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Ultimate Edition

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Linux, Solaris, AIX, and HP-UX

Workflows for Oracle

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Contents

Oracle 9

Oracle - Compliance Audit 11
- Prerequisites for this Workflow 12
- How this Workflow Works 13
- How to Run this Workflow 17
- Sample Scenarios 20
- Parameters for Oracle - Compliance Audit 27

Patching Database 27
- Oracle - Patch Home and Databases 29
  - Prerequisites for this Workflow 30
  - How this Workflow Works 31
  - How to Run this Workflow 37
  - Sample Scenario 40
  - Parameters for Oracle - Patch Home and Databases 44
- Oracle - Rollback Patch from Home and Databases 46
  - Prerequisites for this Workflow 47
  - How this Workflow Works 48
  - How to Run this Workflow 52
  - Sample Scenario 55
  - Parameters for Oracle - Rollback Patch from Home and Databases 56
- Apply Critical Patch Update to Database 58
  - Prerequisites for this Workflow 59
  - How this Workflow Works 60
  - How to Run this Workflow 64
  - Sample Scenario 67
  - Parameters for Apply Critical Patch Update to Database 68
- Rollback Critical Patch Update from Database 70
  - Prerequisites for this Workflow 71
  - How this Workflow Works 72
  - How to Run this Workflow 76
  - Sample Scenario 79
  - Parameters for Rollback Critical Patch Update from Database 80
- Apply Oracle Patchset 82
  - Prerequisites for this Workflow 83
  - How this Workflow Works 84
  - How to Run this Workflow 89
  - Sample Scenario 92
  - Parameters for Apply Oracle Patchset 94
- Clone Oracle Home 98
  - Prerequisites for this Workflow 99
  - How this Workflow Works 100
  - How to Run this Workflow 103

Sample Scenario 105
Parameters for Clone Oracle Home 106
Migrate Oracle Home 108
Prerequisites for this Workflow 109
How this Workflow Works 110
How to Run this Workflow 114
Sample Scenario 116
Parameters for Migrate Oracle Home 118
Oracle - Migrate and Patch Grid Managed Database 119
Prerequisites for this Workflow 121
How this Workflow Works 122
How to Run this Workflow 123
Parameters for Oracle - Migrate and Patch Grid Managed Database 126
The Advanced Database Patching Solution 127
Oracle - Patch Grid Infrastructure and Databases 128
Prerequisites for this Workflow 129
How this Workflow Works 130
How to Run this Workflow 135
Sample Scenarios 137
Parameters for Oracle - Patch Grid Infrastructure and Databases 140
Oracle - Rollback Patch from Grid Infrastructure and Database 144
Prerequisites for this Workflow 145
How this Workflow Works 146
How to Run this Workflow 149
Sample Scenarios 151
Parameters for Oracle - Rollback Patch from Grid Infrastructure and Database 152
Refreshing Database 153
Oracle - Extract Database via RMAN 155
Prerequisites for this Workflow 156
How this Workflow Works 157
How to Run this Workflow 160
Sample Scenarios 162
Parameters for Oracle - Extract Database via RMAN 164
Oracle - Refresh Database via RMAN 166
Prerequisites for this Workflow 167
How this Workflow Works 168
Sample Scenarios 171
How to Run this Workflow 173
Parameters for Oracle - Refresh Database via RMAN 175
Oracle - Extract and Refresh Database via RMAN 178
Prerequisites for this Workflow 179
How this Workflow Works 180
How to Run this Workflow 183
Sample Scenarios 185
Parameters for Oracle - Extract and Refresh Database via RMAN 189
Oracle - Export Database via Data Pump 192
Prerequisites for this Workflow 193

How this Workflow Works ... 194
How to Run this Workflow ... 198
Sample Scenarios ... 200
Parameters for Oracle - Export Database via Data Pump ... 205
Oracle - Refresh Database via Data Pump ... 209
Prerequisites for this Workflow ... 210
How this Workflow Works ... 211
How to Run this Workflow ... 214
Sample Scenarios ... 216
Parameters for Oracle - Refresh Database via Data Pump ... 220
Oracle - Migrate Database TTS ... 225
Prerequisites for this Workflow ... 226
How this Workflow Works ... 227
How to Run this Workflow ... 230
Sample Scenarios ... 232
Parameters for Oracle - Migrate Database TTS ... 234
Oracle - Patch Home and Databases ... 234
Prerequisites ... 235
Process Overview ... 235
Workflow: Oracle - Patch Home and Databases ... 236
Solution pack ... 236
Parameters to expose ... 236
Input parameters ... 236
FAQs ... 237
What can cause the workflow to fail? ... 237
What if I don't want specific Oracle errors to prevent patching? ... 237
Can I run an SQL script before updating the database catalog? ... 237
Can I use the Oracle Configuration Manager with HPE DMA? ... 238
Oracle - Drop Database ... 239
Prerequisites for this Workflow ... 240
How this Workflow Works ... 241
How to Run this Workflow ... 242
Parameters for Oracle - Drop Database ... 243
Provisioning Data Guard ... 243
Prerequisites ... 243
Process Overview ... 244
Workflow 1: Oracle - Provision Data Guard ... 246
Solution pack ... 247
Parameters to expose ... 247
Input parameters ... 247
Workflow 2: Oracle - Create Data Guard Broker Configuration ... 252
Solution pack ... 253
Parameters to expose ... 253
Input parameters ... 253
Workflow 3: Oracle - Configure Data Guard Broker Properties ... 255
Solution pack ... 256
Parameters to expose ... 256

Input parameters ... 256
Workflow 4: Oracle - Data Guard Broker Switchover #1 ... 259
Solution pack ... 260
Parameters to expose ... 260
Input parameters ... 260
Workflow 5: Oracle - Data Guard Broker Switchover #2 ... 262
Solution pack ... 263
Parameters to expose ... 263
Input parameters ... 263
FAQs ... 264
What if I don't want to meet all of the prerequisites? ... 264
What if I get a failure on the Oracle installer that the ASM disk is not a valid device? ... 265
What if I get an error message that the /u01/app directory doesn't exist? ... 265
What if I get a failure in the install log related to the virtual IP address or SCAN virtual IP address? ... 265
What if I get an error referencing the public, private, or virtual IP addresses? ... 266
Provisioning Grid Infrastructure ... 266
Prerequisites ... 266
Process Overview ... 267
Workflow 1: Oracle - Provision or Upgrade Grid Infrastructure ... 268
Solution pack ... 268
Parameters to expose ... 268
Input parameters ... 268
Workflow 2: Oracle - Provision Database Software ... 271
Solution pack ... 271
Parameters to expose ... 271
Input parameters ... 271
Workflow 3: Oracle - Provision Database ... 273
Solution pack ... 273
Parameters to expose ... 273
Input parameters ... 274
FAQs ... 276
What if I don't want to meet all of the prerequisites? ... 276
What if I get a failure on the Oracle installer that the ASM disk is not a valid device? ... 276
What if I get an error message that the /u01/app directory doesn't exist? ... 277
Provisioning RAC ... 277
Prerequisites ... 277
Process Overview ... 278
Workflow 1: Oracle - Provision or Upgrade Grid Infrastructure ... 281
Solution pack ... 281
Parameters to expose ... 281
Input parameters ... 281
Workflow 2: Oracle - Provision Database Software ... 284
Solution pack ... 284
Parameters to expose ... 284
Input parameters ... 284
Workflow 3: Oracle - Provision Database ... 286

Solution pack 286
Parameters to expose 287
Input parameters 287
Oracle - SQL Release 289
Prerequisites for this Workflow 291
How this Workflow Works 292
How to Run this Workflow 295
Sample Scenarios 298
Parameters for Oracle - SQL Release 302

Send Documentation Feedback 304

Oracle

The following topics are included:

Workflow type	Workflow name
Compliance	Oracle - Compliance Audit
Provisioning	"Workflow 1: Oracle - Provision Data Guard" on page 246
	"Workflow 2: Oracle - Create Data Guard Broker Configuration" on page 252
	"Workflow 3: Oracle - Configure Data Guard Broker Properties" on page 255
	"Workflow 4: Oracle - Data Guard Broker Switchover #1" on page 259
	"Workflow 5: Oracle - Data Guard Broker Switchover #2" on page 262
	"Workflow 1: Oracle - Provision or Upgrade Grid Infrastructure" on page 268
	"Workflow 2: Oracle - Provision Database Software" on page 271
	"Workflow 3: Oracle - Provision Database" on page 273
	"Workflow 1: Oracle - Provision or Upgrade Grid Infrastructure" on page 281
	"Workflow 2: Oracle - Provision Database Software" on page 284
	"Workflow 3: Oracle - Provision Database" on page 286
Patching	Oracle - Patch Home and Databases
	Oracle - Rollback Patch from Home and Databases
	Apply Critical Patch Update to Database
	Rollback Critical Patch Update from Database
	Apply Oracle Patchset
	Clone Oracle Home
	Migrate Oracle Home
	"Oracle - Patch Grid Infrastructure and Databases" on page 128
	"Oracle - Rollback Patch from Grid Infrastructure and Database" on page 144
	Oracle - Patch Grid Infrastructure and Databases
	"Oracle - Patch Home and Databases" on page 234
	"Oracle - Migrate and Patch Grid Managed Database" on page 119

Workflow type	Workflow name
Refreshing	"Oracle - Extract Database via RMAN" on page 155
	"Oracle - Refresh Database via RMAN" on page 166
	"Oracle - Extract and Refresh Database via RMAN" on page 178
	"Oracle - Export Database via Data Pump" on page 192
	"Oracle - Refresh Database via Data Pump" on page 209
	"Oracle - Migrate Database TTS" on page 225
Release Management	Oracle - SQL Release

Oracle - Compliance Audit

The "Oracle - Compliance Audit" workflow enables you to audit an Oracle Database instance for compliance with one of the following security benchmarks:

- Center for Internet Security (CIS) security configuration benchmarks
- Payment Card Industry (PCI) data security standard
- Sarbanes-Oxley (SOX) requirements

The workflow performs CIS Level 1 and Level 2 auditing and can identify more than 175 compliance related problems.

The workflow performs the checks included in the CIS benchmark and then maps those CIS checks to the benchmark type that you specify in the Compliance Type parameter. The audit summary email will match the Compliance Type that you specify.

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 step descriptions
"How to Run this Workflow"	Instructions for running this workflow in your environment
"Sample Scenarios"	Examples of typical parameter values for this workflow
Parameters	List of input parameters for this workflow

Prerequisites for this Workflow

Be sure that the following prerequisites are satisfied before you run the "Oracle - Compliance Audit" workflow:

- The latest HPE DMA solution packs require the latest HPE DMA platform. To use the latest solution packs, update the HPE DMA platform. HPE DMA 10.40.000.000 solution packs are supported on HPE DMA 10.40.000.000 (and later).
- You have installed the Database Compliance solution pack.

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

How this Workflow Works

This workflow performs the following actions:

- Prepares to run the workflow by gathering information about the target Oracle Database instance and validating parameter values.
- Audits the various configuration settings specified in the pertinent benchmark.
- Composes and sends an email containing the results of the audit.

Note: The emails are sent through the mail server configured on the HPE DMA server. You can configure the mail server in the path below:

DMA setup > Configuration > Outgoing Mail > Server.

Validation Checks Performed show

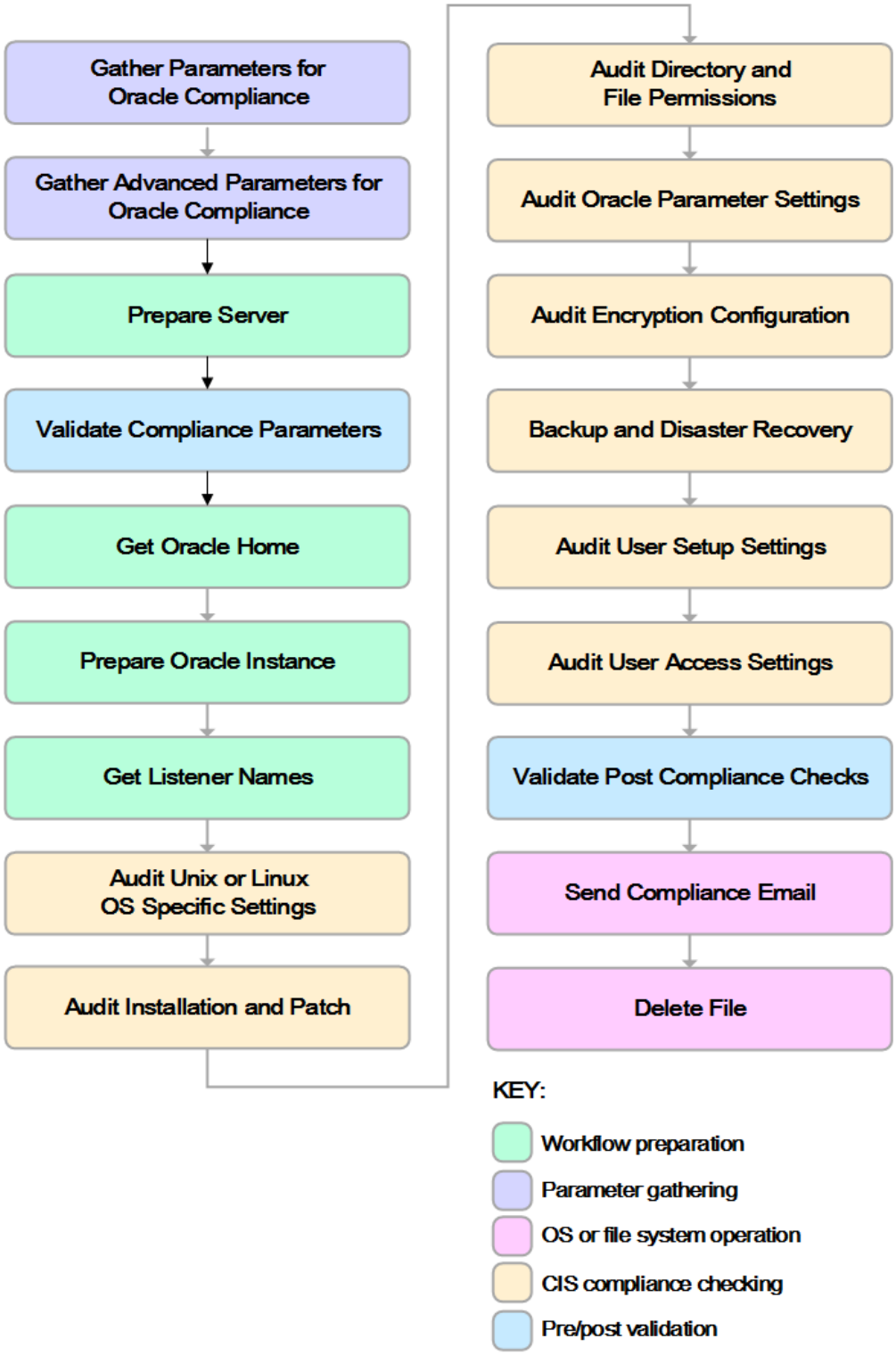
This workflow validate the following conditions:

1. The Oracle Home derived in the Get Oracle Home step is a fully qualified path that exists on the target server.
2. The workflow can connect to the Oracle SID derived in the Get Oracle Home step.
3. Any Excluded Checks specified by the user refer to actual CIS checks.
4. Any email addresses specified are valid addresses.
5. The workflow can create the temporary file that will store the compliance check results.

Steps Executed show

The "Oracle - Compliance Audit" 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.

Click each box in the diagram to view additional information about that step.



Steps Used in Oracle Compliance Audit

Workflow Step	Description
Gather Parameters for Oracle Compliance	This step gathers three pieces of information that the workflow needs to perform the compliance audit: • The type of compliance audit to perform (CIS, PCI, or SOX) • A list of compliance checks to exclude from the audit (if any) • The location of the Oracle inventory files. All parameters are optional.
Gather Advanced Parameters for Oracle Compliance	This step gathers the information that the workflow needs to create and deliver the compliance audit report via email. It also enables you to specify the name of the most recent Oracle patch that was applied to the pertinent Oracle Home (derived from the Oracle inventory file).
Validate Compliance Parameters	This step validates the input parameters specified in the previous steps. It validates the list of excluded checks to ensure that all specified checks in the list correspond to actual Center for Internet Security (CIS) benchmark items. It also validates the email information to ensure that all specified email addresses are valid. The step then creates the path to the temporary file that will store the results of the current audit as the workflow is running. This file is deleted after the audit report is sent.
Prepare Server	This step prepares the Server Wrapper and Instance Wrapper, which enable subsequent steps to be executed by the OS administrator user or the owner of the database or middleware software.
Get Oracle Home	This step determines the value of ORACLE_HOME from the Oracle inventory file on UNIX targets or from the Registry on Windows targets.
Prepare Oracle Instance	This step gathers the information that the workflow will need to access the pertinent Oracle instance.
Get Listener Names	This step gets the names of the Oracle listeners that are running. Results can be filtered based on one or more ORACLE_HOMEs, one or more ORACLE_SIDs, or both.
Audit Unix or Linux OS Specific Settings	This step audits the scorable UNIX/Linux related recommendations in Section 1, Operating System Specific Settings, of the Center for Internet Security (CIS) Security Configuration Benchmarks for Oracle 9i/10g, 11g, and 12c.
Audit Installation and Patch	This step audits the scorable recommendations in Section 2, Installation and Patch, of the Center for Internet Security (CIS) Security Configuration Benchmarks for Oracle 9i/10g, 11g, and 12c.
Audit Directory and File	This step audits the scorable recommendations in Section 3, Oracle Directory and File Permissions, of the Center for Internet Security (CIS) Security Configuration Benchmarks for Oracle 9i/10g, 11g, and 12c.

Steps Used in Oracle Compliance Audit, continued

Workflow Step	Description
Permissions	
Audit Oracle Parameter Settings	This step audits the scorable recommendations in Section 4, Oracle Parameter Settings, of the Center for Internet Security (CIS) Security Configuration Benchmarks for Oracle 9i/10g, 11g, and 12c.
Audit Encryption Configuration	This step audits the scorable recommendations in Section 5, Encryption Specific Settings, of the Center for Internet Security (CIS) Security Configuration Benchmarks for Oracle 9i/10g, 11g and Oracle Database Server 12c.
Backup and Disaster Recovery	This step audits the scorable recommendations in Section 7, Backup and Disaster Recovery, of the Center for Internet Security (CIS) Security Configuration Benchmarks for Oracle 9i/10g, 11g, and 12c.
Audit User Setup Settings	This step audits the scorable recommendations in Section 9, Oracle Profile (User) Access Settings, of the Center for Internet Security (CIS) Security Configuration Benchmarks for Oracle 9i/10g, 11g, and 12c.
Validate Post-Compliance Checks	This step reads the temporary file that contains the results of the compliance audit and prints the audit results to the HPE DMA Console. If email addresses were specified, it also creates a report in HTML format that will be emailed to those addresses by a later step in the workflow.
Send Compliance Email	If email addresses are provided, this step sends the previously generated compliance audit report to the specified email addresses.
Delete File	This step deletes the specified file on the target server.

Note: For input parameter descriptions and defaults, see "Parameters for Oracle - Compliance Audit" on page 27.

How to Run this Workflow

The following instructions show you how to customize and run the "Oracle - Compliance Audit" 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 Oracle - Compliance Audit" on page 27.

Note: Before following this procedure, review the "Prerequisites for this Workflow" on page 12, and ensure that all requirements are satisfied.

To use the Run Oracle Compliance Audit workflow:

1. Create a deployable copy of the workflow.
2. Determine the values that you will specify for the following parameters:

   Parameters Defined in this Step: Gather Parameters for Oracle Compliance

Parameter Name	Default Value	Required	Description
Compliance Type	CIS	optional	Type of compliance report that will be generated by the workflow. Supported types are: CIS = Center for Internet Security (CIS) Security Configuration Benchmark PCI = Payment Card Industry (PCI) Data Security Standard SOX = Sarbanes-Oxley (SOX) sections 302.2, 302.4b, 302.4c, and 302.5 requirements
Excluded Compliance Checks	no default	optional	Comma-separated list of compliance checks to exclude from the audit. For example: 1.2, 2, 3.*, 5*, 6.1.2 **Note:** Make sure that the checks specified here correspond with the compliance audit type (CIS, PCI, or SOX) that you are running.
Inventory Files	see description	optional	Comma-separated list of fully qualified Oracle inventory files. If this parameter is not specified, it defaults to one of the following values: Linux or AIX: `/etc/oraInst.loc` Solaris: `/var/opt/oracle/oraInst.loc` Windows: `%ProgramFiles%\Oracle\Inventory`

Parameters Defined in this Step: Gather Advanced Parameters for Oracle Compliance

Parameter Name	Default Value	Required	Description
Email Addresses to Receive Report	no default	optional	Comma-separated list of email addresses for those individuals or groups who will receive a copy of the compliance audit report.

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

See "Parameters for Oracle - Compliance Audit" on page 27 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. 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.
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 .

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.

Information about each compliance check is displayed in the step output on the Console (and the History page) for each of the auditing steps. A summary of the compliance audit is also displayed in the step output for the Validate Post-Compliance Checks step.

To view the reports:

A compliance audit summary in HTML format is emailed to all parties on the Email Addresses to Receive Report list.

After you run this workflow, you can generate two types of compliance reports on the Reports page:

- Database Compliance Report
- Database Compliance Detail Report

To access the Database Compliance reports:

1. Go to the Reports page.
2. At the bottom of the page,specify the following settings:

   For the Database Compliance Report:

   a. Select the Database Compliance report.
   b. Select the organization where your target resides.
   c. Because this report lists the latest compliance audit reports for all targets in the specified organization, you do not specify a Server, Database, or Time span.

   For the Database Compliance Detail Report:

   a. Select the Database Compliance Details report.
   b. Select the organization where your target resides.
   c. Specify the Server and Instance that you selected when you created your deployment.
3. Click **Run report**.

Sample Scenarios

This topic shows you how to use various parameters to achieve the following compliance audit scenarios in your environment using the "Oracle - Compliance Audit" workflow.

Scenario 1: Perform a Partial CIS Compliance Audit and Email the Results show

In the scenario, the following checks are excluded from the audit:

- Section 8: Oracle Profile (User) Setup Settings
- Section 9: Oracle Profile (User) Access Settings

A summary report is sent to the three parties listed in the Email Addresses to Receive Report parameter.

Parameter Name	Example Value	Description
Compliance Type	CIS	Type of compliance report that will be generated by the workflow. Supported types are: CIS = Center for Internet Security (CIS) Security Configuration Benchmark PCI = Payment Card Industry (PCI) Data Security Standard SOX = Sarbanes-Oxley (SOX) sections 302.2, 302.4b, 302.4c, and 302.5 requirements
Excluded Compliance Checks	8.*,9.*	Comma-separated list of compliance checks to exclude from the audit. For example: 1.2, 2, 3.*, 5*, 6.1.2 **Note:** Make sure that the checks specified here correspond with the compliance audit type (CIS, PCI, or SOX) that you are running.

Note: Some of these parameters are not exposed by default in the deployment.

Be sure that the default values for all remaining input parameters are appropriate for your environment (see "Parameters for Oracle - Compliance Audit" on page 27).

Scenario 2: Perform a Full PCI Compliance Audit and Email the Results show

In the scenario, no checks are excluded from the audit. A summary report is sent to the three parties listed in the Email Addresses to Receive Report parameter.

Parameter Name	Example Value	Description
Compliance Type	PCI	Type of compliance report that will be generated by the workflow. Supported types are: CIS = Center for Internet Security (CIS) Security Configuration Benchmark PCI = Payment Card Industry (PCI) Data Security Standard SOX = Sarbanes-Oxley (SOX) sections 302.2, 302.4b, 302.4c, and 302.5 requirements
Email Addresses to Receive Report	DBAdminTeam@mycompany.com, DBAdminMgr@mycompany.com, CustomerSupportTeam@mycompany.com	Comma-separated list of email addresses for those individuals or groups who will receive a copy of the compliance audit report.

Note: Some of these parameters are not exposed by default in the deployment.

Be sure that the default values for all remaining input parameters are appropriate for your environment (see "Parameters for Oracle - Compliance Audit" on page 27).

Scenario 3: Perform a Full SOX Compliance Audit and Email the Results show

In the scenario, no checks are excluded from the audit. A summary report is sent to the three parties listed in the Email Addresses to Receive Report parameter.

Parameter Name	Example Value	Description
Compliance Type	SOX	Type of compliance report that will be generated by the workflow. Supported types are: CIS = Center for Internet Security (CIS) Security Configuration Benchmark PCI = Payment Card Industry (PCI) Data Security Standard SOX = Sarbanes-Oxley (SOX) sections 302.2, 302.4b, 302.4c, and 302.5 requirements
Email Addresses to Receive Report	DBAdminTeam@mycompany.com, DBAdminMgr@mycompany.com, CustomerSupportTeam@mycompany.com	Comma-separated list of email addresses for those individuals or groups who will receive a copy of the compliance audit report.

Note: Some of these parameters are not exposed by default in the deployment.

Be sure that the default values for all remaining input parameters are appropriate for your environment (see "Parameters for Oracle - Compliance Audit" on the next page).

Scenario 4: Perform a Full CIS Compliance Audit and Display the Results on the HPE DMA Console show

In the scenario, all scorable checks are performed, and the compliance audit report is displayed only on the HPE DMA Console. In this case, a summary report is not emailed. This scenario would be appropriate for initial testing.

It is not necessary to specify any input parameters in this scenario unless the Oracle Databaseinventory file is located in a non-standard directory.

Parameter Name	Example Value	Description
Compliance Type	CIS	Type of compliance report that will be generated by the workflow. Supported types are: CIS = Center for Internet Security (CIS) Security Configuration Benchmark PCI = Payment Card Industry (PCI) Data Security Standard SOX = Sarbanes-Oxley (SOX) sections 302.2, 302.4b, 302.4c, and 302.5 requirements

Be sure that the default values for all remaining input parameters are appropriate for your environment (see "Parameters for Oracle - Compliance Audit" on the next page).

Parameters for Oracle - Compliance Audit

The following tables describe the required and optional input parameters for this workflow. Some of these parameters are not initially visible in a deployment. For most parameters, if you do not specify a value for a parameter, a default value is assigned.

Note: Only those parameters that are configurable in a standard deployment are listed here. Input parameters that must be mapped to output parameters of previous steps are not listed.

Parameters Defined in this Step: Gather Parameters for Oracle Compliance

Parameter Name	Default Value	Required	Description
Compliance Type	CIS	optional	Type of compliance report that will be generated by the workflow. Supported types are: CIS = Center for Internet Security (CIS) Security Configuration Benchmark PCI = Payment Card Industry (PCI) Data Security Standard SOX = Sarbanes-Oxley (SOX) sections 302.2, 302.4b, 302.4c, and 302.5 requirements
Excluded Compliance Checks	no default	optional	Comma-separated list of compliance checks to exclude from the audit. For example: 1.2, 2, 3.*, 5*, 6.1.2 **Note:** Make sure that the checks specified here correspond with the compliance audit type (CIS, PCI, or SOX) that you are running.
Inventory Files	see description	optional	Comma-separated list of fully qualified Oracle inventory files. If this parameter is not specified, it defaults to one of the following values:

Parameters Defined in this Step: Gather Advanced Parameters for Oracle Compliance

Parameter Name	Default Value	Required	Description
Email Addresses to Receive Report	no default	optional	Comma-separated list of email addresses for those individuals or groups who will receive a copy of the compliance audit report.
Latest Patch	no default	optional	Most recent Oracle patch installed on this Oracle Home.

Patching Database

This solution pack contains the following workflows:

Workflow Template	Description
Oracle - Patch Home and Databases	This workflow applies an Oracle Critical Patch Update or Security Patch Update (CPU/SPU), Patch Bundle, or Patch Set Update (PSU) to an Oracle Home and to the Oracle Database Instances associated with the Oracle Home. It also updates the OPatch version if the OPatch Archive file is specified.
Oracle - Rollback Patch from Home and Databases	This workflow rolls back a Critical Patch Update or Security Patch Update (CPU/SPU), Patch Bundle, or Patch Set Update (PSU) from an Oracle Home and from the Oracle Database Instances associated with the Oracle Home.
Apply Oracle Patchset	This workflow applies an Oracle Software Patch Set to an existing Oracle Home and Oracle Database.
Clone Oracle Home	This workflow makes a clone (copy) of an Oracle Home on the same server.
Migrate Oracle Home	This workflow moves an Oracle Instance from one Oracle Home to another Oracle Home.

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.

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.

   For simple patching scenarios, you can use the default values for most parameters. To use this solution's more advanced features, you will need to expose additional parameters.
2. Specify the values for those parameters. You do this when you create a deployment.

Tip: Detailed instructions are provided in the "How to Run this Workflow" topic for each workflow.

The information presented here assumes the following:

- HPE DMA is installed and operational.
- At least one suitable target server is available.
- You are logged in to the HPE DMA web interface.
- You have permission to create, edit, and deploy copies of the workflows included in this solution pack.

Tip: All parameters used by the workflows in this solution are provided in the "Parameters" topic associated with each workflow.

Oracle - Patch Home and Databases

This workflow applies an Oracle Critical Patch Update or Security Patch Update (CPU/SPU), Patch Bundle, or Patch Set Update (PSU) to an Oracle Home and to the Oracle Database Instances associated with the Oracle Home. It also updates the OPatch version if the OPatch Archive file is specified.

Oracle Database patches are published on a quarterly basis.

If you have problems after applying the patch, you can remove it by running Oracle - Rollback Patch from Home and Databases.

This workflow only applies to single Oracle Instance installations. It is not designed for Oracle Real Application Clusters (RAC). To patch Oracle RAC, you can run the Apply Critical Patch Update to RAC Home workflow found in the HPE DMA Advanced Database Patching Solution Pack.

If the Oracle patch has already been applied, this workflow will verify the patch and end with SUCCESS status.

Caution: This workflow stops all processes running from the ORACLE_HOME in order to patch. This includes the Oracle Listener, which may be servicing Oracle Instances outside this ORACLE_HOME.

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 Scenario"	Examples of typical parameter values for this workflow
Parameters	List of input parameters for this workflow

Note: The documentation for this workflow contains steps that are referred to by their base names. The names in the HPE DMA user interface may have a version appended, for example, v2.

Prerequisites for this Workflow

Be sure that the following prerequisites are satisfied before you run the "Oracle - Patch Home and Databases" workflow:

- The latest HPE DMA solution packs require the latest HPE DMA platform. To use the latest solution packs, update the HPE DMA platform. HPE DMA 10.30 solution packs are supported on HPE DMA 10.30 (and later).
- You have installed the HPE DMA Database Patching Solution Pack.
- You need to have Oracle Database provisioned and operational. You can do this by running the following workflows in the HPE DMA Database Provisioning Solution Pack:

  Oracle – Provision Database Software

  Oracle – Provision Database
- You have read access to all specified inventory pointers (Linux/UNIX).
- You have an Oracle support contract and have downloaded the appropriate patches either to the software repository or to the target machine.
- If you do not specify the OPatch option, you must have the current OPatch already available on your system.

There may be additional storage requirements for specific platforms due to known Oracle issues. Use your Oracle support contract to access https://support.oracle.com.

Caution: This workflow stops all processes running from the ORACLE_HOME in order to patch. This includes the Oracle Listener, which may be servicing Oracle Instances outside this ORACLE_HOME.

