRANSPARENT. • If you specify an Encryption Password but do not specify the Encryption Mode, the mode defaults to PASSWORD. This parameter is only supported in Oracle Database Enterprise Edition version 11g.
File Size	16GB	Maximum size (in MByte) of each dump file in the dump file set. If any file in the dump file set reaches this size, that file is closed, and Data Pump attempts to create a new file. Specify an integer and one of the following units: B (bytes), KB (kilobytes), MB (megabytes), GB (gigabytes), or TB (terabytes). The default unit is bytes. The minimum valid file size is 4 kilobytes; the maximum valid file size is 16 terabytes. The actual size of a dump file may be slightly smaller depending on the size of the internal blocks used.

Parameter Name	Example Value	Description
Oracle DB User	siteadmin	Database user account (if other than sysdba) that will be used to perform the Data Pump Export. **Note:** For Oracle Database 11g R2, this user must have the DATAPUMP_EXP_FULL_DATABASE role, or the workflow will fail. For earlier versioins, the user must have the EXP_FULL_DATABASE role.
Oracle DB User Password	siteadminpwd **Tip:** To avoid having to re-enter passwords whenever they change, you can create a policy to provide them to the workflow (see How to Use a Policy to Specify Parameter Values on page 214).	Password for the Oracle DB User. This is required when this user is not sysdba.
Ignorable Oracle Errors	ORA-39083, ORA-00959, ORA-01917, ORA-01918, ORA-01435	Comma delimited list of Oracle errors to ignore while executing the Data Pump Export.
Temporary File Location	`/var/temp/DP_temp_files`	Location to store temporary files while the workflow is running.

Be sure that the default values for all remaining parameters are appropriate for your environment (see Parameters for Export Oracle Schema via Data Pump on the next page).

Parameters for Export Oracle Schema via Data Pump

The following tables describe the required and optional input parameters for this workflow. Some of these parameters may not be initially visible in a deployment (see How to Expose Additional Workflow Parameters on page 213). For most parameters, if you do not specify a value for a parameter, a default value is assigned.

Parameters whose values are derived in one step and consumed by another step are not shown here.

Parameters Defined in this Step: Gather Parameters for Oracle Schema Export via Data Pump

Parameter Name	Default Value	Required	Description
Data Pump Export File	see description	optional	Name (absolute path) of the Data Pump Export dump file (or files) that will be created from an existing Oracle database. The default is: *Target Directory*\Oracle SID.dmp
Data Pump Parameter File	no default	optional	Name of the Data Pump Export parameter file that you provide. If you do not specify the absolute path to the Parameter File, the workflow will look for the file in the Target Directory. If you do not specify a Parameter File, default Data Pump Export settings will be used for parameters not specified in the deployment.
Inventory Files	see description	optional	Comma separated list of Oracle inventory file names (with absolute paths). If not specified, set to the appropriate default value for the target server operating system. Defaults are: Solaris: /var/opt/oracle/oraInst.loc Linux: /etc/oraInst.loc Windows: %ProgramFiles%\Oracle\Inventory
Oracle Account	no default	optional	Oracle user that owns the ORACLE_HOME on the target Oracle database server. Required if an inventory file does not exist. Leave blank for Windows.
Oracle Home	no default	optional	The ORACLE_HOME to use if more than one home is found in the inventory file (or files).
Oracle SID	no default	required	The Oracle System ID (SID) of the target database.
Schema	no default	optional	Comma-separated list of schemas to export. This parameter is required if a Data Pump Parameter File is not specified.

Parameters Defined in this Step: Gather Parameters for Oracle Schema Export via Data Pump (continued)

Parameter Name	Default Value	Required	Description

Server Wrapper	jython	required	Command that will be used to construct the call wrapper. The workflow uses the call wrapper to execute subsequent steps as either the OS administrative user or the Oracle user who owns the pertinent ORACLE_HOME. For example:
			`sudo su - root /opt/hp/dma/client/bin/jython.sh`
			`sudo su - sysdba /opt/hp/dma/client/bin/jython.sh`

Target Directory	no default	required	Directory where the Data Pump Export dump file set and the Parameter file will be staged on the target database server. This directory must be known to the Oracle instance.

Parameters Defined in this Step: Gather Advanced Parameters for Oracle Schema Export via Data Pump

Parameter Name	Default Value	Required	Description
Compression	ALL	optional	Items that will be compressed in the Data Pump Export dump file set. Valid settings are ALL, NONE, DATA_ONLY, METADATA_ONLY. • DATA_ONLY: Compress only the table row data (must also specify DATA_ ONLY or ALL for the Content parameter). • METADATA_ONLY: Compress only the database object definitions (must also specify METADATA_ONLY or ALL for the Content parameter). • ALL: Compress both the table row data and the database object definitions in the dump file set (must also specify ALL for the Content parameter). • NONE: Nothing is compressed in the dump file set. You must specify the same Compression setting for the export and any subsequent import operations. DATA_ONLY and ALL compression settings are only supported in Oracle Database Enterprise Edition version 11g. You must enable the Oracle Advanced Compression option to use these settings.

Parameters Defined in this Step: Gather Advanced Parameters for Oracle Schema Export via Data Pump (continued)

Parameter Name	Default Value	Required	Description
Content	ALL	optional	What to include in the Data Pump Export dump file set. Valid settings are ALL, DATA_ONLY, or METADATA_ONLY. • DATA_ONLY: Include only table row data. Do not include database object definitions. • METADATA_ONLY: Include only database object definitions. Do not include table row data. If you specify METADATA_ONLY, any index or table statistics later imported from the dump file set will be locked after the import. • ALL: Include both table row data and database object definitions in the dump file set. You must specify the same Content setting for the export and any subsequent import operations.

Parameters Defined in this Step: Gather Advanced Parameters for Oracle Schema Export via Data Pump (continued)

Parameter Name	Default Value	Required	Description
Encryption Mode	Default depends on the other encryption settings. Assuming that ENCRYPTION is true: • If Encryption Password is specified, and the Oracle encryption wallet is open, default is DUAL. • If Encryption Password is specified, and the wallet is closed, default is PASSWORD. • If Encryption Password is not specified, and the wallet is open, default is TRANSPARENT. • If Encryption Password is not specified, and the wallet is closed, the Data Pump Export operation returns an error.	optional	This setting determines how the dump file set will be encrypted and how it can later be decrypted during a subsequent Data Pump Import operation. Valid values are PASSWORD, TRANSPARENT, and DUAL. • PASSWORD: Data Pump Export uses the Encryption Password to encrypt the dump file set. You must specify the same Encryption Password to perform a subsequent import. • TRANSPARENT: The Oracle encryption wallet is used to encrypt the dump file set using the Secure Sockets Layer (SSL) protocol. The encryption wallet must also be used to decrypt the dump file set during a subsequent import. You cannot specify an Encryption Password if you specify TRANSPARENT mode. • DUAL: During a subsequent import operation, the dump file set can either be decrypted transparently using the Oracle encryption wallet, or it can be decrypted by using the same Encryption Password that was used for the export. DUAL and TRANSPARENT mode are only supported in Oracle Database Enterprise Edition version 11g. **Note:** To use DUAL or TRANSPARENT mode, you must enable Oracle Advanced Security.

Parameters Defined in this Step: Gather Advanced Parameters for Oracle Schema Export via Data Pump (continued)

Parameter Name	Default Value	Required	Description
Encryption Password	no default	optional	Key used to ensure that any encrypted column data, metadata, or table data is re-encrypted before it is written to the dump file set. If you do not specify an Encryption Password—or specify TRANSPARENT for the Encryption Mode—data will be written to the dump files in clear text form. Note the following: • If you specify an Encryption Password for the export, and the Encryption Mode is PASSWORD, you must specify the same Encryption Password for any subsequent import operations. • The Encryption Password is required when Encryption Mode is PASSWORD or DUAL. • The Encryption Password is not valid when Encryption Mode is TRANSPARENT. • If you specify an Encryption Password but do not specify the Encryption Mode, the mode defaults to PASSWORD. This parameter is only supported in Oracle Database Enterprise Edition version 11g.
File Size	200MB	optional	Maximum size (in MByte) of each dump file in the dump file set. If any file in the dump file set reaches this size, that file is closed, and Data Pump attempts to create a new file. Specify an integer and one of the following units: B (bytes), KB (kilobytes), MB (megabytes), GB (gigabytes), or TB (terabytes). The default unit is bytes. The minimum valid file size is 4 kilobytes; the maximum valid file size is 16 terabytes. The actual size of a dump file may be slightly smaller depending on the size of the internal blocks used.

Parameters Defined in this Step: Gather Advanced Parameters for Oracle Schema Export via Data Pump (continued)

Parameter Name	Default Value	Required	Description
Full	YES	optional	Set to YES to perform a full Data Pump Export (data and metadata); set to NO to export schemas (metadata). **Caution:** The workflow sets the value of this parameter. Do not modify the mapping for this parameter that is defined in the workflow.
Ignorable Oracle Errors	ORA-31684,ORA-39111,ORA-39151,ORA-31685,ORA-00001,RMAN-00571,RMAN-00569,RMAN-03002,RMAN-06054	optional	Comma delimited list of Oracle errors to ignore while executing the Data Pump Export.
Metrics	YES	optional	If you specify YES, the number of objects exported and the elapsed time required for the export operation to complete are recorded in the Data Pump log file. Valid values are YES or NO.
Oracle DB User	no default	optional	Database user account (if other than sysdba) that will be used to perform the Data Pump Export. **Note:** For Oracle Database 11g R2, this user must have the DATAPUMP_EXP_FULL_DATABASE role, or the workflow will fail. For earlier versioins, the user must have the EXP_FULL_DATABASE role.
Oracle DB User Password	/ as sysdba	optional	Password for the Oracle DB User. This is required when this user is not sysdba.

Refresh Oracle Schema via Data Pump

This workflow imports a specific Oracle database schema (or schemas) from a previously created Data Pump Export file (or files). The files can be located in the local file system or on a network share. You can use this workflow to implement a cross-platform database refresh (for example: Linux to Solaris).

Data Pump uses SQL commands to import and export specific data objects. It is slower than the Oracle Recovery Manager (RMAN) but offers more flexibility.

The workflow automatically detects which ORACLE_HOME and ORACLE_SID to use when performing the Data Pump import. You must specify the same encryption mode and password, compression level, and file size that was used for the export.

You have the option of providing a Data Pump parameter file or entering the parameters on the Deployment page. In either case, the parameter values are validated prior to the Data Pump Import operation. If you do not provide a parameter file, the workflow creates one based on the parameter values that you specify on the Deployment page. If you do not specify a value for a particular parameter, the default value is used (see Parameters for Refresh Oracle Schema via Data Pump on page 169).

The following tables describe the required and optional input parameters for this workflow. Some of these parameters may not be initially visible in a deployment (see How to Expose Additional Workflow Parameters on page 213). For most parameters, if you do not specify a value for a parameter, a default value is assigned.

To use this workflow in your environment, see the following information:

Topic	Information Included
Prerequisites for this Workflow	List of prerequisites that must be satisfied before you can run this workflow
How this Workflow Works	Information about what the workflow does, including validation checks performed, steps executed, and a high-level process flow
How to Run this Workflow	Instructions for running this workflow in your environment
Sample Scenarios	Examples of typical parameter values for this workflow
Parameters for Refresh Oracle Schema via Data Pump	List of input parameters for this workflow

Note: To view the steps included in this workflow, see the Steps for Refresh Oracle Schema via Data Pump.

Prerequisites for this Workflow

Be sure that the following prerequisites are satisfied before you run the Refresh Oracle Schema via Data Pump workflow:

1. The HP DMA client must be installed on all target servers.
2. The Target Directory must exist prior to the execution of the workflow. This directory can be local, or it can be a Network File System (NFS) mount point.

   Note: If you specify an NFS mount point, the pertinent NFS share must be available to the target server, and it must be mounted prior to running this workflow.

3. The specified Oracle Database user must have READ and WRITE permission for the specified Target Directory.
4. The Oracle Database software must be provisioned, and the database must exist in the target instance prior to workflow execution.

Note: For Data Pump workflows, you must specify the same Content and Encryption Password settings for the export and any subsequent import operations.

For more information about prerequisites for Oracle Database, refer to the Oracle Database Product Documentation on page 203.

How this Workflow Works

This topic contains the following information about the Refresh Oracle Schema via Data Pump workflow:

Overview

This workflow imports a specific Oracle database schema (or schemas) from a previously created Data Pump Export file (or files). The files can be located in the local file system or on a network share. You can use this workflow to implement a cross-platform database refresh (for example: Linux to Solaris).

Data Pump uses SQL commands to import and export specific data objects. It is slower than the Oracle Recovery Manager (RMAN) but offers more flexibility.

The workflow automatically detects which ORACLE_HOME and ORACLE_SID to use when performing the Data Pump import. You must specify the same encryption mode and password, compression level, and file size that was used for the export.

You have the option of providing a Data Pump parameter file or entering the parameters on the Deployment page. In either case, the parameter values are validated prior to the Data Pump Import operation. If you do not provide a parameter file, the workflow creates one based on the parameter values that you specify on the Deployment page. If you do not specify a value for a particular parameter, the default value is used (see Parameters for Refresh Oracle Schema via Data Pump on page 169).

You can use this workflow as part of a database refresh process. Database refresh involves moving the contents of a database in one Oracle instance into a database in another Oracle instance. This is useful, for example, if you want to move a database from a traditional IT infrastructure to a private cloud. It is also useful if you want to duplicate production data in a test environment for application development or troubleshooting purposes.