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

How this Workflow Works

The following information describes how the "Oracle - Patch Home and Databases" workflow works:

Overview show

This workflow does the following things in the order shown:

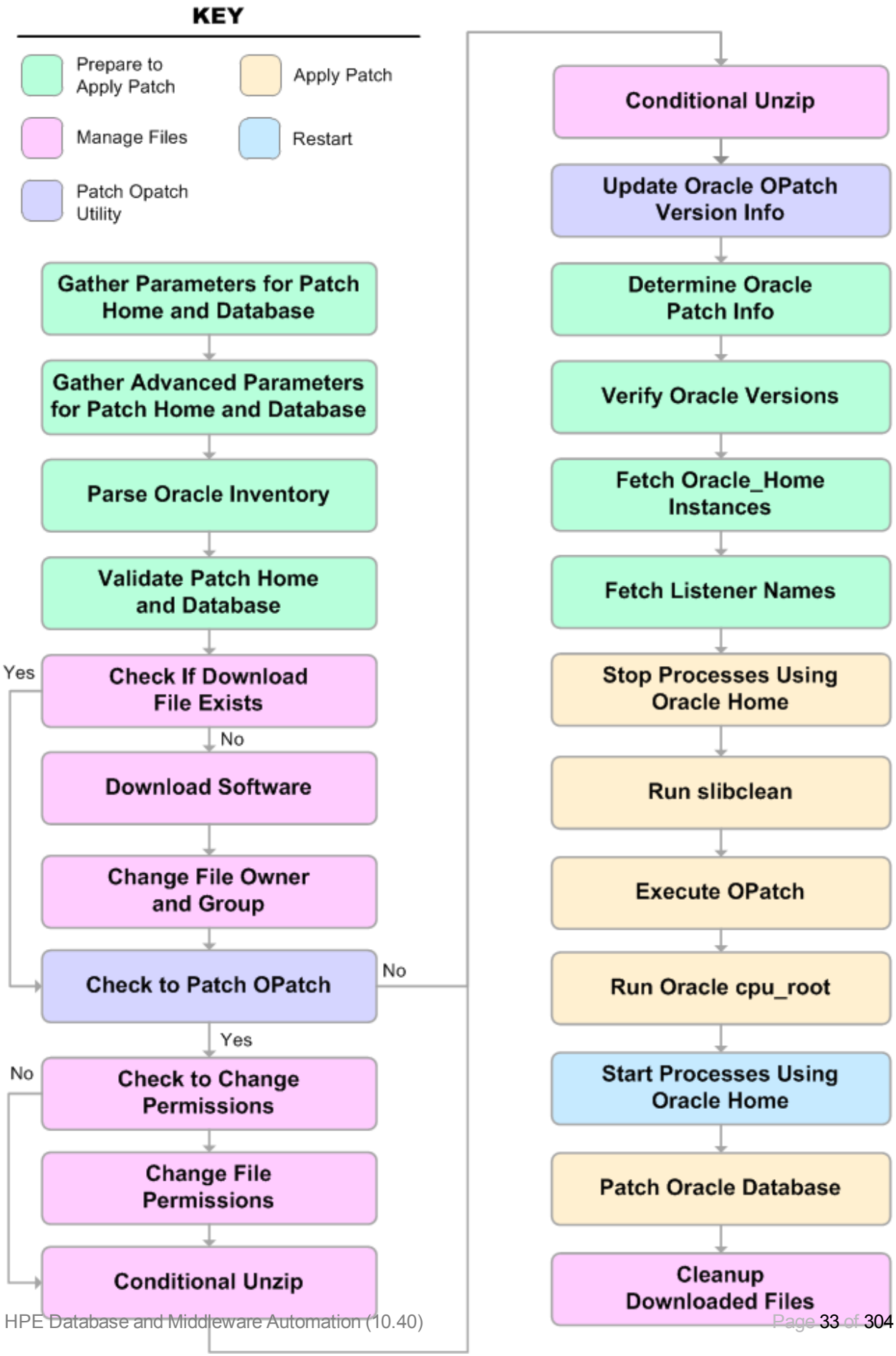
- The initial steps of the workflow prepare it to patch the Oracle Home. The workflow processes and validates user input parameters, constructs commands used in subsequent steps, downloads any required files, and fetches the Oracle Home Instances and Listener names.
- If an OPatch archive file has been provided, the workflow uses the correct OPatch version to patch the Oracle OPatch utility before applying the patch.
- The workflow applies the patch to the Oracle Database Home. The workflow stops all Oracle Instances, all Oracle Listeners in the list, and the Oracle Agent. The workflow removes any currently unused modules in kernel and library memory. Then the workflow runs the OPatch utility to deploy an Oracle supplied Patch and runs the cpu_root.sh script (provided by Oracle) to complete the installation.
- The workflow applies the patch to the Oracle Instances, skipping instances in the Ignore SIDs list.
- The final steps of the workflow allow the workflow to end cleanly. The workflow restarts all the Oracle Instances, all Oracle Listeners, and the Oracle Agent. Then it cleans up the downloaded files.

Validation Checks Performed show

- The input parameters have the proper syntax (no special characters or spaces).
- Files exist or have valid specifications if they do not exist.
- If supplied, the OPatch file matches the required version.
- The supplied Critical Patch Update applies to the current Oracle Database version.
- If you are patching Oracle Home manually, the following parameters are all specified: New OPatch Version, Patch Name, and Patch Number.

Steps Executed show

The Oracle - Patch Home and Database 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.


KEY
Prepare to Apply Patch
Apply Patch
Manage Files
Restart
Patch Opatch Utility
Gather Parameters for Patch Home and Database
Gather Advanced Parameters for Patch Home and Database
Parse Oracle Inventory
Validate Patch Home and Database
Yes
Check If Download File Exists
No
Download Software
Change File Owner and Group
Check to Patch OPatch
No
Yes
No
Check to Change Permissions
Change File Permissions
Conditional Unzip
Conditional Unzip
Update Oracle OPatch Version Info
Determine Oracle Patch Info
Verify Oracle Versions
Fetch Oracle_Home Instances
Fetch Listener Names
Stop Processes Using Oracle Home
Run slibclean
Execute OPatch
Run Oracle cpu_root
Start Processes Using Oracle Home
Patch Oracle Database
Cleanup Downloaded Files

Steps Used in Oracle - Patch Home and Database

Workflow Step	Description
Gather Parameters for Patch Home and Database	This step gathers the required parameters for the Oracle - Patch Home and Database workflow.
Gather Advanced Parameters for Patch Home and Database	This step gathers the optional advanced parameters for the Oracle - Patch Home and Database workflow.
Parse Oracle Inventory	This step parses the specified Oracle inventory files (if they exist) and passes the inventory information to subsequent steps. • If one or more Inventory Files are specified and they exist, the step parses these files and extracts their contents. • If no Inventory Files are specified, the step assigns the appropriate default and attempts to parse that file. • If one or more Inventory Files are specified and they do not exist, the step creates inventory information based on the specified Oracle Account and Oracle Home.
Validate Apply Critical Patch Update to Home	This step validates the values specified for the input parameters used by the "Oracle - Patch Home and Databases" workflow. It also sets the values of various output parameters that will be consumed by subsequent steps.
Check if Download File Exists	This step determines whether one or more specified files already exist on the target server.
Download Software	This step downloads a list of files to a specified location on the target server.
Change File Owner and Group	This step changes the ownership and group of each file specified. A warning is issued for files that are not found and they are downloaded from the software repository.
Check to Patch OPatch	This step determines whether an OPatch archive file has been provided. If this file has been provided, the workflow will use the file to patch the Oracle OPatch utility before applying the patch.
Check to Change Permissions	This step determines whether a Change Mode parameter is provided—only if the operating system is AIX.
Change File Permissions	If a Change Mode parameter is provided, this step changes the permissions for the OPatch mode.

Steps Used in Oracle - Patch Home and Database, continued

Workflow Step	Description
Conditional Unzip	This step unzips the specified Archive File into the specified destination directory—for the OPatch download.
Conditional Unzip	This step unzips the specified Archive File into the specified destination directory—for the Critical Patch Update download.
Update Oracle OPatch Version Info	This step determines which version of OPatch will be used to apply the patch update. If OPatch will be updated before the CPU is applied, and the OPatch archive file is available, the updated version is retrieved from the archive file. If OPatch will not be updated before the patch is applied, the current version is used.
Determine Oracle Patch Info	This step determines all the patch information that the workflow requires to apply the pertinent patch.
Verify Oracle Versions	This step ensures that the current Oracle Database and OPatch versions match the versions required to apply the patch.
Fetch Oracle_ Home Instances	This step fetches the list of Oracle Instances that share the specified ORACLE_HOME.
Fetch Listener Names	This step fetches the names of the Oracle Listeners running from the specified Oracle Home.
Stop Processes Using Oracle Home	This step stops all Oracle Instances included in the Oracle SIDs list—excluding any specified in the Ignore SIDs list. The step attempts to stop the Oracle Agent.
Run slibclean	This step runs the `slibclean` command on AIX targets. The `slibclean` utility removes any currently unused modules in kernel and library memory.
Execute OPatch	This step runs the Oracle OPatch utility to deploy an Oracle supplied patch.
Run Oracle cpu-root	This step runs the Oracle provided `cpu_root.sh` script as part of an Oracle CPU patch.
Start Processes Using Oracle Home	This step starts all Oracle Instances and Oracle Listeners in the Oracle SIDs list. It also attempts to start the Oracle Agent.
Patch Oracle Databases	This step patches every Oracle Instance in the supplied SID List (skipping all instances in the Ignore SIDs list) by doing the following: 1. Running the optional Preparatory SQL Script 2. Running the Patch SQL file—or the `dbpatch` utility

Steps Used in Oracle - Patch Home and Database, continued

Workflow Step	Description
Cleanup Downloaded Files	This step removes all downloaded files and archives.

For parameter descriptions and defaults, see "Parameters for Oracle - Patch Home and Databases".

How to Run this Workflow

The following instructions show you how to customize and run the "Oracle - Patch Home and Databases" workflow in your environment.

Tip: For detailed instructions to run HPE DMA workflows—using the Oracle - Compliance Audit workflow as an example—see HPE DMA Quick Start Tutorial.

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 Oracle - Patch Home and Databases" on page 44.

Note: Before following this procedure, review the "Prerequisites for this Workflow" on page 30, and ensure that all requirements are satisfied.

To run this workflow, you need to set your parameters differently depending on the location and status of your Oracle Patch Bundle. Use the following table to choose the method that matches your situation.

To specify the parameters for the Oracle Patch Bundle, choose one of the following methods:

Method 1: The Oracle ZIP file is in the software repository:

Note: The ZIP file name must have the following form: `pPatchNum_DBVersion_OSVersion.zip`. Example: `p6880880_102000_Linux-x86-64.zip`

1. In the Patch Archive parameter, specify the name (or names) of the patch archive ZIP file (or files) that was downloaded from Oracle.
2. In the Patch Download Location parameter, specify the directory where the ZIP file (or files) specified in the Patch Archive parameter should be downloaded.
3. In the Patch Archive Location parameter, specify the directory where the ZIP file (or files) specified in the Patch Archive parameter should be extracted (unzipped).

All downloaded files are removed upon successful completion of the workflow.

Method 2: The Oracle ZIP file is stored on each target machine:

Note: The ZIP file name must have the following form: `pPatchNum_DBVersion_OSVersion.zip`. Example: `p6880880_102000_Linux-x86-64.zip`

1. In the Patch Archive parameter, specify the fully qualified name (or names) of the ZIP file (or files) that was downloaded from Oracle.
2. If either OCM Response File or Patch Information File need to be downloaded, specify the Patch Download Location.

All downloaded files are removed upon successful completion of the workflow.

To use the Oracle - Patch Home and Database workflow:

1. Create a deployable copy of the workflow.
2. Determine the values that you will specify for the following parameters:

   Input Parameters for Gather Parameters for Patch Home and Database

Parameter Name	Default Value	Required	Description
Oracle Home	no default	required	Fully-qualified path name of the Oracle Home where the patch will be applied.
Patch Archive	no default	required	Name of the patch archive file. If the file does not exist on the target it will be downloaded from the software repository.

   Input Parameters for Gather Advanced Parameters for Patch Home and Database

Parameter Name	Default Value	Required	Description
OPatch Archive	no default	optional	Name of the OPatch archive file required for this patch. If this file does not exist on the target, it will be downloaded from the software repository. If this parameter value is not specified, the current OPatch version will be used.
Patch Information File	no default	optional	Name of the Patch Information File that contains supplementary patch data in XML format—supplied by support. If not found on the target, this file is downloaded from the software repository.

   Note: See "Parameters for Oracle - Patch Home and Databases" on page 44 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. 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.
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.

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.

Optional: If you want to further verify that the patch was successfully applied on the Oracle Home:

1. Run the following command:

   ```
   $ORACLE_HOME/OPatch/opatch lsinventory -oh $ORACLE_HOME
   ```
2. Check that the patch you applied is on the list of installed patches.

Optional: If you want to further verify that the patch was successfully applied to the Oracle Database Instances associated with the Oracle Home:

1. Log in as an SQLPlus privileged user.
2. Set the environment variable, for example:

   ```
   . oraenv
   ```
3. Give the name of the Oracle Database, for example:

   ```
   orca
   ```
4. Search results for comments and actions, for example:

   ```
   select comments,action from sys.registry$history;
   ```
5. Check that the desired patch was applied. For example, look for:

   CPUOct2013 or PSUOct2013

Sample Scenario

This topic shows you typical parameter values for different use cases for the "Oracle - Patch Home and Databases" workflow. The workflow always applies an Oracle Critical Patch Update or Security Patch Update (CPU/SPU), Patch Bundle, or Patch Set Update (PSU) to an Oracle Home and the Oracle Database Instances associated with the Oracle Home.

Scenario 1: To patch the Oracle Home and databases and also update the OPatch version

Use this scenario when Oracle provides a new OPatch version.

For this use case, specify a value for the OPatch Archive parameter. This is the OPatch archive file required for this patch update. If this file is not present, it will be downloaded from the software repository.

Input Parameters for Gather Parameters for Patch Home and Database

Parameter Name	Example Value	Description
Oracle Home	`/u01/app/oracle/product/11.2.0/db1`	Fully-qualified path name of the Oracle Home where the patch will be applied.
Patch Archive	`p16902043_112030_Linux-x86-64.zip`	Name of the patch archive file. If the file does not exist on the target it will be downloaded from the software repository.

Input Parameters for Gather Advanced Parameters for Patch Home and Database

Parameter Name	Example Value	Description
OPatch Archive	`p6880880_112000_Linux-x86-64.zip`	Name of the OPatch archive file required for this patch. If this file does not exist on the target, it will be downloaded from the software repository. If this parameter value is not specified, the current OPatch version will be used.
Patch Information File	`201310_PatchInfo.xml`	Name of the Patch Information File that contains supplementary patch data in XML format—supplied by support. If not found on the target, this file is downloaded from the software repository.

Scenario 2: To patch the Oracle Home and databases without updating the OPatch version

When Oracle has not updated the OPatch version, you do not specify a value for the OPatch Archive parameter. This forces the current OPatch version to be used.

Input Parameters for Gather Parameters for Patch Home and Database

Parameter Name	Example Value	Description
Oracle Home	`/u01/app/oracle/product/11.2.0/db1`	Fully-qualified path name of the Oracle Home where the patch will be applied.
Patch Archive	`p16902043_112030_Linux-x86-64.zip`	Name of the patch archive file. If the file does not exist on the target it will be downloaded from the software repository.

Input Parameters for Gather Advanced Parameters for Patch Home and Database

Parameter Name	Example Value	Description
OPatch Archive		Name of the OPatch archive file required for this patch. If this file does not exist on the target, it will be downloaded from the software repository. If this parameter value is not specified, the current OPatch version will be used.
Patch Information File	`201310_PatchInfo.xml`	Name of the Patch Information File that contains supplementary patch data in XML format—supplied by support. If not found on the target, this file is downloaded from the software repository.

Scenario 3: To manually specify the patch update

For this use case, you provide the proper parameter values to manually configure the patch.

The example values are sufficient to run the October 2013 Critical Patch Update for Oracle 11.2.0.3.

Caution: This use case is quite complex and only experienced Oracle database administrators should implement it.

This example also shows example values for other optional advanced parameters.

Input Parameters for Gather Parameters for Patch Home and Database

Parameter Name	Example Value	Description
Oracle Home	`/u01/app/oracle/product/11.2.0/db1`	Fully-qualified path name of the Oracle Home where the patch will be applied.
Patch Archive	`p16902043_112030_Linux-x86-64.zip`	Name of the patch archive file. If the file does not exist on the target it will be downloaded from the software repository.

Input Parameters for Gather Advanced Parameters for Patch Home and Database

Parameter Name	Example Value	Description
Ignorable Oracle Errors	see description	A comma-separated list of Oracle errors to be ignored when applying the patch to the database. This is in addition to the list of Oracle errors specified in the patch readme. Values are of the form ORA-nnnnn. Example value: ORA-00942,ORA-00955,ORA-01430,ORA-01432,ORA-01434,ORA-01435,ORA-01917,ORA-01920,ORA-01921,ORA-01927,ORA-01952,ORA-02303,ORA-02443,ORA-04043,ORA-06512,ORA-14452,ORA-29809,ORA-29830,ORA-29832,ORA-29844,ORA-29931
Ignore SIDs	TST,DEV	Comma-separated list of Oracle Instances (SIDs) that should not be patched.
Inventory Files	`/etc/oraInst.loc`	Comma-separated list of fully-qualified Oracle inventory files. If not specified, set to the appropriate default value for the target server operating system. Defaults are: Solaris or HP-UX: `/var/opt/oracle/oraInst.loc` Linux: `/etc/oraInst.loc`
New OPatch Version	11.2.0.3.0	The new OPatch version of the patch being applied. If you specify a value for this parameter, you MUST also specify values for Patch Number and Patch Name.
OCM Response File	`ocm.rsp`	Path name of the Oracle Configuration Manager (OCM) response file. If not found on the target, this file is downloaded from the software repository. If left blank, a default response file will be created.
OPatch Archive	`p6880880_112000_Linux-x86-64.zip`	Name of the OPatch archive file required for this patch. If this file does not exist on the target, it will be downloaded from the software repository. If this parameter value is not specified, the current OPatch version will be used.
Patch Information File	`201310_PatchInfo.xml`	Name of the Patch Information File that contains supplementary patch data in XML format—supplied by support. If not found on the target, this file is downloaded from the software repository.
Patch Name	CPUOct2013	Name of the patch that is being applied. If you specify a value for this parameter, you MUST also expose and specify New OPatch Version and Patch Number.
Patch Number	17082364	Patch number of the patch being applied. If you specify a value for this parameter, you MUST also expose and specify New OPatch Version and Patch Name.
Preparatory SQL Script	`example.sql`	File name containing SQL statements that must be run before the

Input Parameters for Gather Advanced Parameters for Patch Home and Database, continued

Parameter Name	Example Value	Description
		database catalog update. This file is passed directly to SQLPlus and must be formatted as such. If it is not found on the target server, this file is downloaded from the software repository.

You need to expose these additional parameters in the Gather Advanced Parameters for Patch Home and Database step to manually configure the patch:

- New OPatch Version
- Patch Name
- Patch Number

You may need to expose these additional parameters in the Gather Advanced Parameters for Patch Home and Database step:

- Ignorable Oracle Errors
- Ignore SIDs
- Inventory Files
- OCM Response File
- Preparatory SQL Script

Parameters for Oracle - Patch Home and Databases

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. For some parameters, if you do not specify a value for a parameter, a default value is assigned.

Note: Only those parameters that are configurable in a standard deployment are listed here. Input parameters that must be mapped to output parameters of previous steps are not listed.

Input Parameters Defined in this Step: Gather Parameters for Patch Home and Database

Parameter Name	Default Value	Required	Description
Oracle Home	no default	required	Fully-qualified path name of the Oracle Home where the patch will be applied.
Patch Archive	no default	required	Name of the patch archive file. If the file does not exist on the target it will be downloaded from the software repository.

Additional Input Parameters Defined in this Step: Gather Advanced Parameters for Patch Home and Database

Parameter Name	Default Value	Required	Description
Ignorable Oracle Errors	no default	optional	Comma-separated list of Oracle errors to be ignored when applying the patch to the database. This is in addition to the list of Oracle errors specified in the patch README. Values are of the form ORA-nnnnn. For example: ORA-04020,ORA-03113
Ignore SIDs	no default	optional	Comma-separated list of Oracle Instances (SIDs) that should not be patched.
Inventory Files	see description	optional	Comma-separated list of fully-qualified Oracle inventory files. If not specified, set to the appropriate default value for the target server operating system. Defaults are: Solaris or HP-UX: `/var/opt/oracle/oraInst.loc` Linux: `/etc/oraInst.loc`
New OPatch Version	no default	optional	The new OPatch version of the patch being applied. If you specify a value for this parameter, you MUST also specify values for Patch Number and Patch Name.
OCM Response File	no default	optional	Path name of the Oracle Configuration Manager (OCM) response file. If not found on the target, this file is downloaded from the software repository. If left blank, a default response file will be created.
OPatch Archive	no default	optional	Name of the OPatch archive file required for this patch. If this file does not exist on the target, it will be downloaded from the software repository. If this parameter value is not specified, the current OPatch version will be used.

Additional Input Parameters Defined in this Step: Gather Advanced Parameters for Patch Home and Database, continued

Parameter Name	Default Value	Required	Description
Patch Archive Location	/tmp	optional	Directory location where the zip archives will be extracted.
Patch Download Location	/tmp	optional	Directory on the target server to which all downloaded files are copied from the software repository—used only if the required files are not found on the target but are found in the software repository.
Patch Information File	no default	optional	Name of the Patch Information File that contains supplementary patch data in XML format—supplied by support. If not found on the target, this file is downloaded from the software repository.
Patch Name	no default	optional	Name of the patch that is being applied. If you specify a value for this parameter, you MUST also expose and specify New OPatch Version and Patch Number.
Patch Number	no default	optional	Patch number of the patch being applied. If you specify a value for this parameter, you MUST also expose and specify New OPatch Version and Patch Name.
Preparatory SQL Script	no default	optional	File name containing SQL statements that must be run before the database catalog update. This file is passed directly to SQLPlus and must be formatted as such. If it is not found on the target server, this file is downloaded from the software repository.

Oracle - Rollback Patch from Home and Databases

This workflow rolls back a Critical Patch Update or Security Patch Update (CPU/SPU), Patch Bundle, or Patch Set Update (PSU) from an Oracle Home and from the Oracle Database Instances associated with the Oracle Home.

Use this workflow if you encounter problems after applying a patch update. Only the last patch that was applied is rolled back.

For additional information about how the Oracle - Rollback Patch from Home and Databases workflow can be used with other patching workflows see How to Use the Workflows Together topic.

This workflow only applies to single Oracle Instance installations. It is not designed for Oracle Real Application Clusters (RAC).

If the Oracle patch has already been removed, this workflow will verify the patch removal and end with SUCCESS status.

Caution: This workflow stops all processes running from the ORACLE_HOME in order to patch. This includes the Oracle Listener, which may be servicing Oracle Instances outside this ORACLE_HOME.

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 Scenario"	Examples of typical parameter values for this workflow
Parameters	List of input parameters for this workflow

Note: The documentation for this workflow contains steps that are referred to by their base names. The names in the HPE DMA user interface may have a version appended, for example, v2.

Prerequisites for this Workflow

Be sure that the following prerequisites are satisfied before you run the "Oracle - Rollback Patch from Home and Databases" workflow:

- The latest HPE DMA solution packs require the latest HPE DMA platform. To use the latest solution packs, update the HPE DMA platform. HPE DMA 10.30 solution packs are supported on HPE DMA 10.30 (and later).
- You have installed the HPE DMA Database Patching Solution Pack.
- You have read access to all specified inventory pointers (Linux/UNIX).

Caution: This workflow stops all processes running from the ORACLE_HOME in order to rollback the patch. This includes the Oracle Listener, which may be servicing Oracle Instances outside this ORACLE_HOME.

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

How this Workflow Works

The following information describes how the "Oracle - Rollback Patch from Home and Databases" workflow works:

Overview show

This workflow does the following things in the order shown:

- The initial steps of the workflow prepare it to roll back the last patch applied to the Oracle Home. The workflow processes user input parameters, constructs commands used in subsequent steps, and downloads any required files.
- The workflow rolls back the Critical Patch Update from the Oracle Database Home. The workflow stops all Oracle Instances, all Oracle Listeners in the list, and the Oracle Agent. The workflow removes any currently unused modules in kernel and library memory. Then the workflow runs the OPatch utility to roll back an Oracle supplied Patch and runs the Oracle provided `cpu_root.sh` script to complete the rollback.
- The final steps of the workflow allow the workflow to end cleanly. The workflow restarts all the Oracle Instances, all Oracle Listeners, and the Oracle Agent. Then it runs Discovery to update the metadata and cleans up the downloaded files.

Validation Checks Performed show

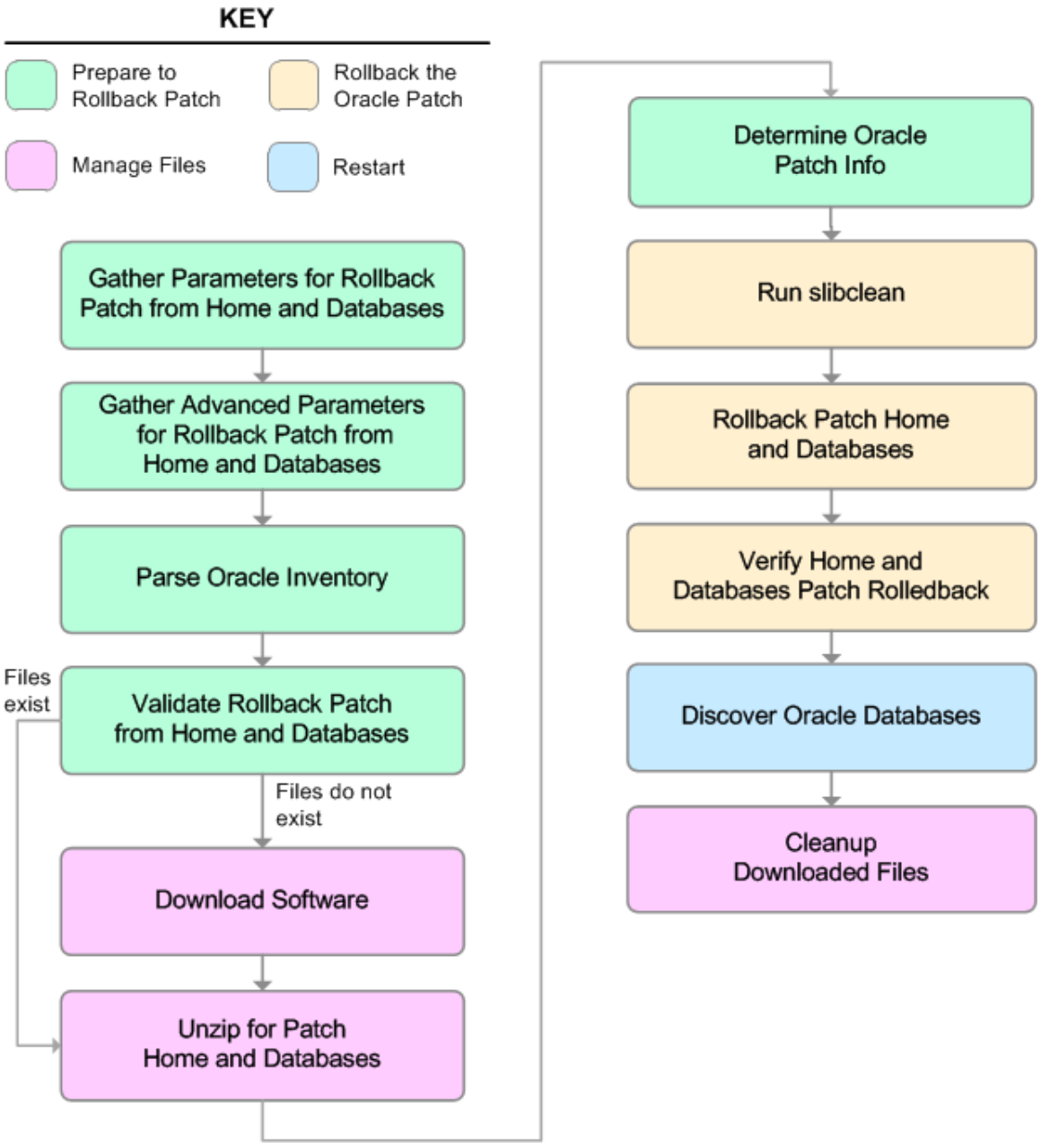
Much of the validation centers on the input parameters:

- The input parameters have the proper syntax (no special characters or spaces).
- Files exist or have valid specifications.
- The supplied patch update applies to the current Oracle Database version.

Steps Executed show

The Oracle - Rollback Patch from Home and Databases 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.

Click each box in the diagram to view additional information about that step.



Steps Used in Oracle - Rollback Patch from Home and Databases

Workflow Step	Description
Gather Parameters for Rollback Patch from Home and Databases	This step gathers the required parameters for the Oracle - Rollback Patch from Home and Databases workflow.
Gather Advanced Parameters for Rollback Patch from Home and Databases	This step gathers the optional advanced parameters for the Oracle - Rollback Patch from Home and Databases workflow.
Parse Oracle Inventory	This step parses the specified Oracle inventory files (if they exist) and passes the inventory information to subsequent steps. • If one or more Inventory Files are specified and they exist, the step parses these files and extracts their contents. • If no Inventory Files are specified, the step assigns the appropriate default and attempts to parse that file. • If one or more Inventory Files are specified and they do not exist, the step creates inventory information based on the specified Oracle Account and Oracle Home.
Validate Rollback Patch from Home and Databases	This step validates the specified values of the input parameters for the "Oracle - Rollback Patch from Home and Databases" workflow.
Download Software	This step downloads a list of files to a specified location on the target server.
Unzip for Patch Home and Databases	This step unzips the OPatch Archive and the Patch Archive.
Determine Oracle Patch Info	This step determines all the patch information that the workflow requires to apply the pertinent patch.
Run slibclean	This step runs the `slibclean` command on AIX targets. The `slibclean` utility removes any currently unused modules in kernel and library memory.
Rollback Patch Home and Databases	This step rolls back the patch from the Oracle Home and all databases within the Home.
Verify Home and Databases Patch Rolledback	This step confirms that the patch rollback was properly applied to the Oracle Home and the databases.
Discover Oracle Databases	This step audits the server's physical environment looking for Oracle instances and databases. **Note:** Discovery is ONLY additive. It will not remove instances or databases currently in your environment. It is the end-user's responsibility to delete content that is no longer in use. In cluster situations where one node is active while other nodes are

Steps Used in Oracle - Rollback Patch from Home and Databases, continued

Workflow Step	Description
	inactive, Discovery will only find instances and databases on the active node. Nothing will be added to inactive nodes.
Cleanup Downloaded Files	This step removes all downloaded files and archives.

For parameter descriptions and defaults, see "Parameters for Oracle - Rollback Patch from Home and Databases" on page 56.

How to Run this Workflow

The following instructions show you how to customize and run the "Oracle - Rollback Patch from Home and Databases" workflow in your environment.

Tip: For detailed instructions to run HPE DMA workflows—using the Oracle - Compliance Audit workflow as an example—see HPE DMA Quick Start Tutorial.

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 Oracle - Rollback Patch from Home and Databases" on page 56.

Note: Before following this procedure, review the "Prerequisites for this Workflow" on page 47, and ensure that all requirements are satisfied.

To use the Oracle - Rollback Patch from Home and Databases workflow:

1. Create a deployable copy of the workflow.
2. Determine the values that you will specify for the following parameters:

Input Parameters for Gather Parameters for Rollback Patch from Home and Databases

Parameter Name	Default Value	Required	Description
Oracle Home	no default	required	Fully-qualified path name of the Oracle Home where the patch will be rolled back.
Oracle OS User	oracle	required	The OS user that owns the specified Oracle Home.
Patch Archive	no default	required	Name of the patch archive file. If the file does not exist on the target it will be downloaded from the software repository.

Input Parameters for Gather Advanced Parameters for Rollback Patch from Home and Databases

Parameter Name	Default Value	Required	Description
Patch Information File	no default	optional	Name of the Patch Information File that contains supplementary patch data in XML format—supplied by support. If not found on the target, this file is downloaded from the software repository.
Trust SSL Certificates	no default	deprecated	HPE DMA no longer uses this workflow parameter to determine whether the workflow will trust any Secure Sockets Layer (SSL) certificate used to connect to the HPE DMA web service. HPE DMA uses the following parameter in the dma.xml file: <Parameter name="com.hp.dma.conn.trustAllCertificates" values="VALUE" />

Input Parameters for Gather Advanced Parameters for Rollback Patch from Home and Databases, continued

Parameter Name	Default Value	Required	Description
			Here, VALUE is true or false.
Web Service Password	no default	optional	Password for the HPE DMA Discovery web service API.
Web Service URL	DMA.Url	optional	URL for the Discovery web service API.
Web Service User	no default	optional	User who is capable of modifying the managed environment by using the HPE DMA Discovery web service API.

Note: See "Parameters for Oracle - Rollback Patch from Home and Databases" on page 56 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. You will specify values for those parameters when you create the deployment. 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.
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.

   Note: The targets need to be the same targets (servers) you used when you ran the Oracle - Patch Home and Database workflow.

8. Save the deployment (click **Save** in the lower right corner).
9. Run the workflow using this deployment.

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.

Optional: If you want to further verify that the patch was successfully removed from the Oracle Home:

1. Go to `$ORACLE_HOME/OPatch/opatch lsinventory -oh $ORACLE_HOME`
2. Check that the patch you rolled back is NOT on the list of patches.

Optional: If you want to further verify that the patch was successfully removed from the Oracle Database Instances associated with the Oracle Home:

1. Log in as an SQLPlus privileged user.
2. Set the environment variable, for example:

   ```
   . oraenv
   ```
3. Give the name of the Oracle Database, for example:

   ```
   orca
   ```
4. Search results for comments and actions, for example:

   ```
   select comments,action from sys.registry$history;
   ```
5. Verify that the patch number that you rolled back is NOT listed in the output, for example:

   CPUOct2013 or PSUOct2013

Sample Scenario

It is very straightforward to run the "Oracle - Rollback Patch from Home and Databases" workflow. This topic shows you typical parameter values to use.

Input Parameters for Gather Parameters for Rollback Patch from Home and Databases

Parameter Name	Example Value	Description
Oracle Home	`/u01/app/oracle/product/11.2.0/db1`	Fully-qualified path name of the Oracle Home where the patch will be rolled back.
Oracle OS User	oracle	The OS user that owns the specified Oracle Home.
Patch Archive	`p16902043_112030_Linux-x86-64.zip`	Name of the patch archive file. If the file does not exist on the target it will be downloaded from the software repository.

Input Parameters for Gather Advanced Parameters for Rollback Patch from Home and Databases

Parameter Name	Example Value	Description
Patch Information File	`201310_PatchInfo.xml`	Name of the Patch Information File that contains supplementary patch data in XML format—supplied by support. If not found on the target, this file is downloaded from the software repository.

Parameters for Oracle - Rollback Patch from Home and Databases

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 WorkflowParameters on page 93). For some parameters, if you do not specify a value for a parameter, a default value is assigned.

Note: Only those parameters that are configurable in a standard deployment are listed here. Input parameters that must be mapped to output parameters of previous steps are not listed.

Input Parameters Defined in this Step: Gather Parameters for Rollback Patch from Home and Databases

Parameter Name	Default Value	Required	Description
Oracle Home	no default	required	Fully-qualified path name of the Oracle Home where the patch will be rolled back.
Oracle OS User	oracle	required	The OS user that owns the specified Oracle Home.
Patch Archive	no default	required	Name of the patch archive file. If the file does not exist on the target it will be downloaded from the software repository.

Additional Parameters Defined in this Step: Gather Advanced Parameters for Rollback Patch from Home and Databases

Parameter Name	Default Value	Required	Description
Cleanup	True	optional	Flag that determines whether any downloaded and extracted files will be cleaned up. Valid values are True and False.
Download Location	`/tmp`	optional	The directory on the target server where files are copied from the software repository—used only if the required files are not found on the target but are found in the software repository.
Extract Location	`/tmp`	optional	Location where the archive files will be extracted.
Ignorable Oracle Errors	no default	optional	Comma-separated list of Oracle errors to be ignored when applying the patch to the database. This is in addition to the list of Oracle errors specified in the patch README. Values are of the form ORA-nnnnn. For example: ORA-04020,ORA-03113
OCM Response File	no default	optional	Path name of the Oracle Configuration Manager (OCM) response file. If not found on the target, this file is downloaded from the software repository. If left blank, a default response file will be created.
Oracle SIDs	ALL	optional	Oracle Instances (SIDs) that will be rolled back. Valid values are ALL, INCLUDE: followed by a comma-separated list of SIDs to be rolled back with the Oracle Home, and EXCLUE: followed by a

Additional Parameters Defined in this Step: Gather Advanced Parameters for Rollback Patch from Home and Databases, continued

Parameter Name	Default Value	Required	Description
			comma-separated list of Oracle SIDS to exclude from the rollback process.
Patch Information File	no default	optional	Name of the Patch Information File that contains supplementary patch data in XML format—supplied by support. If not found on the target, this file is downloaded from the software repository.
Preparatory SQL Script	no default	optional	File name containing SQL statements that must be run before the database catalog update. This file is passed directly to SQLPlus and must be formatted as such. If it is not found on the target server, this file is downloaded from the software repository.
Run Database View Recompile	N	optional	Flag to indicate if the Database View Recompile step will be run.
Trust SSL Certificates	no default	deprecated	HPE DMA no longer uses this workflow parameter to determine whether the workflow will trust any Secure Sockets Layer (SSL) certificate used to connect to the HPE DMA web service. HPE DMA uses the following parameter in the dma.xml file: <Parameter name="com.hp.dma.conn.trustAllCertificates" values="VALUE" /> Here, VALUE is true or false.
Web Service Password	no default	optional	Password for the HPE DMA Discovery web service API.
Web Service URL	DMA.Url	optional	URL for the Discovery web service API.
Web Service User	no default	optional	User who is capable of modifying the managed environment by using the HPE DMA Discovery web service API.

Apply Critical Patch Update to Database

This workflow applies the database portion of an Oracle Critical Patch Update (CPU), Patch Bundle, or Patch Set Update (PSU).

Oracle Database patches are published on a quarterly basis.

Before you can run the Oracle - Patch Home and Database workflow you need to apply the CPU, Bundle, or PSU to the Oracle Home. To do this, use the workflow "Oracle - Patch Home and Databases" on page 29.

Note: The target for this workflow is an Oracle Instance. An Oracle Home may have multiple Oracle Instances. After patching the Oracle Home, all associated Oracle Instances need to be patched.

If you have problems after applying the patch to both the Oracle Home and the Oracle Database Instances, you can remove it by running the workflows "Rollback Critical Patch Update from Database" on page 70 then "Oracle - Rollback Patch from Home and Databases" on page 46.

For additional information about how the Oracle - Patch Home and Database workflow can be used with other patching workflows see How to Use the Workflows Together topic.

This workflow only applies to single Oracle Instance installations. It is not designed for Oracle Real Application Clusters (RAC). To patch Oracle RAC, you can run the Apply Critical Patch Update to RAC Home workflow found in the HPE DMA Advanced Database Patching Solution Pack.

The patch to be applied is determined by the last directory entry in `${ORACLE_HOME}/.patch_storage` (sorted by name, not date).

If the January 2008 view recompile is not found in the `sys.registry$history` table, this patch is also applied (for Oracle versions prior to 11.2).

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 Scenario"	Examples of typical parameter values for this workflow
Parameters	List of input parameters for this workflow

Prerequisites for this Workflow

Be sure that the following prerequisites are satisfied before you run the "Apply Critical Patch Update to Database" workflow:

- The latest HPE DMA solution packs require the latest HPE DMA platform. To use the latest solution packs, update the HPE DMA platform. HPE DMA 10.30 solution packs are supported on HPE DMA 10.30 (and later).
- You have installed the HPE DMA Database Patching Solution Pack.
- You need to have Oracle Database provisioned and operational. You can do this by running the following workflows in the HPE DMA Database Provisioning Solution Pack:

  Oracle – Provision Database Software

  Oracle – Provision Database
- You have already run the workflow "Oracle - Patch Home and Databases" on page 29
- You have read access to all specified inventory pointers (Linux/UNIX).

Caution: Because this workflow runs the Oracle Database in upgrade mode while the patch is being applied, no one can use the database while the patch is being applied.

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

How this Workflow Works

The following information describes how the "Apply Critical Patch Update to Database" workflow works:

Overview show

This workflow does the following things in the order shown:

- First, the workflow prepares to apply the patch. It prepares the server, determines the Oracle Home, prepares the Oracle Instance, and validates the input parameters. If the patch files do not already exist they are downloaded. It determines all the pertinent patch information.
- The patch is applied by running the specified SQL Script. Then the workflow verifies that the patch is applied
- The database view is recompiled. Then the workflow verifies that this was successful.
- The Patch Level **metadata** is updated.
- Finally, the workflow cleans up files that are no longer needed.

Validation Checks Performed show

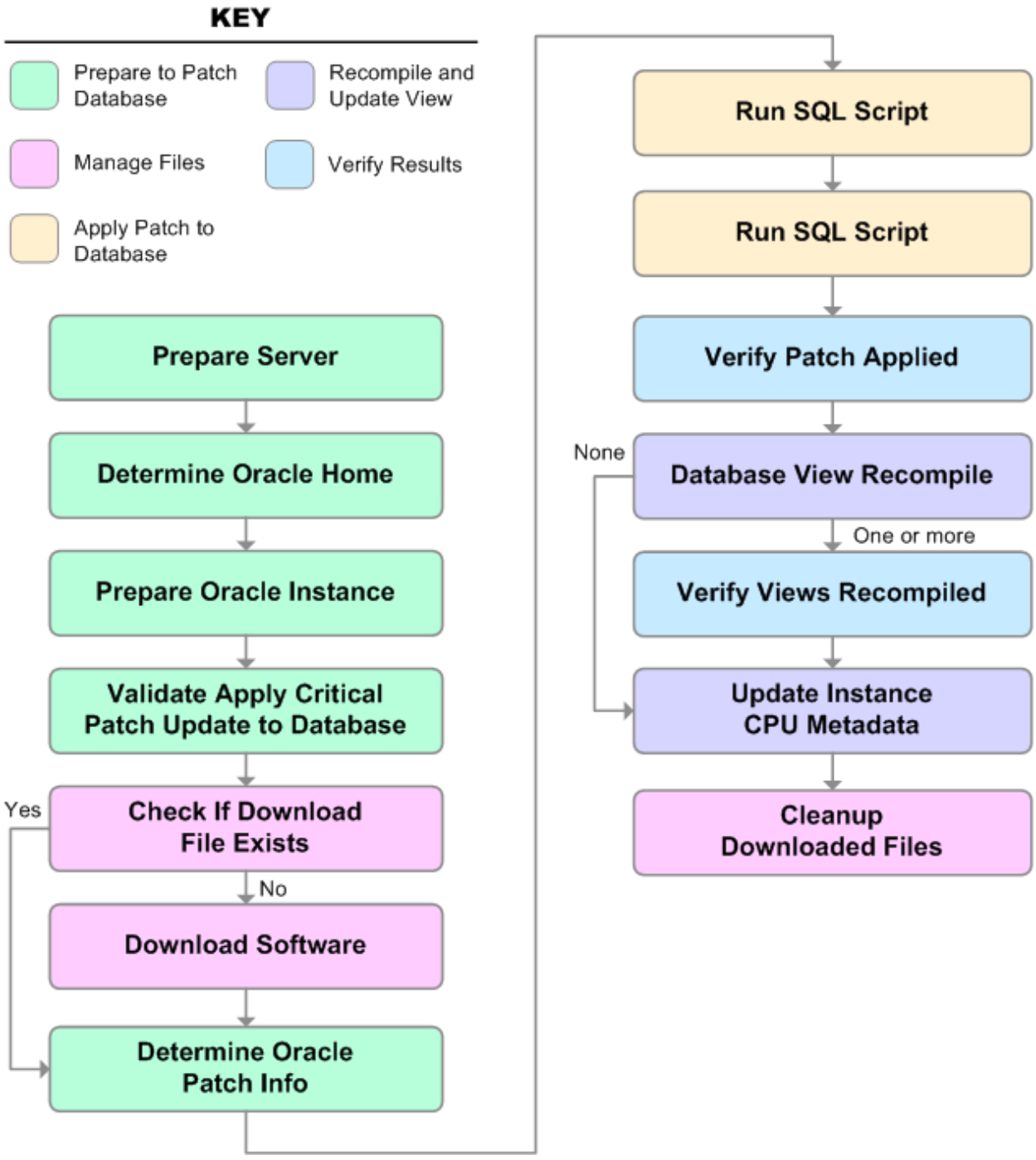
Much of the validation centers on the input parameters:

- The input parameters have the proper syntax (no special characters or spaces).
- Files exist or have valid specifications.
- The supplied critical patch update applies to the current Oracle Database version.

Steps Executed show

The Oracle - Patch Home and Database 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.

Click each box in the diagram to view additional information about that step.



Steps Used in Oracle - Patch Home and Database

Workflow Step	Description
Prepare Server	This step prepares the Server Wrapper and Instance Wrapper, which enable subsequent steps to be executed by the OS administrator user or the owner of the database or middleware software.
Determine Oracle Home	This step determines the value of ORACLE_HOME from the `/etc/oratab` or `/var/opt/oracle/oratab` file on UNIX targets.
Prepare Oracle Instance	This step prepares access to the pertinent Oracle Instance.
Validate Apply Critical Patch Update to Database	This step validates the values specified for the input parameters used by the "Apply Critical Patch Update to Database" workflow. It also sets the values of various output parameters that will be consumed by subsequent steps.
Check if Download File Exists	This step determines whether one or more specified files already exist on the target server.
Download Software	This step downloads a list of files to a specified location on the target server.
Determine Oracle Patch Info	This step determines all the patch information that the workflow requires to apply the pertinent patch.
Run SQL Script	This step runs the specified SQL Script against each SID in the specified Oracle SIDs list. It skips all Oracle Instances in the Ignore SIDs list (these are typically standby databases). The first Run SQL Script step runs the optional user-defined Preparatory SQL Script file.
Run SQL Script	This step runs the specified SQL Script against each SID in the specified Oracle SIDs list. It skips all Oracle Instances in the Ignore SIDs list (these are typically standby databases). The second Run SQL Script step runs the Patch Information File.
Verify Patch Applied	This step confirms that the patch was properly applied to the database.
Database View Recompile	This step recompiles the database views as required by the Critical Patch Update (CPU) or Patch Set Update (PSU) patching process.
Verify Views Recompiled	This step confirms that any views that were required to be recompiled where successfully recompiled.
Update Instance CPU Metadata	This step updates the Patch Level **metadata** field associated with the pertinent instance.
Cleanup	This step removes files and archives that were downloaded to the target system during

Steps Used in Oracle - Patch Home and Database, continued

Workflow Step	Description
Downloaded Files	previous workflow steps.

For parameter descriptions and defaults, see "Parameters for Apply Critical Patch Update to Database" on page 68.

How to Run this Workflow

The following instructions show you how to customize and run the "Apply Critical Patch Update to Database" workflow in your environment.

Tip: For detailed instructions to run HPE DMA workflows—using the Oracle - Compliance Audit workflow as an example—see HPE DMA Quick Start Tutorial.

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 Oracle - Patch Home and Databases" on page 44.

Note: Before following this procedure, review the "Prerequisites for this Workflow" on page 59, and ensure that all requirements are satisfied.

To use the Oracle - Patch Home and Database workflow:

1. Create a deployable copy of the workflow.
2. Determine the values that you will specify for the following parameters:

Input Parameters for Prepare Oracle Instance

Parameter Name	Default Value	Required	Description
Inventory Files	see description	optional	Comma-separated list of fully-qualified Oracle inventory files. If not specified, set to the appropriate default value for the target server operating system. Defaults are: Solaris or HP-UX: `/var/opt/oracle/oraInst.loc` Linux: `/etc/oraInst.loc`

Input Parameters for Validate Apply Critical Patch Update to Database

Parameter Name	Default Value	Required	Description
Download Location	`/var/tmp`	optional	The directory on the target server where files are copied from the software repository—used only if the required files are not found on the target but are found in the software repository.
Ignorable Oracle Errors	no default	optional	Comma-separated list of Oracle errors to be ignored when applying the patch to the database. This is in addition to the list of Oracle errors specified in the patch README. Values are of the form ORA-nnnnn. For example:

Input Parameters for Validate Apply Critical Patch Update to Database, continued

Parameter Name	Default Value	Required	Description
			ORA-04020,ORA-03113
Patch Information File	no default	optional	Name of the Patch Information File that contains supplementary patch data in XML format—supplied by support. If not found on the target, this file is downloaded from the software repository.
Preparatory SQL Script	no default	optional	File name containing SQL statements that must be run before the database catalog update. This file is passed directly to SQLPlus and must be formatted as such. If it is not found on the target server, this file is downloaded from the software repository.

Note: See "Parameters for Oracle - Patch Home and Databases" on page 44 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 . 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.
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.

   Note: The target for this workflow is an instance.

8. Save the deployment (click **Save** in the lower right corner).
9. Run the workflow using this deployment.

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.

Optional: If you want to further verify the results:

1. Log in as an SQLPlus privileged user.
2. Set the environment variable, for example:

   ```
   . oraenv
   ```
3. Give the name of the Oracle Database, for example:

   ```
   orca
   ```
4. Search results for comments and actions, for example:

   ```
   select comments,action from sys.registry$history;
   ```
5. Check that the desired patch was applied. For example, look for:

   CPUOct2013 or PSUOct2013

Sample Scenario

It is very straightforward to run the "Apply Critical Patch Update to Database" workflow. This topic shows you typical parameter values to use.

Typical scenario: To apply a CPU patch to your Oracle Database

This case shows how to set the input parameters to patch Oracle Database. Inventory Files contains one (or more) Oracle inventory file names. Download Location is the directory on the target server from where files are copied. Ignorable Oracle Errors is a list of Oracle errors to be ignored (in addition to the errors specified in the patch readme). Patch Information File is a file that contains all patch information in XML format.Preparatory SQL Script is a file that contains your customized SQL statements will be run before the database catalog update. If this file is not found on the target server, the file is downloaded from the software repository. When you set Startup Instance to Y, the workflow will start the Oracle Instance if it is offline.

Input Parameters for Prepare Oracle Instance

Parameter Name	Example Value	Description
Inventory Files	`/etc/oraInst.loc`	Comma-separated list of fully-qualified Oracle inventory files. If not specified, set to the appropriate default value for the target server operating system. Defaults are: Solaris or HP-UX: `/var/opt/oracle/oraInst.loc` Linux: `/etc/oraInst.loc`

Input Parameters for Validate Apply Critical Patch Update to Database

Parameter Name	Example Value	Description
Download Location	`/var/tmp`	The directory on the target server where files are copied from the software repository—used only if the required files are not found on the target but are found in the software repository.
Ignorable Oracle Errors	see description	A comma-separated list of Oracle errors to be ignored when applying the patch to the database. This is in addition to the list of Oracle errors specified in the patch readme. Values are of the form ORA-nnnnn. Example value: ORA-00942,ORA-00955,ORA-01430,ORA-01432,ORA-01434,ORA-01435,ORA-01917,ORA-01920,ORA-01921,ORA-01927,ORA-01952,ORA-02303,ORA-02443,ORA-04043,ORA-06512,ORA-14452,ORA-29809,ORA-29830,ORA-29832,ORA-29844,ORA-29931
Patch Information File	`/etc/oraInst.loc`	Name of the Patch Information File that contains supplementary patch data in XML format—supplied by support. If not found on the target, this file is downloaded from the software repository.
Preparatory SQL Script	`example.sql`	File name containing SQL statements that must be run before the database catalog update. This file is passed directly to SQLPlus and must be formatted as such. If it is not found on the target server, this file is downloaded from the software repository.

Parameters for Apply Critical Patch Update to Database

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. For some parameters, if you do not specify a value for a parameter, a default value is assigned.

Note: Only those parameters that are configurable in a standard deployment are listed here. Input parameters that must be mapped to output parameters of previous steps are not listed.

Parameters Defined in this Step: Prepare Oracle Instance

Parameter Name	Default Value	Required	Description
Inventory Files	see description	optional	Comma-separated list of fully-qualified Oracle inventory files. If not specified, set to the appropriate default value for the target server operating system. Defaults are: Solaris or HP-UX: `/var/opt/oracle/oraInst.loc` Linux: `/etc/oraInst.loc`
Oracle Home	no default	optional	Fully qualified path name of the Oracle Home where the patch will be applied. Only necessary to specify if there is more than one Oracle Home in the inventory file (or files).
Server Wrapper	see description	required	Command that will execute a step as the OS administrative user. The default for UNIX targets is: `sudo su - root /opt/hp/dma/client/jython.sh` **Caution:** This parameter is derived by the workflow. Under most circumstances, you should not change its mapping or its value.

Additional Parameters Defined in this Step: Validate Apply Critical Patch Update to Database

Parameter Name	Default Value	Required	Description
Download Location	`/var/tmp`	optional	The directory on the target server where files are copied from the software repository—used only if the required files are not found on the target but are found in the software repository.
Ignorable Oracle Errors	no default	optional	Comma-separated list of Oracle errors to be ignored when applying the patch to the database. This is in addition to the list of Oracle errors specified in the patch README. Values are of the form ORA-nnnnn. For example: ORA-04020,ORA-03113

Additional Parameters Defined in this Step: Validate Apply Critical Patch Update to Database, continued

Parameter Name	Default Value	Required	Description
Instance Wrapper	no default	required	Command that will be used to execute subsequent steps as the user who owns the ORACLE_HOME. For example: `su - oracle /opt/hp/dma/client/jython.sh` **Caution:** This parameter is derived by the workflow. Under most circumstances, you should not change its mapping or its value.
Patch Archive Location	`/tmp`	optional	Directory location where the zip archives will be extracted.
Patch Directory	no default	optional	Deprecated. No longer used.
Patch Download Location	`/tmp`	optional	Directory on the target server to which all downloaded files are copied from the software repository—used only if the required files are not found on the target but are found in the software repository.
Patch Information File	no default	optional	Name of the Patch Information File that contains supplementary patch data in XML format—supplied by support. If not found on the target, this file is downloaded from the software repository.
Preparatory SQL Script	no default	optional	File name containing SQL statements that must be run before the database catalog update. This file is passed directly to SQLPlus and must be formatted as such. If it is not found on the target server, this file is downloaded from the software repository.
Startup Instance	no default	optional	Specify Y if you would like to attempt to start the database instance if it is offline.

Additional Parameters Defined in this Step: Run SQL Script

Parameter Name	Default Value	Required	Description
Ignore SIDs	no default	optional	Comma-separated list of Oracle Instances (SIDs) that should not be patched.

Rollback Critical Patch Update from Database

This workflow rolls back the database portion of a Critical Patch Update (CPU), Patch Bundle, or Patch Set Update (PSU).

Use this workflow if you encounter problems after applying the Critical Patch Update to both the Oracle Home and the Oracle Database Instances. Only the last patch that was applied is rolled back.

After you run this workflow, run the workflow "Oracle - Rollback Patch from Home and Databases" on page 46 to rollback the CPU, Bundle, or PSU from the Oracle Home.

For additional information about how the Oracle - Rollback Patch from Home and Databases workflow can be used with other patching workflows see How to Use the Workflows Together topic.

Note: The target for this workflow is an Oracle Instance. An Oracle Home may have multiple Oracle Instances. After rolling back all associated Oracle Instances, you will need to roll back the Oracle Home.

This workflow only applies to single Oracle Instance installations. It is not designed for Oracle Real Application Clusters (RAC).

The rollback script used is located in `${ORACLE_HOME}/rdbms/admin` per the patch README instructions.

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 Scenario"	Examples of typical parameter values for this workflow
Parameters	List of input parameters for this workflow

Prerequisites for this Workflow

Be sure that the following prerequisites are satisfied before you run the "Rollback Critical Patch Update from Database" on the previous page workflow:

- The latest HPE DMA solution packs require the latest HPE DMA platform. To use the latest solution packs, update the HPE DMA platform. HPE DMA 10.30 solution packs are supported on HPE DMA 10.30 (and later).
- You have installed the HPE DMA Database Patching Solution Pack.
- You have read access to all specified inventory pointers (Linux/UNIX).
- You have already run the workflow "Oracle - Rollback Patch from Home and Databases" on page 46.

Caution: This workflow runs the Oracle Database in upgrade mode while the patch is being applied so the database cannot be used by others.

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

How this Workflow Works

The following information describes how the "Rollback Critical Patch Update from Database" workflow works:

Overview show

This workflow does the following things in the order shown:

- First, the workflow prepares to roll back the patch. It prepares the server, determines the Oracle Home, prepares the Oracle Instance, and validates the input parameters. If the patch files do not already exist they are downloaded. It determines all the pertinent patch information.
- The workflow applies the rollback by running the specified SQL Script. Then the workflow verifies that the patch was properly rolled back from the database.
- The workflow confirms that the database view was recompiled correctly. If not, it recompiles the database view.
- The workflow updates the Patch Level **metadata**.
- Finally, the workflow cleans up files that are no longer needed.

Validation Checks Performed show

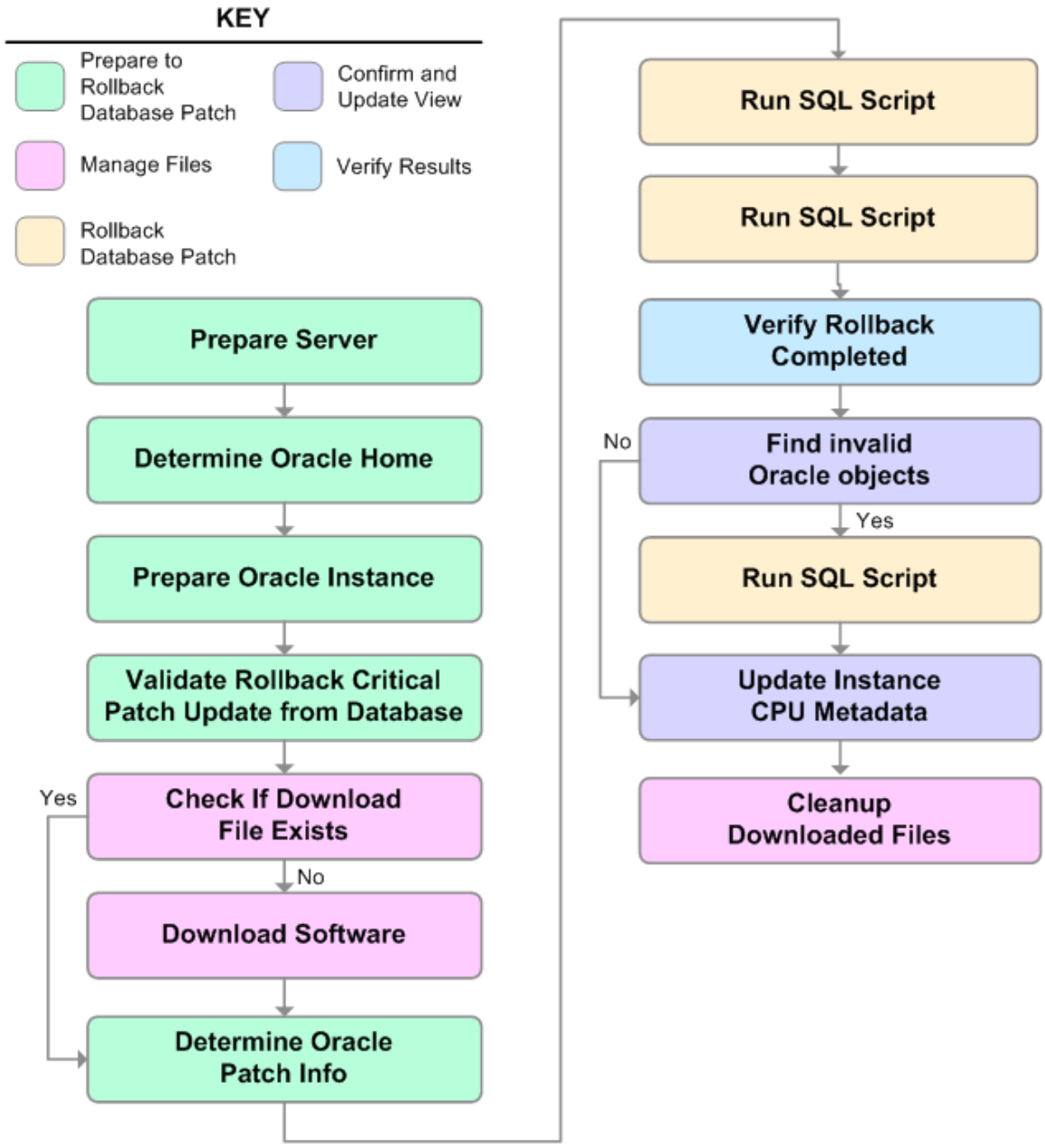
Much of the validation centers on the input parameters:

- The input parameters have the proper syntax (no special characters or spaces).
- Files exist or have valid specifications.

Steps Executed show

The Oracle - Rollback Patch from Home and Databases 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.

Click each box in the diagram to view additional information about that step.



Steps Used in Oracle - Rollback Patch from Home and Databases

Workflow Step	Description
Prepare Server	This step prepares the Server Wrapper and Instance Wrapper, which enable subsequent steps to be executed by the OS administrator user or the owner of the database or middleware software.
Determine Oracle Home	This step determines the value of ORACLE_HOME from the `/etc/oratab` or `/var/opt/oracle/oratab` file on UNIX targets.
Prepare Oracle Instance	This step prepares access to the pertinent Oracle Instance.
Validate Rollback Critical Patch Update from Database	This step validates the specified values of the input parameters for the "Rollback Critical Patch Update from Database" workflow.
Check if Download File Exists	This step determines whether one or more specified files already exist on the target server.
Download Software	This step downloads a list of files to a specified location on the target server.
Determine Oracle Patch Info	This step determines all the patch information that the workflow requires to apply the pertinent patch.
Run SQL Script	This step runs the specified SQL Script against each SID in the specified Oracle SIDs list. It skips all Oracle Instances in the Ignore SIDs list (these are typically standby databases). The first Run SQL Script step runs the optional user-defined Preparatory SQL Script file.
Run SQL Script	This step runs the specified SQL Script against each SID in the specified Oracle SIDs list. It skips all Oracle Instances in the Ignore SIDs list (these are typically standby databases). The second Run SQL Script step runs the Patch Information File.
Verify Rollback Completed	This step confirms that the patch was properly rolled back from the database.
Find Invalid Oracle Objects	This step confirms that the database view was recompiled correctly.
Run SQL Script	This step runs the specified SQL Script against each SID in the specified Oracle SIDs list. It skips all Oracle Instances in the Ignore SIDs list (these are typically standby databases). The third Run SQL Script step runs the Oracle provided utlrp sql file to recompile all invalid objects in the database.
Update Instance CPU Metadata	This step updates the Patch Level **metadata** field associated with the pertinent instance.

Steps Used in Oracle - Rollback Patch from Home and Databases, continued

Workflow Step	Description
Cleanup Downloaded Files	This step removes files and archives that were downloaded to the target system during previous workflow steps.

For parameter descriptions and defaults, see "Parameters for Rollback Critical Patch Update from Database" on page 80.

How to Run this Workflow

The following instructions show you how to customize and run the "Rollback Critical Patch Update from Database" workflow in your environment.