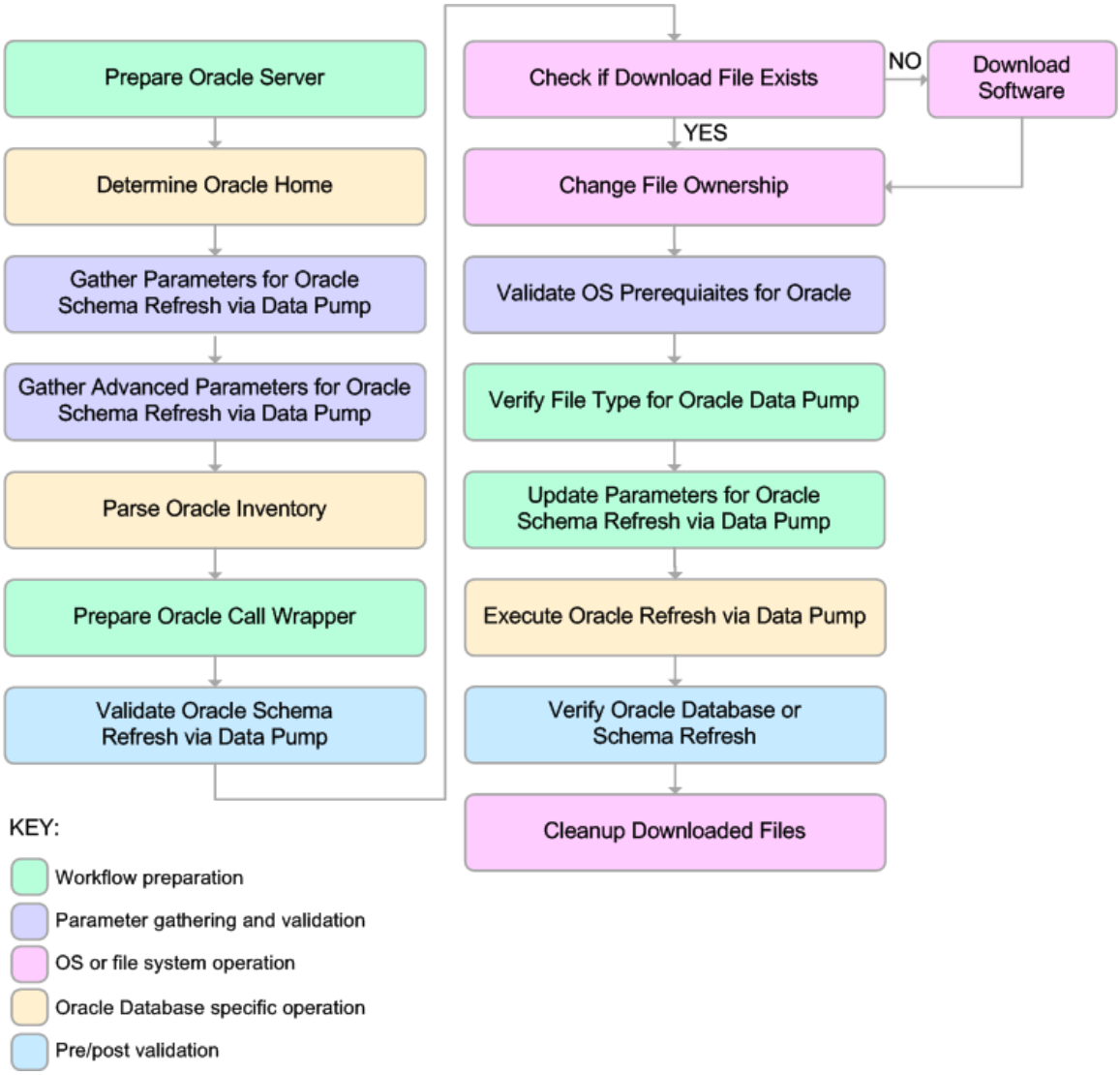
Validation Checks Performed

The workflow validates the following conditions:

1. The Oracle Database user can connect to and query the database specified in the Oracle SID.
2. Oracle Database version 10.2 (or later) is installed at the specified (or automatically detected) Oracle Home.
3. For Oracle Database version 11.2 (or later), the Oracle DB User has DATAPUMP_EXP_FULL_DATABASE permission. For earlier supported versions, the Oracle DB User has EXP_FULL_DATABASE permission.
4. The operating system on the target server is a supported HP DMA platform.
5. A temporary directory required for file storage can be created on the target server.
6. The specified Ignorable Oracle Errors are, in fact, valid error codes.
7. The specified Data Pump Export File is a valid path and file name.
8. If a Data Pump Parameter file is specified, the file exists in the specified location.
9. If a Data Pump Parameter file is not specified, at least one schema is specified.
10. The specified Target Directory exists, either locally or on a network share, and is readable.
11. The directory names included in the Do Not Remove list (if any) are valid.
12. The specified Data Pump Export File was, indeed, created by Data Pump.

Steps Executed

The Refresh Oracle Database via Data Pump workflow includes the following steps. Each step must complete successfully before the next step can start. If a step fails, the workflow reports a failure, and all subsequent steps are skipped.



Process Flow

This workflow performs the following tasks:

1. Determines the target server platform type, and identifies the server call wrapper.
2. Determines the Oracle Home path and Oracle SID by reading the `oratab` file.
3. Gathers all required and optional parameters.
4. Determines the OS owner of the Oracle Home directory.
5. Prepares the instance call wrapper based on the specified Oracle User.
6. Validates all parameter values specified or derived.
7. Downloads the Data Pump Parameter File, SQL Verification Script, and SQL Verification Results (if specified) from the software repository.
8. Creates a Data Pump parameter file (or updates the existing parameter file) using values specified on the Deployment page. If you do not specify a value for a particular parameter, the default value is used.
9. Performs the Data Pump Import operation.
10. Checks the Import Log File to ensure that it does not contain any unexpected errors.
11. Verifies that the database is online after the import:
    - No corrupted blocks exist.
    - No files are in backup mode.
    - Temporary table space is available.
12. Runs the SQL Verification Script (if provided), and compares the results to the SQL Verification Results (must be provided if the script is provided).
13. Removes any temporary files and directories used to perform the import.

How to Run this Workflow

The following instructions show you how to customize and run the Refresh Oracle Schema via Data Pump workflow in your environment.

The workflow provides default values for most parameters. These default values are usually sufficient for a "typical" export. You can override the defaults by specifying parameter values in the deployment. You can also expose additional parameters in the workflow, if necessary, to accomplish more advanced scenarios. Any parameters not explicitly specified in the deployment will have the default values listed in Parameters for Refresh Oracle Schema via Data Pump on page 169

Note: Before following this procedure, review the Prerequisites for this Workflow, and ensure that all requirements are satisfied.

To use the Refresh Oracle Database via Data Pump workflow:

1. Create a deployable copy of the workflow (see Create a Deployable Workflow on page 17).
2. Determine the values that you will specify for the following parameters:

Parameter Name	Default Value	Required	Description
Data Pump Export Files	no default	required	Comma-separated list of Data Pump Export dump files included in the dump file set that will be used for this Data Pump Import. If only one file is specified, no comma is required.
Data Pump Parameter File	no default	optional	Name of the Data Pump Export parameter file that you provide. If you do not specify the absolute path to the Parameter File, the workflow will look for the file in the Target Directory. If you do not specify a Parameter File, default Data Pump Export settings will be used for parameters not specified in the deployment.
Oracle Account	no default	optional	Oracle user that owns the ORACLE_HOME on the target Oracle database server. Required if an inventory file does not exist. Leave blank for Windows.
Schema	no default	optional	Comma-separated list of schemas to import. This parameter is required if a Data Pump Parameter File is not specified.
Target Directory	no default	required	Directory where the Data Pump Export dump file set and the Parameter file will be staged on the target database server. This directory must be known to the Oracle instance.

Note: This is the minimum set of parameters required to run this workflow. You may need to expose additional parameters depending on your provisioning objectives.

> See Parameters for Refresh Oracle Schema via Data Pump on page 169 for detailed descriptions of all input parameters for this workflow, including default values.

3. In the workflow editor, expose any additional parameters that you need (see How to Expose Additional Workflow Parameters on page 213). You will specify values for those parameters when you create the deployment.
4. Save the changes to the workflow (click **Save** in the lower right corner).
5. Create a new deployment (see Create a Deployment on page 18 for instructions).
6. On the Parameters tab, specify values for the required parameters listed in step 2 and any additional parameters that you have exposed.You do not need to specify values for those parameters whose default values are appropriate for your environment.
7. On the Targets tab, specify one or more targets for this deployment.
8. Save the deployment (click **Save** in the lower right corner).
9. Run the workflow using this deployment (see Run Your Workflow on page 19 for instructions).

To verify the results:

The workflow will complete and report SUCCESS on the Console if it has run successfully. If an error occurs during workflow execution, the error is logged, and the workflow terminates in the FAILURE state.

Sample Scenarios

This topic shows you how to use various parameters to achieve the following database backup scenarios in your environment using the Refresh Oracle Schema via Data Pump workflow:

Scenario 1: Perform an Import Using Default Settings and a Network Share Target Directory

This is the simplest Data Pump import scenario. In this example, the export file has been stored on a network share. The parameters shown here are visible by default.

In this scenario, the Data Pump Parameter File is not specified. The workflow will create its own parameter file using default values. The Oracle Account parameter is also not specified; it will be obtained from the Oracle inventory file (typically `oratab`).

Parameter Name	Example Value	Description
Data Pump Export Files	`april302012export.dmp`	Comma-separated list of Data Pump Export dump files included in the dump file set that will be used for this Data Pump Import. If only one file is specified, no comma is required.
Schema	`hr,sh,oe`	Comma-separated list of schemas to import. This parameter is required if a Data Pump Parameter File is not specified.
Target Directory	`myfileserver.mycompany.com:/uo1/nfs_share`	Directory where the Data Pump dump and Parameter files will be staged on the target database server. This directory must be known to the Oracle instance.

Be sure that the default values for all remaining parameters are appropriate for your environment (see Parameters for Refresh Oracle Database via Data Pump on page 97).

Scenario 2: Perform an Import Using Non-Default Parameters

The Refresh Oracle Schema via Data Pump workflow provides many parameters that can be modified to suit your needs. For example, the Data Pump Export file might have been compressed or encrypted. You can instruct Data Pump how to proceed if it finds existing data in the database. You can also tell the workflow to ignore specific Oracle errors that might arise during the import but would have no bearing on its outcome.

In this example, the Data Pump Export file is stored on a network share. The first four parameters listed are visible by default; the remaining parameters must be exposed in the workflow so that they are available in the deployment (see How to Expose Additional Workflow Parameters on page 213).

Parameter Name	Example Value	
Data Pump Export Files	`april302012export.dmp`	Comma-separated list of Data Pump Export dump files included in the dump file set that will be used for this Data Pump Import. If only one file is specified, no comma is required.
Schema	`hr,sh,oe`	Comma-separated list of schemas to import. This parameter is required if a Data Pump Parameter File is not specified.
Oracle Account	oracle	Oracle user that owns the ORACLE_HOME on the target Oracle database server. Required if an inventory file does not exist. Leave blank for Windows.
Target Directory	`myfileserver.mycompany.com:/uo1/nfs_share`	Directory where the Data Pump dump and Parameter files will be staged on the target database server. This directory must be known to the Oracle instance.

Parameter Name	Example Value	
Compression	DATA_ONLY	Items that are compressed in the Data Pump Export dump file set. Valid settings are ALL, NONE, DATA_ONLY, METADATA_ONLY. • DATA_ONLY: Only the table row data is compressed (must also specify DATA_ONLY or ALL for the Content parameter). • METADATA_ONLY: Only the database object definitions are compressed (must also specify METADATA_ONLY or ALL for the Content parameter). • ALL: Both the table row data and the database object definitions in the dump file set are compressed (must also specify ALL for the Content parameter). • NONE: Nothing is compressed in the dump file set. You must specify the same Compression setting for the export and any subsequent import operations. DATA_ONLY and ALL compression settings are only supported in Oracle Database Enterprise Edition version 11g. You must enable the Oracle Advanced Compression option to use these settings.

Parameter Name	Example Value	
Content	DATA_ONLY	What is included in the Data Pump Export dump file set. Valid settings are ALL, DATA_ONLY, or METADATA_ ONLY. • DATA_ONLY: Only table row data is included. Database object definitions are not included. • METADATA_ONLY: Only database object definitions are included. Table row data is not included. If you specify METADATA_ONLY, any index or table statistics later imported from the dump file set will be locked after the import. • ALL: Both table row data and database object definitions are included in the dump file set. You must specify the same Content setting for the export and any subsequent import operations.

Parameter Name	Example Value	
Encryption Mode	PASSWORD	This setting indicates how the dump file set was encrypted and how it can be decrypted during the Data Pump Import operation. Valid values are PASSWORD, TRANSPARENT, and DUAL. • PASSWORD: Data Pump Export used the Encryption Password to encrypt the dump file set. You must specify the same Encryption Password to perform a subsequent import. • TRANSPARENT: The Oracle encryption wallet was used to encrypt the dump file set using the Secure Sockets Layer (SSL) protocol. The encryption wallet must also be used to decrypt the dump file set during a subsequent import. You cannot specify an Encryption Password if you specify TRANSPARENT mode. • DUAL: During the import operation, the dump file set can be decrypted either transparently using the Oracle encryption wallet or by using the same Encryption Password that was used for the export. DUAL and TRANSPARENT mode are only supported in Oracle Database Enterprise Edition version 11g. **Note:** To use DUAL or TRANSPARENT mode, you must enable Oracle Advanced Security.

Parameter Name	Example Value	
Encryption Password	myencpwd **Tip:** To avoid having to re-enter passwords whenever they change, you can create a policy to provide them to the workflow (see How to Use a Policy to Specify Parameter Values on page 214).	Key that was used to ensure that any encrypted column data, metadata, or table data was re-encrypted before it was written to the dump file set. If you did not specify an Encryption Password for the Data Pump Export operation—or specify TRANSPARENT for the Encryption Mode—data was written to the dump files in clear text form. Note the following: • If you specified an Encryption Password for the export, and the Encryption Mode is PASSWORD, you must specify the same Encryption Password for any subsequent import operations. • The Encryption Password is required when Encryption Mode is PASSWORD or DUAL. • The Encryption Password is not valid when Encryption Mode is TRANSPARENT. • If you specify an Encryption Password but do not specify the Encryption Mode, the mode defaults to PASSWORD. This parameter is only supported in Oracle Database Enterprise Edition version 11g.