Tip: For detailed instructions to run HPE DMA workflows—using the Oracle - Compliance Audit workflow as an example—see HPE DMA Quick Start Tutorial.

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 Rollback Critical Patch Update from Database" on page 80

Note: Before following this procedure, review the "Prerequisites for this Workflow" on page 71, and ensure that all requirements are satisfied.

To use the Oracle - Rollback Patch from Home and Databases workflow:

1. Create a deployable copy of the workflow.
2. Determine the values that you will specify for the following parameters:

Input Parameters for Prepare Oracle Instance

Parameter Name	Default Value	Required	Description
Inventory Files	see description	optional	Comma-separated list of fully-qualified Oracle inventory files. If not specified, set to the appropriate default value for the target server operating system. Defaults are: Solaris or HP-UX: `/var/opt/oracle/oraInst.loc` Linux: `/etc/oraInst.loc`

Input Parameters for Validate Rollback Critical Patch Update from Database

Parameter Name	Default Value	Required	Description
Download Location	`/var/tmp`	optional	The directory on the target server where files are copied from the software repository—used only if the required files are not found on the target but are found in the software repository.
Ignorable Oracle Errors	no default	optional	Comma-separated list of Oracle errors to be ignored when rolling back the patch. This is in addition to the list of Oracle errors specified in the patch README. Values are of the form ORA-nnnnn. For example: ORA-04020,ORA-03113

Input Parameters for Validate Rollback Critical Patch Update from Database, continued

Parameter Name	Default Value	Required	Description
Patch Information File	no default	optional	Name of the Patch Information File that contains supplementary patch data in XML format—supplied by support. If not found on the target, this file is downloaded from the software repository.
Preparatory SQL Script	no default	optional	File name containing SQL statements that must be run before the database catalog update. This file is passed directly to SQLPlus and must be formatted as such. If it is not found on the target server, this file is downloaded from the software repository.
Startup Instance	no default	optional	Specify Y if you would like to attempt to start the database instance if it is offline.

Input Parameters for Run SQL Script

Parameter Name	Default Value	Required	Description
Startup Instance	no default	optional	Specify Y if you would like to attempt to start the database instance if it is offline.

Note: See Parameters for Oracle - Rollback Patch from Home and Databases on page 46 for detailed descriptions of all input parameters for this workflow, including default values.

Note: See "Parameters for Rollback Critical Patch Update from Database" on page 80 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. 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.
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.

   Note: The targets need to be the same targets (instances) you used when you ran the Oracle - Patch Home and Database workflow.

8. Save the deployment (click **Save** in the lower right corner).
9. Run the workflow using this deployment.

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.

Optional: If you want to further verify the results:

1. Log in as an SQLPlus privileged user.
2. Set the environment variable, for example:

   ```
   . oraenv
   ```
3. Give the name of the Oracle Database, for example:

   ```
   orca
   ```
4. Search results for comments and actions, for example:

   ```
   select comments,action from sys.registry$history;
   ```
5. Check that the desired patch was rolled back. For example, look for:

   CPUOct2013 or PSUOct2013

Sample Scenario

It is very straightforward to run the "Rollback Critical Patch Update from Database" workflow. This topic shows you typical parameter values to use.

Input Parameters for Prepare Oracle Instance

Parameter Name	Example Value	Description
Inventory Files	`/etc/oraInst.loc`	Comma-separated list of fully-qualified Oracle inventory files. If not specified, set to the appropriate default value for the target server operating system. Defaults are: Solaris or HP-UX: `/var/opt/oracle/oraInst.loc` Linux: `/etc/oraInst.loc`

Input Parameters for Validate Rollback Critical Patch Update from Database

Parameter Name	Example Value	Description
Download Location	`/var/tmp`	The directory on the target server where files are copied from the software repository—used only if the required files are not found on the target but are found in the software repository.
Ignorable Oracle Errors	see description	Comma-separated list of Oracle errors to be ignored when rolling back the patch. This is in addition to the list of Oracle errors specified in the patch README. Values are of the form ORA-nnnnn. For example: ORA-04020,ORA-03113
Patch Information File	`/etc/oraInst.loc`	Name of the Patch Information File that contains supplementary patch data in XML format—supplied by support. If not found on the target, this file is downloaded from the software repository.
Preparatory SQL Script	`example.sql`	File name containing SQL statements that must be run before the database catalog update. This file is passed directly to SQLPlus and must be formatted as such. If it is not found on the target server, this file is downloaded from the software repository.
Startup Instance	Y	Specify Y if you would like to attempt to start the database instance if it is offline.

Input Parameters for Run SQL Script

Parameter Name	Example Value	Description
Startup Instance	Y	Specify Y if you would like to attempt to start the database instance if it is offline.

Parameters for Rollback Critical Patch Update from Database

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 93). For some parameters, if you do not specify a value for a parameter, a default value is assigned.

Note: Only those parameters that are configurable in a standard deployment are listed here. Input parameters that must be mapped to output parameters of previous steps are not listed.

Parameters Defined in this Step: Prepare Oracle Instance

Parameter Name	Default Value	Required	Description
Inventory Files	see description	optional	Comma-separated list of fully-qualified Oracle inventory files. If not specified, set to the appropriate default value for the target server operating system. Defaults are: Solaris or HP-UX: `/var/opt/oracle/oraInst.loc` Linux: `/etc/oraInst.loc`
Oracle Home	no default	optional	Fully qualified path name of the Oracle Home where the patch will be applied. Only necessary to specify if there is more than one Oracle Home in the inventory file (or files).
Server Wrapper	see description	required	Command that will execute a step as the OS administrative user. The default for UNIX targets is: `sudo su - root /opt/hp/dma/client/jython.sh` Caution: This parameter is derived by the workflow. Under most circumstances, you should not change its mapping or its value.

Additional Parameters Defined in this Step: Validate Rollback Critical Patch Update from Database

Parameter Name	Default Value	Required	Description
Download Location	`/var/tmp`	optional	The directory on the target server where files are copied from the software repository—used only if the required files are not found on the target but are found in the software repository.
Ignorable Oracle Errors	no default	optional	Comma-separated list of Oracle errors to be ignored when rolling back the patch. This is in addition to the list of Oracle errors specified in the patch README. Values are of the form ORA-nnnnn. For example: ORA-04020,ORA-03113
Instance Wrapper	no default	required	Command that will be used to execute subsequent steps as the user who owns the ORACLE_HOME. For example:

Additional Parameters Defined in this Step: Validate Rollback Critical Patch Update from Database , continued

Parameter Name	Default Value	Required	Description
			`su - oracle /opt/hp/dma/client/jython.sh` **Caution:** This parameter is derived by the workflow. Under most circumstances, you should not change its mapping or its value.
Patch Information File	no default	optional	Name of the Patch Information File that contains supplementary patch data in XML format—supplied by support. If not found on the target, this file is downloaded from the software repository.
Preparatory SQL Script	no default	optional	File name containing SQL statements that must be run before the database catalog update. This file is passed directly to SQLPlus and must be formatted as such. If it is not found on the target server, this file is downloaded from the software repository.
Startup Instance	no default	optional	Specify Y if you would like to attempt to start the database instance if it is offline.

Additional Parameters Defined in this Step: Run SQL Script

Parameter Name	Default Value	Required	Description
Ignore SIDs	no default	optional	Comma-separated list of Oracle Instances (SIDs) that should not be patched.
Startup Instance	no default	optional	Specify Y if you would like to attempt to start the database instance if it is offline.

Apply Oracle Patchset

This workflow applies an Oracle Software Patch Set to an existing Oracle Home and Oracle Database.

Before you can run the Apply Oracle Patchset workflow you must provide the Oracle Software Patch Set in one of the following forms:

- A software archive (ZIP or `cpio.gz` file) that exists on the software repository or the target machine
- Unarchived files on a CD, DVD, NFS mount, or similar device

For additional information about how the Apply Oracle Patchset workflow can be used with other provisioning and patching workflows see How to Use the Workflows Together topic.

Note the following:

- The Database Upgrade Assistant (DBUA) utility is not available in Oracle Database version 9.2.0 (and earlier).
- The workflow does not upgrade the following items:
  - Oracle Label Security
  - Oracle Data Vault
  - Oracle ASM
- The workflow does not run the `changePerm.sh` command.
- The workflow does not configure Oracle Configuration Manager (OCM) for a cloned home.
- The workflow does not update Database time zone definitions.

Caution: This workflow stops all processes running from the ORACLE_HOME in order to patch. This includes the Oracle Listener, which may be servicing Oracle Instances outside this ORACLE_HOME.

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 Scenario"	Examples of typical parameter values for this workflow
Parameters	List of input parameters for this workflow

Prerequisites for this Workflow

Be sure that the following prerequisites are satisfied before you run the "Apply Oracle Patchset" workflow:

- The latest HPE DMA solution packs require the latest HPE DMA platform. To use the latest solution packs, update the HPE DMA platform. HPE DMA 10.30 solution packs are supported on HPE DMA 10.30 (and later).
- You have installed the HPE DMA Database Patching Solution Pack.
- You need to have Oracle Database provisioned and operational. You can do this by running workflows found in the HPE DMA Database Provisioning Solution Pack:

  Oracle – Provision Database Software

  Oracle – Provision Database
- You have an Oracle support contract and have downloaded the appropriate patches to software repository or to the target machine.
- You have read access to all specified inventory pointers (Linux/UNIX).

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

How this Workflow Works

The following information describes how the "Apply Oracle Patchset" workflow works:

Overview show

This workflow does the following things in the order shown:

- The initial steps of the workflow prepare it to apply the Oracle Patch Set to the Oracle Home and Oracle Database. The workflow processes user input parameters, constructs commands used in subsequent steps, downloads any required files, uncompresses the archive files, and fetches the Oracle binaries and Instances.
- The workflow applies the Patch Set to the Oracle Home. The workflow updates the Oracle installer response file. Then it stops all processes using the Oracle Home. It runs platform-dependent steps. Then the workflow executes the Oracle Software Installer and completes the installation.
- The workflow configures the Oracle Database.
- The final steps of the workflow allow the workflow to end cleanly. The workflow stops and restarts all the Oracle processes. Then it cleans up the downloaded files.

Validation Checks Performed show

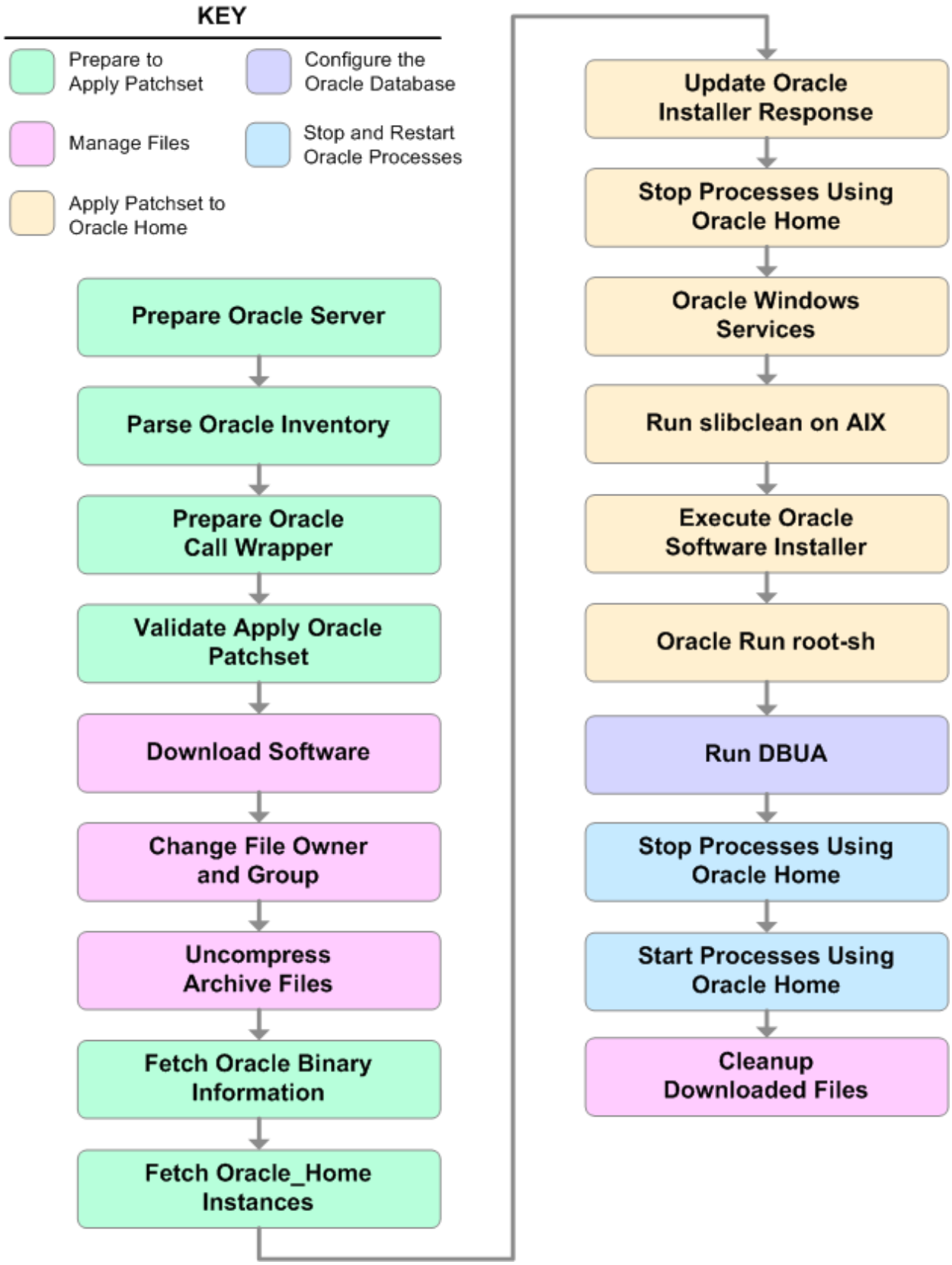
Much of the validation centers on the input parameters:

- The input parameters have the proper syntax (no special characters or spaces).
- Files exist or have valid specifications.

Steps Executed show

The Apply Oracle Patchset 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.

Click each box in the diagram to view additional information about that step.


KEY
Prepare to Apply Patchset
Configure the Oracle Database
Manage Files
Stop and Restart Oracle Processes
Apply Patchset to Oracle Home
Prepare Oracle Server
Parse Oracle Inventory
Prepare Oracle Call Wrapper
Validate Apply Oracle Patchset
Download Software
Change File Owner and Group
Uncompress Archive Files
Fetch Oracle Binary Information
Fetch Oracle_Home Instances
Update Oracle Installer Response
Stop Processes Using Oracle Home
Oracle Windows Services
Run slibclean on AIX
Execute Oracle Software Installer
Oracle Run root-sh
Run DBUA
Stop Processes Using Oracle Home
Start Processes Using Oracle Home
Cleanup Downloaded Files

Workflow Steps show

Steps Used in Apply Oracle Patchset

Workflow Step	Description
Prepare Oracle Server	This step prepares the target server for access by the OS administrative user.
Parse Oracle Inventory	This step parses the specified Oracle inventory files (if they exist) and passes the inventory information to subsequent steps. • If one or more Inventory Files are specified and they exist, the step parses these files and extracts their contents. • If no Inventory Files are specified, the step assigns the appropriate default and attempts to parse that file. • If one or more Inventory Files are specified and they do not exist, the step creates inventory information based on the specified Oracle Account and Oracle Home.
Prepare Oracle Call Wrapper	This step constructs the commands needed to execute subsequent steps in the workflow as either the OS administrative user or the user who owns the pertinent ORACLE_HOME. The step also creates utility parameters that will be used by subsequent steps.
Validate Apply Oracle Patchset	This step validates the values specified for the input parameters used by the "Apply Oracle Patchset" workflow. It also sets the values of various output parameters that will be consumed by subsequent steps.
Download Software	This step downloads a list of files to a specified location on the target server.
Change File Owner and Group	This step changes the ownership and group of each file specified. A warning is issued for files that are not found.
Uncompress Archive Files	For each supplied file, this step extracts the contents of the archive file (or files).

Fetch Oracle Binary Information	This step fetches the fully qualified pathnames of the following files from the staging location in an Oracle software archive (either a Patch Set or the install software):
	`runInstaller`
	`products.xml`
	`rootpre.sh`
	`*.rsp`.

Fetch Oracle_ Home Instances	This step fetches the list of Oracle Instances that share the specified ORACLE_HOME.

Steps Used in Apply Oracle Patchset, continued

Workflow Step	Description
Update Oracle Installer Response	This step updates the provided installer response file or, if one is not provided, creates an installer response file based on a default response file provided by Oracle. This step is designed to be run by the owner of the ORACLE_HOME.
Stop Processes Using Oracle Home	This step stops all Oracle Instances included in the Oracle SIDs list—excluding any specified in the Ignore SIDs list. The step attempts to stop the Oracle Agent.
Oracle Windows Services	This step preserves the list of Windows Services. This is necessary because the same step can be used more than once in a workflow.
Run slibclean on AIX	This step runs the `slibclean` command, if approprate, on AIX targets.
Execute Oracle Software Installer	This step installs the Oracle software as defined by the response file. It is designed to be run as the Oracle software owner (typically oracle).
Oracle Run root-sh	This step runs the Oracle provided `root.sh` script in silent mode. It must be run as root.
Run DBUA	This step runs the Oracle Database Upgrade Assistant (DBUA) with the specified response file. It must be run as the Oracle software owner (typically oracle).
Stop Processes Using Oracle Home	This step stops all Oracle Instances included in the Oracle SIDs list—excluding any specified in the Ignore SIDs list. The step attempts to stop the Oracle Agent.
Start Processes Using Oracle Home	This step starts all Oracle Instances and Oracle Listeners in the Oracle SIDs list. It also attempts to start the Oracle Agent.
Cleanup Downloaded Files	This step removes all downloaded files and archives.

For parameter descriptions and defaults, see "Parameters for Apply Oracle Patchset" on page 94.

How to Run this Workflow

The following instructions show you how to customize and run the "Apply Oracle Patchset" workflow in your environment.

Tip: For detailed instructions to run HPE DMA workflows—using the Oracle - Compliance Audit workflow as an example—see HPE DMA Quick Start Tutorial.

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 Apply Oracle Patchset" on page 94

Note: Before following this procedure, review the "Prerequisites for this Workflow" on page 83, and ensure that all requirements are satisfied.

To run this workflow, you need to set your parameters differently depending on the location and status of your Oracle Patch Set. Use the following table to choose the method that matches your situation.

For information about uploading files to the HPE DMA software repository, see How to Import a File into the Software Repository on page 97.

To specify the Oracle Software Patch Set, choose one of the following methods:

Method 1: The Oracle ZIP file is in the software repository:

Note: The ZIP file must be downloaded from Oracle. Example: `p6890831_111070_Linux-x86.zip`.

1. In the Patchset Archive parameter, specify the name (or names) of the ZIP file (or files) that was downloaded from Oracle.
2. In the Download Location parameter, specify the directory where the ZIP file (or files) specified in the Patchset Archive parameter should be downloaded.
3. In the Software Archive Location parameter, specify the directory where the ZIP file (or files) specified in the Patchset Archive parameter should be extracted (unzipped).

All downloaded files are removed upon successful completion of the workflow.

Method 2: The Oracle ZIP file is stored on each target machine:

Note: The ZIP file must be downloaded from Oracle. Example: `p6890831_111070_Linux-x86.zip`.

1. In the Patchset Archive parameter, specify the fully qualified name (or names) of the ZIP file (or files) that was downloaded from Oracle.
2. You must specify a value for the Download Location parameter if the Install Response needs to be downloaded; otherwise, do not specify a value for Download Location.

All downloaded files are removed upon successful completion of the workflow.

To use the Apply Oracle Patchset workflow:

1. Create a deployable copy of the workflow.
2. Determine the values that you will specify for the following parameters:

Input Parameters for Parse Oracle Inventory

Parameter Name	Default Value	Required	Description
Inventory Files	see description	optional	Comma-separated list of fully-qualified Oracle inventory files. If not specified, set to the appropriate default value for the target server operating system. Defaults are: Solaris or HP-UX: `/var/opt/oracle/oraInst.loc` Linux: `/etc/oraInst.loc`
Oracle Home	no default	optional	Fully-qualified path name of the Oracle Home where the patch will be applied.

Input Parameters for Validate Apply Oracle Patchset

Parameter Name	Default Value	Required	Description
Download Location	`/var/tmp`	optional	The directory on the target server where files are copied from the software repository—used only if the required files are not found on the target but are found in the software repository.
Oracle Base	`/u01/app/oracle`	required	The location of the base directory for an Optimal Flexible Architecture (OFA) installation. This is typically called the ORACLE_BASE.
Patchset Archive	see description	required	Comma-separated list of relative or fully-qualified path names of the Oracle Patch Set archive files. If a fully-qualified path name points to a file, that file is expected to be on the target. If a relative path name points to a file, that file will be downloaded from the software directory on the HPE DMA server. If a fully-qualified path name is a directory, the software is expected to be unzipped and ready to be applied. The default for UNIX targets is: `/tmp/p5337014_10203_SOLARIS64.zip`
Skip root-sh	N	optional	Skip running the `rootpre.sh` and `root.sh` scripts. Valid values are Y (yes) and N (no). Set to Y if an existing newer ORACLE_HOME is installed.
Software Archive	`/var/tmp`	optional	Directory location where the patch archives will be extracted.

Input Parameters for Update Oracle Installer Response

Parameter Name	Default Value	Required	Description
Install Edition	EE	optional	The product edition of the Oracle Database installation. Can be one of the following: SE (standard edition) or EE (enterprise edition).

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 60).

Note: See "Parameters for Apply Oracle Patchset" on page 94 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. 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.
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.

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.

Optional: If you want to further verify the results:

1. Log in to Oracle on the server where you deployed the Patch Set.
2. Check that the version that is running is the same as the deployed Patch Set, for example:

   Oracle Database 11g 11.2.0.4.0

Sample Scenario

It is very straightforward to run the "Apply Oracle Patchset" workflow. This topic shows you typical parameter values to use.

Input Parameters for Parse Oracle Inventory

Parameter Name	Example Value	Description
Inventory Files	`/etc/oraInst.loc`	Comma-separated list of fully-qualified Oracle inventory files. If not specified, set to the appropriate default value for the target server operating system. Defaults are: Solaris or HP-UX: `/var/opt/oracle/oraInst.loc` Linux: `/etc/oraInst.loc`
Oracle Home	`/u01/app/oracle/product/11.2.0/db1`	Fully-qualified path name of the Oracle Home where the patch will be applied.

Input Parameters for Validate Apply Oracle Patchset

Parameter Name	Example Value	Description
Download Location	`/var/tmp`	The directory on the target server where files are copied from the software repository—used only if the required files are not found on the target but are found in the software repository.
Oracle Base	`/u01/app/oracle`	The location of the base directory for an Optimal Flexible Architecture (OFA) installation. This is typically called the ORACLE_BASE.
Patchset Archive	`p5337014_10203_SOLARIS64.zip`	Comma-separated list of relative or fully-qualified path names of the Oracle Patch Set archive files. If a fully-qualified path name points to a file, that file is expected to be on the target. If a relative path name points to a file, that file will be downloaded from the software directory on the HPE DMA server. If a fully-qualified path name is a directory, the software is expected to be unzipped and ready to be applied. The default for UNIX targets is: `/tmp/p5337014_10203_SOLARIS64.zip`
Skip root-sh	N	Skip running the `rootpre.sh` and `root.sh` scripts. Valid values are Y (yes) and N (no). Set to Y if an existing newer ORACLE_HOME is installed.
Software Archive	`/tmp/software`	Directory location where the patch archives will be extracted.

Input Parameters for Update Oracle Installer Response

Parameter Name	Example Value	Description
Install Edition	EE	The product edition of the Oracle Database

Input Parameters for Update Oracle Installer Response, continued

Parameter Name	Example Value	Description
		installation. Can be one of the following: SE (standard edition) or EE (enterprise edition).

Parameters for Apply Oracle Patchset

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 93). For some parameters, if you do not specify a value for a parameter, a default value is assigned.

Note: Only those parameters that are configurable in a standard deployment are listed here. Input parameters that must be mapped to output parameters of previous steps are not listed.

Parameters Defined in this Step: Parse Oracle Inventory

Parameter Name	Default Value	Required	Description
Inventory Files	see description	optional	Comma-separated list of fully-qualified Oracle inventory files. If not specified, set to the appropriate default value for the target server operating system. Defaults are: Solaris or HP-UX: `/var/opt/oracle/oraInst.loc` Linux: `/etc/oraInst.loc`
Oracle Account	no default	optional	Oracle user who owns the ORACLE_HOME. Required if inventory does not exist.
Oracle Home	no default	optional	Fully-qualified path name of the Oracle Home where the patch will be applied.
Server Wrapper	see description	required	Command that will execute a step as the OS administrative user. The default for UNIX targets is: `sudo su - root /opt/hp/dma/client/jython.sh` **Caution:** This parameter is derived by the workflow. Under most circumstances, you should not change its mapping or its value.

Additional Parameters Defined in this Step: Validate Apply Oracle Patchset

Parameter Name	Default Value	Required	Description
Download Location	`/var/tmp`	optional	The directory on the target server where files are copied from the software repository—used only if the required files are not found on the target but are found in the software repository.
Ignore SIDs	no default	optional	Comma-separated list of Oracle Instances (SIDs) that should not be patched.
Install Response	no default	optional	Location of the Oracle Universal Installer response file.
Instance Wrapper	no default	required	Command that will be used to execute subsequent steps as the user who owns the ORACLE_HOME. For example: `su - oracle /opt/hp/dma/client/jython.sh`

Additional Parameters Defined in this Step: Validate Apply Oracle Patchset, continued

Parameter Name	Default Value	Required	Description
			Caution: This parameter is derived by the workflow. Under most circumstances, you should not change its mapping or its value.
Inventory Pointers	no default	optional	Comma separated list of fully qualified inventory pathname directories. **Caution:** This parameter is derived by the workflow. Under most circumstances, you should not change its mapping or its value.
Oracle Base	`/u01/app/oracle`	required	The location of the base directory for an Optimal Flexible Architecture (OFA) installation. This is typically called the ORACLE_BASE.
Oracle Home Info	no default	optional	Dictionary list of all information discovered in the specified inventory file(s). **Caution:** This parameter is derived by the workflow. Under most circumstances, you should not change its mapping or its value.
Patchset Archive	see description	required	Comma-separated list of relative or fully-qualified path names of the Oracle Patch Set archive files. If a fully-qualified path name points to a file, that file is expected to be on the target. If a relative path name points to a file, that file will be downloaded from the software directory on the HPE DMA server. If a fully-qualified path name is a directory, the software is expected to be unzipped and ready to be applied. The default for UNIX targets is: `/tmp/p5337014_10203_SOLARIS64.zip`
Skip root-sh	N	optional	Skip running the `rootpre.sh` and `root.sh` scripts. Valid values are Y (yes) and N (no). Set to Y if an existing newer ORACLE_HOME is installed.
Software Archive	`/var/tmp`	optional	Directory location where the patch archives will be extracted.

Additional Parameters Defined in this Step: Update Oracle Installer Response

Parameter Name	Default Value	Required	Description
CRS Nodes	no default	optional	List of all nodes where Oracle Clusterware is deployed.

Additional Parameters Defined in this Step: Update Oracle Installer Response, continued

Parameter Name	Default Value	Required	Description
			Caution: This parameter should only be specified for RAC and Cluster Ready systems.
DBA Group	no default	optional	The DBA group to use for superuser access to the subsequent Oracle Database.
Install Edition	EE	optional	The product edition of the Oracle Database installation. Can be one of the following: SE (standard edition) or EE (enterprise edition).
Operator Group	no default	optional	The operator group to use for operator access to the subsequent Oracle Database.
Oracle Group	no default	optional	The Oracle software installation group. **Caution:** This parameter is derived by the workflow. Under most circumstances, you should not change its mapping or its value.
Oracle Home Name	no default	optional	The name of the ORACLE_HOME as recorded in the inventory. **Caution:** This parameter is derived by the workflow. Under most circumstances, you should not change its mapping or its value.
Oracle Products File	see description	optional	The fully qualified path name of the `products.xml` file. Default is: `/tmp/Disk1/stage/products.xml` **Caution:** This parameter is derived by the workflow. Under most circumstances, you should not change its mapping or its value.
Oracle Response Files	see description	optional	A comma-separated list of default response files. Default is: `/tmp/Disk1/response/standard.rsp` **Caution:** This parameter is derived by the workflow. Under most circumstances, you should not change its mapping or its value.
Oracle runInstaller	see description	optional	The fully qualified path name of the Oracle installer executable. Default is: `/tmp/Disk1/runInstaller` **Caution:** This parameter is derived by the workflow. Under most circumstances, you should not change its mapping or its value.

Additional Parameters Defined in this Step: Update Oracle Installer Response, continued

Parameter Name	Default Value	Required	Description
RAC One Node Install	false	optional	The `oracle.install.db.isRACOneInstall` option. If set to true, the installer will install Oracle RAC One Node software. **Caution:** This parameter should only be specified for RAC and Cluster Ready systems.
Temporary File Location	no default	optional	The location where all temporary output files will be placed. This directory will be removed at the completion of the workflow. **Caution:** This parameter is derived by the workflow. Under most circumstances, you should not change its mapping or its value.

Clone Oracle Home

This workflow makes a clone (copy) of an Oracle Home on the same server.

This workflow uses the tar facility to copy the Oracle Home. The new copy of the Oracle Home is then registered in the inventory using the Oracle Installer (`runInstaller`).

For additional information about how the Clone Oracle Home workflow can be used with other provisioning and patching workflows see How to Use the Workflows Together topic.

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 Scenario"	Examples of typical parameter values for this workflow
Parameters	List of input parameters for this workflow

Prerequisites for this Workflow

Be sure that the following prerequisites are satisfied before you run the "Clone Oracle Home" workflow:

- The latest HPE DMA solution packs require the latest HPE DMA platform. To use the latest solution packs, update the HPE DMA platform. HPE DMA10.40 solution packs are supported on HPE DMA10.40 (and later).
- You have installed the HPE DMA Database Patching Solution Pack .
- You need to have Oracle Database provisioned and operational. You can do this by running workflows found in the HPE DMA Database Provisioning Solution Pack:

  Oracle – Provision Database Software

  Oracle – Provision Database
- You have an Oracle support contract and have downloaded the appropriate patches to the software repository or to the target machine.
- You have read access to all specified inventory pointers (Linux/UNIX).

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

How this Workflow Works

The following information describes how the "Clone Oracle Home" workflow works:

Overview show

This workflow does the following things in the order shown:

- The initial steps of the workflow prepare it to clone the Oracle Home. The workflow processes user input parameters, and constructs commands used in subsequent steps.
- The workflow creates a clone (copy) of one ore more specified Oracle Homes.

Validation Checks Performed show

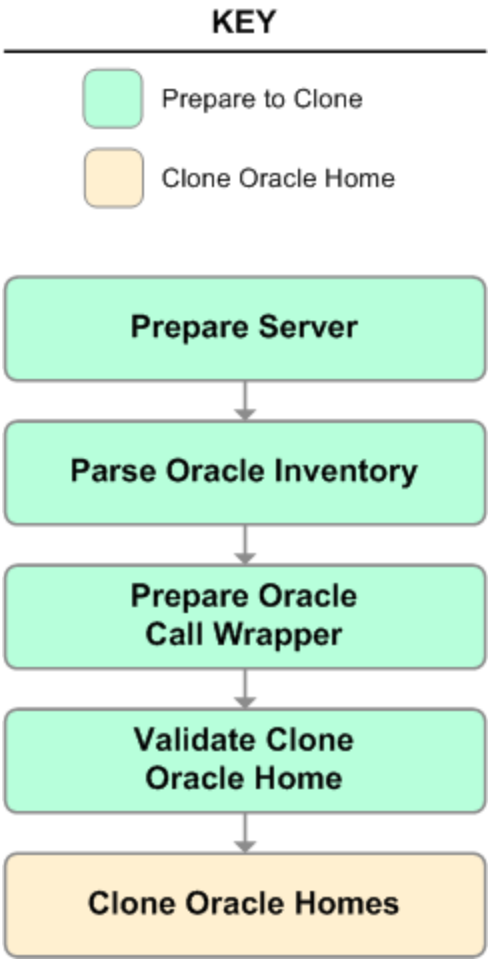
Much of the validation centers on the input parameters:

- The input parameters have the proper syntax (no special characters or spaces).
- Files exist or have valid specifications.