Parameter Name	Example Value	
File Size	16GB	Maximum size (in MByte) of each dump file in the dump file set. Specify an integer and one of the following units: B (bytes), KB (kilobytes), MB (megabytes), GB (gigabytes), or TB (terabytes). The default unit is bytes. The minimum valid file size is 4 kilobytes; the maximum valid file size is 16 terabytes. The actual size of a dump file may be slightly smaller depending on the size of the internal blocks used.
Oracle DB User	siteadmin	Database user account (if other than sysdba) that will be used to perform the Data Pump Import. **Note:** For Oracle Database 11g R2, this user must have the DATAPUMP_IMP_FULL_DATABASE role, or the workflow will fail. For earlier versioins, the user must have the IMP_FULL_DATABASE role.
Oracle DB User Password	siteadminpwd **Tip:** To avoid having to re-enter passwords whenever they change, you can create a policy to provide them to the workflow (see How to Use a Policy to Specify Parameter Values on page 214).	Required only if the DB User Password is not '/ as sysdba'.
Ignorable Oracle Errors	ORA-39111,ORA-39151,ORA-31685	Comma delimited list of Oracle errors to ignore while executing the Data Pump Import.

Parameter Name	Example Value	
Table Exist Action	REPLACE	This parameter tells the Data Pump Import utility what to do if a table that it is attempting to import already exists in the database. Valid values are: • SKIP leaves the table unchanged (no rows are imported from the dump file). • APPEND adds the rows from the dump file and leaves the existing rows unchanged. • TRUNCATE deletes the existing rows from the table and adds the rows from the dump file. • REPLACE removes the existing table and recreates it from the dump file. **Note:** SKIP and REPLACE are not valid options if Content is DATA_ ONLY.
Temporary File Location	`/var/temp/ DP_temp_files`	Location to store temporary files while the workflow is running.

Be sure that the default values for all remaining parameters are appropriate for your environment (see Parameters for Refresh Oracle Database via Data Pump on page 97).

Scenario 3: Perform an Import Using a Parameter File that is Stored in the Software Repository

In this scenario, a Data Pump Parameter File that contains all the non-default parameter settings is specified. The Oracle Account parameter is not specified; it will be obtained from the Oracle inventory file (typically `oratab`).

Parameter Name	Example Value	Description
Data Pump Export Files	`april302012export.dmp`	Comma-separated list of Data Pump Export dump files included in the dump file set that will be used for this Data Pump Import. If only one file is specified, no comma is required.
Data Pump Parameter File	`myDPparameters.par`	Name of the Data Pump Import parameter file that you provide. If you do not specify the absolute path to the Parameter File, the workflow will look for the file in the Target Directory. If you do not specify a Parameter File, default Data Pump Import settings will be used for parameters not specified in the deployment.
Oracle Account	oracle	Oracle user that owns the ORACLE_HOME on the target Oracle database server. Required if an inventory file does not exist. Leave blank for Windows.
Target Directory	`myfileserver.mycompany.com:/uo1/nfs_share`	Directory where the Data Pump Export dump file set and the Parameter file will be staged on the target database server. This directory must be known to the Oracle instance.

Be sure that the default values for all remaining parameters are appropriate for your environment (see Parameters for Refresh Oracle Database via Data Pump on page 97).

Parameters for Refresh Oracle Schema via Data Pump

The following tables describe the required and optional input parameters for this workflow. Some of these parameters may not be initially visible in a deployment (see How to Expose Additional Workflow Parameters on page 213). For most parameters, if you do not specify a value for a parameter, a default value is assigned.

Parameters whose values are derived in one step and consumed by another step are not shown here.

Parameters Defined in this Step: Gather Parameters for Oracle Schema Refresh via Data Pump

Parameter Name	Default Value	Required	Description
Data Pump Export Files	no default	required	Comma-separated list of Data Pump Export dump files included in the dump file set that will be used for this Data Pump Import. If only one file is specified, no comma is required.
Data Pump Parameter File	no default	optional	Name of the Data Pump Import parameter file that you provide. If you do not specify the absolute path to the Parameter File, the workflow will look for the file in the Target Directory. If you do not specify a Parameter File, default Data Pump Import settings will be used for parameters not specified in the deployment.
Inventory Files	see description	optional	Comma separated list of Oracle inventory file names (with absolute paths). If not specified, set to the appropriate default value for the target server operating system. Defaults are: Solaris: `/var/opt/oracle/oraInst.loc` Linux: `/etc/oraInst.loc` Windows: `%ProgramFiles%\Oracle\Inventory`
Oracle Account	no default	optional	Oracle user that owns the ORACLE_HOME on the target Oracle database server. Required if an inventory file does not exist. Leave blank for Windows.
Oracle Home	no default	optional	The ORACLE_HOME to use if more than one home is found in the inventory file (or files).
Oracle SID	no default	required	The Oracle System ID (SID) of the target database.

Parameters Defined in this Step: Gather Parameters for Oracle Schema Refresh via Data Pump (continued)

Parameter Name	Default Value	Required	Description

Server Wrapper	jython	required	Command that will be used to construct the call wrapper. The workflow uses the call wrapper to execute subsequent steps as either the OS administrative user or the Oracle user who owns the pertinent ORACLE_HOME. For example:
			`sudo su - root /opt/hp/dma/client/bin/jython.sh`
			`sudo su - sysdba /opt/hp/dma/client/bin/jython.sh`

Target Directory	no default	required	Directory where the Data Pump Export dump file set and the Parameter file will be staged on the target database server. This directory must be known to the Oracle instance.

Parameters Defined in this Step: Gather Advanced Parameters for Oracle Schema Refresh via Data Pump

Parameter Name	Default Value	Required	Description
Content	ALL	optional	What is included in the Data Pump dump file set that will be imported. Valid settings are ALL, DATA_ONLY, or METADATA_ONLY. • DATA_ONLY: Include only table row data. Do not include database object definitions. • METADATA_ONLY: Include only database object definitions. Do not include table row data. If you specify METADATA_ONLY, any index or table statistics later imported from the dump file set will be locked after the import. • ALL: Include both table row data and database object definitions in the dump file set. You must specify the same Content setting for the export and any subsequent import operations.

Parameters Defined in this Step: Gather Advanced Parameters for Oracle Schema Refresh via Data Pump (continued)

Parameter Name	Default Value	Required	Description
Encryption Password	no default	optional	This setting determines how the dump file set that will be imported should be decrypted. Valid values are PASSWORD, TRANSPARENT, and DUAL. • PASSWORD: Data Pump Export used the Encryption Password to encrypt the dump file set. You must specify the same Encryption Password to perform a subsequent import. • TRANSPARENT: The Oracle encryption wallet was used to encrypt the dump file set using the Secure Sockets Layer (SSL) protocol. The encryption wallet must also be used to decrypt the dump file set during the import. You cannot specify an Encryption Password if you specify TRANSPARENT mode. • DUAL: The dump file set can either be decrypted transparently using the Oracle encryption wallet, or it can be decrypted by using the same Encryption Password that was used for the export. DUAL and TRANSPARENT mode are only supported in Oracle Database Enterprise Edition version 11g. **Note:** To use DUAL or TRANSPARENT mode, you must enable Oracle Advanced Security.
Ignorable Oracle Errors	ORA-31684,ORA-39111,ORA-39151,ORA-31685,ORA-00001	optional	Comma delimited list of Oracle errors to ignore while executing the Data Pump Import.
Oracle DB User	no default	optional	Database user account (if other than sysdba) that will be used to perform the Data Pump Import. **Note:** For Oracle Database 11g R2, this user must have the DATAPUMP_IMP_FULL_DATABASE role, or the workflow will fail. For earlier versioins, the user must have the IMP_FULL_DATABASE role.

Parameters Defined in this Step: Gather Advanced Parameters for Oracle Schema Refresh via Data Pump (continued)

Parameter Name	Default Value	Required	Description
Oracle DB User Password	/ as sysdba	optional	Password for the Oracle DB User. This is required when this user is not sysdba.
Schema	no default	optional	Comma-separated list of schemas to import. This parameter is required if a Data Pump Parameter File is not specified.
Schema Excluded	no default	optional	Comma-separated list of schemas to exclude from the import.
Table Exist Action	SKIP	optional	This parameter tells the Data Pump Import utility what to do if a table that it is attempting to import already exists in the database. Valid values are: • SKIP leaves the table unchanged (no rows are imported from the dump file). • APPEND adds the rows from the dump file and leaves the existing rows unchanged. • TRUNCATE deletes the existing rows from the table and adds the rows from the dump file. • REPLACE removes the existing table and recreates it from the dump file. **Note:** SKIP and REPLACE are not valid options if Content is DATA_ONLY.
Verification Result	no default	optional	Name (with absolute path) of a text file containing the expected results of the SQL queries included in the Verification SQL Script. This parameter is required if you provide a Verification SQL Script. Be sure to run the Verification SQL Script on the SOURCE database before running this workflow, and copy the results into this file. You must provide this file in a location where the workflow can access it.
Verification SQL Script	no default	optional	Name (with absolute path) of a text file containing a SQL script that verifies the integrity of the database. You must provide this file in a location where the workflow can access it. The expected results of the queries included in this script must be provided in the Verification Result file.

Export and Refresh Oracle Schema via Data Pump

This workflow performs a database refresh using the Oracle Data Pump Utility. It exports one or more specific schemas in a database in one Oracle instance (the SOURCE) and imports them into a database in another Oracle instance (the DESTINATION). You can use this workflow to implement a cross-platform database refresh (for example: Linux to Solaris).

Data Pump uses SQL commands to import and export specific data objects. It is slower than the Oracle Recovery Manager (RMAN) but offers more flexibility.

The workflow automatically detects which ORACLE_HOME and ORACLE_SID to use when performing the Data Pump import. You must specify the same encryption mode and password, compression level, and file size that was used for the export.

You have the option of providing a Data Pump parameter file or entering the parameters on the Deployment page. In either case, the parameter values are validated prior to the Data Pump import. If you do not provide a parameter file, the workflow creates one based on the parameter values that you specify on the Deployment page. If you do not specify a value for a particular parameter, the default value is used (see Parameters for Export and Refresh Oracle Database via Data Pump on page 121).

Note: This workflow is a bridged execution workflow. You specify the SOURCE and DESTINATION targets at run-time.

The following tables describe the required and optional input parameters for this workflow. Some of these parameters may not be initially visible in a deployment (see How to Expose Additional Workflow Parameters on page 213). For most parameters, if you do not specify a value for a parameter, a default value is assigned.

To use this workflow in your environment, see the following information:

Topic	Information Included
Prerequisites for this Workflow	List of prerequisites that must be satisfied before you can run this workflow
How this Workflow Works	Information about what the workflow does, including validation checks performed, steps executed, and a high-level process flow
How to Run this Workflow	Instructions for running this workflow in your environment
Sample Scenarios	Examples of typical parameter values for this workflow
Parameters for Export and Refresh Oracle Schema via Data Pump	List of input parameters for this workflow

Note: To view the steps included in this workflow, see the Steps for Export and Refresh Oracle Schema via Data Pump.

Prerequisites for this Workflow

Be sure that the following prerequisites are satisfied before you run the Export and Refresh Oracle Schema via Data Pump workflow:

1. The HP DMA client must be installed on all target servers.
2. The Target Directory must exist prior to the execution of the workflow. This directory can be local, or it can be a Network File System (NFS) mount point.

   Note: If you specify an NFS mount point, the pertinent NFS share must be available to the target server, and it must be mounted prior to running this workflow.

3. The specified Oracle Database user must have READ and WRITE permission for the specified Target Directory.
4. The Oracle Database software must be provisioned, and the database must exist in the target instance prior to workflow execution.

Note: For Data Pump workflows, you must specify the same Content and Encryption Password settings for the export and any subsequent import operations.

For more information about prerequisites for Oracle Database, refer to the Oracle Database Product Documentation on page 203.

How this Workflow Works

This topic contains the following information about the Export and Refresh Oracle Schema via Data Pump workflow:

Overview

This workflow performs a database schema refresh using the Oracle Data Pump Utility. It exports the contents of one or more specific schemas in one Oracle instance (the SOURCE) and imports them into a database in another Oracle instance (the DESTINATION). You can use this workflow to implement a cross-platform database refresh (for example: Linux to Solaris).

Data Pump uses SQL commands to import and export specific data objects. It is slower than the Oracle Recovery Manager (RMAN) but offers more flexibility.

The workflow automatically detects which ORACLE_HOME and ORACLE_SID to use when performing the Data Pump export and import operations.

You have the option of either providing Data Pump parameter files or entering the parameters on the Deployment page. In either case, the parameter values are validated prior to the Data Pump operation export and import operations. If you do not provide a parameter file, the workflow creates one based on the parameter values that you specify on the Deployment page. If you do not specify a value for a particular parameter, the default value is used (see Parameters for Export and Refresh Oracle Schema via Data Pump on page 194).

Note: This workflow is a bridged execution workflow. You specify the SOURCE and DESTINATION targets at run-time.

Validation Checks Performed

The workflow validates the following conditions on the SOURCE target:

1. The specified Oracle DB User can connect to and query the database specified in the Oracle SID.
2. Oracle Database version 10.2 (or later) is installed at the specified (or automatically detected) Oracle Home.
3. The Oracle DB User has permission to perform a full database export using the Data Pump utility. The Oracle Database user must have EXP_FULL_DATABASE permission.
4. A temporary directory required for file storage can be created on the target server.
5. The specified Ignorable Oracle Errors are, in fact, valid error codes.
6. If a Data Pump Parameter file is specified, the file exists in the specified location.

   If a Data Pump Parameter file is not specified, one or more schemas are specified in the deployment.
7. The specified Target Directory exists, either locally or on a network share, and is writable.
8. The directory names included in the Do Not Remove list (if any) are valid.
9. The operating system on the target server is a supported HP DMA platform.