Steps Executed show

The Clone Oracle Home 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.

Click each box in the diagram to view additional information about that step.



Workflow Steps show

Steps Used in Clone Oracle Home

Workflow Step	Description
Prepare Server	This step prepares the Server Wrapper and Instance Wrapper, which enable subsequent steps to be executed by the OS administrator user or the owner of the database or middleware software.
Parse Oracle Inventory	This step parses the specified Oracle inventory files (if they exist) and passes the inventory information to subsequent steps. • If one or more Inventory Files are specified and they exist, the step parses these files and extracts their contents. • If no Inventory Files are specified, the step assigns the appropriate default and attempts to parse that file. • If one or more Inventory Files are specified and they do not exist, the step creates inventory information based on the specified Oracle Account and Oracle Home.
Prepare Oracle Call Wrapper	This step constructs the commands needed to execute subsequent steps in the workflow as either the OS administrative user or the user who owns the pertinent ORACLE_HOME. The step also creates utility parameters that will be used by subsequent steps.
Validate Clone Oracle Home	This step validates the values specified for the input parameters used by the "Clone Oracle Home" workflow. It also sets the values of various output parameters that will be consumed by subsequent steps.
Clone Oracle Homes	This step creates a copy of one or more specified Oracle homes.

For parameter descriptions and defaults, see "Parameters for Clone Oracle Home" on page 106.

How to Run this Workflow

The following instructions show you how to customize and run the "Clone Oracle Home" 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 Clone Oracle Home" on page 106.

Note: Before following this procedure, review the "Prerequisites for this Workflow" on page 99 and ensure that all requirements are satisfied.

To use the Clone Oracle Home workflow:

1. Create a deployable copy of the workflow.
2. Determine the values that you will specify for the following parameters:

   Input Parameters for Parse Oracle Inventory

Parameter Name	Default Value	Required	Description
Inventory Files	see description	optional	Comma-separated list of fully-qualified Oracle inventory files. If not specified, set to the appropriate default value for the target server operating system. Defaults are: Solaris or HP-UX: `/var/opt/oracle/oraInst.loc` Linux: `/etc/oraInst.loc`

   Input Parameters for Validate Clone Oracle Home

Parameter Name	Default Value	Required	Description
New Oracle Homes	see description	optional	Comma-separated list of the Oracle homes (fully qualified paths) that will be cloned (copied) from the Oracle Homes list. There must be one New Oracle Home for each Clone Oracle Home. Default is: `/u01/app/oracle/product/11.2.0.0/DB4`
Oracle Homes	see description	optional	Comma-separated list of Oracle Homes (fully qualified path names) that will be cloned. One or more is required. Default is: `/u01/app/oracle/product/11.2.0.0/DB2`

   Tip: To avoid having to re-enter passwords whenever they change, you can create a policy to provide them to the workflow.

   Note: See "Parameters for Clone Oracle Home" on page 106 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. 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.
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.

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.

Optional: If you want to further verify the results:

1. Go to the location where the Oracle Home was cloned.
2. Check that your important folders and files were created.

Sample Scenario

It is very straightforward to run the "Clone Oracle Home" workflow. This topic shows you typical parameter values to use.

Input Parameters for Parse Oracle Inventory

Parameter Name	Example Value	Description
Inventory Files	`/etc/oraInst.loc`	Comma-separated list of fully-qualified Oracle inventory files. If not specified, set to the appropriate default value for the target server operating system. Defaults are: Solaris or HP-UX: `/var/opt/oracle/oraInst.loc` Linux: `/etc/oraInst.loc`

Input Parameters for Validate Clone Oracle Home

Parameter Name	Example Value	Description
New Oracle Homes	`/opt/app/oracle/product/11.2.0/DB4`	Comma-separated list of the Oracle homes (fully qualified paths) that will be cloned (copied) from the Oracle Homes list. There must be one New Oracle Home for each Clone Oracle Home. Default is: `/u01/app/oracle/product/11.2.0.0/DB4`
Oracle Homes	`/opt/app/oracle/product/11.2.0/DB2`	Comma-separated list of Oracle Homes (fully qualified path names) that will be cloned. One or more is required. Default is: `/u01/app/oracle/product/11.2.0.0/DB2`

Parameters for Clone Oracle Home

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. For some parameters, if you do not specify a value for a parameter, a default value is assigned.

Note: Only those parameters that are configurable in a standard deployment are listed here. Input parameters that must be mapped to output parameters of previous steps are not listed.

Parameters Defined in this Step: Parse Oracle Inventory

Parameter Name	Default Value	Required	Description
Inventory Files	see description	optional	Comma-separated list of fully-qualified Oracle inventory files. If not specified, set to the appropriate default value for the target server operating system. Defaults are: Solaris or HP-UX: `/var/opt/oracle/oraInst.loc` Linux: `/etc/oraInst.loc`
Oracle Account	no default	optional	Oracle user who owns the ORACLE_HOME. Required if inventory does not exist.
Oracle Home	no default	optional	Fully-qualified path name of the Oracle Home where the patch will be applied.
Server Wrapper	see description	required	Command that will execute a step as the OS administrative user. The default for UNIX targets is: `sudo su - root /opt/hp/dma/client/jython.sh` This parameter is derived by the workflow. Under most circumstances, you should not change its mapping or its value.

Additional Parameters Defined in this Step: Validate Clone Oracle Home

Parameter Name	Default Value	Required	Description
Instance Wrapper	no default	required	Command that will be used to execute subsequent steps as the user who owns the ORACLE_HOME. For example: `su - oracle /opt/hp/dma/client/jython.sh` **Caution:** This parameter is derived by the workflow. Under most circumstances, you should not change its mapping or its value.
New Oracle Home Names	Ora102A	optional	Comma-separated list of Oracle Home Names for the cloned Oracle homes. There must be one New Oracle Home Name for each New Oracle Home.

Additional Parameters Defined in this Step: Validate Clone Oracle Home , continued

Parameter Name	Default Value	Required	Description
New Oracle Homes	see description	optional	Comma-separated list of the Oracle homes (fully qualified paths) that will be cloned (copied) from the Oracle Homes list. There must be one New Oracle Home for each Clone Oracle Home. Default is: `/u01/app/oracle/product/11.2.0.0/DB4`
Oracle Homes	see description	optional	Comma-separated list of Oracle Homes (fully qualified path names) that will be cloned. One or more is required. Default is: `/u01/app/oracle/product/11.2.0.0/DB2`
Oracle Inventory Info	no default	optional	Dictionary list of all information discovered in the supplied inventory file(s).

Migrate Oracle Home

This workflow moves an Oracle Instance from one Oracle Home to another Oracle Home.

For additional information about how the Migrate Oracle Home workflow can be used with other patching workflows see How to Use the Workflows Together topic.

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 Scenario	Examples of typical parameter values for this workflow
Parameters	List of input parameters for this workflow

Prerequisites for this Workflow

Be sure that the following prerequisites are satisfied before you run the "Migrate Oracle Home" workflow:

- The latest HPE DMA solution packs require the latest HPE DMA platform. To use the latest solution packs, update the HPE DMA platform. HPE DMA10.40 solution packs are supported on HPE DMA10.40 (and later).
- You have installed the HPE DMA Database Patching Solution Pack .
- You need to have Oracle Database provisioned and operational. You can do this by running workflows found in the HPE DMA Database Provisioning Solution Pack:

  Oracle – Provision Database Software

  Oracle – Provision Database
- You have an Oracle support contract and have downloaded the appropriate patches to software repository or to the target machine.
- You have read access to all specified inventory pointers (Linux/UNIX).

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

How this Workflow Works

The following information describes how the "Migrate Oracle Home" workflow works:

Overview show

This workflow does the following things in the order shown:

- The initial steps of the workflow prepare it to move an Oracle Instance from one Oracle Home to another Oracle Home. The workflow prepares the server, determines the Oracle Home, parses the Oracle inventory, constructs commands used in subsequent steps, and processes user input parameters,
- The workflow migrates the Oracle Instance. The workflow shuts down the Oracle Instances, Oracle Listeners, and the Oracle Agent. It copies the Oracle configuration files and the Oracle network files. It resets the Oracle Home in the network files.
- The final steps of the workflow allow the workflow to end cleanly. The workflow restarts all the Oracle Instances, all Oracle Listeners, and the Oracle Agent. Then it shuts down these processes and restarts them to force a clean run environment. Then it associates the Oracle Instance with the Oracle Home in the `oratab` file.

Validation Checks Performed show

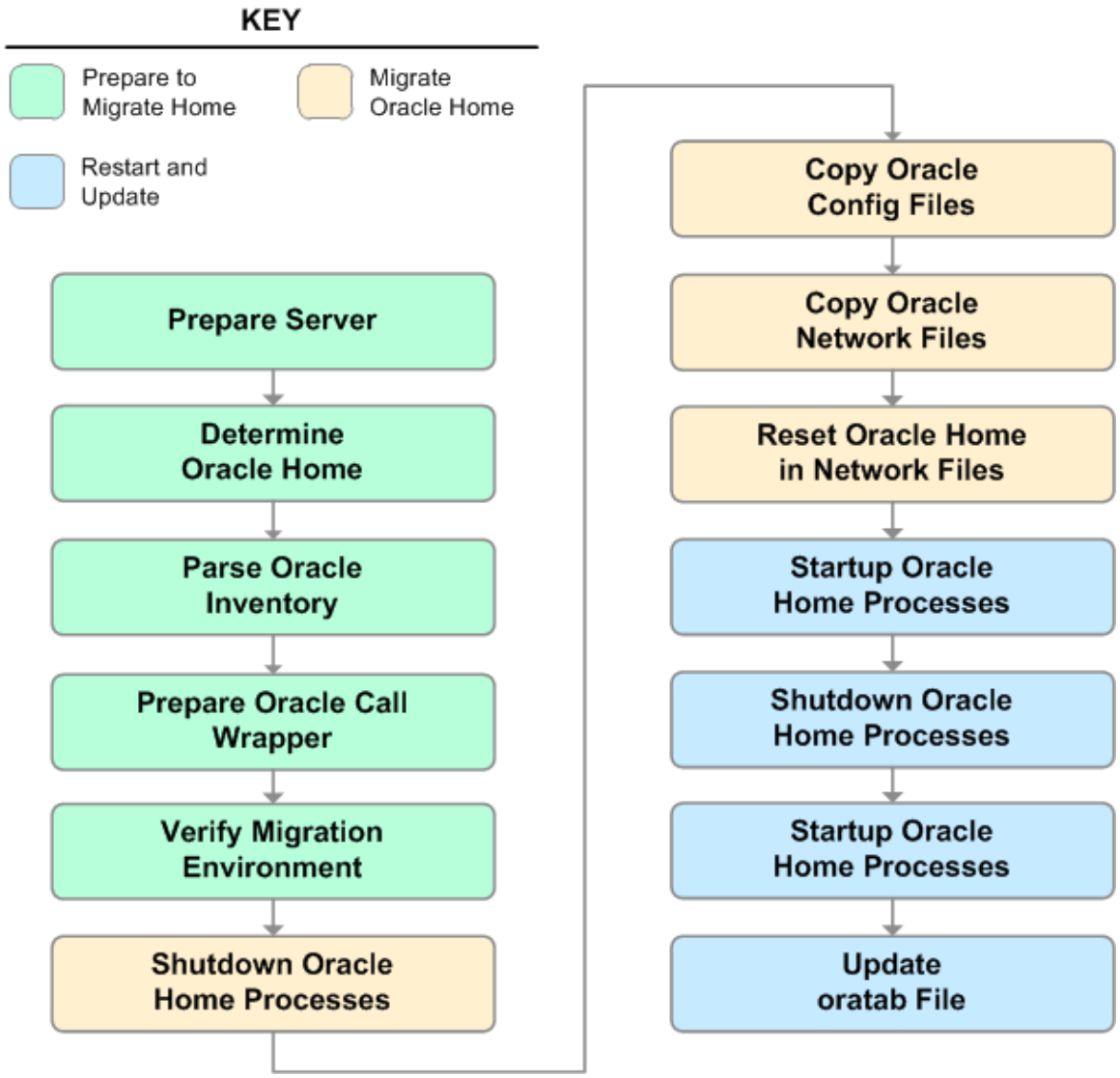
Much of the validation centers on the input parameters:

- The directories specified in the Current Oracle Home, New Oracle Home, Oracle SIDS, and Listeners parameters exist on the target.
- There are entries in the `oratab` file for the specified Oracle SIDs.
- There are entries in the `listener.ora` file for the specified Oracle Listeners.

Steps Executed show

The Migrate Oracle Home 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.

Click each box in the diagram to view additional information about that step.



Workflow Steps show

Steps Used in Migrate Oracle Home

Workflow Step	Description
Prepare Server	This step prepares the Server Wrapper and Instance Wrapper, which enable subsequent steps to be executed by the OS administrator user or the owner of the database or middleware software.
Determine Oracle Home	This step determines the value of ORACLE_HOME from the `/etc/oratab` or `/var/opt/oracle/oratab` file on UNIX targets.
Parse Oracle Inventory	This step parses the specified Oracle inventory files (if they exist) and passes the inventory information to subsequent steps. • If one or more Inventory Files are specified and they exist, the step parses these files and extracts their contents. • If no Inventory Files are specified, the step assigns the appropriate default and attempts to parse that file. • If one or more Inventory Files are specified and they do not exist, the step creates inventory information based on the specified Oracle Account and Oracle Home.
Prepare Oracle Call Wrapper	This step constructs the commands needed to execute subsequent steps in the workflow as either the OS administrative user or the user who owns the pertinent ORACLE_HOME. The step also creates utility parameters that will be used by subsequent steps.
Verify Migration Environment	This step verifies the input parameters used throughout the Migrate Oracle Home workflow: • The directories specified in the Current Oracle Home, New Oracle Home, Oracle SIDS, and Listeners parameters exist on the target. • There are entries in the `oratab` file for the specified Oracle SIDs. • There are entries in the `listener.ora` file for the specified Oracle Listeners.
Shutdown Oracle Home Processes	This step stops the Oracle Instances specified in the Oracle SIDs list—excluding those Oracle Instances in the Ignore SIDs list. It also stops all Oracle Listeners in the Listeners list and attempts to stop the Oracle Agent.
Copy Oracle Config Files	This step copies the Oracle configuration files from the current (source) Oracle home to the new (destination) Oracle home.
Copy Oracle Network Files	This step copies the following files from the `${Current Oracle Home}/network/admin` directory to the `${New Oracle Home}/network/admin` directory: • `tnsnames.ora` • `listener.ora` • `sqlnet.ora`
Reset Oracle Home in Network	This step resets the ORACLE_HOME value in the `${New Oracle Home}/network/admin` files to reflect the `${New Oracle Home}` value.

Steps Used in Migrate Oracle Home, continued

Workflow Step	Description
Files	
Startup Oracle Home Processes	This step starts the Oracle Instances specified in the Oracle SIDs list—excluding those Oracle Instances in the Ignore SIDs list. It also starts all Oracle Listeners in the Listeners list and attempts to start the Oracle Agent.
Shutdown Oracle Home Processes	This step stops the Oracle Instances specified in the Oracle SIDs list—excluding those Oracle Instances in the Ignore SIDs list. It also stops all Oracle Listeners in the Listeners list and attempts to stop the Oracle Agent.
Startup Oracle Home Processes	This step starts the Oracle Instances specified in the Oracle SIDs list—excluding those Oracle Instances in the Ignore SIDs list. It also starts all Oracle Listeners in the Listeners list and attempts to start the Oracle Agent.
Update oratab File	This step updates the `${oratab directory}/oratab` file that associates the ORACLE_SID and ORACLE_HOME values. It replaces entries with the `${Current Oracle Home}` value with the `${New Oracle Home}` value.

For parameter descriptions and defaults, see "Parameters for Migrate Oracle Home" on page 118.

How to Run this Workflow

The following instructions show you how to customize and run the "Migrate Oracle Home" workflow in your environment.

Tip: For detailed instructions to run HPE DMA workflows—using the Oracle - Compliance Audit workflow as an example—see *Quick Start Tutorial*.

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 Migrate Oracle Home" on page 118.

Note: Before following this procedure, review the "Prerequisites for this Workflow" on page 109, and ensure that all requirements are satisfied.

To use the Migrate Oracle Home workflow:

1. Create a deployable copy of the workflow.
2. Determine the values that you will specify for the following parameters:

   Input Parameters for Parse Oracle Inventory

Parameter Name	Default Value	Required	Description
Inventory Files	see description	optional	Comma-separated list of fully-qualified Oracle inventory files. If not specified, set to the appropriate default value for the target server operating system. Defaults are: Solaris or HP-UX: `/var/opt/oracle/oraInst.loc` Linux: `/etc/oraInst.loc`

   Input Parameters for Verify Migration Environment

Parameter Name	Default Value	Required	Description
Listeners	no default	optional	Comma-separated list of the Oracle Listener names to be included in start-up and shut-down sequences.
New Oracle Home	no default	required	File system location of the new ORACLE_HOME (migration destination).

   Tip: To avoid having to re-enter passwords whenever they change, you can create a policy to provide them to the workflow.

   Note: See "Parameters for Migrate Oracle Home" on page 118 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 . 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.
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.

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.

Optional: If you want to further verify the results:

Make sure that you can log in to the server where your Oracle Database was migrated.

Sample Scenario

The following use cases demonstrate different ways that the "Migrate Oracle Home" workflow can be run:

Scenario 1: To migrate Oracle Home without shutting down and starting up the Listeners

For this use case, you leave the Listeners parameter blank.

Input Parameters for Parse Oracle Inventory

Parameter Name	Example Value	Description
Inventory Files	`/etc/oraInst.loc`	Comma-separated list of fully-qualified Oracle inventory files. If not specified, set to the appropriate default value for the target server operating system. Defaults are: Solaris or HP-UX: `/var/opt/oracle/oraInst.loc` Linux: `/etc/oraInst.loc`

Input Parameters for Verify Migration Environment

Parameter Name	Example Value	Description
Listeners		Comma-separated list of the Oracle Listener names to be included in start-up and shut-down sequences.
New Oracle Home	`/u01/app/oracle/product/11.2.0/db4`	File system location of the new ORACLE_HOME (migration destination).

Scenario 2: To migrate Oracle Home with shutting down and starting up the Listeners

For this use case, you set the Listeners parameter to a comma-separated list of Oracle Listener names.

Input Parameters for Parse Oracle Inventory

Parameter Name	Example Value	Description
Inventory Files	`/etc/oraInst.loc`	Comma-separated list of fully-qualified Oracle inventory files. If not specified, set to the appropriate default value for the target server operating system. Defaults are: Solaris or HP-UX: `/var/opt/oracle/oraInst.loc` Linux: `/etc/oraInst.loc`

Input Parameters for Verify Migration Environment

Parameter Name	Example Value	Description
Listeners	LISTENER1, LISTENER2	Comma-separated list of the Oracle Listener names to be included in start-up and shut-down sequences.
New Oracle Home	`/u01/app/oracle/product/11.2.0/db4`	File system location of the new ORACLE_HOME (migration destination).

Parameters for Migrate Oracle Home

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. For some parameters, if you do not specify a value for a parameter, a default value is assigned.

Note: Only those parameters that are configurable in a standard deployment are listed here. Input parameters that must be mapped to output parameters of previous steps are not listed.

Parameters Defined in this Step: Parse Oracle Inventory

Parameter Name	Default Value	Required	Description
Inventory Files	see description	optional	Comma-separated list of fully-qualified Oracle inventory files. If not specified, set to the appropriate default value for the target server operating system. Defaults are: Solaris or HP-UX: `/var/opt/oracle/oraInst.loc` Linux: `/etc/oraInst.loc`
Oracle Account	no default	optional	Oracle user who owns the ORACLE_HOME. Required if inventory does not exist.
Oracle Home	no default	optional	Fully-qualified path name of the Oracle Home where the patch will be applied. **Caution:** This parameter is derived by the workflow. Under most circumstances, you should not change its mapping or its value.
Server Wrapper	see description	required	Command that will execute a step as the OS administrative user. The default for UNIX targets is: `sudo su - root /opt/hp/dma/client/jython.sh` **Caution:** This parameter is derived by the workflow. Under most circumstances, you should not change its mapping or its value.

Additional Parameters Defined in this Step: Verify Migration Environment

Parameter Name	Default Value	Required	Description
Call Wrapper	no default	required	Command used to execute a step as the Oracle Instance owner. For example: `sudo -u oracle /opt/hp/dma/client/jython.sh` **Caution:** This parameter is derived by the workflow. Under most circumstances, you should not change its mapping or its value.

Additional Parameters Defined in this Step: Verify Migration Environment, continued

Parameter Name	Default Value	Required	Description
Current Oracle Home	no default	required	File system location of the existing ORACLE_HOME (migration source). **Caution:** This parameter is derived by the workflow. Under most circumstances, you should not change its mapping or its value.
Listeners	no default	optional	Comma-separated list of the Oracle Listener names to be included in start-up and shut-down sequences.
New Oracle Home	no default	required	File system location of the new ORACLE_HOME (migration destination).
Oracle SIDs	no default	optional	Comma-separated list of the Oracle Instances (ORACLE_SIDs) in this ORACLE_HOME where the step's action should be performed. **Caution:** This parameter is derived by the workflow. Under most circumstances, you should not change its mapping or its value.

Additional Parameters Defined in this Step: Shutdown Oracle Home Processes

Parameter Name	Default Value	Required	Description
Ignore SIDs	TST,DEV	optional	Comma-separated list of Oracle Instances (SIDs) that should not be patched.

Oracle - Migrate and Patch Grid Managed Database

This workflow is designed to migrate and patch a database to a new home. The database is managed by Oracle Grid Infrastructure. The workflow will work for both Grid Standalone and Grid Cluster environments. The workflow is a database level workflow so you can migrate each database individually..

For additional information about how the Oracle - Migrate and Patch Grid Managed Database workflow can be used with other patching workflows see How to Use the Workflows Together topic.

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

Topic	Information Included
"Prerequisites for this Workflow" on the next page	List of prerequisites that must be satisfied before you can run this workflow
"How this Workflow Works" on page 122	Information about what the workflow does, including validation checks performed, steps executed, and a high-level process flow
"How to Run this Workflow" on page 123	Instructions for running this workflow in your environment
"Parameters for Oracle - Migrate and Patch Grid Managed Database" on page 126	List of input parameters for this workflow

Prerequisites for this Workflow

Be sure that the following prerequisites are satisfied before you run the Oracle - Migrate and Patch Grid Managed Database workflow:

- The latest HPE DMA solution packs require the latest HPE DMA platform. To use the latest solution packs, update the HPE DMA platform. HPE DMA10.40 solution packs are supported on HPE DMA10.40 (and later).
- You have installed the HPE DMA Database Patching Solution Pack .
- You need to have Oracle Database provisioned and operational. You can do this by running workflows found in the HPE DMA Database Provisioning Solution Pack:

  Oracle – Provision Database Software

  Oracle – Provision Database
- You have an Oracle support contract and have downloaded the appropriate patches to software repository or to the target machine.
- You have read access to all specified inventory pointers (Linux/UNIX).

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

How this Workflow Works

The following information describes how the Oracle - Migrate and Patch Grid Managed Database workflow works:

Overview show

This workflow does the following things in the order shown:

- The initial steps of the workflow prepare it to move an Oracle Instance from one Oracle Home to another Oracle Home. The workflow prepares the server, determines the Oracle Home, parses the Oracle inventory, constructs commands used in subsequent steps, and processes user input parameters,
- The workflow migrates the Oracle Instance. The workflow shuts down the Oracle Instances, Oracle Listeners, and the Oracle Agent. It copies the Oracle configuration files and the Oracle network files. It resets the Oracle Home in the network files.
- The final steps of the workflow allow the workflow to end cleanly. The workflow restarts all the Oracle Instances, all Oracle Listeners, and the Oracle Agent. Then it shuts down these processes and restarts them to force a clean run environment. Then it associates the Oracle Instance with the Oracle Home in the `oratab` file.

Validation Checks Performed show

Much of the validation centers on the input parameters:

- The directories specified in the Current Oracle Home, New Oracle Home, Oracle SIDS, and Listeners parameters exist on the target.
- There are entries in the `oratab` file for the specified Oracle SIDs.
- There are entries in the `listener.ora` file for the specified Oracle Listeners.

Steps Executed show

The Oracle - Migrate and Patch Grid Managed Database 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.

Workflow Steps show

Steps Used in Oracle - Migrate and Patch Grid Managed Database

Workflow Step	Description
Gather Parameters for Migrate and Patch Grid Managed Database	This step gathers the required parameters for Migrate and Patch Grid Managed Database.
Migrate and Patch Database	This step migrates the Oracle instance to a new home and patches the database.

For parameter descriptions and defaults, see Parameters for Oracle - Migrate and Patch Grid Managed Database.

How to Run this Workflow

The following instructions show you how to customize and run the Oracle - Migrate and Patch Grid Managed Database workflow in your environment.

Tip: For detailed instructions to run HPE DMA workflows—using the Oracle - Compliance Audit workflow as an example—see *Quick Start Tutorial*.

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 Oracle - Migrate and Patch Grid Managed Database.

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

To use the Oracle - Migrate and Patch Grid Managed Database workflow:

1. Create a deployable copy of the workflow.
2. Determine the values that you will specify for the following parameters:

Input Parameters for Gather Parameters for Migrate and Patch Grid Managed Database

Parameter Name	Default Value	Required	Description
Ignorable Oracle Errors	no default	optional	Comma-separated list of Oracle errors to be ignored when applying the patch to the database. This is in addition to the list of Oracle errors specified in the patch readme. Values are of the form ORA-nnnnn. Example: ORA-04020,ORA-03113
New Oracle Home	no default	optional	File system location of the new ORACLE_HOME (migration destination).
Oracle OS User	oracle	required	The OS user that owns the specified Oracle Home.

Input Parameters for Migrate and Patch Grid Managed Database

Parameter Name	Default Value	Required	Description
Call Wrapper	no default	required	Command used to execute a step as the Oracle Instance owner. For example: `sudo -u oracle /opt/hp/dma/client/jython.sh` **Caution:** This parameter is derived by the workflow. Under most circumstances, you should not change its mapping or its value.

Input Parameters for Migrate and Patch Grid Managed Database, continued

Parameter Name	Default Value	Required	Description
			Caution: This parameter is derived by the workflow. Under most circumstances, you should not change its mapping or its value.
Database Name	no default	required	The name of the new database.
Grid Nodes	no default	optional	Comma separated list of nodes that are part of a Grid Infrastructure environment. By default, the nodes are discovered by olsnodes and then all nodes are rolled back.
Ignorable Oracle Errors	no default	optional	Comma-separated list of Oracle errors to be ignored when applying the patch to the database. This is in addition to the list of Oracle errors specified in the patch readme. Values are of the form ORA-nnnnn. Example: ORA-04020,ORA-03113
Instance Name	no default	Required	The Oracle Database Instance Name.
New Oracle Home	no default	required	File system location of the new ORACLE_HOME (migration destination).
Oracle Home	no default	required	File system location of the current ORACLE_HOME.
Oracle OS User	oracle	required	The OS user that owns the specified Oracle Home.
Oracle Version	no default	optional	Version of the Oracle Installation

Tip: To avoid having to re-enter passwords whenever they change, you can create a policy to provide them to the workflow.

Note: See Parameters for Oracle - Migrate and Patch Grid Managed Database 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 . 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.
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.

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.

Optional: If you want to further verify the results:

Make sure that you can log in to the server where your Oracle Database was migrated.

Parameters for Oracle - Migrate and Patch Grid Managed Database

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. For some parameters, if you do not specify a value for a parameter, a default value is assigned.

Note: Only those parameters that are configurable in a standard deployment are listed here. Input parameters that must be mapped to output parameters of previous steps are not listed.

Parameters Defined in this Step: Gather Parameters for Migrate and Patch Grid Managed Database

Parameter Name	Default Value	Required	Description
Ignorable Oracle Errors	no default	optional	Comma-separated list of Oracle errors to be ignored when applying the patch to the database. This is in addition to the list of Oracle errors specified in the patch readme. Values are of the form ORA-nnnnn. Example: ORA-04020,ORA-03113
New Oracle Home	no default	optional	File system location of the new ORACLE_HOME (migration destination).
Oracle OS User	oracle	required	The OS user that owns the specified Oracle Home.
Ignorable Oracle Errors	no default	optional	Comma-separated list of Oracle errors to be ignored when applying the patch to the database. This is in addition to the list of Oracle errors specified in the patch readme. Values are of the form ORA-nnnnn. Example: ORA-04020,ORA-03113

Additional Parameters Defined in this Step: Migrate and Patch Grid Managed Database

Parameter Name	Default Value	Required	Description
Call Wrapper	no default	required	Command used to execute a step as the Oracle Instance owner. For example: `sudo -u oracle /opt/hp/dma/client/jython.sh` **Caution:** This parameter is derived by the workflow. Under most circumstances, you should not change its mapping or its value. **Caution:** This parameter is derived by the workflow. Under most circumstances, you should not change its mapping or its value.
Database Name	no default	required	The name of the new database.
Grid Nodes	no	optional	Comma separated list of nodes that are part of a Grid

Additional Parameters Defined in this Step: Migrate and Patch Grid Managed Database, continued

Parameter Name	Default Value	Required	Description
	default		Infrastructure environment. By default, the nodes are discovered by olsnodes and then all nodes are rolled back.
Ignorable Oracle Errors	no default	optional	Comma-separated list of Oracle errors to be ignored when applying the patch to the database. This is in addition to the list of Oracle errors specified in the patch readme. Values are of the form ORA-nnnnn. Example: ORA-04020,ORA-03113
Instance Name	no default	Required	The Oracle Database Instance Name.
New Oracle Home	no default	required	File system location of the new ORACLE_HOME (migration destination).
Oracle Home	no default	required	File system location of the current ORACLE_HOME.
Oracle OS User	oracle	required	The OS user that owns the specified Oracle Home.
Oracle Version	no default	optional	Version of the Oracle Installation

The Advanced Database Patching Solution

The HPE Database and Middleware Automation (HPE DMA) Database Compliance solution provides tools that you can use to patch specialized Oracle Grid Infrastructure in an efficient and automated way.

The benefits of using this HPE DMA solution instead of patching your databases manually are:

- You can patch databases across multiple targets in either a development or production environment.
- You can use a variety of Oracle-supplied patches.
- You can easily roll back your system to a previous patch level.
- You can reduce database down time.
- You can reduce patching errors thanks to safeguards that HPE DMA provides.

By consistently using the tools provided in this solution, you can apply database patches more accurately and consistently—and save time in the process.

Oracle - Patch Grid Infrastructure and Databases

This workflow enables you to patch Oracle Grid Infrastructure on 11.2 and 12.1 environments. The workflow patches both Grid Standalone and Grid Cluster environments. In addition to the Grid Home, it patches all of the Database Homes and databases managed with Grid.

In order to run on a clustered environment, you must specify a list of all nodes that are part of the Oracle Cluster in the Grid Nodes parameter. If there are specific Oracle Database Homes that you want included or excluded from the patching process, you can expose the Oracle Database Homes parameter in the Gather Advanced Parameters for Patch Grid Infrastructure and Databases step and specify the homes.