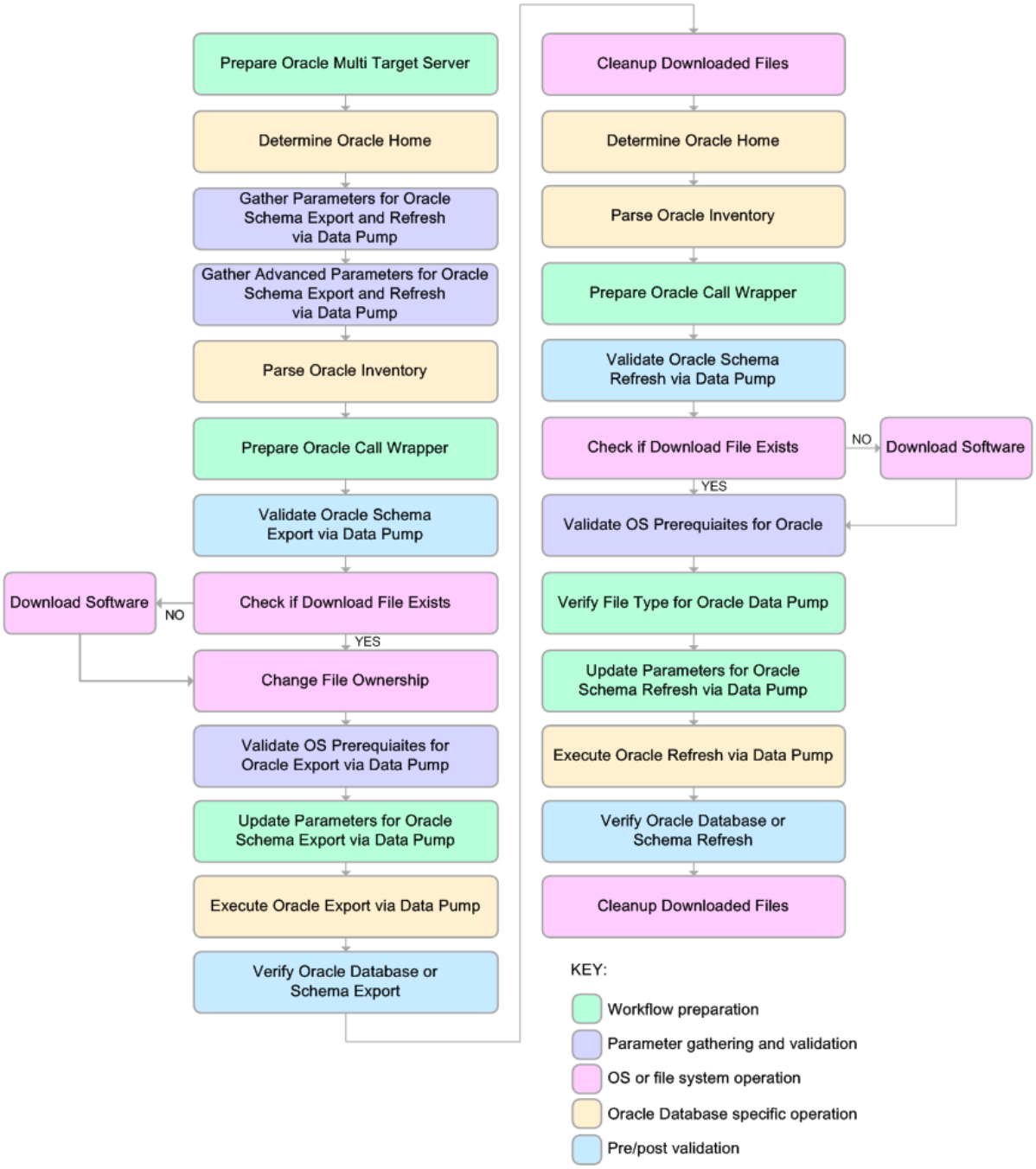
After the workflow successfully performs the Data Pump Export on the SOURCE target, it validates the following conditions on the DESTINATION target:

1. The specified Oracle DB User can connect to and query the database specified in the Oracle SID.
2. Oracle Database version 10.2 (or later) is installed at the specified (or automatically detected) Oracle Home.
3. The Oracle DB User has permission to perform a full database export using the Data Pump utility.
4. A temporary directory required for file storage can be created on the target server.
5. The specified Ignorable Oracle Errors are, in fact, valid error codes.
6. If a Data Pump Parameter file is specified, the file exists in the specified location.

   If a Data Pump Parameter file is not specified, one or more schemas are specified in the deployment.
7. The specified Target Directory exists, either locally or on a network share, and is writable.
8. The directory names included in the Do Not Remove list (if any) are valid.
9. The operating system on the target server is a supported HP DMA platform.

Steps Executed

The Export and Refresh Oracle Schema via Data Pump workflow includes the following steps. Each step must complete successfully before the next step can start. If a step fails, the workflow reports a failure, and all subsequent steps are skipped.



Process Flow

This workflow performs the following tasks on the SOURCE target server:

1. Determines the target server platform type, and identifies the server call wrapper.
2. Determines the Oracle Home path and Oracle SID by reading the `oratab` file.
3. Gathers all required and optional parameters.
4. Determines the OS owner of the Oracle Home directory.
5. Prepares the instance call wrapper based on the specified Oracle User.
6. Validates all parameter values specified or derived.
7. Downloads the Data Pump Parameter File (if specified) from the software repository.
8. Creates a Data Pump parameter file (or updates the existing parameter file) using values specified on the Deployment page. If you do not specify a value for a particular parameter, the default value is used.
9. Performs the Data Pump Export operation.
10. Verifies that the database is back online after the export:
    - No corrupted blocks exist.
    - No files are in backup mode.
    - Temporary table space is available.
11. Verifies that the Data Pump Export File exists in the Target Directory.
12. Removes any temporary files and directories used to perform the export.

The workflow then performs the following tasks on the DESTINATION target server:

1. Determines the target server platform type, and identifies the server call wrapper.
2. Determines the Oracle Home path and Oracle SID by reading the `oratab` file.
3. Gathers all required and optional parameters.
4. Determines the OS owner of the Oracle Home directory.
5. Prepares the instance call wrapper based on the specified Oracle User.
6. Validates all parameter values specified or derived.
7. Downloads the Data Pump Parameter File, SQL Verification Script, and SQL Verification Results (if specified) from the software repository.
8. Creates a Data Pump parameter file (or updates the existing parameter file) using values specified on the Deployment page. If you do not specify a value for a particular parameter, the default value is used.
9. Performs the Data Pump Import operation.
10. Checks the Import Log File to ensure that it does not contain any unexpected errors.

11. Verifies that the database is online after the import:
    - No corrupted blocks exist.
    - No files are in backup mode.
    - Temporary table space is available.
12. Runs the SQL Verification Script (if provided), and compares the results to the SQL Verification Results (must be provided if the script is provided).
13. Removes any temporary files and directories used to perform the import.

How to Run this Workflow

The following instructions show you how to customize and run the Export and Refresh Oracle Schema via Data Pump workflow in your environment.

The workflow provides default values for most parameters. These default values are usually sufficient for a "typical" export. You can override the defaults by specifying parameter values in the deployment. You can also expose additional parameters in the workflow, if necessary, to accomplish more advanced scenarios. Any parameters not explicitly specified in the deployment will have the default values listed in Parameters for Export and Refresh Oracle Schema via Data Pump on page 194

Note: Before following this procedure, review the Prerequisites for this Workflow, and ensure that all requirements are satisfied.

To use the Export and Refresh Oracle Database via Data Pump workflow:

1. Create a deployable copy of the workflow (see Create a Deployable Workflow on page 17).
2. Determine the values that you will specify for the following parameters:

Parameter Name	Default Value	Required	Description
ALL - Schema	no default	optional	Comma-separated list of schemas to export and import. This parameter is REQUIRED if the EXPORT- Data Pump Parameter File parameter is not specified.
EXPORT - Data Pump Parameter File	no default	optional	Name of the Data Pump Export parameter file that you provide. If you do not specify the absolute path to the EXPORT- Data Pump Parameter File, the workflow will look for the file in the EXPORT - Target Directory. If you do not specify an EXPORT- Parameter File at all, default Data Pump Export settings will be used for parameters not specified in the deployment.
EXPORT - Oracle Account	no default	optional	Oracle user that owns the ORACLE_HOME on the SOURCE database server. Required if an inventory file does not exist. Leave blank for Windows.
EXPORT - Target Directory	no default	required	Staging directory path known to the SOURCE database server and shared with the DESTINATION database server. This is the path to the NFS mount point as known by the SOURCE database server.
IMPORT - Data Pump Parameter File	no default	optional	Name of the Data Pump Import parameter file that you provide. If you do not specify the absolute path to the Parameter File, the workflow will look for the file in the IMPORT - Target Directory. If you do not specify a Parameter File, default Data Pump Import settings will be used for parameters not specified in the deployment.

Parameter Name	Default Value	Required	Description
IMPORT - Oracle Account	no default	optional	Oracle user that owns the ORACLE_HOME on the DESTINATION database server. Required if an inventory file does not exist. Leave blank for Windows.
IMPORT - Target Directory	no default	required	Staging directory path known to the DESTINATION database server and shared with the SOURCE database server. This is the path to the NFS mount point as known by the DESTINATION database server.

Note: This is the minimum set of parameters required to run this workflow. You may need to expose additional parameters depending on your provisioning objectives.

See Parameters for Export and Refresh Oracle Schema via Data Pump on page 194 for detailed descriptions of all input parameters for this workflow, including default values.

3. In the workflow editor, expose any additional parameters that you need (see How to Expose Additional Workflow Parameters on page 213). You will specify values for these parameters when you create the deployment.
4. Save the changes to the workflow (click **Save** in the lower right corner).
5. Create a new deployment (see Create a Deployment on page 18 for instructions).
   a. On the Targets tab, select all the target servers—both source and destination—that will participate in this database refresh. The targets that you select here will be available in the Target Parameters drop-down menus on the Run page (see step 7).
   b. On the Parameters tab, specify values for the required parameters listed in step 2 and any additional parameters that you exposed in step 3.You do not need to specify values for those parameters whose default values are appropriate for your environment.
6. Save the deployment (click **Save** in the lower right corner).
7. Run the workflow using this deployment (see Run Your Workflow on page 19 for instructions).

   On the Run page, select the following targets from the respective drop-down menus:

Parameter Name	Default	Description
Source	no default	Instance that contains the database whose schema will be exported.
Destination	no default	Instance where the database schema will be imported.

To verify the results:

The workflow will complete and report SUCCESS on the Console if it has run successfully. If an error occurs during workflow execution, the error is logged, and the workflow terminates in the FAILURE state.

Sample Scenarios

This topic shows you how to use various parameters to achieve the following database backup scenarios in your environment using the Export and Refresh Oracle Schema via Data Pump workflow:

Scenario 1: Perform a Schema Export and Refresh Using Default Settings and a Network Share Target Directory

This is the simplest Data Pump database refresh scenario. In this example, the export file is stored on a network share to minimize data transfer overhead. The parameters shown here are visible by default.

In this scenario, the Data Pump Parameter File is not specified for either the export or the import. The workflow will create its own parameter files using default values. The Oracle Account parameter is also not specified; it will be obtained from the Oracle inventory file (typically `oratab`) on the SOURCE and DESTINATION target servers, respectively.

Parameter Name	Example Value	Description
EXPORT - Target Directory	`myfileserver.mycompany.com:/uo1/nfs_share`	Staging directory path known to the DESTINATION database server and shared with the SOURCE database server. This is the path to the NFS mount point as known by the DESTINATION database server.
IMPORT - Target Directory	`myfileserver.mycompany.com:/uo1/nfs_share`	Staging directory path known to the DESTINATION database server and shared with the SOURCE database server. This is the path to the NFS mount point as known by the DESTINATION database server.

Be sure that the default values for all remaining parameters are appropriate for your environment (see Parameters for Export and Refresh Oracle Database via Data Pump on page 121).

Scenario 2: Perform an Import Using Parameter Files Stored in the Software Repository

In this scenario,the Data Pump Parameter Files that contain all the non-default parameter settings for the import and export, respectively, are specified. The Oracle Account parameter is not specified; it will be obtained from the Oracle inventory file (typically `oratab`).

Parameter Name	Example Value	Description
EXPORT - Data Pump Parameter File	`DPExportParameters.par`	Name of the Data Pump Export parameter file that you provide. If you do not specify the absolute path to the EXPORT- Data Pump Parameter File, the workflow will look for the file in the EXPORT - Target Directory. If you do not specify an EXPORT- Parameter File at all, default Data Pump Export settings will be used for parameters not specified in the deployment.
EXPORT - Oracle Account	sysdba	Oracle user that owns the ORACLE_ HOME on the SOURCE database server. Required if an inventory file does not exist. Leave blank for Windows.
EXPORT - Target Directory	`myfileserver.mycompany.com: /uo1/nfs_share`	Staging directory path known to the SOURCE database server and shared with the DESTINATION database server. This is the path to the NFS mount point as known by the SOURCE database server.
IMPORT - Data Pump Parameter File	`DPImportParameters.par`	Name of the Data Pump Import parameter file that you provide. If you do not specify the absolute path to the Parameter File, the workflow will look for the file in the IMPORT - Target Directory. If you do not specify a Parameter File, default Data Pump Import settings will be used for parameters not specified in the deployment.
IMPORT - Oracle Account	sysdba	Oracle user that owns the ORACLE_ HOME on the DESTINATION database server. Required if an inventory file does not exist. Leave blank for Windows.
IMPORT - Target Directory	`myfileserver.mycompany.com: /uo1/nfs_share`	Staging directory path known to the DESTINATION database server and shared with the SOURCE database server. This is the path to the NFS mount point as known by the DESTINATION database server.

Be sure that the default values for all remaining parameters are appropriate for your environment (see Parameters for Export and Refresh Oracle Database via Data Pump on page 121).

Scenario 3: Perform a Schema Export and Refresh Using Non-Default Parameters

The Export and Refresh Oracle Schema via Data Pump workflow provides many parameters that can be modified to suit your needs. For example, you can compress or encrypt the Data Pump Export file. You can specify the type of content that should be refreshed, and you can instruct Data Pump how to proceed if it finds existing data in the DESTINATION database. You can also tell the workflow to ignore specific Oracle errors that might arise during the export or the import but would have no bearing on its outcome.

Again in this scenario, the Data Pump Parameter File is not specified for either the export or the import. The workflow will create its own parameter files using default values. The EXPORT - Oracle Account parameter is also not specified; it will be obtained from the Oracle inventory file (typically `oratab`) on the SOURCE and DESTINATION target servers, respectively.

Here, the Data Pump Export file is stored on a network share to minimize data transfer overhead.

The first six parameters listed are visible by default; the remaining parameters must be exposed in the workflow so that they are available in the deployment (see How to Expose Additional Workflow Parameters on page 213).

Parameter Name	Example Value	Description
EXPORT - Target Directory	`myfileserver.mycompany.com:/uo1/nfs_share`	Staging directory path known to the SOURCE database server and shared with the DESTINATION database server. This is the path to the NFS mount point as known by the SOURCE database server.
IMPORT - Oracle Account	sysdba	Oracle user that owns the ORACLE_HOME on the DESTINATION database server. Required if an inventory file does not exist. Leave blank for Windows.
IMPORT - Target Directory	`myfileserver.mycompany.com:/uo1/nfs_share`	Staging directory path known to the DESTINATION database server and shared with the SOURCE database server. This is the path to the NFS mount point as known by the DESTINATION database server.

Parameter Name	Example Value	Description
ALL - Content	DATA_ONLY	What to export and subsequently import. Valid settings are ALL, DATA_ONLY, or METADATA_ONLY. • DATA_ONLY: Include only table row data. Do not include database object definitions. • METADATA_ONLY: Include only database object definitions. Do not include table row data. If you specify METADATA_ONLY, any index or table statistics later imported from the dump file set will be locked after the import. • ALL: Include both table row data and database object definitions in the dump file set.

Parameter Name	Example Value	Description
EXPORT - Compression	DATA_ONLY	Items that will be compressed in the Data Pump Export dump file set. Valid settings are ALL, NONE, DATA_ONLY, METADATA_ONLY. • DATA_ONLY: Compress only the table row data (must specify DATA_ ONLY or ALL for the Content parameter). • METADATA_ONLY: Compress only the database object definitions (must specify METADATA_ONLY or ALL for the Content parameter). • ALL: Compress both the table row data and the database object definitions in the dump file set (must specify ALL for the Content parameter). • NONE: Nothing is compressed in the dump file set. You must specify the same Compression setting for the export and subsequent import operations. DATA_ONLY and ALL compression settings are only supported in Oracle Database Enterprise Edition version 11g. You must enable the Oracle Advanced Compression option to use these settings.

Parameter Name	Example Value	Description
EXPORT - Encryption Mode	PASSWORD	This setting determines how the dump file set will be encrypted and how it can later be decrypted during the subsequent import operation. Valid values are PASSWORD, TRANSPARENT, and DUAL. • PASSWORD: Data Pump Export uses the Encryption Password to encrypt the dump file set. You must specify the same Encryption Password to perform a subsequent import. • TRANSPARENT: The Oracle encryption wallet is used to encrypt the dump file set using the Secure Sockets Layer (SSL) protocol. The encryption wallet must also be used to decrypt the dump file set during a subsequent import. You cannot specify an Encryption Password if you specify TRANSPARENT mode. • DUAL: During a subsequent import operation, the dump file set can either be decrypted transparently using the Oracle encryption wallet, or it can be decrypted by using the same Encryption Password that was used for the export. DUAL and TRANSPARENT mode are only supported in Oracle Database Enterprise Edition version 11g. **Note:** To use DUAL or TRANSPARENT mode, you must enable Oracle Advanced Security.

Parameter Name	Example Value	Description
ALL - Encryption Password	myencpwd **Tip:** To avoid having to re-enter passwords whenever they change, you can create a policy to provide them to the workflow (see How to Use a Policy to Specify Parameter Values on page 214).	Key used to ensure that any encrypted column data, metadata, or table data is re-encrypted before it is written to the dump file set. If you do not specify an Encryption Password—or specify TRANSPARENT for the Encryption Mode in the Parameter File—data will be written to the dump files in clear text form. Note the following: • The Encryption Password is required when Encryption Mode is PASSWORD or DUAL. • The Encryption Password is not valid when Encryption Mode is TRANSPARENT. This parameter is only supported in Oracle Database Enterprise Edition version 11g
EXPORT - File Size	16GB	Maximum size of each dump file in the dump file set. If any file in the dump file set reaches this size, that file is closed, and Data Pump attempts to create a new file. Specify an integer and one of the following units: B (bytes), KB (kilobytes), MB (megabytes), GB (gigabytes), or TB (terabytes). The default unit is bytes. The minimum valid file size is 4 kilobytes; the maximum valid file size is 16 terabytes. The actual size of a dump file may be slightly smaller depending on the size of the internal blocks used.

Parameter Name	Example Value	Description
EXPORT - Oracle DB User	prodadmin	SOURCE database user account that will be used to perform the Data Pump Export. **Note:** For Oracle Database 11g R2, this user must have the DATAPUMP_EXP_FULL_DATABASE and DATAPUMP_EXP_FULL_DATABASE roles. For earlier versions, the user must have the EXP_FULL_DATABASE and EXP_FULL_DATABASE roles.
EXPORT - Oracle DB User Password	prodadminpwd **Tip:** To avoid having to re-enter passwords whenever they change, you can create a policy to provide them to the workflow (see How to Use a Policy to Specify Parameter Values on page 214).	Password for the SOURCE Oracle database user specified in the EXPORT-Oracle DB User parameter. This is required when this user is not sysdba.
IMPORT - Oracle DB User	testadmin	DESTINATION database user account that will be used to perform the Data Pump Import. **Note:** For Oracle Database 11g R2, this user must have the DATAPUMP_IMP_FULL_DATABASE and DATAPUMP_IMP_FULL_DATABASE roles. For earlier versions, the user must have the IMP_FULL_DATABASE and IMP_FULL_DATABASE roles.

Parameter Name	Example Value	Description
IMPORT - Oracle DB User Password	testadminpwd **Tip:** To avoid having to re-enter passwords whenever they change, you can create a policy to provide them to the workflow (see How to Use a Policy to Specify Parameter Values on page 214).	Password for the DESTINATION Oracle database user specified in the IMPORT- Oracle DB User parameter. This is required when this user is not sysdba.
ALL - Ignorable Oracle Errors	ORA-39111,ORA-39151,ORA-31685	Comma delimited list of Oracle errors to ignore while executing the export and subsequent import.
IMPORT - Table Exist Action	REPLACE	This parameter tells the Data Pump Import utility what to do if a table that it is attempting to import already exists in the database. Valid values are: • SKIP leaves the table unchanged (no rows are imported from the dump file). • APPEND adds the rows from the dump file and leaves the existing rows unchanged. • TRUNCATE deletes the existing rows from the table and adds the rows from the dump file. • REPLACE removes the existing table and recreates it from the dump file. **Note:** SKIP and REPLACE are not valid options if ALL - Content is DATA_ONLY.

Parameter Name	Example Value	Description
IMPORT - Verification Result	`/var/dp/sql_ver_results`	Name (with absolute path) of a text file containing the expected results of the SQL queries included in the Verification SQL Script. This parameter is required if you provide a Verification SQL Script. Be sure to run the Verification SQL Script on the SOURCE database before running this workflow, and copy the results into this file. You must provide this file in a location where the workflow can access it.
IMPORT - Verification SQL Script	`/var/dp/sql_ver_script`	Name (with absolute path) of a text file containing a SQL script that verifies the following on the DESTINATION database: • The import operation was successful. • No data is missing. You must provide this file in a location where the workflow can access it. The expected results of the queries included in this script must be provided in the Verification Result file.

Parameter Name	Example Value	Description
Defaulted Parameters	FULL,METRICS	The Defaulted Parameters list ensures that the following order of precedence is honored when parameter values are specified: 1. Specified in a parameter file 2. Specified in the deployment 3. Defaulted By default, the list of Default Parameters is generated automatically by the workflow. However, if you unmap one or more of the following parameters in the workflow and specify their values in the deployment (or at run-time), you must tell the workflow which of the other parameters should be defaulted: • COMPRESSION • CONTENT • FILESIZE • FULL • METRICS For example: If you unmap COMPRESSION and specify its value in the deployment, you must also unmap Defaulted Parameters and specify CONTENT, FILESIZE, FULL, METRICS if these parameters are not specified in your parameter file.

Be sure that the default values for all remaining parameters are appropriate for your environment (see Parameters for Export and Refresh Oracle Database via Data Pump on page 121).

Parameters for Export and Refresh Oracle Schema via Data Pump

The following tables describe the required and optional input parameters for this workflow. Some of these parameters may not be initially visible in a deployment (see How to Expose Additional Workflow Parameters on page 213). For most parameters, if you do not specify a value for a parameter, a default value is assigned.

Parameters whose values are derived in one step and consumed by another step are not shown here.

Parameters Defined in this Step: Gather Parameters for Oracle Schema Export and Import via Data Pump

Parameter Name	Default Value	Required	Description
ALL - Schema	no default	optional	Comma-separated list of schemas to export and import. This parameter is REQUIRED if the EXPORT- Data Pump Parameter File parameter is not specified.
EXPORT - Data Pump Parameter File	no default	optional	Name of the Data Pump Export parameter file that you provide. If you do not specify the absolute path to the EXPORT- Data Pump Parameter File, the workflow will look for the file in the EXPORT - Target Directory. If you do not specify an EXPORT- Parameter File at all, default Data Pump Export settings will be used for parameters not specified in the deployment.
EXPORT - Inventory Files	see description	optional	Comma-separated list of fully qualified Oracle inventory files on the SOURCE database server. Defaults are as follows: Solaris: `/var/opt/oracle/oraInst.loc` Linux: `/etc/oraInst.loc` Windows: `%ProgramFiles%\Oracle\Inventory`
EXPORT - Oracle Account	no default	optional	Oracle user that owns the ORACLE_HOME on the SOURCE database server. Required if an inventory file does not exist. Leave blank for Windows.
EXPORT - Target Directory	no default	required	Staging directory path known to the SOURCE database server and shared with the DESTINATION database server. This is the path to the NFS mount point as known by the SOURCE database server.
IMPORT - Data Pump Parameter File	no default	optional	Name of the Data Pump Import parameter file that you provide. If you do not specify the absolute path to the Parameter File, the workflow will look for the file in the IMPORT - Target Directory. If you do not specify a Parameter File, default Data Pump Import settings will be used for parameters not specified in the deployment.

Parameters Defined in this Step: Gather Parameters for Oracle Schema Export and Import via Data Pump (continued)

Parameter Name	Default Value	Required	Description
IMPORT - Inventory Files	see description	optional	Comma-separated list of fully qualified Oracle inventory files on the DESTINATION database server. Defaults are as follows: Solaris: `/var/opt/oracle/oraInst.loc` Linux: `/etc/oraInst.loc` Windows: `%ProgramFiles%\Oracle\Inventory`
IMPORT - Oracle Account	no default	optional	Oracle user that owns the ORACLE_HOME on the DESTINATION database server. Required if an inventory file does not exist. Leave blank for Windows.
IMPORT - Target Directory	no default	required	Staging directory path known to the DESTINATION database server and shared with the SOURCE database server. This is the path to the NFS mount point as known by the DESTINATION database server.

Server Wrapper	jython	required	Command that will be used to construct the call wrapper. The workflow uses the call wrapper to execute subsequent steps as either the OS administrative user or the Oracle user who owns the pertinent ORACLE_HOME. For example:
			`sudo su - root /opt/hp/dma/client/bin/jython.sh`
			`sudo su - sysdba /opt/hp/dma/client/bin/jython.sh`

Parameters Defined in this Step: Gather Advanced Parameters for Oracle Schema Export and Import via Data Pump

Parameter Name	Default Value	Required	Description
ALL - Content	ALL	optional	What to export and subsequently import. Valid settings are ALL, DATA_ONLY, or METADATA_ONLY. • DATA_ONLY: Include only table row data. Do not include database object definitions. • METADATA_ONLY: Include only database object definitions. Do not include table row data. If you specify METADATA_ONLY, any index or table statistics later imported from the dump file set will be locked after the import. • ALL: Include both table row data and database object definitions in the dump file set.
ALL - Encryption Password	no default	optional	Key used to ensure that any encrypted column data, metadata, or table data is re-encrypted before it is written to the dump file set. If you do not specify an Encryption Password—or specify TRANSPARENT for the Encryption Mode in the Parameter File—data will be written to the dump files in clear text form. Note the following: • The Encryption Password is required when Encryption Mode is PASSWORD or DUAL. • The Encryption Password is not valid when Encryption Mode is TRANSPARENT. This parameter is only supported in Oracle Database Enterprise Edition version 11g

Parameters Defined in this Step: Gather Advanced Parameters for Oracle Schema Export and Import via Data Pump (continued)

Parameter Name	Default Value	Required	Description
ALL - Ignorable Oracle Errors	ORA-31684,ORA-39111,ORA-39151,ORA-31685,ORA-00001,RMAN-00571,RMAN-00569,RMAN-03002,RMAN-06054	optional	Comma delimited list of Oracle errors to ignore while executing the export and subsequent import.
EXPORT - Compression	ALL	optional	Items that will be compressed in the Data Pump Export dump file set. Valid settings are ALL, NONE, DATA_ONLY, METADATA_ONLY. • DATA_ONLY: Compress only the table row data (must specify DATA_ONLY or ALL for the Content parameter). • METADATA_ONLY: Compress only the database object definitions (must specify METADATA_ONLY or ALL for the Content parameter). • ALL: Compress both the table row data and the database object definitions in the dump file set (must specify ALL for the Content parameter). • NONE: Nothing is compressed in the dump file set. You must specify the same Compression setting for the export and subsequent import operations. DATA_ONLY and ALL compression settings are only supported in Oracle Database Enterprise Edition version 11g. You must enable the Oracle Advanced Compression option to use these settings.
EXPORT - Data Pump Export File Name	no default	optional	Name of the Data Pump Export dump file (or files) that will be created from an existing Oracle database. A timestamp is appended to the file name (or names) that you specify. If you do not specify a file name, a default file name (or list of names) is generated.