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, and steps executed
"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 Oracle - Patch Grid Infrastructure and Databases" on page 140	List of input parameters for this workflow

Note: The documentation for this workflow refers to the workflow and its steps by their base names. The names in the HPE DMA user interface may have a version appended, for example, v2.

Prerequisites for this Workflow

Be sure that the following prerequisites are satisfied before you run the "Oracle - Patch Grid Infrastructure and Databases" workflow:

1. You have installed the HPE DMA Advanced Database Patching solution pack.
2. You have read access to all specified inventory pointers (Linux/UNIX).
3. You have a valid Oracle support contract.
4. You have imported the pertinent Oracle CPU/SPU into the HPE DMA software repository.
5. If you do not specify the OPatch option, you must have the current OPatch already available on your system.
6. Your targets are running one of the supported operating systems (see the *HPE DMA Support Matrix*).

Other Dependencies

- Oracle Grid Home must be version 11.2.0.1 or later.
- The Oracle OPatch utility must be the latest version, or you must provide the newest OPatch archive using the appropriate workflow parameter.
- You must have enough free space available, which varies depending on the Oracle patch.

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

How this Workflow Works

The "Oracle - Patch Grid Infrastructure and Databases" workflow performs the following actions:

- The initial steps of the workflow prepare it to patch the Grid Home and all of the Database Homes and databases managed with Grid. The workflow performs the validation checks described in the "Validation Checks Performed show" section below.
- If an OPatch archive file has been provided, the workflow uses the correct OPatch version to patch the Oracle OPatch utility before applying the patch to the Grid Infrastructure Home and the target databases.
- The workflow performs various staging operations before applying the patch such as checking to see if Oracle Home is to be patched. If so, it will perform various validation checks. Otherwise, it will perform just those staging operations relevant to patching the Grid Infrastructure Home.
- The workflow applies the patch to the Grid Home and to all of the Database Homes and databases managed with the Grid.
- The final steps of the workflow allow the workflow to end cleanly. The workflow verifies that the patch has been applied. Then it cleans up the downloaded files and runs Discovery to update the metadata.

Validation Checks Performed show

This workflow validate the following conditions:

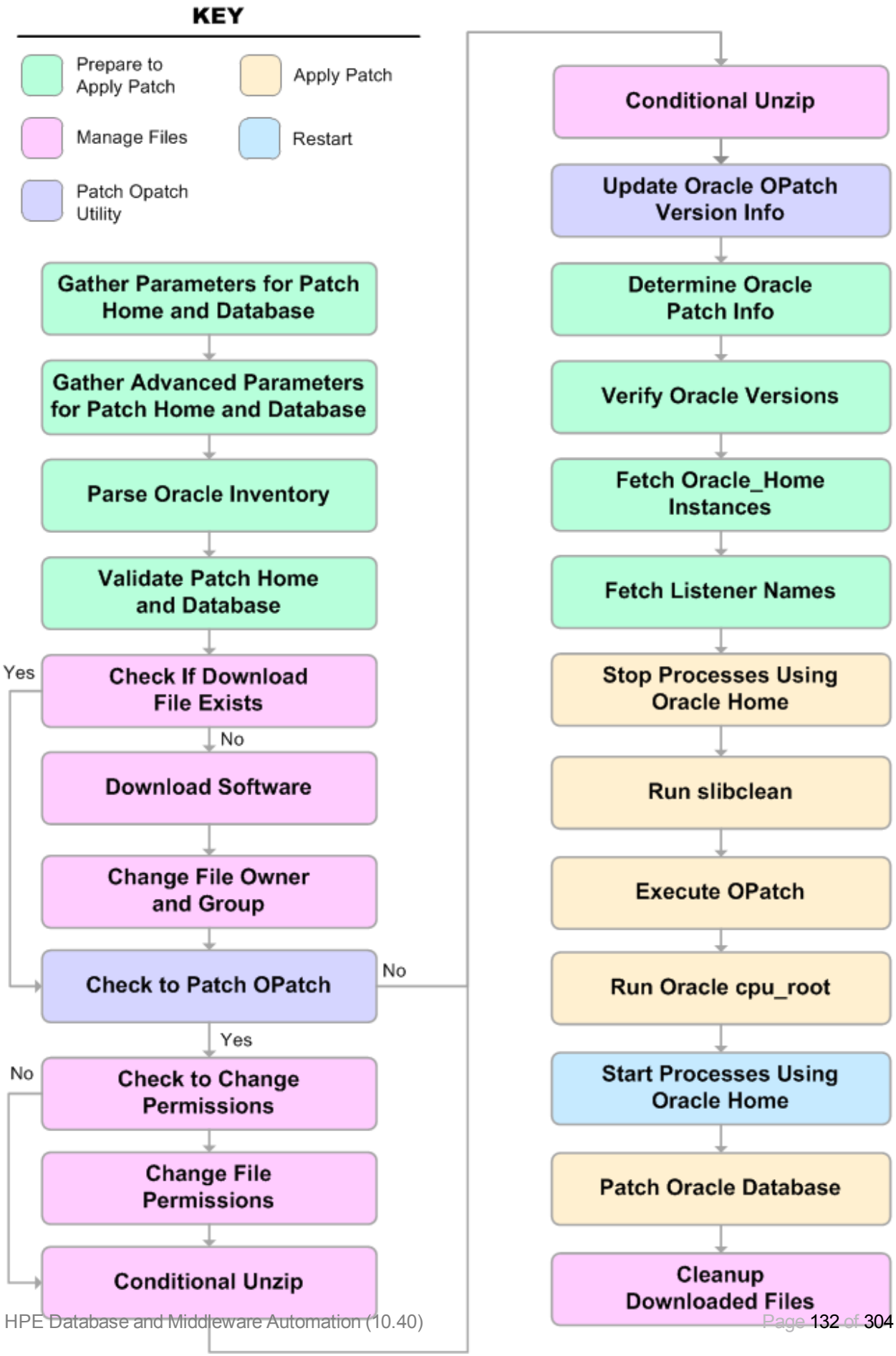
1. The input parameters have the proper syntax (no special characters or spaces).
2. Files exist or have valid specifications.
3. The current Oracle Database and OPatch versions match the required versions.
4. The supplied patch applies to Oracle Home.
5. Recompiled database views are accurate.
6. The download location has enough space.

After the patching operation is completed, the workflow verifies that the patch has been successfully applied to the Grid Infrastructure Home, Database Homes, and the target databases.

Steps Executed show

The "Oracle - Patch Grid Infrastructure and Databases" 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.

Click each box in the diagram to view additional information about that step.


KEY
Prepare to Apply Patch
Apply Patch
Manage Files
Restart
Patch Opatch Utility
Gather Parameters for Patch Home and Database
Gather Advanced Parameters for Patch Home and Database
Parse Oracle Inventory
Validate Patch Home and Database
Yes
Check If Download File Exists
No
Download Software
Change File Owner and Group
Check to Patch OPatch
No
Yes
No
Check to Change Permissions
Change File Permissions
Conditional Unzip
Conditional Unzip
Update Oracle OPatch Version Info
Determine Oracle Patch Info
Verify Oracle Versions
Fetch Oracle_Home Instances
Fetch Listener Names
Stop Processes Using Oracle Home
Run slibclean
Execute OPatch
Run Oracle cpu_root
Start Processes Using Oracle Home
Patch Oracle Database
Cleanup Downloaded Files

Steps Used in Oracle - Patch Grid Infrastructure and Databases

Workflow Step	Description
Gather Parameters for Patch Grid Infrastructure and Databases	This step gathers the required parameters for Oracle - Patch Grid Infrastructure and Databases.
Gather Advanced Parameters for Patch Grid Infrastructure and Databases	This step gathers the optional advanced parameters for Oracle - Patch Grid Infrastructure and Databases.
Prepare Oracle Instance	This step prepares instance level Oracle access.
Validate Patch Grid Infrastructure and Databases	This step validates the values specified for the input parameters used by Oracle - Patch Grid Infrastructure and Databases. It also sets the values of various output parameters that will be consumed by subsequent steps.
Download Software	This step downloads a list of files to a specified location on the target server.
Unzip for Patch Grid Infrastructure and Databases	This step unzips on all nodes: • The OPatch on the Grid and the Database Homes • The Patch Archive
Patch Grid Infrastructure and Databases	This step runs the preparatory SQL script and then patches the Grid infrastructure, the Database Homes, and all databases managed with the Grid.
Cleanup Downloaded Files	This step removes files and archives that were downloaded to the target system during previous workflow steps.
Determine Oracle Patch Info	This step determines all patch information that the workflow requires to apply the pertinent patch.
Verify Grid and Databases Patched	This step confirms that the patch has been properly applied to the Grid Infrastructure, Database Homes, and databases managed with the Grid. In a clustered environment, the workflow verifies across all nodes.
Run slibclean	This step runs the `slibclean` command on AIX targets. The slibclean utility removes any currently unused modules in kernel and library memory.
Backup and Compress	By default this step backs up all of the Grid and Database Homes and then compresses them into an archive. In addition, you can specify other direc.tories and files that you want backed up—these parameters can be found in Gather Advanced Parameters for Patch Grid Infrastructure and Databases
Discover Oracle Databases	This step audits the server's physical environment looking for Oracle instances and databases. **Note:** Discovery is only additive. It will not remove instances or databases

Steps Used in Oracle - Patch Grid Infrastructure and Databases, continued

Workflow Step	Description
	currently in your environment. It is the end user's responsibility to delete content this is no longer in use. In cluster situations where on node is active and other nodes are inactive, Discovery will only find instances and databases on the active node. Nothing will be added to inactive nodes.

Note: For input parameter descriptions and defaults, see "Parameters for Oracle - Patch Grid Infrastructure and Databases" on page 140.

How to Run this Workflow

The following instructions show you how to customize and run the "Oracle - Patch Grid Infrastructure and Databases" workflow in your environment.

Tip: For detailed instructions to run HPE DMA workflows—using the Oracle - Compliance Audit workflow as an example—see HPE DMA Quick Start Tutorial.

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 Oracle - Patch Grid Infrastructure and Databases" on page 140.

Note: Before following this procedure, review the "Prerequisites for this Workflow" on page 129, and ensure that all requirements are satisfied.

To use the Oracle - Patch Grid Infrastructure and Databases workflow:

1. Create a deployable copy of the workflow.
2. Determine the values that you will specify for the following parameters:

   Input Parameters Defined in this Step: Gather Parameters for Patch Grid Infrastructure and Databases

Parameter Name	Default Value	Required	Description
Patch Archive	no default	required	Comma-separated list of patch file names (not fully-qualified).
Gold Grid Home	no default	required	A .tgz home that is already patched to be unzipped and then migrated.

   Additional Input Parameters Defined in this Step: Gather Advanced Parameters for Patch Grid Infrastructure and Databases

Parameter Name	Default Value	Required	Description
Backup File Name	dma_ backup	optional	Name of the backup file.
Patch Name	no default	optional	Name of the patch that is being applied. If you specify a value for this parameter, you MUST also expose and specify OPatch Version and Patch Number.
Patch Number	no default	optional	Patch number of the patch being applied. If you specify a value for this parameter, you MUST also expose and specify OPatch Version and Patch Name.

   Note: This is the minimum set of parameters required to run this workflow. You may specify values

for the optional advanced parameters and you may need to expose additional parameters depending on your objectives.

See "Oracle - Patch Grid Infrastructure and Databases" 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. 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.
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.

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.

Optional: To further verify that the Grid patch was successfully applied:

1. Log in to the target server.
2. Set the ORACLE_HOME to your Grid Home.
3. Run the command: `$ORACLE_HOME/OPatch/opatch lsinventory`
4. Verify that the patch number from the archive that you specified is listed in the output.

Optional: To further verify that the patch was successfully applied on the Database Homes:

1. Log in to the target server.
2. Set the ORACLE_HOME to your Database Home.
3. Run the command: `$ORACLE_HOME/OPatch/opatch lsinventory`
4. Verify that the patch number from the archive that you specified is listed in the output.

Optional: To further verify that the patch was successfully applied to the Oracle Database Instances associated with the Oracle Home:

1. Log in as an SQLPlus privileged user.
2. Set the environment variable, for example:

   ```
   . oraenv
   ```
3. Give the name of the Oracle Database, for example:

   ```
   orca
   ```
4. Search results for comments and actions, for example:

   ```
   select comments,action from sys.registry$history;
   ```
5. Check that the desired patch was applied. For example, look for:

   CPUOct2013 or PSUOct2013

Sample Scenarios

This topic shows you how to use various parameters to achieve the following advanced patching scenarios in your environment using the "Oracle - Patch Grid Infrastructure and Databases" workflow.

Note: Use the ASM instance in your environment as the deployment's target.

Scenario 1: Apply patch to a Grid clustered environment show

In this scenario, the workflow patches Grid clustered environments. It applies the patch to the Grid Infrastructure, the Oracle Database Homes, and all associated databases. Under most cases you will specify the OPatch Archive and the Patch Information File. You only need to set the required parameters as shown in the following parameter table:

Parameter Name	Description
Patch Archive	Comma-separated list of patch file names (not fully-qualified). Example: `p17272829_121010_Linux-x86-64.zip`
Grid Nodes	Comma separated list of nodes that are part of a Grid Infrastructure environment. By default, the nodes are discovered by `olsnodes` and then all nodes are rolled back. Example: dma-rac1.usa.hp.com,dma-rac2.usa.hp.com
OPatch Archive	The OPatch Archive file required for this patch (not fully-qualified). If this parameter value is not specified, the current OPatch version will be used. Example: `p6880880_121010_Linux-x86-64.zip`
Oracle Database Homes	Oracle Database Homes to patch along with the Oracle Grid. Valid values are ALL, NONE, INCLUDE: followed by a comma separated list of Oracle Homes to patch with the Oracle Grid, and EXCLUDE: followed by a comma separated list of Oracle Homes to exclude from the patching process. Example: ALL
Patch Information File	Supplementary patch information supplied by support. If this file is not found on the target, it is downloaded from the software repository on the HPE DMA server. Example: `201310_PatchInfo.xml`

Be sure that the default values for all remaining input parameters are appropriate for your environment (see "Parameters for Oracle - Patch Grid Infrastructure and Databases" on page 140).

Scenario 2: Apply patch to a Grid Standalone environment show

In this scenario, the workflow patches a Grid Standalone environment. It applies the patch to both the Grid Standalone Home, the Oracle Database Homes, and all associated databases. You only need to leave Grid Nodes blank.

Parameter Name	Description
Patch Archive	Comma-separated list of patch file names (not fully-qualified). Example: `p17272829_121010_Linux-x86-64.zip`
Grid Nodes	Comma separated list of nodes that are part of a Grid Infrastructure environment. By default, the nodes are discovered by `olsnodes` and then all nodes are rolled back. Example:
OPatch Archive	The OPatch Archive file required for this patch (not fully-qualified). If this parameter value is not specified, the current OPatch version will be used. Example: `p6880880_121010_Linux-x86-64.zip`
Oracle Database Homes	Oracle Database Homes to patch along with the Oracle Grid. Valid values are ALL, NONE, INCLUDE: followed by a comma separated list of Oracle Homes to patch with the Oracle Grid, and EXCLUDE: followed by a comma separated list of Oracle Homes to exclude from the patching process. Example: ALL
Patch Information File	Supplementary patch information supplied by support. If this file is not found on the target, it is downloaded from the software repository on the HPE DMA server. Example: `201310_PatchInfo.xml`

Be sure that the default values for all remaining input parameters are appropriate for your environment (see "Parameters for Oracle - Patch Grid Infrastructure and Databases" on page 140).

Scenario 3: Only patch specific Oracle Database Homes show

In this scenario, the workflow patches Grid clustered environments. It applies the patch to the Grid Infrastructure, only the specified Oracle Database Homes, and all associated databases. You only need to set Oracle Database Homes to the desired Oracle Database Homes.

Parameter Name	Description
Patch Archive	Comma-separated list of patch file names (not fully-qualified). Example: `p17272829_121010_Linux-x86-64.zip`
Grid Nodes	Comma separated list of nodes that are part of a Grid Infrastructure environment. By default, the nodes are discovered by `olsnodes` and then all nodes are rolled back. Example: dma-rac1.usa.hp.com,dma-rac2.usa.hp.com
OPatch Archive	The OPatch Archive file required for this patch (not fully-qualified). If this parameter value is not specified, the current OPatch version will be used. Example: `p6880880_121010_Linux-x86-64.zip`
Oracle Database Homes	Oracle Database Homes to patch along with the Oracle Grid. Valid values are ALL, NONE, INCLUDE: followed by a comma separated list of Oracle Homes to patch with the Oracle Grid, and EXCLUDE: followed by a comma separated list of Oracle Homes to exclude from the patching process. Example: INCLUDE: /u01/app/oracle/product/12.1.0/dbhome_1
Patch Information File	Supplementary patch information supplied by support. If this file is not found on the target, it is downloaded from the software repository on the HPE DMA server. Example: `201310_PatchInfo.xml`

Be sure that the default values for all remaining input parameters are appropriate for your environment (see "Parameters for Oracle - Patch Grid Infrastructure and Databases" on the next page).

Parameters for Oracle - Patch Grid Infrastructure and Databases

The following tables describe the required and optional input parameters for this workflow. Some of these parameters are not initially visible in a deployment. For most parameters, if you do not specify a value for a parameter, a default value is assigned

Note: Only those parameters that are configurable in a standard deployment are listed here. Input parameters that must be mapped to output parameters of previous steps are not listed.

Input Parameters Defined in this Step: Gather Parameters for Patch Grid Infrastructure and Databases

Parameter Name	Default Value	Required	Description
Gold Grid Home	no default	required	A .tgz home that is already patched to be unzipped and then migrated to. This parameter is to be used in place of using a patch archive.
Patch Archive	no default	required	Comma-separated list of patch file names (not fully-qualified).

Additional Input Parameters Defined in this Step: Gather Advanced Parameters for Patch Grid Infrastructure and Databases

Parameter Name	Default Value	Required	Description
2 Phase Patching	false	optional	If the value is True the workflow will clone and patch the cloned home in the first run of the workflow. The second time you run the workflow it will perform the switchover operation to the newly patched home.
Additional Grid Patches	no default	optional	Comma separated list of any additional patched that need to be applied on top of the PSU. Example are ocw patches or any oneoff patches that need to be applied to the Grid Home.
Backup File List	see description	optional	List of additional files and folders that you would like backed up. By default, the backup already includes Grid Home, Database Homes, and Inventory Location.
Backup File Name	dma_ backup	optional	Name of the backup file.
Backup Location	no default	optional	Location where the backup file will be located.
Cleanup	True	optional	If true, the workflow will cleanup downloaded and extracted files upon completion. Valid values are True and False.
Clone Patching Database	no default	optional	True if patching process should use Oracle Clone Patching process for Oracle Database Homes and Databases.
Clone Patching Grid	no default	optional	True if patching process should use Oracle Clone Patching process for Oracle Database Homes and Databases.

Additional Input Parameters Defined in this Step: Gather Advanced Parameters for Patch Grid Infrastructure and Databases, continued

Parameter Name	Default Value	Required	Description
DB Version	no default	optional	The current Oracle Database version. For example: 11.2.0.3
Patch Name	no default	optional	Name of the patch that is being applied. If you specify a value for this parameter, you MUST also expose and specify OPatch Version and Patch Number.
Patch Number	no default	optional	Patch number of the patch being applied. If you specify a value for this parameter, you MUST also expose and specify OPatch Version and Patch Name.
Decommission Grid Home	true	optional	If Clone Patching Grid is set to True this parameter if set to true will decommission old Grid Home. If set to False the old Grid Home will remain after workflow has completed.
Decommission RDBMS Home	true	optional	If Clone Patching Database is set to True this parameter if set to True will decommission any old RDBMS Homes. If set to False the old RDBMS Homes will remain after workflow has completed.
Download Location	/tmp	optional	Location where all files where files will be downloaded or they already exist.
Extract Location	/tmp	optional	Directory location where the ZIP archives will be extracted.
Grid Nodes	no default	optional	Comma separated list of nodes that are part of a Grid Infrastructure environment. By default, the nodes are discovered by `olsnodes` and then all nodes are rolled back.
Ignorable Oracle Errors	no default	optional	A comma-separated list of Oracle errors to be ignored when applying the patch to the database. This is in addition to the list of Oracle errors specified in the patch readme file. Values are of the form ORA-nnnnn. For example: ORA-04020,ORA-03113
Migrate Database	true	optional	When using a Gold RDBMS Home to patch, the databases for the homes will be migrated to the new home and patched. Default value is True. To migrate and patched databases rather than during the workflow specify False and run the Oracle - Migrate and Patch Grid Managed Database.
OCM Response File	no default	optional	Path name of the Oracle Configuration Manager (OCM) response file. If not found on the target, this file is downloaded from the software repository. If left blank, a default response file will be created.
Oneoff Archives	no default	optional	Comma separated list of One-off patch archive(s).

Additional Input Parameters Defined in this Step: Gather Advanced Parameters for Patch Grid Infrastructure and Databases, continued

Parameter Name	Default Value	Required	Description
OPatch Archive	no default	optional	The OPatch Archive file required for this patch (not fully-qualified). If this parameter value is not specified, the current OPatch version will be used.
OPatch Version	no default	optional	The new OPatch version of the patch being applied. If you specify a value for this parameter, you MUST also specify values for Patch Number and Patch Name.
Oracle Database Homes	ALL	optional	Oracle Database Homes to patch along with the Oracle Grid. Valid values are ALL, NONE, INCLUDE: followed by a comma separated list of Oracle Homes to patch with the Oracle Grid, and EXCLUDE: followed by a comma separated list of Oracle Homes to exclude from the patching process.
Oracle Group	no default	optional	The group that owns the Grid Oracle Home.
Patch Information File	no default	optional	Supplementary patch information supplied by support. If this file is not found on the target, it is downloaded from the software repository on the HPE DMA server.
Patch Name	no deffault	optional	Name of the patch that is being applied.
Patch Number	no default	optional	Patch number of the patch being applied.
Preparatory SQL	no default	optional	File name that contains SQL statements that must be run before the database catalog update. This file is passed directly to SQLPlus and must be formatted as such. If not found on the target, it is downloaded from the software repository.
RDBMS Homes Only	false	optional	If value is True than the patching workflow will only patch database homes found to be patched from the Oracle Database Homes parameter. The default value is False.
Required Disk Space	no default	optional	Amount of disk space required (checked for) before installing the patch. Size is in Gigabytes.
Run Database View Recompile	False	deprecated	If set to true, the Database View Recompile step will be run. Valid values are True and False.
Startup Instance	Y	deprecated	If set to Y, the workflow will attempt to start the database instance if it is offline. Valid values are Y and N.
Trust SSL Certificates	no default	deprecated	HPE DMA no longer uses this workflow parameter to determine whether the workflow will trust any Secure Sockets Layer (SSL) certificate used to connect to the HPE DMA web service. HPE DMA uses the following parameter in the dma.xml file: <Parameter

Additional Input Parameters Defined in this Step: Gather Advanced Parameters for Patch Grid Infrastructure and Databases, continued

Parameter Name	Default Value	Required	Description
			name="com.hp.dma.conn.trustAllCertificates" values="VALUE" /> Here, VALUE is true or false.
Web Service Password	no default	optional	Password for the HPE DMA Discovery web service API.
Web Service URL	no default	optional	URL for the HPE DMA Discovery web service API.
Web Service User	no default	optional	User who is capable of modifying the managed environment by using the HPE DMA Discovery web service API.

Oracle - Rollback Patch from Grid Infrastructure and Database

This workflow rolls back a patch from Oracle Grid Infrastructure on 11.2 and 12.1 environments. It works for both Grid Standalone and Grid Cluster environments. In addition to the Grid Home, it rolls back the patch from all of the Database Homes and databases managed with the Grid.

In order to run on a clustered environment, in the Grid Nodes parameter you specify a list all nodes that are part of the Oracle Cluster.

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, and steps executed
"How to Run this Workflow"	Instructions for running this workflow in your environment
"Sample Scenarios"	Examples of typical parameter values for this workflow
Parameters	List of input parameters for this workflow

Note: The documentation for this workflow refers to the workflow and its steps by their base names. The names in the HPE DMA user interface may have a version appended, for example, v2.

Prerequisites for this Workflow

Be sure that the following prerequisites are satisfied before you run the "Oracle - Rollback Patch from Grid Infrastructure and Database" workflow:

1. You have installed the HPE DMA Advanced Database Patching solution pack.
2. You have Read access to all specified inventory pointers (Linux/UNIX).
3. Your targets are running one of the supported operating systems (see the *HPE DMA Support Matrix*).

Other Dependencies

- The workflow must have unchallenged ability to become the Oracle database user (typically oracle) on all nodes of the RAC. This is generally done using `sudo` or `ssh oracle@localhost`.
- The workflow must have unchallenged ability to become the Oracle CRS user (example oracrs) on all nodes of the RAC. This is generally done using `sudo` or `ssh oracle@localhost`.
- The workflow must have unchallenged ability to become the superuser user (typically root) on all nodes of the RAC. This is generally done using `sudo` or `ssh oracle@localhost`.
- The workflow and the CRS/ASM/Instance/Listener users (typically oracle) must have unchallenged ability to `ssh` to all the RAC nodes.

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

How this Workflow Works

The "Oracle - Rollback Patch from Grid Infrastructure and Database" workflow performs the following actions:

- The initial steps of the workflow prepare it to roll back the patch from the Grid Home,and all of the Database Homes and databases managed with Grid. The workflow performs the validation checks described in the "Validation Checks Performed show" section below.
- The workflow verifies the archive to roll back, the download location, and the Homes to roll back.
- The workflow rolls back the patch from the Grid Home and from all of the Database Homes and databases managed with the Grid.
- The final steps of the workflow allow the workflow to end cleanly. The workflow verifies that the patch has been rolled back. Then it runs Discovery to update the metadata and cleans up the downloaded files.

Validation Checks Performed show

This workflow validates the following conditions:

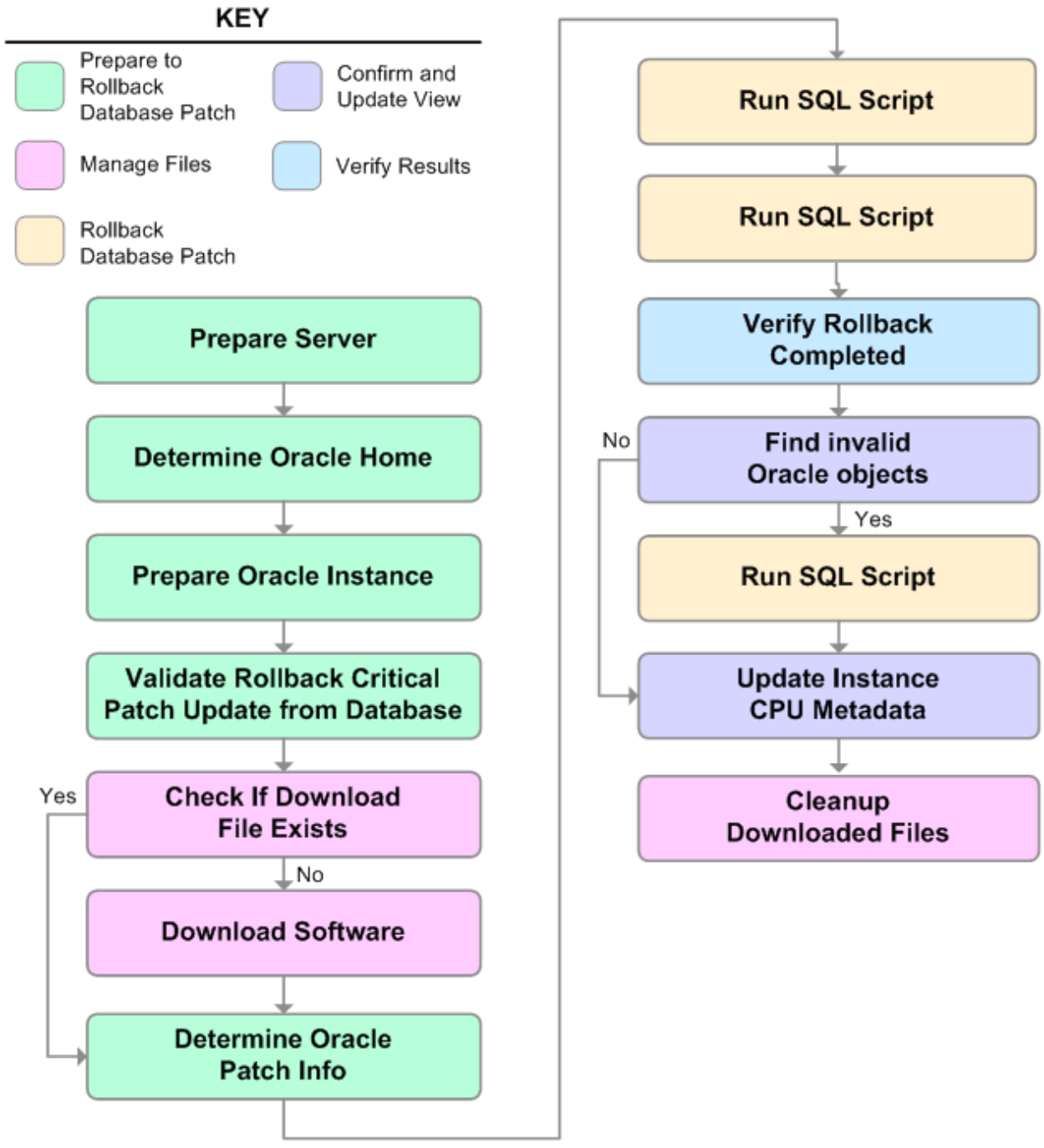
1. The input parameters have the proper syntax (no special characters or spaces).
2. Files exist or have valid specifications.
3. The supplied patch applies to Oracle Home.
4. The download location has enough space.

After the patching operation is completed, the workflow verifies that the patch has been successfully rolled back from the Grid Infrastructure Home, Database Homes, and the target databases.

Steps Executed show

The "Oracle - Rollback Patch from Grid Infrastructure and Database" 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.

Click each box in the diagram to view additional information about that step.



Steps Used in Oracle - Rollback Patch from Grid Infrastructure and Databases

Workflow Step	Description
Gather Parameters for Rollback Patch from Grid Infrastructure and Databases	This step gathers the required parameters for Oracle - Rollback Patch from Grid Infrastructure and Databases.
Gather Advanced Parameters for Rollback Patch from Grid Infrastructure and Databases	This step gathers the optional advanced parameters for Oracle - Rollback Patch from Grid Infrastructure and Databases.
Prepare Oracle Instance	This step prepares instance level Oracle access.
Validate Rollback Patch from Grid Infrastructure and Databases	This step validates the parameters for Oracle - Rollback Patch from Grid Infrastructure and Databases.
Download Software	This step downloads a list of files to a specified location on the target server.
Run slibclean	This step runs the `slibclean` command on AIX targets. The slibclean utility removes any currently unused modules in kernel and library memory.
Rollback Patch Grid Infrastructure and Databases	This step rolls back the patches from the Grid infrastructure, the Database Homes, and all databases managed with the Grid.
Verify Grid and Databases Patch Rollback	This step confirms that the patch has been properly rolled back from the Grid Infrastructure, Database Homes, and databases managed with the Grid. In a clustered environment, the workflow verifies across all nodes.
Discover Oracle Databases	This step audits the server's physical environment looking for Oracle instances and databases. **Note:** Discovery is only additive. It will not remove instances or databases currently in your environment. It is the end user's responsibility to delete content this is no longer in use. In cluster situations where on node is active and other nodes are inactive, Discovery will only find instances and databases on the active node. Nothing will be added to inactive nodes.
Cleanup Downloaded Files	This step removes files and archives that were downloaded to the target system during previous workflow steps.