Parameters Defined in this Step: Gather Advanced Parameters for Oracle Schema Export and Import via Data Pump (continued)

Parameter Name	Default Value	Required	Description
EXPORT - Encryption Mode	Default depends on the other encryption settings. Assuming that ENCRYPTION is true: • If Encryption Password is specified, and the Oracle encryption wallet is open, default is DUAL. • If Encryption Password is specified, and the wallet is closed, default is PASSWORD. • If Encryption Password is not specified, and the wallet is open, default is TRANSPARENT. • If Encryption Password is not specified, and the wallet is closed, the Data Pump Export operation returns an error.	optional	This setting determines how the dump file set will be encrypted and how it can later be decrypted during the subsequent import operation. Valid values are PASSWORD, TRANSPARENT, and DUAL. • PASSWORD: Data Pump Export uses the Encryption Password to encrypt the dump file set. You must specify the same Encryption Password to perform a subsequent import. • TRANSPARENT: The Oracle encryption wallet is used to encrypt the dump file set using the Secure Sockets Layer (SSL) protocol. The encryption wallet must also be used to decrypt the dump file set during a subsequent import. You cannot specify an Encryption Password if you specify TRANSPARENT mode. • DUAL: During a subsequent import operation, the dump file set can either be decrypted transparently using the Oracle encryption wallet, or it can be decrypted by using the same Encryption Password that was used for the export. DUAL and TRANSPARENT mode are only supported in Oracle Database Enterprise Edition version 11g. **Note:** To use DUAL or TRANSPARENT mode, you must enable Oracle Advanced Security.

Parameters Defined in this Step: Gather Advanced Parameters for Oracle Schema Export and Import via Data Pump (continued)

Parameter Name	Default Value	Required	Description
EXPORT - File Size	200M	optional	Maximum size of each dump file in the dump file set. If any file in the dump file set reaches this size, that file is closed, and Data Pump attempts to create a new file. Specify an integer and one of the following units: B (bytes), KB (kilobytes), MB (megabytes), GB (gigabytes), or TB (terabytes). The default unit is bytes. The minimum valid file size is 4 kilobytes; the maximum valid file size is 16 terabytes. The actual size of a dump file may be slightly smaller depending on the size of the internal blocks used.
EXPORT - Full	NO	optional	This parameter is set to YES to perform a full Data Pump Export (data and metadata) or NO to export schemas (metadata). **Caution:** The workflow sets the value of this parameter. Do not modify the mapping for this parameter that is defined in the workflow.
EXPORT - Metrics	YES	optional	If you specify YES, the number of objects exported and the elapsed time required for the export operation to complete are recorded in the Data Pump log file. Valid values are YES or NO.
EXPORT - Oracle DB User	no default	optional	SOURCE database user account that will be used to perform the Data Pump Export. **Note:** For Oracle Database 11g R2, this user must have the DATAPUMP_EXP_FULL_DATABASE and DATAPUMP_EXP_FULL_DATABASE roles. For earlier versions, the user must have the EXP_FULL_DATABASE and EXP_FULL_DATABASE roles.

Parameters Defined in this Step: Gather Advanced Parameters for Oracle Schema Export and Import via Data Pump (continued)

Parameter Name	Default Value	Required	Description
EXPORT - Oracle DB User Password	no default	required	Password for the SOURCE Oracle database user specified in the EXPORT- Oracle DB User parameter. This is required when this user is not sysdba.
IMPORT - Oracle DB User	no default	optional	DESTINATION database user account that will be used to perform the Data Pump Import. **Note:** For Oracle Database 11g R2, this user must have the DATAPUMP_IMP_FULL_DATABASE and DATAPUMP_IMP_FULL_DATABASE roles. For earlier versions, the user must have the IMP_FULL_DATABASE and IMP_FULL_DATABASE roles.
IMPORT - Oracle DB User Password	no default	required	Password for the DESTINATION Oracle database user specified in the IMPORT- Oracle DB User parameter. This is required when this user is not sysdba.
IMPORT - Schema Excluded	FALSE	optional	This parameter is set to TRUE if there are schema that will be explicitly excluded from the import. It is set to FALSE otherwise. **Caution:** The workflow sets the value of this parameter. Do not modify the mapping for this parameter that is defined in the workflow.

Parameters Defined in this Step: Gather Advanced Parameters for Oracle Schema Export and Import via Data Pump (continued)

Parameter Name	Default Value	Required	Description
IMPORT - Table Exist Action	SKIP	optional	This parameter tells the Data Pump Import utility what to do if a table that it is attempting to import already exists in the database. Valid values are: • SKIP leaves the table unchanged (no rows are imported from the dump file). • APPEND adds the rows from the dump file and leaves the existing rows unchanged. • TRUNCATE deletes the existing rows from the table and adds the rows from the dump file. • REPLACE removes the existing table and recreates it from the dump file. **Note:** SKIP and REPLACE are not valid options if ALL - Content is DATA_ ONLY.
IMPORT - Update System Tables	FALSE	optional	Determines whether the system tables are updated during the Data Pump Import. If TRUE, all system tables will be included in the import. If FALSE, the SYS and SYSMGR tables are excluded from the import. This is useful, because importing these tables often generates numerous errors, each of which must otherwise be added to the Ignorable Oracle Errors list.
IMPORT - Verification Result	no default	optional	Name (with absolute path) of a text file containing the expected results of the SQL queries included in the Verification SQL Script. This parameter is required if you provide a Verification SQL Script. Be sure to run the Verification SQL Script on the SOURCE database before running this workflow, and copy the results into this file. You must provide this file in a location where the workflow can access it.

Parameters Defined in this Step: Gather Advanced Parameters for Oracle Schema Export and Import via Data Pump (continued)

Parameter Name	Default Value	Required	Description
IMPORT - Verification SQL Script	no default	optional	Name (with absolute path) of a text file containing a SQL script that verifies the following on the DESTINATION database: • The import operation was successful. • No data is missing. You must provide this file in a location where the workflow can access it. The expected results of the queries included in this script must be provided in the Verification Result file.

Chapter 4

Reference Information

This chapter contains the following information:

HP DMA Documentation

For information about using the HP DMA web interface, see the *HP DMA User Guide* and the *HP DMA Administrator Guide*.

These documents are part of the HP DMA documentation library, which is available on the HP Software Product Manuals web site:

http://h20230.www2.hp.com/selfsolve/manuals

Oracle Database Product Documentation

For information about Oracle Database 11g, including prerequisites, see the product documentation available at the following web site:

Document Title	Link to the Current Version
Oracle Database 11g Documentation Library	http://www.oracle.com/pls/db112/homepage
Oracle Database 11g Documentation Book List	http://www.oracle.com/pls/db112/portal.all_books
Oracle Recovery Manager Documentation	Oracle RMAN Documentation
Oracle Data Pump Documentation	Oracle Data Pump Documentation

Oracle RMAN Documentation

The following topics in the Oracle Database product documentation suite provide information about the Recovery Manager (RMAN) utility:

Document Title	Topic	Current Link
Oracle® Database Backup and Recovery User's Guide 11g Release 2 (11.2)	Recovery Manager Architecture	http://docs.oracle.com/cd/E11882_01/backup.112/e10642/rcmarchi.htm#BRADV001
Oracle Database Backup and Recovery User's Guide 11g Release 2 (11.2)	RMAN Backup Concepts	http://docs.oracle.com/cd/E11882_01/backup.112/e10642/rcmcncpt.htm#BRADV002
Oracle Database 2 Day DBA 11g Release 2 (11.2)	Performing Backup and Recovery	http://docs.oracle.com/cd/E11882_01/server.112/e10897/backrest.htm#ADMQS009
Oracle Database Backup and Recovery Reference 11g Release 2 (11.2)	About RMAN Commands	http://docs.oracle.com/cd/E11882_01/backup.112/e10643/rcmcomma.htm#RCMRF001

The links listed here were correct as of the publication of this guide. They are subject to change at Oracle's discretion.

Oracle Data Pump Documentation

The following topics in the Oracle Database product documentation suite provide information about the Data Pump utility:

Document Title	Topic	Current Link
Oracle Database Concepts 11g Release 2	Data Pump Architecture	http://docs.oracle.com/cd/E11882_01/server.112/e25789/cncptdba.htm#CNCPT1277
Oracle® Database Concepts 11g Release 2 (11.2)	Oracle Data Pump Export and Import	http://docs.oracle.com/cd/E11882_01/server.112/e25789/cncptdba.htm#CHDDDDBJ
Oracle® Database Utilities 11g Release 2 (11.2)	Overview of Oracle Data Pump	http://docs.oracle.com/cd/E11882_01/server.112/e22490/dp_overview.htm#SUTIL100
Oracle® Database Utilities 11g Release 2 (11.2)	Data Pump Export	http://docs.oracle.com/cd/E11882_01/server.112/e22490/dp_export.htm#SUTIL200
Oracle® Database Utilities 11g Release 2 (11.2)	Data Pump Import	http://docs.oracle.com/cd/E11882_01/server.112/e22490/dp_import.htm#SUTIL300
Oracle Database Utilities 11g Release 2 (11.2)	Data Pump Command Reference	http://docs.oracle.com/cd/E11882_01/server.112/e22490/part_dp.htm#i436481

The links listed here were correct as of the publication of this guide. They are subject to change at Oracle's discretion.

Example of a Verification SQL Script and Results File

The following example shows a simple SQL script that could be used to verify that the contents of the source and destination databases are the same.

SQL Script Example

Here are the contents of a simple Verification SQL Script that could be used to verify a Data Pump import or RMAN restore operation:

```
connect ESPN/ESPN
select count(*) from player;
select * from player where player_id = 27;
select * from team where team_code = 10;
exit
```

Results File Example

Here are the results of running the Verification SQL Script shown above on the source database prior to the Data Pump export or the RMAN backup operation. The goal is to get the same results when you run the script on the destination database after the Data Pump import or the RMAN restore operation.

```
COUNT(*)
----------
  27


 PLAYER_ID PLAYER_NAME                                COUNTRY              G
---------- ---------------------------------------- ------------------
-- -
    27 Michael Jordan                          USA                   M


 TEAM_CODE NAME                      HOME_TOWN                 SPORTS_CODE
---------- ------------------------ ------------------------- -------
----
    10 Unilever Volei        Rio de Janerio                       6
```

Chapter 5

Tips and Best Practices

This portion of the document contains a collection of tips and best practices that will enable you to use HP DMA more effectively. It contains the following topics:

How this Solution is Organized

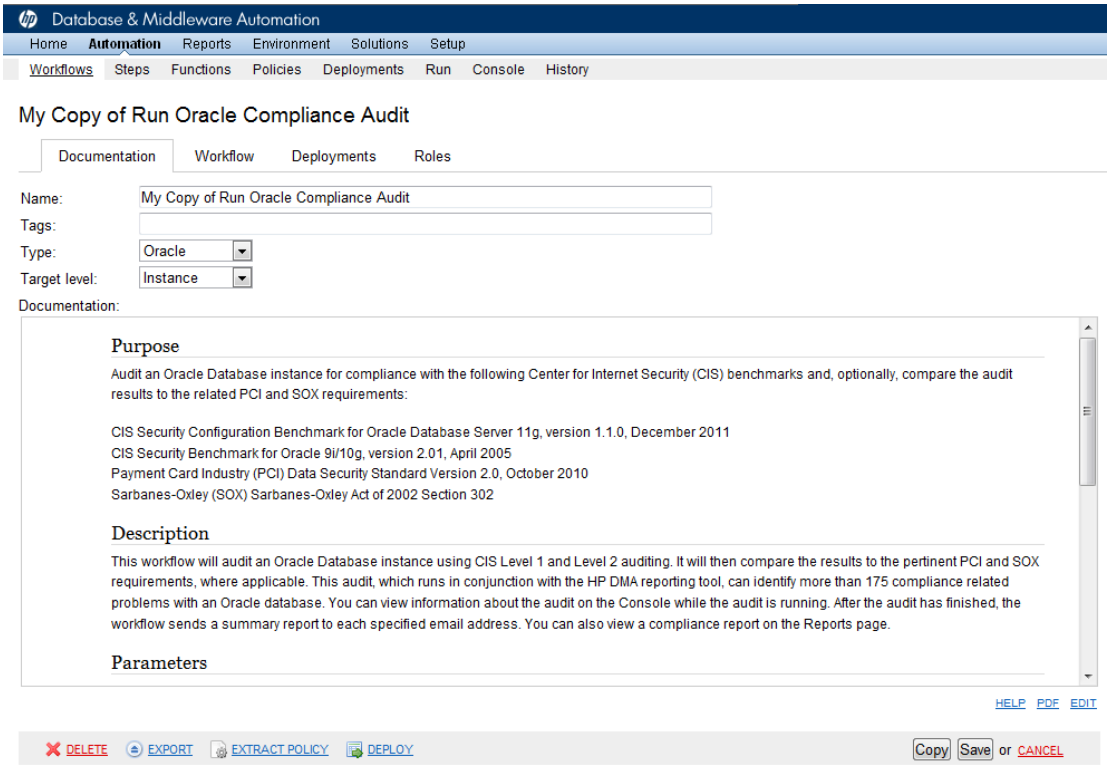
In HP DMA, a **workflow** executes a process —such as exporting the contents of a database and loading them into another database.

A **solution pack** contains one or more related **workflow templates**. This solution contains the following workflow templates:

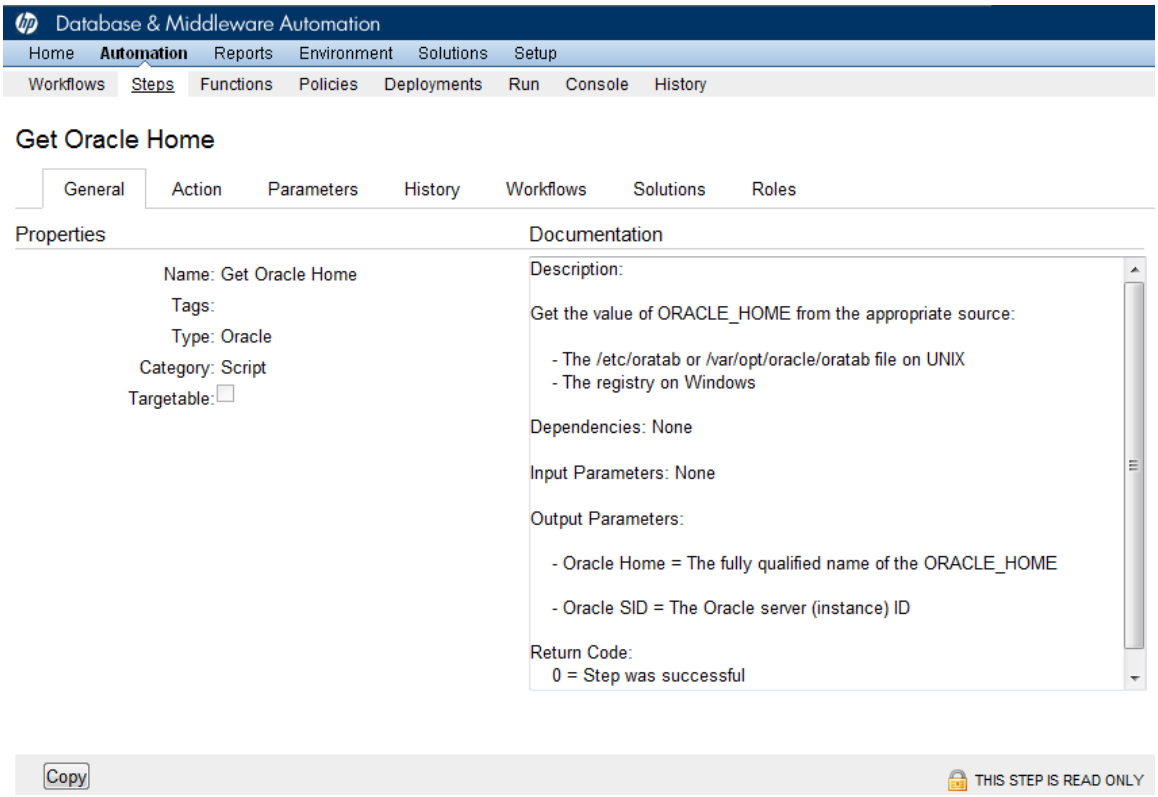
Workflow Name	Purpose
Extract Oracle Database via RMAN	Executes a full database backup using Oracle Recovery Manager (RMAN) for the purpose of performing a full database refresh.
Refresh Oracle Database via RMAN	Restores an Oracle database from a previously created RMAN backup set.
Extract and Refresh Oracle Database via RMAN	Uses RMAN to perform a full database backup of the SOURCE database followed by a full restore of the DESTINATION database.
Export Oracle Database via Data Pump	Performs a full database export using the Oracle Data Pump utility for the purpose of performing a full database refresh.
Refresh Oracle Database via Data Pump	Imports the contents of one or more previously created Data Pump export files.
Export and Refresh Oracle Database via Data Pump	Uses the Data Pump utility to export the contents of the SOURCE database and then import them into the DESTINATION database.
Export Oracle Schema via Data Pump	Exports the specified schemas from an Oracle database using the Data Pump utility.
Refresh Oracle Schema via Data Pump	Imports the specified schemas from one or more previously created Data Pump export files.
Export and Refresh Oracle Schema via Data Pump	Uses the Data Pump utility to export the specified schemas from a SOURCE database and import them into a DESTINATION database.

What's Inside

Each workflow template has a Documentation tab that provides detailed information about that workflow.

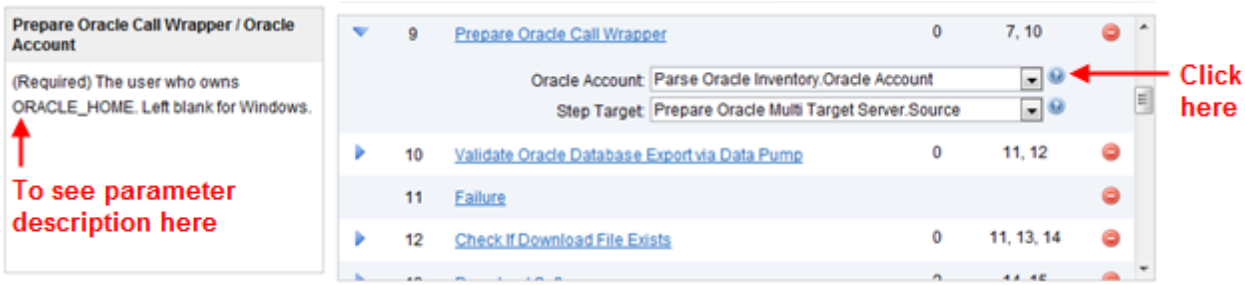


A workflow consist of a sequence of **steps**. Each step performs a very specific task. Each step includes a documentation panel that briefly describes its function. example

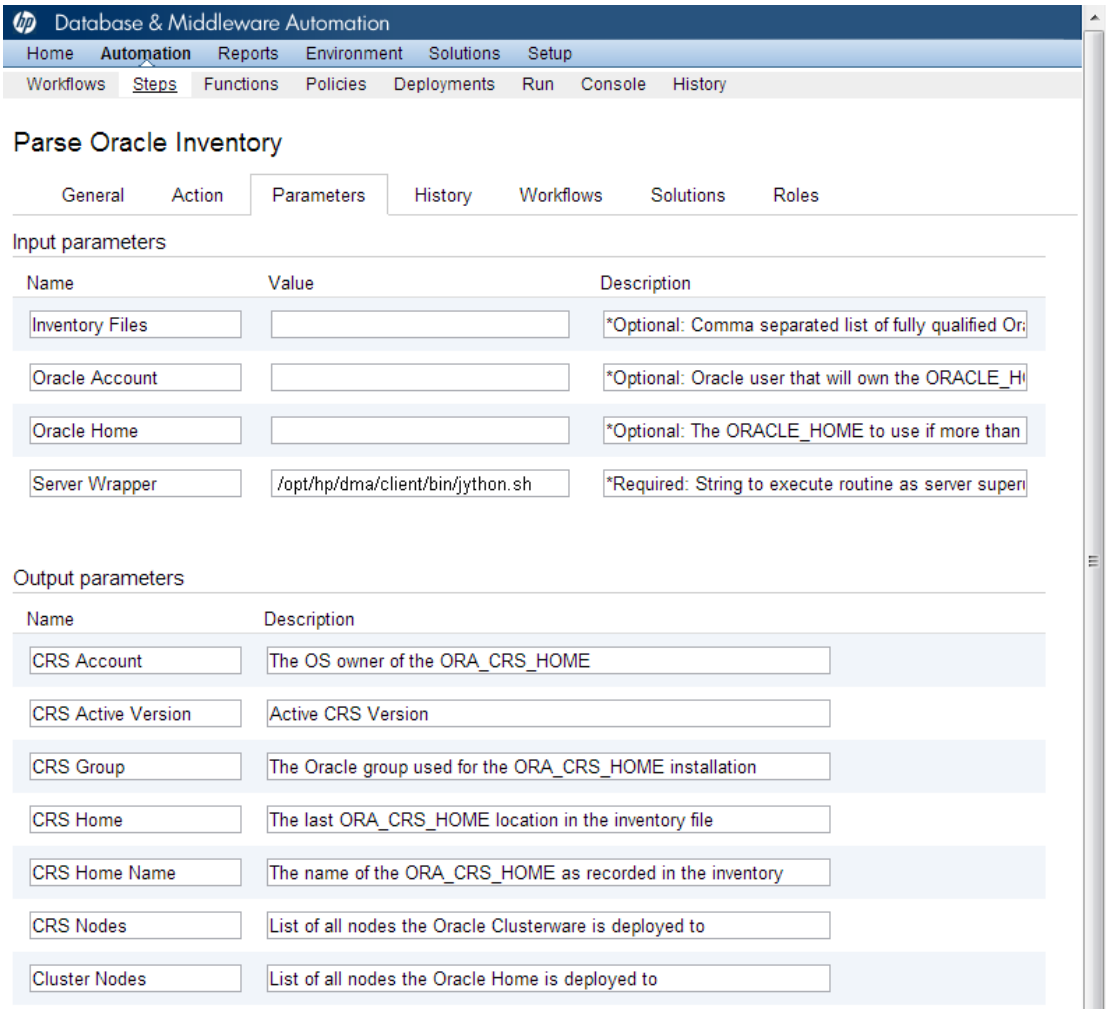


Steps can have input and output **parameters**. Output parameters from one step often serve as input parameters to another step. Steps can be shared among workflows.

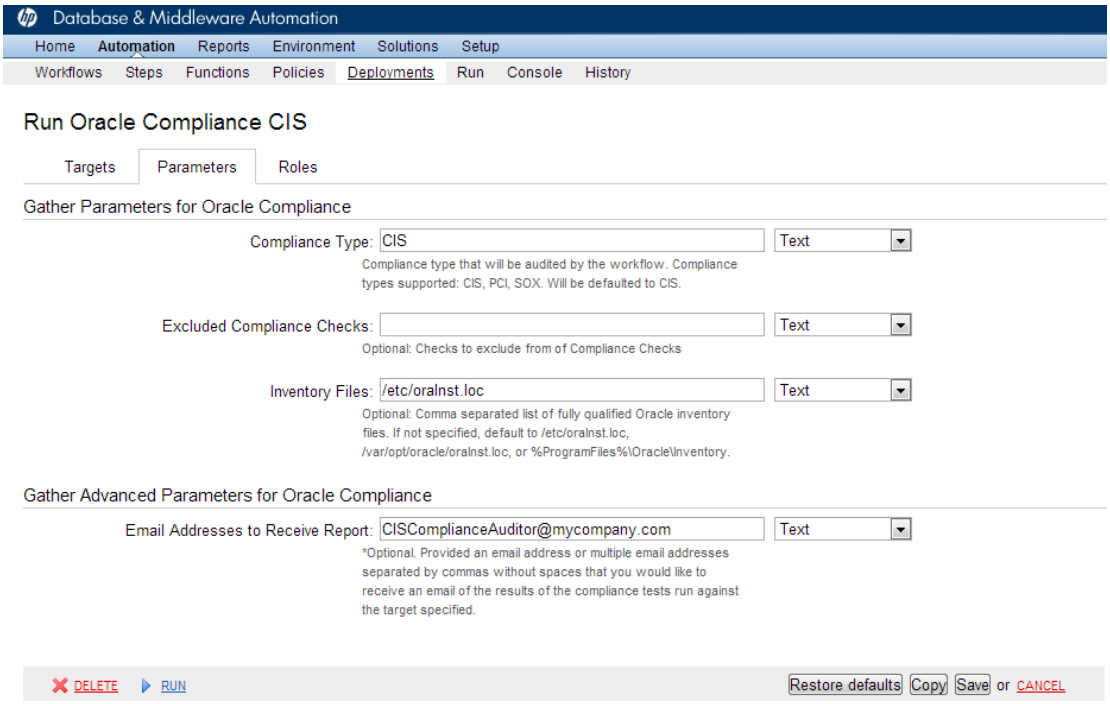
Parameter descriptions are also displayed in several locations in the HP DMA web interface. They appear on the Workflow tab for each workflow.



Parameter descriptions also appear on the Parameters tab for each step in the workflow.



Parameter descriptions also appear on the Parameters tab in the deployment (organized by step).



All parameters used by the workflows in this solution pack are also described in the Reference Information for this solution pack.

Note: The workflow templates included in this solution pack are read-only and cannot be deployed. To use a workflow template, you must first create a copy of the template and then customize that copy for your environment (see Create a Deployable Workflow on page 17

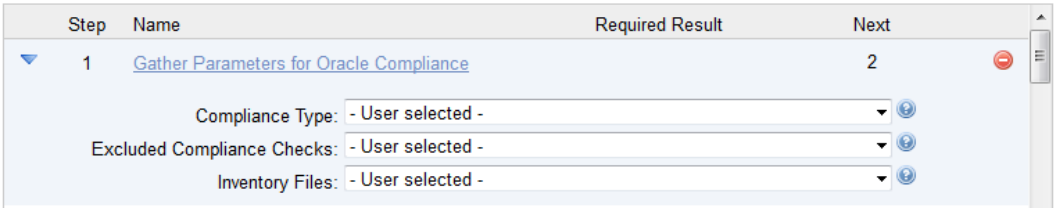
How to Expose Additional Workflow Parameters

Each workflow in this solution pack has a set of input parameters. Some are required and some are optional. To run a workflow in your environment, you must specify values for a subset of these parameters when you create a deployment.

By default, only a few of the input parameters for each workflow are visible on the Deployment page, and the rest are hidden. In order to specify a value for a parameter that is currently hidden, you must first expose that parameter by changing its mapping in the workflow editor.

To expose a hidden workflow parameter:

1. In the HP DMA web interface, go to Automation > Workflows.
2. From the list of workflows, select a deployable workflow.
3. Go to the Workflow tab.
4. In the list of steps below the workflow diagram, click the ▶ (blue arrow) to the immediate left of the pertinent step name. This expands the list of input parameters for this step.
5. For the parameter that you want to expose, select - User Selected - from the drop-down list. For example:



6. Repeat steps 4 and 5 for all the parameters that you would like to specify in the deployment.
7. Click **Save** in the lower right corner.