Note: For input parameter descriptions and defaults, see "Parameters for Oracle - Rollback Patch from Grid Infrastructure and Database" on page 152.

How to Run this Workflow

The following instructions show you how to customize and run the "Oracle - Rollback Patch from Grid Infrastructure and Database" workflow in your environment.

Tip: For detailed instructions to run HPE DMA workflows—using the Oracle - Compliance Audit workflow as an example—see HPE DMA Quick Start Tutorial.

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 Oracle - Rollback Patch from Grid Infrastructure and Database" on page 152.

Note: Before following this procedure, review the "Prerequisites for this Workflow" on page 145, and ensure that all requirements are satisfied.

To use the Oracle - Rollback Patch from Grid Infrastructure and Databases workflow:

1. Create a deployable copy of the workflow.
2. Determine the values that you will specify for the following parameters:

   Input Parameters Defined in this Step: Gather Parameters for Rollback Patch from Grid Infrastructure and Databases

Parameter Name	Default Value	Required	Description
Patch Archive	no default	required	Patch archive file of the applied patch to roll back from the Oracle Grid and databases.

   Note: This is the minimum set of parameters required to run this workflow. You may specify values for the optional advanced parameters and you may need to expose additional parameters depending on your objectives.

   See "Parameters for Oracle - Rollback Patch from Grid Infrastructure and Database" 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. 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.
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.

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.

Optional: To further verify that the Grid patch was successfully rolled back:

1. Log in to the target server.
2. Set the ORACLE_HOME to your Grid Home.
3. Run the command: `$ORACLE_HOME/OPatch/opatch lsinventory`
4. Verify that the patch number that you rolled back is NOT listed in the output.

Optional: To further verify that the patch was successfully rolled back from the Database Homes:

1. Log in to the target server.
2. Set the ORACLE_HOME to your Database Home.
3. Run the command: `$ORACLE_HOME/OPatch/opatch lsinventory`
4. Verify that the patch number that you rolled back is NOT listed in the output.

Optional: To further verify that the patch was successfully rolled back from the Oracle Database Instances associated with the Oracle Home:

1. Log in as an SQLPlus privileged user.
2. Set the environment variable, for example:

   ```
   . oraenv
   ```
3. Give the name of the Oracle Database, for example:

   ```
   orca
   ```
4. Search results for comments and actions, for example:

   ```
   select comments,action from sys.registry$history;
   ```
5. Verify that the patch number that you rolled back is NOT listed in the output, for example:

   CPUOct2013 or PSUOct2013

Sample Scenarios

This topic shows you how to use various parameters to achieve the following advanced patching scenarios in your environment using the "Oracle - Rollback Patch from Grid Infrastructure and Database" workflow.

Note: Use the ASM instance in your environment as the deployment's target.

Scenario: Roll back patch in a Grid cluster or Grid Standalone environment show

In this scenario, the workflow rolls back the patch from the Grid Infrastructure (cluster or Standalone), the Database Homes, and all associated databases.

Parameter Name	Description
Patch Archive	Patch archive file of the applied patch to roll back from the Oracle Grid and databases. Example: `p17272829_121010_Linux-x86-64.zip`

Be sure that the default values for all remaining input parameters are appropriate for your environment (see "Parameters for Oracle - Rollback Patch from Grid Infrastructure and Database" on the next page).

Parameters for Oracle - Rollback Patch from Grid Infrastructure and Database

The following tables describe the required and optional input parameters for this workflow. Some of these parameters are not initially visible in a deployment. For most parameters, if you do not specify a value for a parameter, a default value is assigned

Note: Only those parameters that are configurable in a standard deployment are listed here. Input parameters that must be mapped to output parameters of previous steps are not listed.

Input Parameters Defined in this Step: Gather Parameters for Rollback Patch from Grid Infrastructure and Databases

Parameter Name	Default Value	Required	Description
Patch Archive	no default	required	Patch archive file of the applied patch to roll back from the Oracle Grid and databases.

Additional Input Parameters Defined in this Step: Gather Advanced Parameters for Rollback Patch from Grid Infrastructure and Databases

Parameter Name	Default Value	Required	Description
Cleanup	True	optional	If true, the workflow will cleanup downloaded and extracted files upon completion. Valid values are True and False.
Download Location	/tmp	optional	Location where all files where files will be downloaded or they already exist.
Extract Location	/tmp	optional	Directory location where the ZIP archives will be extracted.
Grid Nodes	no default	optional	Comma separated list of nodes that are part of a Grid Infrastructure environment. By default, the nodes are discovered by `olsnodes` and then all nodes are rolled back.
Ignorable Oracle Errors	no default	optional	A comma-separated list of Oracle errors to be ignored when applying the patch to the database. This is in addition to the list of Oracle errors specified in the patch readme file. Values are of the form ORA-nnnnn. For example: ORA-04020,ORA-03113
OCM Response File	no default	optional	Path name of the Oracle Configuration Manager (OCM) response file. If not found on the target, this file is downloaded from the software repository. If left blank, a default response file will be created.
Oracle Database Homes	ALL	optional	Oracle Database Homes to roll back along

Additional Input Parameters Defined in this Step: Gather Advanced Parameters for Rollback Patch from Grid Infrastructure and Databases, continued

Parameter Name	Default Value	Required	Description
			with the Oracle Grid. Valid values are ALL, NONE, INCLUDE: followed by a comma separated list of Oracle Homes to roll back with the Oracle Grid, and EXCLUDE: followed by a comma separated list of Oracle Homes to exclude from the rollback process.
Preparatory SQL	no default	optional	File name that contains SQL statements that must be run before the database catalog update. This file is passed directly to SQLPlus and must be formatted as such. If not found on the target, it is downloaded from the software repository.
Run Database View Recompile	False	deprecated	If set to true, the Database View Recompile step will be run. Valid values are True and False.
Trust SSL Certificates	no default	deprecated	HPE DMA no longer uses this workflow parameter to determine whether the workflow will trust any Secure Sockets Layer (SSL) certificate used to connect to the HPE DMA web service. HPE DMA uses the following parameter in the dma.xml file: <Parameter name="com.hp.dma.conn.trustAllCertificates" values="VALUE" /> Here, VALUE is true or false.
Web Service Password	no default	optional	Password for the HPE DMA Discovery web service API.
Web Service URL	no default	optional	URL for the HPE DMA Discovery web service API.
Web Service User	no default	optional	User who is capable of modifying the managed environment by using the HPE DMA Discovery web service API.

Refreshing Database

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:

- HPE DMA is installed and operational.
- At least one suitable target server is available.
- You are logged in to the HPE DMA web interface.
- You have permission to create, edit, and deploy copies of the workflows included in this solution pack.

Oracle - Extract 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 Oracle - Extract Database via RMAN"	List of input parameters for this workflow

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

Prerequisites for this Workflow

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

1. The HPE 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.

How this Workflow Works

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

Overview show

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 show

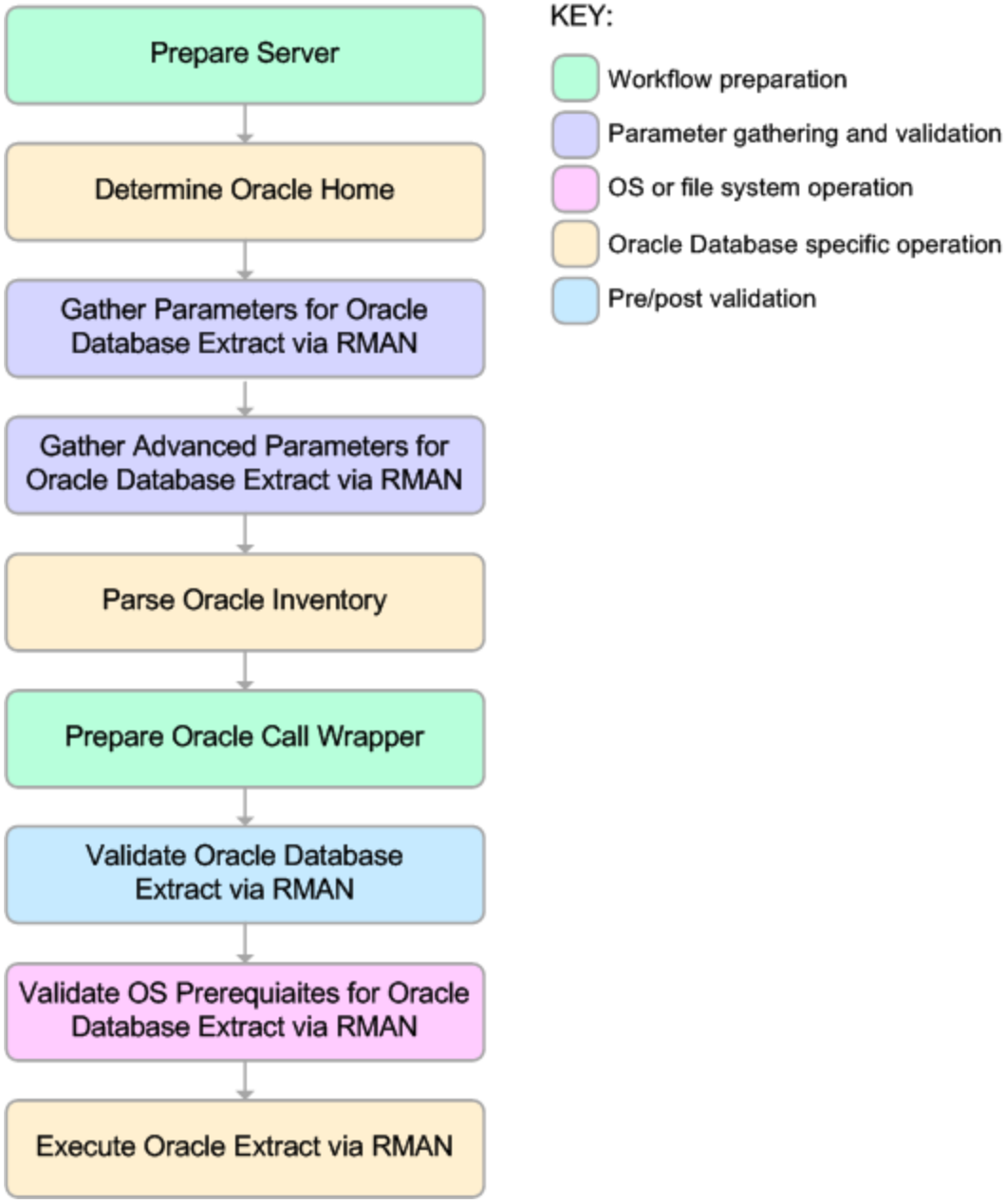
The workflow validates the following conditions:

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 show

The "Oracle - Extract 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.

Click each box in the diagram to view additional information about that step.



Process Flow show

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 "Oracle - Extract 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 Oracle - Extract Database via RMAN" on page 164

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

To use the Oracle - Extract Database via RMAN workflow:

1. Create a deployable copy of the workflow.
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 objectives.

See "Parameters for Oracle - Extract Database via RMAN" on page 164 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. You will specify values for those parameters when you create the deployment or at runtime.
4. Save the changes to the workflow (click **Save** in the lower right corner).
5. Create a new deployment.
6. On the Parameters tab, specify values (or set the type to Runtime Value) 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, specifying any runtime parameters.

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 "Oracle - Extract 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 Oracle - Extract Database via RMAN").

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 Oracle - Extract Database via RMAN").

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 deploymen.

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 Oracle - Extract Database via RMAN").

Parameters for Oracle - Extract 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. For some 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.
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	see	optional	Comma separated list of Oracle inventory file names (with absolute

Additional Parameter Defined in this Step: Parse Oracle Inventory, continued

Parameter Name	Default Value	Required	Description
Files	description		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 - Refresh 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 Oracle - Refresh Database via RMAN"	List of input parameters for this workflow

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

Prerequisites for this Workflow

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

1. The HPE 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.

How this Workflow Works

This topic contains the following information about the "Oracle - Refresh 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.

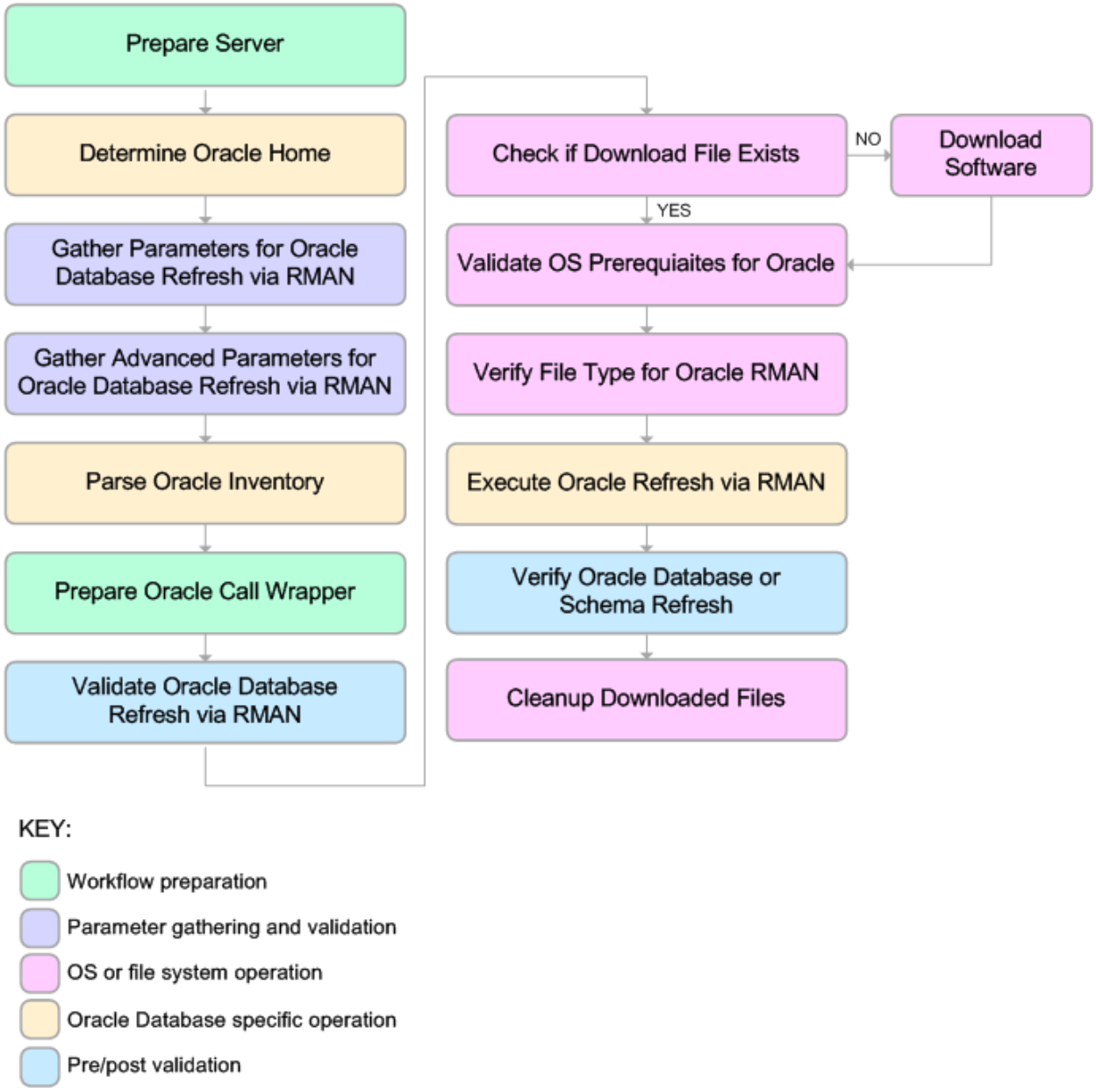
Validation Checks Performed show

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 HPE DMA.
10. Sufficient disk space is available to perform the database restore.

Steps Executed show

The "Oracle - Refresh 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 show

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.

Sample Scenarios

This topic shows you how to use various parameters to achieve the following database backup scenarios in your environment using the "Oracle - Refresh 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 workflow uses extracted files from an RMAN backup. These are files that were generated by using the Extract Oracle Database via RMAN 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_04n1lfnh.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 Oracle - Refresh Database via RMAN).

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_04n1lfnh.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 Oracle - Refresh Database via RMAN).

How to Run this Workflow

The following instructions show you how to customize and run the "Oracle - Refresh 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 Oracle - Refresh Database via RMAN" on page 175

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

To use the Oracle - Refresh Database via RMAN workflow:

1. Create a deployable copy of the workflow.
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.
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 objectives.
>
> See "Parameters for Oracle - Refresh Database via RMAN" on the next page 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. You will specify values for those parameters when you create the deployment or at runtime.
4. Save the changes to the workflow (click **Save** in the lower right corner).
5. Create a new deployment.
6. On the Parameters tab, specify values (or set the type to Runtime Value) 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, specifying any runtime parameters.

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.

Parameters for Oracle - Refresh 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. For some 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.
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.
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

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

Parameter Name	Default Value	Required	Description
			RMAN backup on the source database (see "Oracle - Extract Database via RMAN" on page 155).

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.

Oracle - Extract and Refresh 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 Oracle - Extract and Refresh Database via RMAN"	List of input parameters for this workflow

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

Prerequisites for this Workflow

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

1. The HPE 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.

How this Workflow Works

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

Overview show

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 show

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

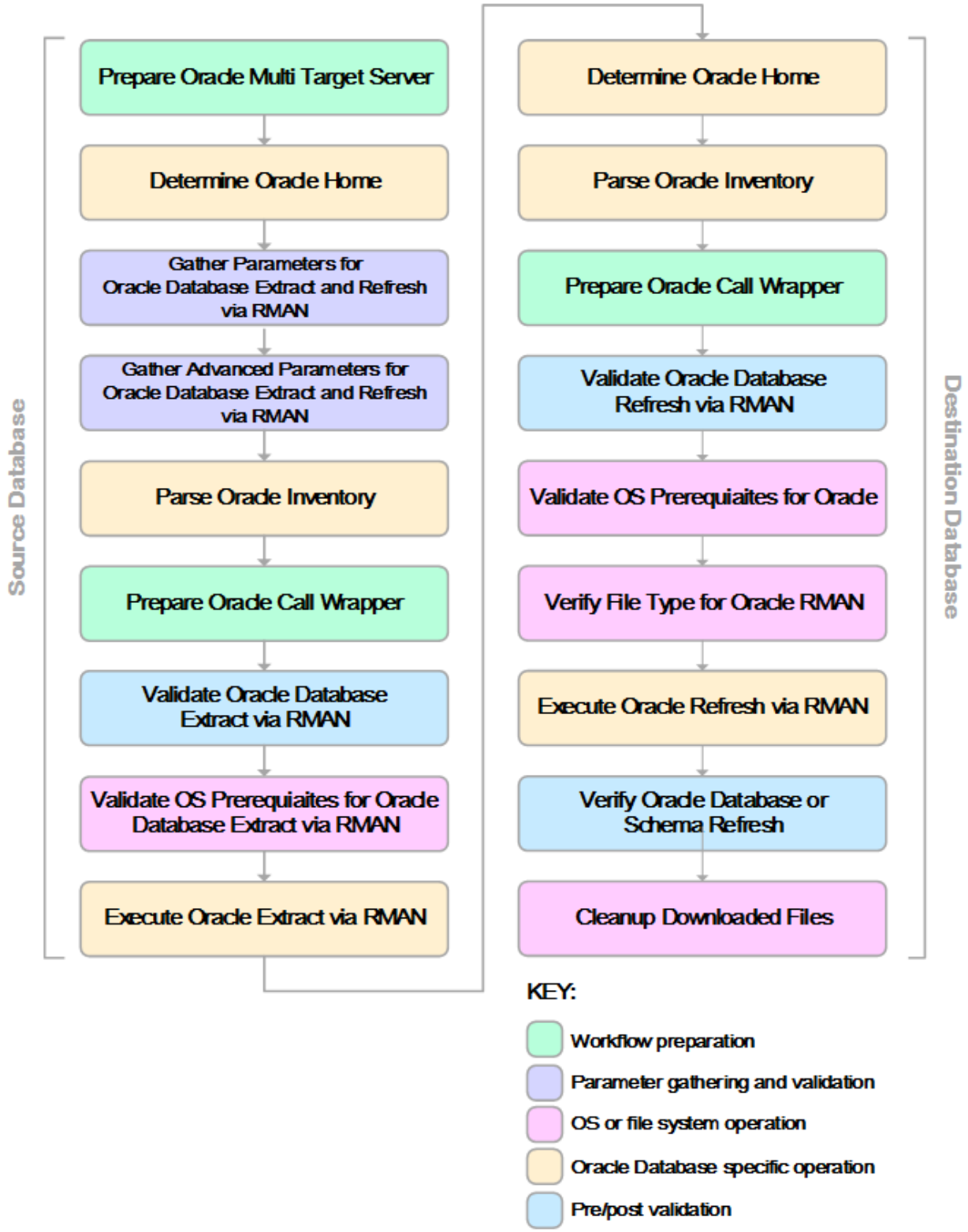
1. The Oracle Home derived in the Determine Oracle Home step is a fully qualified path that exists on the target server.
2. The specified Target Directory exists, either locally or on a network share, and is writable.
3. The following system utilities are available: `ar`,`make`,`ls`,`nm`,`unzip`, and `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 HPE DMA.
10. Sufficient disk space is available to perform the database restore.

Steps Executed show

The "Oracle - Extract and Refresh 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 show

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 "Oracle - Extract and Refresh 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 Oracle - Extract and Refresh Database via RMAN" on page 189

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

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

1. Create a deployable copy of the workflow.
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 objectives.

See "Parameters for Oracle - Extract and Refresh Database via RMAN" on page 189 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. 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.
   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.

   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 "Oracle - Extract and Refresh 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 Oracle - Extract and Refresh Database via RMAN").

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 Oracle - Extract and Refresh Database via RMAN").

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.

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.
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.

Parameter Name	Example Value	Description
		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 Oracle - Extract and Refresh Database via RMAN").

Parameters for Oracle - Extract and Refresh 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. For some 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.

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.
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

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

Parameter Name	Default Value	Required	Description
			the workflow can access it. The expected results of the queries included in this script must be provided in the Verification Result file.

Oracle - Export 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 Oracle - Export Database via Data Pump" on page 205).

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 Oracle - Export Database via Data Pump"	List of input parameters for this workflow

Note: The documentation for this workflow refers to the workflow and its steps by their base names. The names in the HPE DMA user interface may have a version appended, for example, v2.

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

Prerequisites for this Workflow

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

1. The HPE 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.

How this Workflow Works

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

Overview show

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 Oracle - Export Database via Data Pump" on page 205).

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 show

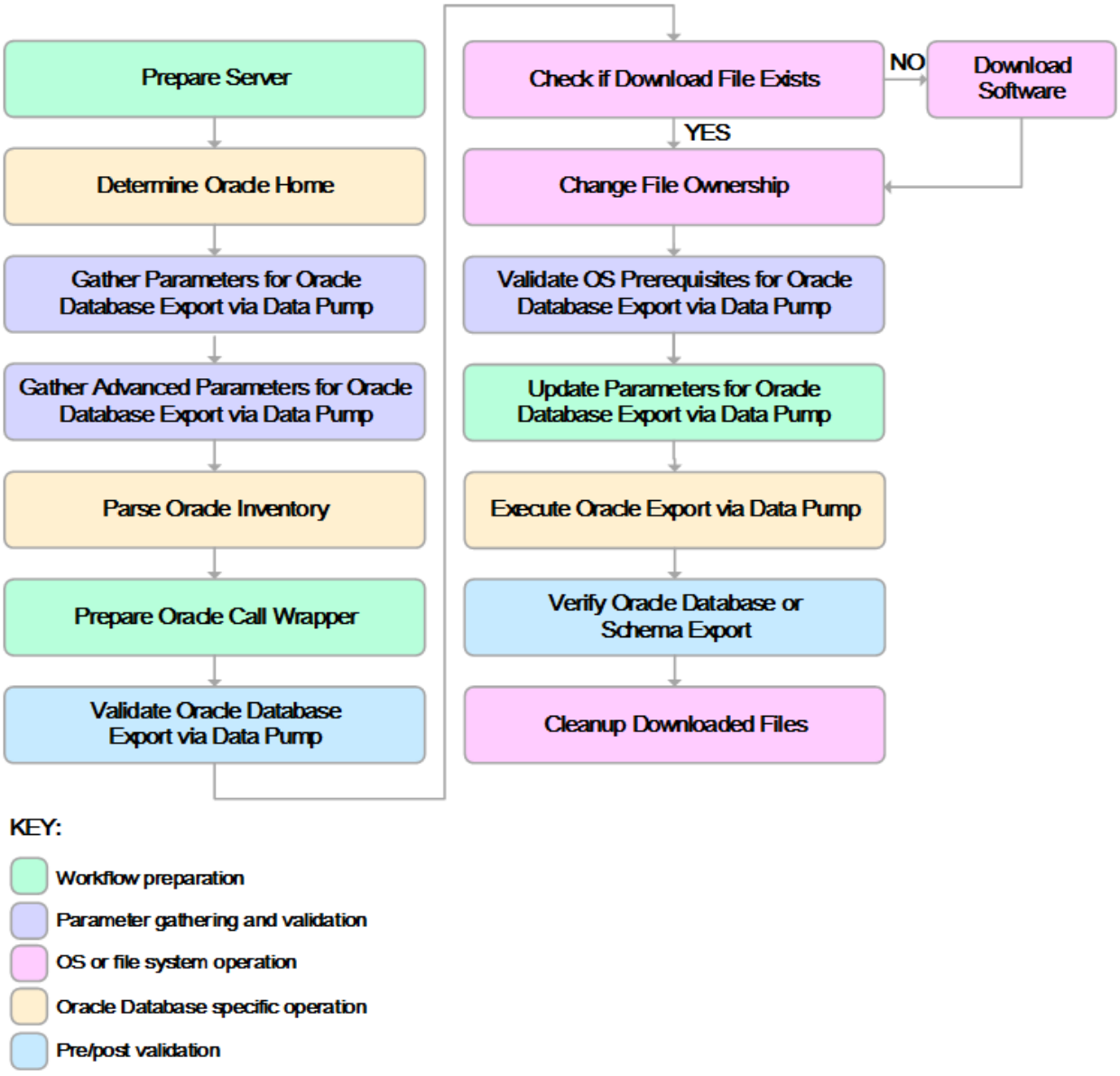
The workflow validates the following conditions:

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 HPE DMA platform.
5. A temporary directory required for file storage can be created on the target server.
6. Values specified for parameters are appropriate for the parameters.
7. The specified Ignorable Oracle Errors are, in fact, valid error codes.
8. The specified Data Pump Export File is a valid path and file name.
9. If a Data Pump Parameter file is specified, the file exists in the specified location.
10. If a Data Pump Parameter file is not specified, at least one schema is specified.
11. The specified Target Directory exists, either locally or on a network share, or it can be created.
12. The directory names included in the Do Not Remove list (if any) are valid.
13. The objects in Exclude are mutually exclusive of the objects in Include.
14. Flashback SCN and Flashback Time parameters are not used together. If Flashback Time is specified, it is in the proper time format.

Steps Executed show

The "Oracle - Export 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.

Click each box in the diagram to view additional information about that step.



Process Flow show

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. Optionally prints the export log file contents to console and history pages.
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 "Oracle - Export 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 Oracle - Export Database via Data Pump" on page 205

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

To use the Oracle - Export Database via Data Pump workflow:

1. Create a deployable copy of the workflow.
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 specify values for the optional parameters in the gather advanced parameters set. You also may need to expose additional parameters depending on your objectives.

See "Parameters for Oracle - Export Database via Data Pump" on page 205 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. You will specify values for those parameters when you create the deployment or at runtime.
4. Save the changes to the workflow (click **Save** in the lower right corner).
5. Create a new deployment.
6. On the Parameters tab, specify values (or set the type to Runtime Value) 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, specifying any runtime parameters.

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 "Oracle - Export 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 Oracle - Export Database via Data Pump).

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 Oracle - Export Database via Data Pump.

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.

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.
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. You must enable the Oracle Advanced Compression option to use these settings.
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

Parameter Name	Example Value	Description
		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.
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. **Note:** To use DUAL or TRANSPARENT mode, you must enable Oracle Advanced Security. If Encryption Mode is specified, Encryption Password must also be specified. If no value is specified, the default workflow behavior is that there will be no encryption.
Encryption Password	myencpwd	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.

Parameter Name	Example Value	Description
	Tip: To avoid having to re-enter passwords whenever they change, you can create a policy to provide them to the workflow.	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.
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.
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.
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 (and later), this user must have the DATAPUMP_EXP_FULL_DATABASE role, or the workflow will fail. For earlier versions, the user must have the EXP_FULL_DATABASE role.
Oracle DB User Password	siteadminpwd	Password for the Oracle DB User. This is required when this user is not sysdba.

Parameter Name	Example Value	Description
	Tip: To avoid having to re-enter passwords whenever they change, you can create a policy to provide them to the workflow.	
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 Oracle - Export Database via Data Pump).

Parameters for Oracle - Export 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. For some 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 Name	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.

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. You must enable the Oracle Advanced Compression option to use these settings.
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.
Encryption Mode	see description	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

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

Parameter Name	Default Value	Required	Description
			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. **Note:** To use DUAL or TRANSPARENT mode, you must enable Oracle Advanced Security. If Encryption Mode is specified, Encryption Password must also be specified. If no value is specified, the default workflow behavior is that there will be no encryption.
Encryption Password	no default	optional	Encryption password. Only required when Encryption Mode is set.
Exclude	no default	optional	Filter for the metadata—objects and object types—that you want to EXCLUDE from the export. For example: SCHEMA:"='HR'"
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.
Flashback SCN	no default	optional	SCN (System Change Number) used to reset the session snapshot.
Flashback Time	no default	optional	Time used to find the closest corresponding SCN (System Change Number) value. Format: DD-MM-YYYY HH24:MI:SS
Full	Y	optional	This parameter is set to Y to perform a full Data Pump Export (data and metadata) or N to only export schemas (metadata).

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

Parameter Name	Default Value	Required	Description
Ignorable Oracle Errors	no default	optional	Comma delimited list of Oracle errors to ignore while executing the Data Pump Export.
Include	no default	optional	Filter for the metadata—objects and object types for the current export mode—that you want to INCLUDE in the export. The specified objects and all their dependent objects are exported. Grants on these objects are also exported. For example: SCHEMA:"='HR'"
Job Name	no default	optional	Name of export job to be created.
Metrics	Y	optional	If you specify Y, 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 Y or N.
Oracle DB User	sysdba	optional	Database user account (if other than sysdba) that will be used to perform the Data Pump Export. **Note:** For Oracle Database 11g R2 (and later), this user must have the DATAPUMP_EXP_FULL_DATABASE role, or the workflow will fail. For earlier versions, 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.
Parallel	1	optional	Number of active workers for current export job. If no value is specified, the default workflow behavior is 1.
Reuse	N	optional	If set to Y, the workflow overwrites the destination dump file (if it exists). Default behavior is N.
Schema	no default	optional	Comma separated list of schemas to export. Required if Data Pump Parameter File is not specified.
Show Log File	False	optional	If set to True, the workflow prints the export log file contents to console and history pages. Default value is False.
Statistics	no default	optional	A parameter comparable to STATISTICS is not needed. Statistics are always saved for tables.

Oracle - Refresh 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 Oracle - Refresh Database via Data Pump" on page 220).

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 Oracle - Refresh Database via Data Pump"	List of input parameters for this workflow

Note: The documentation for this workflow refers to the workflow and its steps by their base names. The names in the HPE DMA user interface may have a version appended, for example, v2.

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

Prerequisites for this Workflow

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

1. The HPE 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.

How this Workflow Works

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

Overview show

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 Oracle - Refresh Database via Data Pump" on page 220).