How to Use a Policy to Specify Parameter Values

It is sometimes advantageous to provide parameter values by using a policy rather than explicitly specifying the values in a deployment. This approach has the following advantages:

- The policy can be used in any deployment.
- It is faster and less error-prone than specifying parameter values manually.
- For parameter values that change frequently—for example, passwords that must be changed regularly—you only need to update them in one place.

To establish a policy, you can either Create a Policy or Extract a Policy from a workflow.

After you establish the policy, you must Reference the Policy in the Deployment.

For more information, see the *HP DMA User Guide*. This document is available on the HP Software Product Manuals web site: http://h20230.www2.hp.com/selfsolve/manuals

Create a Policy

The first step in this approach is to create a policy that provides parameter values. There are two ways to do this: (1) create a new policy, and define all attributes manually (as shown here) or (2) extract a policy from a workflow (see Extract a Policy on the next page).

To create a policy that provides parameter values:

1. In the HP DMA web UI, go to Automation > Policies.
2. Click **New Policy**.
3. In the **Name** box, specify the name of the policy
4. For each parameter value that you want to provide using this policy, perform the following actions on the Attributes tab:
   a. From the drop-down list, select the type of attribute:
      - A Text attribute contains simple text that users can view while deploying and running workflows.
      - A List attribute contains a comma-separated list of values (or a large amount of text not suitable for a Text attribute).
      - A Password attribute contains simple text, but the characters are masked so that users cannot see the text.

   b. In the text box to the left of the Add button, specify the name of the attribute.

      For your convenience, this name should be similar to the parameter name used in the pertinent workflow (or workflows).

   c. Click **Add**.

   d. In the new text box to the right of the attribute's name, enter a value for this attribute.

      To remove an attribute, click the **Remove** button.
5. On the Roles tab, grant Read and Write permission to any additional users and groups who will

be using this policy. By default, any groups to which you belong have Read and Write permission.

6. Click the **Save** button (lower right corner).

Extract a Policy

An alternative to creating your own policy one attribute at a time is to extract the policy. This automatically creates 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:* Remove any attributes that you do not want to use.
6. *Optional:* Add any new attributes that you 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**.

Reference the Policy in the Deployment

After you create a policy, you can reference its attributes in a deployment.

To reference policy attributes in a deployment:

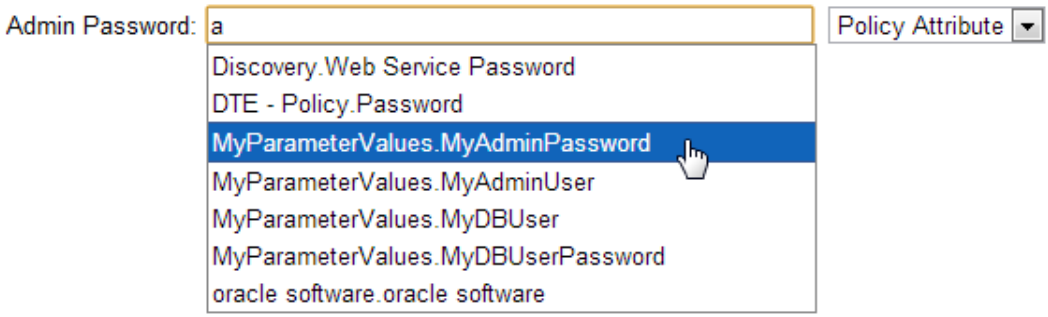
1. Create or access the deployment.

   See “Deployments” in the *HP DMA User Guide* for details.

2. On the Parameters tab, perform the following steps for each parameter whose value you want to provide by referencing a policy attribute:

   a. In the drop-down menu for that parameter, select **Policy Attribute**.

   b. In the text box for that parameter, type any character. A drop-down list of policy attributes appears. For example:



c. From the drop-down list, select the attribute that you want to reference. For example:

3. Click **Save** to save your changes to the deployment.

How to Set Up an NFS Share

The following examples show you one way to create and mount an NFS share that can be used by the Database Refresh workflows in this solution pack. The specific settings will vary according to the environment.

These examples assume that you have already set up an NFS server, and the NFS daemon is running.

- Example 1: Create the NFS share on one server

  On Linux servers, add the following command to the `/etc/dfstab` file:

  ```
  share -F nfs -o rw,anon=0 -d sharedDir /u01/nfs_share
  ```

  On Solaris servers, add the following command to the `/etc/dfs/dfstab` file:

  ```
  share -F nfs -o rw,anon=0 -d sharedDir /u01/nfs_share
  ```

  In both cases, *`sharedDir`* is the directory that you want to share.

- Example 2: Mount the NFS share on another server

  ```
  mount -t nfs -o
  rw,rsize=32768,wsize=32768,tcp,hard,nointr,nfsvers=3,bg,actimeo=0,ti
  meo=600,suid,async serverName:/u01/nfs_share /var/tmp/nfs_share
  ```

  Here, *`serverName`* is the network resolvable name of the server where the NFS share resides, and `/u01/nfs_share` is the shared directory on that server.

  Note: In this example, the `/var/tmp/nfs_share` directory must exist before the `mount` command is executed.

How to Import a File into the Software Repository

Many HP DMA workflows are capable of downloading files from the software repository on the HP DMA server to the target server (or servers) where the workflow is running. The following procedure shows you how to import a file into the software repository so that it can be downloaded and deployed by a workflow.

HP DMA uses the HP Server Automation (HP SA) Software Library as its software repository.

Tip: Be sure to use unique file names for all files that you import into the software repository.

To import a file into the HP SA Software Library:

1. Launch the HP SA Client from the Windows Start Menu.

   By default, the HP SA Client is located in Start → All Programs → HP Software → HP Server Automation Client

   If the HP SA Client is not installed locally, follow the instructions under "Download and Install the HP SA Client Launcher" in the *HP Server Automation Single-Host Installation Guide*.
2. In the navigation pane in the HP SA Client, select Library → By Folder.
3. Select (or create) the folder where you want to store the file.
4. From the Actions menu, select **Import Software**.
5. In the Import Software dialog, click the **Browse** button to the right of the File(s) box.
6. In the Open dialog:
   a. Select the file (or files) to import.
   b. Specify the character encoding to be used from the Encoding drop-down list. The default encoding is English ASCII.
   c. Click **Open**. The Import Software dialog reappears.
7. From the Type drop-down list, select **Unknown**.
8. If the folder where you want to store the files does not appear in the Folder box, follow these steps:
   a. Click the **Browse** button to the right of the Folder box.
   b. In the Select Folder window, select the import destination location, and click **Select**. The Import Software dialog reappears.
9. From the Platform drop-down list, select all the operating systems listed.
10. Click **Import**.

    If one of the files that you are importing already exists in the folder that you specified, you will be prompted regarding how to handle the duplicate file. Press F1 to view online help that explains the options.
11. Click **Close** after the import is completed.

Chapter 6

Troubleshooting

These topics can help you address problems that might occur when you install and run the workflows in this solution pack:

- Target Type below
- User Permissions and Related Requirements below
- Discovery in HP DMA on the next page

Target Type

In your deployment, make sure that you have specified the correct type of target. The workflow type and the target type must match. A workflow designed to run against an instance target, for example, cannot run against a server target.

User Permissions and Related Requirements

Roles define access permissions for organizations, workflows, steps, policies, and deployments. Users are assigned to roles, and they gain access to these automation items according to the permissions and capabilities defined for their roles.

Roles are assigned by your server management tool administrator. They are then registered in HP DMA by your HP DMA administrator.

Your HP DMA administrator will ensure that the users in your environment are assigned roles that grant them the permissions and capabilities they need to accomplish their tasks. For example:

- To create a workflow, your role must have Workflow Creator capability.
- To view a workflow, your role must have Read permission for that workflow.
- To edit a workflow, your role must have Write permission for that workflow.
- To view a deployment, your role must have Read permission for that deployment.
- To modify a deployment, your role must have Write permission for that deployment.
- To run a deployment, your role must have Execute permission for that deployment and Deploy permission for the organization where it will run.

Capabilities determine what features and functions are available and active in the HP DMA UI for each user role.

For more information, see the *HP DMA Administrator Guide*. This document is available on the HP Software Product Manuals web site: http://h20230.www2.hp.com/selfsolve/manuals

Discovery in HP DMA

HP DMA uses a process called “discovery” to find information about the servers, networks, and database instances on target machines in your managed environment.

You must explicitly initiate the process of discovery—it is not automatic. See the *HP DMA User Guide* for instructions. This document is available on the HP Software Product Manuals web site: http://h20230.www2.hp.com/selfsolve/manuals

Glossary

A

automation items

The umbrella term automation items is used to refer to those items to which role-based permissions can be assigned. Automation items include workflows, deployments, steps, and policies.

B

bridged execution

A bridged execution workflow includes some steps that run on certain targets and other steps that run on different targets. An example of a bridged execution workflow is Extract and Refresh Oracle Database via RMAN (in the Database Refresh solution pack). This workflow 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 workflow is useful when you want to clone a database - for example, to move it from a traditional IT infrastructure location into a private cloud. Bridged execution workflows are supported on HP DMA version 9.11 (and later).

C

capability

Capabilities are collections of related privileges. There are three capabilities defined in HP DMA. Login Access capability enables a user to log in to the web interface. This capability does not guarantee that this user can view any organizations or automation items—permissions are required to access those items. Workflow Creator capability enables a user to create new workflows and make copies of other workflows. Administrator capability enables a user to perform any action and view all organizations. If you have Administrator capability, you do not need Workflow Creator capability. The Administrator can assign any of these capabilities to one or more roles registered roles.

connector

HP DMA includes a Connector component that enables it to communicate with your server management tool. You must configure the Connector before you can run an workflow against a target.

cross-platform

Cross-platform database refresh involves converting the data from one type of byte ordering to another. This is necessary, for example, if you want to load a database dump file on a little-endian Linux target that was created on a big-endian Solaris server.

custom field

Custom Fields are used to customize workflows or show information about the environment. Custom Fields can be used in workflow steps to automatically supply information that is specific to an organization, server, instance, or database.

D

Data Pump

Oracle Data Pump is a utility that enables you to move data or metadata from one database to another. You can use Data Pump to move a complete database or a subset of a database.

deployment

Deployments associate a workflow with a target environment in which a workflow runs. You can customize a deployment by specifying values for any workflow parameters that are designated - User Selected - in the workflow. You must save a deployment before you can run the workflow. You can re-use a saved deployment as many times as you like.

destination

In a database refresh scenario, the contents of a database dump file are loaded into the destination databse.

F

function

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.

I

input parameters

A workflow has a set of required parameters for which you must specify a value. The required parameters are a subset of all the parameters associated with that workflow. The remaining parameters are considered optional. You can specify a value for an optional parameter by first exposing it using the workflow editor and then specifying the value when you create a deployment.

M

mapping

An input parameter is said to be "mapped" when it's value is linked to an output parameter from a previous step in the workflow or to a metadata field. Mapped parameters are not visible on the Deployment page. You can "unmap" a parameter by specifying - User Selected - in the workflow editor. This parameter will then become visible on the Deployment page.

O

organization

An organization is a logical grouping of servers. You can use organizations to separate development, staging, and production resources - or to separate logical business units.

P

parameters

Parameters are pieces of information - such as a file system path or a user name - that a step requires to carry out its action. Values for parameters that are designated User Selected in the workflow can be specified in the deployment. Parameters that are marked Enter at Runtime in the deployment must be specified on the target system when the workflow runs.

policy

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.

R

raw devices

In Sybase ASE version 15, you can create and mount database devices on raw bound devices. This enables Sybase ASE to use direct memory access from your address space to the physical sectors on the disk. This can improve performance by reducing memory copy operations from the user address space to the operating system kernel buffers.

Recovery Manager (RMAN)

Oracle Recovery Manager (RMAN) is a backup and recovery tool included in Oracle Database Enterprise Edition (and related products). RMAN enables you to efficiently backup and restore data files, control files, server parameter files, and archived redo log files. It provides block-level corruption detection during both the backup and restore phases. It is optimized for performance and space consumption.

role

Each HP DMA user has one or more roles. Roles are used to grant users permission to log in to and to access specific automation items and organizations. Roles are defined in your server management tool. Before you can associate a role with an automation item or organization, however, you must register that role in HP DMA.

S

smart group

Smart Groups are dynamic groups of servers, instances, or databases defined by some criteria. They are used to specify targets for deployments. As information about an environment object changes, its membership in the groups is re-evaluated.

software repository

The software repository is where the workflow will look for any required files that are not found on the target server. If you are using HP DMA with HP Server Automation (SA), this repository is the SA Software Library.

solution pack

A solution pack contains one or more related workflow templates. These templates are read-only and cannot be deployed. To run one of the workflows included in a solution pack, you must first create a deployable copy of that template and then customize that copy for your environment. Solution packs are organized by function - for example: database patching or application server provisioning.

source

In a database refresh scenario, the contents of the SOURCE database are extracted and stored in a file (or multiple files).

source database

In the context of MS SQL database refresh, the "source database" is the database from which the backup file is created.

steps

Steps contains the actual code used to perform a unit of work detailed in a

workflow.

T

target instance

In the context of MS SQL database refresh, the term "target instance" refers to the SQL Server instance where the database that will be restored resides.

W

workflow

A workflow automates the process followed for an operational procedure. Workflows contain steps, which are linked together to form business logic for a common task. Workflows connect existing tasks in order to perform a new business process by building on existing best practices and processes.

workflow editor

The workflow editor is the tool that you use to assemble steps into workflows. You can map each input parameter to output parameters of previous steps or built-in metadata (such as the server name, instance name, or database name). You can also specify User Selected to expose a parameter in the deployment; this enables the person who creates the deployment to specify a value for that parameter.

workflow templates

A workflow template is a read-only workflow that cannot be deployed. To run one of the workflows included in a solution pack, you must first create a deployable copy of the workflow template and then customize that copy for your environment.