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 show

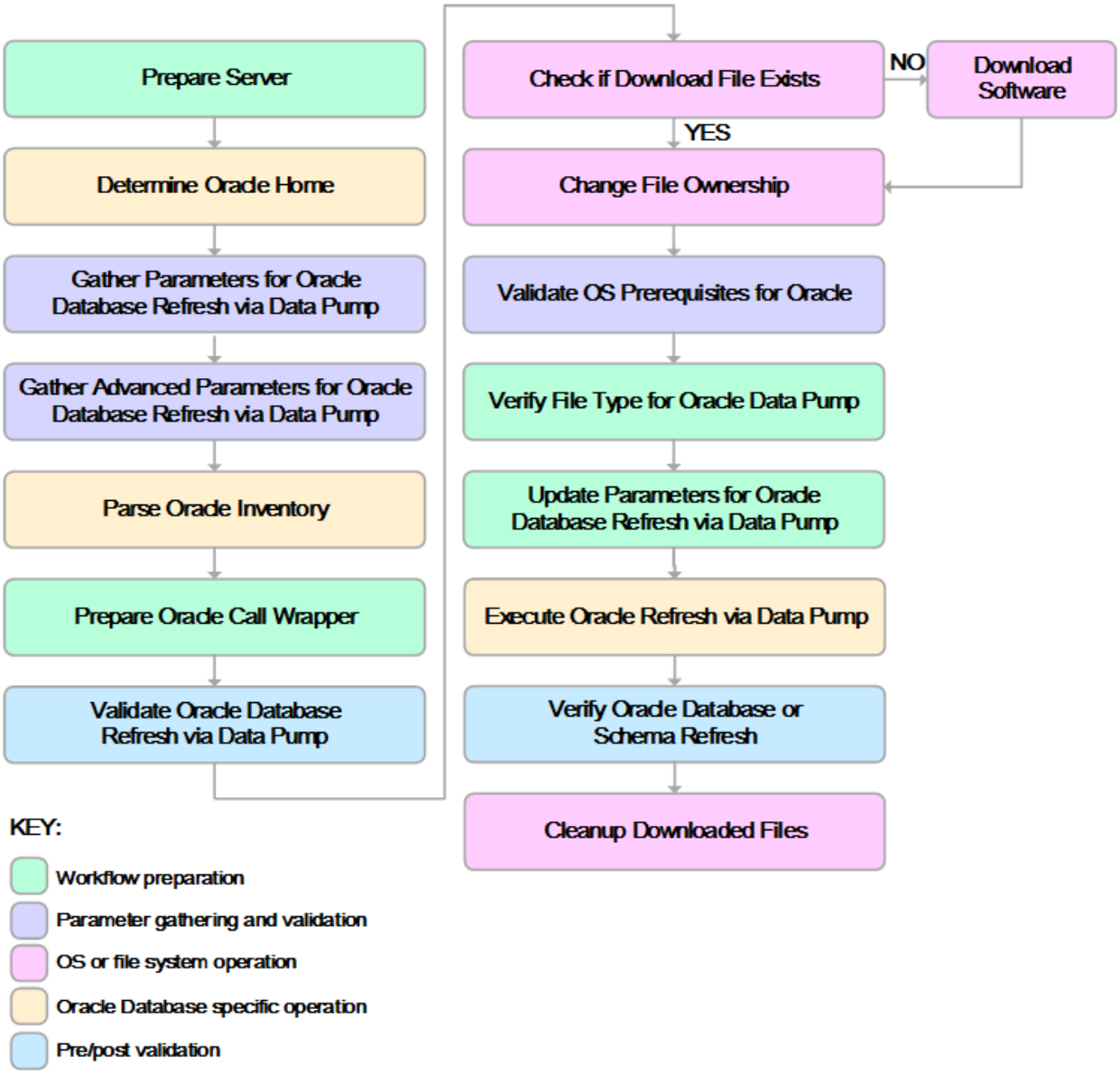
The workflow validates the following conditions:

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 HPE DMA platform.
11. The specified Data Pump Export File was, indeed, created by Data Pump.

Steps Executed show

The "Oracle - Refresh 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.

Click each box in the diagram to view additional information about that step.



Process Flow show

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 "Oracle - Refresh 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 Oracle - Refresh Database via Data Pump" on page 220

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

To use the Oracle - Refresh Database via Data Pump workflow:

1. Create a deployable copy of the workflow.
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 specify values for the optional parameters in the gather advanced parameters set. You also may need to expose additional parameters depending on your objectives.

See "Parameters for Oracle - Refresh Database via Data Pump" on page 220 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. You will specify values for those parameters when you create the deployment or at runtime.
4. Save the changes to the workflow (click **Save** in the lower right corner).

5. Create a new deployment.
6. On the Parameters tab, specify values (or set the type to Runtime Value) 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, specifying any runtime parameters.

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 "Oracle - Refresh 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.
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.
Schema	`hr,sh,oe`	Comma separated list of schemas to be imported.

Be sure that the default values for all remaining parameters are appropriate for your environment.

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.

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

The "Oracle - Refresh Database via Data Pump" workflow provides many parameters that can be modified to suit your needs. 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.

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.
Cleanup Database	True	If set to True, the workflow will clean up the database and will attempt to drop all non-default schemas. Default behavior is False.
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.
Encryption Password	myencpwd	Encryption password. Only required when Encryption Mode was used during the export.

Parameter Name	Example Value	Description
Ignorable Oracle Errors	ORA-39111, ORA-39151, ORA-31685	Comma delimited list of Oracle errors to ignore while executing the Data Pump Import.
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 (and later), 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	Required only if the DB User Password is not '/ as sysdba'.
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.

Parameters for Oracle - Refresh 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. For some 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.

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
Cleanup Database	False	optional	If set to True, the workflow will clean up the database and will attempt to drop all non-default schemas. Default behavior is False.
Cleanup Users Exclude	no default	optional	Comma separated list of database users that should be excluded from the cleanup process.
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.
Data Options	no default	optional	Options for how to handle certain types of data during exports and imports. The only valid option for this parameter is SKIP_CONSTRAINT_ERRORS.
Encryption Password	no default	optional	Encryption password. Only required when Encryption Mode was used during the export.
Exclude	no default	optional	Filter for the metadata—objects and object types—that you want to EXCLUDE from the import. For example: SCHEMA:"='HR'"
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.
Include	no default	optional	Filter for the metadata—objects and object types for the current

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

Parameter Name	Default Value	Required	Description
			import mode—that you want to INCLUDE in the import. For example: SCHEMA:"='HR'"
Job Name	no default	optional	Name of the import job to be created.
Oracle DB User	sysdba	optional	Database user account (if other than sysdba) that will be used to perform the Data Pump Import. **Note:** For Oracle Database 11g R2 (and later), 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	/ as sysdba	optional	Password for the Oracle DB User. This is required when this user is not sysdba.
Parallel	1	optional	Number of active workers for current import job. If no value is specified, the default workflow behavior is 1.
Partition Options	no default	optional	This parameter specifies how table partitions will be created by providing a value for PARTITION_OPTIONS in the Data Pump Import operation. Valid values are: • NONE creates tables as they existed on the system from which the export operation was performed. • DEPARTITION promotes each partition or subpartition to a new individual table. • MERGE combines all partitions and subpartitions into one table.
Remap Data	no default	optional	This parameter allows you to remap data by providing a value for REMAP_TABLE in the Data Pump Import operation. For example: TABLE_NAME1.COLUMN1:TABLE_NAME2.COLUMN2
Remap Datafile	no default	optional	Comma separated list of key value pairs separated by a colon. Changes the name of the source datafile to the target datafile name in all SQL statements where the source datafile is referenced: CREATE TABLESPACE, CREATE LIBRARY, and CREATE DIRECTORY. Example Format:('/u01/app/oracle/oradata/orca/scott1.dbf': '/u01/app/oracle/oradata/orcb/scott1.dbf', '/u01/app/oracle/oradata/orca/scott2.dbf': '/u01/app/oracle/oradata/orcb/scott2.dbf')

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

Parameter Name	Default Value	Required	Description
Remap Tablespace	no default	optional	This parameter allows you to remap all objects selected for import with persistent data in the source tablespace to be created in the target tablespace by providing a value for REMAP_TABLESPACE in the Data Pump Import operation. For example: TABLE_SPACE1:TABLE_SPACE2
Schema	no default	optional	Comma separated list of schemas to be imported.
Show Log File	False	optional	If set to True, the workflow prints the import log file contents to console and history pages. Default value is False.
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.
Tables	no default	optional	Comma separated list of tables to be imported.
Tablespaces	no default	optional	Comma separated list of tablespaces to be imported.
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

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

Parameter Name	Default Value	Required	Description
			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.
XML Password	xdb	optional	XML password. If the XDB schema is present and cleanup is set to True then the XML database will be re-created. Oracle requires the XML database password to be provided in the event that the XML database is re-created.

Oracle - Migrate Database TTS

This workflow migrates a database from a known source database to a known destination database by using a shared staging directory that is available to both the source and the destination. The staging directory can be a Network File System (NFS) mount. You can use this workflow to implement a cross-platform migration (for example: Linux to Solaris).

If the operating systems on the two targets warrant, the workflow also converts the `endian` format during the migration. (Endianness is either big-endian or little-endian and does not depend directly on Oracle software because it is a platform (hardware+OS) property that is used by Oracle software.) If `endian` conversion is necessary, the workflow uses Transportable Tablespace (TTS) cross-platform migration with both Data Pump and RMAN; you choose whether to convert on the source side or the destination side. If `endian` conversion is not necessary, then the workflow uses Data Pump in a standard TTS method.

If the destination has a higher Oracle version, the workflow also upgrades the Oracle version.

This workflow is especially useful in the following cases:

- For refreshing very large databases
- When you plan to move your database from older hardware to newer hardware

You specify the parameters on the Deployment page. The parameter values are validated prior to the migration. If you do not specify a value for a particular parameter, the default value is used (see "Parameters for Oracle - Migrate Database TTS").

Note: This workflow is a **bridged execution** workflow. You specify PRIMARY TARGET and DESTINATION 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 Oracle - Migrate Database TTS"	List of input parameters for this workflow

Note: To view the workflow steps, see Steps for Oracle - Migrate Database TTS.

Prerequisites for this Workflow

Be sure that the following prerequisites are satisfied before you run the "Oracle - Migrate Database TTS" workflow:

1. The Primary Target (source) and Destination must both be available as targets within HPE DMA. In other words, you must run the Discovery workflow beforehand to "discover" them as targets.
2. A single, temporary target directory (staging directory) must exist and be available to both the Primary Target and the Destination prior to the execution of the workflow. This directory can be local, or it can be a Network File System (NFS) mount point. The directory is the Source Target Directory on the Primary Target and is the Destination Target Directory on the Destination.

   Note: If you specify an NFS mount point, the pertinent NFS share must be available to the target servers and mounted prior to running this workflow. These are example NFS mount commands for Linux and Solaris:

Linux	`mount -t nfs -o rw,rsize=32768, wsize=32768,tcp,hard,nointr, nfsvers=3,bg,actimeo=0,timeo=600, suid,async <ServerName>: /u01/nfs_share /u01/nfs_share`	<*ServerName*> is the server name where the NFS mount point is created `/u01/nfs_share` is an example of the NFS mount shared directory
Solaris	`share -F nfs -o rw,anon=0 -d "<InstallServerDirectory>" /var/tmp/nfs_share`	<*InstallServerDirectory*> is the directory name where the NFS mount point is created `/var/tmp/nfs_share` is an example of the NFS mount shared directory

3. The Oracle user account that owns the Oracle binaries must have read and write privileges on both Source Target Directory and Destination Target Directory.
4. The Oracle Database software must be provisioned, and the database must exist in the Primary Target prior to workflow execution.
5. The HPE DMA client must be installed on all target servers.
6. The Oracle version on the destination must be the same or higher than the Oracle version on the source.
7. The same character set must be used on both the Primary Target and the Destination.
8. The Tablespaces must be self-contained. You must move both the Tablespace and the users at the same time.

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

How this Workflow Works

This topic contains the following information about the "Oracle - Migrate Database TTS" workflow:

Overview show

This workflow performs a database migration and/or upgrade from a known source database to a destination database. The destination database must already be provisioned and discovered using Oracle's Transportable Tablespace (TTS) method.

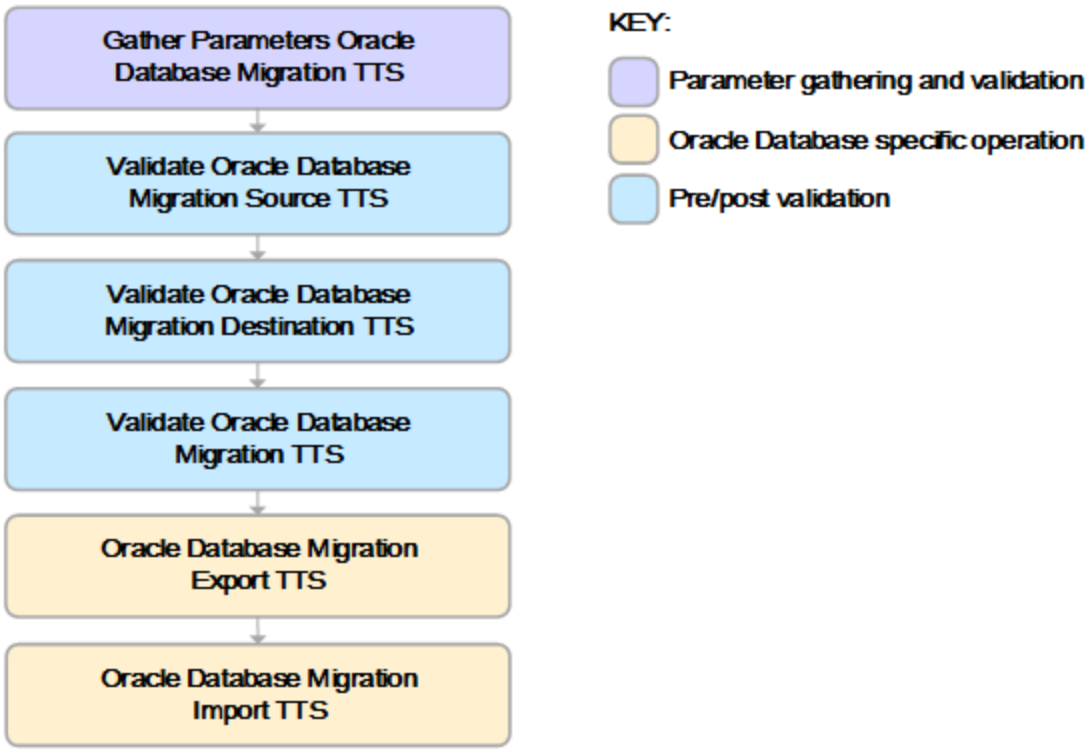
The workflow determines the operating systems where the databases reside. If endian conversion is necessary, then the workflow uses TTS cross-platform migration (both Data Pump and RMAN). If endian conversion is not necessary, then Data Pump is used in a standard Transportable Tablespace refresh method.

You enter the parameters on the Deployment page.The parameter values are validated prior to the migration. If you do not specify a value for a particular parameter, the default value is used (see "Parameters for Oracle - Migrate Database TTS").

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

Steps Executed show

The "Oracle - Migrate Database TTS" 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 show

This workflow performs the following tasks on the SOURCE target server (Primary Target):

1. Gathers all required and optional parameters.
2. Validates the following:
   - The values of the parameters entered on the deployment page and assigns default values if not specified.
   - The Conversion Host is source or destination.
   - The Oracle Account owns Oracle Home.
   - The Oracle Home exists.
   - The target directory exists and is writable.
   - Oracle Errors have the correct format.
   - The database is ready for TTS migration.
   - The archive log mode.
   - Oracle Enterprise Edition.
3. Prepares the target directory and changes the permissions, if necessary.
4. Determines OS type and endian values.

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

5. Validates the following:
   - Oracle Account owns Oracle Home.
   - The Oracle Home exists.
   - The target directory exists and is writable.
   - The database is ready for TTS migration.
   - Oracle Enterprise Edition.
6. Prepares the target directory and changes the permissions, if necessary.
7. Determines OS type and endian values.

The workflow then performs the following tasks on the SOURCE target server (Primary Target):

8. Determines the migration option based on the OSes and endians.
9. Validates the following:
   - The Oracle version on the destination is the same (or higher) than the source.
   - Disk Parallelism is a number.
   - The charactersets are compatible.
10. If Pre-Check Only is True, the workflow ends.
11. Creates the target directory.
12. Performs a Data Pump export of the migration metadata.
13. Assigns full user grants for export database.
14. If conversion is necessary and is to be done on SOURCE, then runs an RMAN endian conversion, or else simply copies the data files.

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

15. Creates the target directory.
16. Assigns full user grants on the import database.

17. If conversion is necessary and is to be done on DESTINATION, then runs an RMAN endian conversion in place, or else simply copies the data files.
18. Performs a Data Pump import of the migration metadata.

How to Run this Workflow

The following instructions show you how to customize and run the "Oracle - Migrate Database TTS" 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 Oracle - Migrate Database TTS".

Note: Before following this procedure, review the "Prerequisites for this Workflow", and ensure that all requirements are satisfied, particularly that the staging directory is available and mounted.

To use the Oracle - Migrate Database TTS workflow:

1. Create a deployable copy of the workflow.
2. Determine the values that you will specify for the following parameters:

Parameter Name	Default Value	Required	Description
Conversion Host	Destination	optional	If `endian` conversions are necessary, the host where the conversions take place. Valid values: Source or Destination.
Destination	no default	required	Name of the destination database (migrated to).
Destination Target Directory	no default	required	Staging directory path known to the DESTINATION Database Server and shared with the SOURCE Database Server. For example, the path to the NFS mount point as known by the DESTINATION Database Server.
Source Target Directory	no default	required	Staging directory path known to the SOURCE Database Server and shared with the DESTINATION Database Server. For example, the path to NFS mount point as known by SOURCE Database Server. For Solaris NFS, these mount options are recommended: `mount -o rw,bg,intr,hard,timeo=600, wsize=32768,rsize=32768`

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

See "Parameters for Oracle - Migrate Database TTS" 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. 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.
   a. On the Targets tab, select all the target servers—both source and destination—that will participate in this database migration. 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.

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

Parameter Name	Default	Description
Primary Target	no default	Instance that contains the database that 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 "Oracle - Migrate Database TTS" workflow:

Scenario 1: Perform a Database Migration between two Solaris systems

This is the simplest Data Pump database migration 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
Conversion Host		If `endian` conversions are necessary, the host where the conversions take place. Valid values: Source or Destination.
Destination		Name of the destination database (migrated to).
Destination Target Directory	`/var/tmp/nfs_destination`	Staging directory path known to the DESTINATION Database Server and shared with the SOURCE Database Server. For example, the path to the NFS mount point as known by the DESTINATION Database Server.
Source Target Directory	`/var/tmp/nfs_source`	Staging directory path known to the SOURCE Database Server and shared with the DESTINATION Database Server. For example, the path to NFS mount point as known by SOURCE Database Server. For Solaris NFS, these mount options are recommended: `mount -o rw,bg,intr,hard,timeo=600, wsize=32768,rsize=32768`

Be sure that the default values for all remaining parameters are appropriate for your environment (see "Parameters for Oracle - Migrate Database TTS").

Scenario 2: Perform a Database Migration pre-check between two Solaris systems

This is almost the same as the previous Data Pump database migration scenario except this time you will only do a pre-check without performing the actual migration. This will validate that the source and destination databases are compatible and are ready for a migration. You need to expose the Pre-Check Only parameter in the workflow so that it is available in the deployment.

Parameter Name	Example Value	Description
Conversion Host		If `endian` conversions are necessary, the host where the conversions take place. Valid values: Source or Destination.
Destination		Name of the destination database (migrated to).
Destination Target Directory	`/var/tmp/nfs_destination`	Staging directory path known to the DESTINATION Database Server and shared with the SOURCE Database Server. For example, the path to the NFS mount point as known by the DESTINATION Database Server.
Pre-Check Only	True	If set to True, then only the pre-check steps will run.
Source Target Directory	`/var/tmp/nfs_source`	Staging directory path known to the SOURCE Database Server and shared with the DESTINATION Database Server. For example, the path to NFS mount point as known by SOURCE Database Server. For Solaris NFS, these mount options are recommended: `mount -o rw,bg,intr,hard,timeo=600, wsize=32768,rsize=32768`

Be sure that the default values for all remaining parameters are appropriate for your environment (see "Parameters for Oracle - Migrate Database TTS").

Parameters for Oracle - Migrate Database TTS

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. For some parameters, if you do not specify a value for a parameter, a default value is assigned.

Parameters Defined in this Step: Gather Parameters Oracle Database Migration TTS

Parameter Name	Default Value	Required	Description
Conversion Host	Destination	optional	If `endian` conversions are necessary, the host where the conversions take place. Valid values: Source or Destination.
Destination	no default	required	Name of the destination database (migrated to).
Destination Target Directory	no default	required	Staging directory path known to the DESTINATION Database Server and shared with the SOURCE Database Server. For example, the path to the NFS mount point as known by the DESTINATION Database Server.
Disk Parallelism	1	optional	RMAN Disk Parallelism to be set when disabling and re-enabling RMAN compression. Specifies how many channels (up to 254) RMAN should allocate for jobs on the specified device type.
Ignorable Oracle Errors	ORA-31684,ORA-39111, ORA-39151,ORA-31685, ORA-00001	optional	Comma-separated list of Oracle Errors to ignore if found during the migration process.
Oracle Account	no default	required	Operation system account that owns the Oracle Home installation.
Pre-Check Only	False	optional	If set to True, then only the pre-check steps will run.
Source Target Directory	no default	required	Staging directory path known to the SOURCE Database Server and shared with the DESTINATION Database Server. For example, the path to NFS mount point as known by SOURCE Database Server. For Solaris NFS, these mount options are recommended: `mount -o rw,bg,intr,hard,timeo=600, wsize=32768,rsize=32768`

Oracle - Patch Home and Databases

This section describes how to use Database and Middleware Automation (HPE DMA) to create a repeatable, standardized method to quickly and accurately applyOracle quarterly patches on Oracle standalone

environments and standalone dataguard across an enterprise to reach quarterly patch compliance standards.

Tip: To patch HP Server Automation Grid standalone environments, see *Achieve Patch Related Compliance for Oracle Grid Standalone Environments Using HPE DMA*.

To patch more complex Oracle clustered environments, see *Achieve Patch Related Compliance for Oracle RAC Environments Using HPE DMA*.

These documents are available at: softwaresupport.hp.com

Prerequisites

Before performing the procedures in this section, your environment must meet the following minimum requirements:

- The Oracle Home and database are ready to be updated.
- The HPE DMA server is online.
- You have obtained the following files:

  The patch archive from Oracle

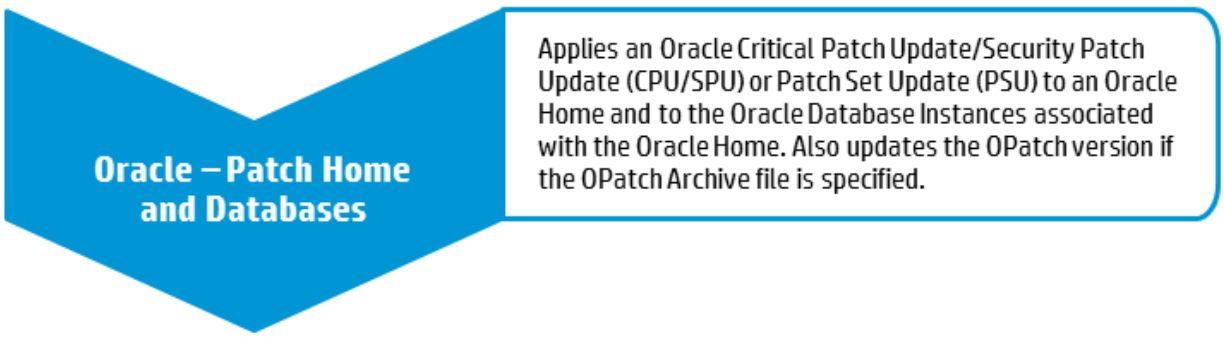
  The current OPatch version from Oracle (optional)

  The Oracle quarterly patch information XML file from HP Support (optional)
- You have licenses for Oracle Database and HPE DMA.
- You have coordinated a scheduled outage for all application servers that use the databases.
- The Oracle Standalone Grid Home must be version 11.2.0.1 or later.
- You have read access to all specified inventory pointers (Linux/UNIX).
- You have enough free space available, which varies depending on the Oracle patch.

Process Overview

Patching Oracle standalone environment or standalone dataguard with HPE DMA is a simple, one-step process. All required checks and steps to patch an Oracle Home and database have been implemented in a single HPE DMA workflow.

Use the following HPE DMA workflow to standardize the process of applying Oracle Security Patch Updates (SPU)—formerly called Critical Patch Updates (CPU)—or Patch Set Updates (PSU):



Workflow: Oracle - Patch Home and Databases

This section provides detailed information required to run the Oracle - Patch Home and Databases workflow.

Note: The following instructions assume that Patch Archive, OPatch Archive, and Patch Information File are found in the software repository or in the Patch Download Location.

Solution pack

This workflow requires the Database Patching Solution Pack.

Parameters to expose

None

Input parameters

When you deploy the Oracle - Patch Home and Databases workflow, specify input parameter values for the following steps.

Note: Bold text in the following tables indicates that you must specify a value for the parameter.

Step: Gather Parameters for Patch Home and Database

Parameter	Description	Example Value
Oracle Home	Required: Fully-qualified pathname of the Oracle Home where the patch will be applied.	`/u01/app/oracle/product/12.1.0/dbhome_1`
Patch Archive	Required: Name of the patch archive file (not fully-qualified).[1]	`p17027533_121010_121010_Linux-x86-64.zip`

[1] If the file is not found on the target server(s), it will be downloaded from the software repository.

Step: Gather Advanced Parameters for Patch Home and Database

Parameter	Description	Example Value
OPatch Archive	Optional: The OPatch Archive file required for this patch (not fully-qualified). If this parameter value is not specified, the current OPatch version will be used.1	`p6880880_121010_Linux-x86-64.zip`
Patch Information File	Optional: Patch information file that contains supplementary patch data in XML format—supplied by HPE Support. If not specified, defaults to the Oracle patch information that was available when the HPE DMA version released. Contact HPE Support for the updated Patch Information File.[1]	`201310_PatchInfo.xml`

FAQs

What can cause the workflow to fail?

The workflow will fail if you do not have the latest patch information file. This file becomes obsolete after three months. To solve this problem, get the latest patch information file from HPE Support.

What if I don't want specific Oracle errors to prevent patching?

The `README` file lists Oracle errors that are permissible—in other words, patching will continue even if these errors occur. If you have additional Oracle errors that you want to permit, specify the permissible errors in the Ignorable Oracle Errors parameter. Use the form: `ORA-nnnnn,ORA-nnnnn,ORA-nnnnn`

Workflow: Oracle - Patch Home and Databases

Step: Gather Advanced Parameters for Patch Home and Database

Parameter: Ignorable Oracle Errors[2]

Can I run an SQL script before updating the database catalog?

Yes. If you have an SQL script file, HPE DMA can run it before updating the database catalog if you specify that file in the Preparatory SQL Script parameter:

[1]If the file is not found on the target server(s), it will be downloaded from the software repository.
[2]This parameter is hidden by default and must be exposed when you make a copy of the workflow.

Workflow: Oracle - Patch Home and Databases

Step: Gather Advanced Parameters for Patch Home and Database

Parameter: Preparatory SQL Script1

Can I use the Oracle Configuration Manager with HPE DMA?

Yes. If you have an Oracle Configuration Manager (OCM) response file, HPE DMA can use it if you specify that file in the OCM Response File parameter:

Workflow: Oracle - Patch Home and Databases

Step: Gather Advanced Parameters for Patch Home and Database

Parameter: OCM Response File1

Oracle - Drop Database

The Oracle Drop Database enables you to remove the target database from the Oracle instance and from the DMA environment.

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

Topic	Information Included
"Prerequisites for this Workflow" on the next page	List of prerequisites that must be satisfied before you can run this workflow
"How this Workflow Works" on page 241	Information about what the workflow does, including validation checks performed, steps executed, and step descriptions
" How to Run this Workflow" on page 242	Instructions for running this workflow in your environment
"Parameters for Oracle - Drop Database" on page 243	List of input parameters for this workflow

Prerequisites for this Workflow

Be sure that the following prerequisites are satisfied before you run the Oracle Drop Database workflow:

- This solution requires HPE DMA version 10.30 (or later).

  The latest HPE DMA solution packs require the latest HPE DMA platform. To use the latest solution packs, update the HPE DMA platform. HPE DMA10.40 solution packs are supported on HPE DMA10.40 (and later).
- You have installed the Database Compliance solution pack.

The workflow must be able to:

- Get the Oracle instance up and running.
- Log in to the Oracle instance using Oracle login credentials.
- Drop the database upon connecting to the Oracle instance.

The information presented here assumes the following:

- HPE DMA is installed and operational.
- At least one suitable target server is available.
- You are logged in to the HPE DMA web interface.
- You have permission to create, edit, and deploy copies of the workflows included in this solution pack.

For more information about prerequisites for Oracle database, refer to the Oracle Server Documentation.

How this Workflow Works

This workflow performs the following actions:

Drops an Oracle database and removes it from the DMA environment.

Steps Executed by the Workflow

The Oracle Drop Database 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.

Steps Used by Oracle

Workflow Step	Description
Gather Parameters for Drop Oracle Database	This step gathers parameters prior to executing the rest of the workflow.
Drop Oracle Database	This steps drops the Oracle database from the target machine.
Remove Instance from Environment	This step removes the Oracle database from the DMA environment.

Note: For input parameter descriptions and defaults, see "Parameters for Oracle - Drop Database" on page 243.

How to Run this Workflow

The following instructions show you how to customize and run the Oracle Drop Database 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 Oracle - Drop Database" on the next page.

Note: Before following this procedure, review the "Prerequisites for this Workflow" on page 240, and ensure that all requirements are satisfied.

To use the Run Oracle Drop Database workflow:

1. Create a deployable copy of the workflow.
2. Determine the values that you will specify for the parameters.

   Note: There are no mandatory parameters required to run this workflow. All parameters are optional. You may need to expose additional parameters depending on your objectives.

   See "Parameters for Oracle - Drop Database" on the next page 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. You will specify values for those parameters when you create the deployment or at runtime.
4. Save the changes to the workflow (click **Save** in the lower right corner).
5. Create a new deployment.
6. On the Parameters tab, specify values (or set the type to Runtime Value) 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, specifying any runtime parameters.

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. The database will be removed from the DMA environment section upon SUCCESS as well.

Parameters for Oracle - Drop Database

There are no mandatory parameters required to run this workflow. All parameters are optional. Some of these parameters are not initially visible in a deployment. For most parameters, if you do not specify a value for a parameter, a default value is assigned.

Provisioning Data Guard

This section describes how to use Database and Middleware Automation (HPE DMA) to create a repeatable, standardized “gold image” for provisioning This parameter is hidden by default and must be exposed when you make a copy of the workflow.

What Oracle Data Guard does

The Oracle Data Guard provides disaster recovery replication to a physical standby database, providing you a contingency plan if your entire environment goes down. It has these features:

- Ensures high availability, data protection, and disaster recovery for enterprise data
- Creates, maintains, manages, and monitors one or more standby databases to enable production Oracle databases to survive disasters and data corruptions
- The standby databases are transactionally consistent copies of the production databases
- If the production database becomes unavailable because of a planned or an unplanned outage, Data Guard can switch any standby database to the production role, minimizing the downtime associated with the outage
- Facilitates failovers and switchovers to alternative hosts in the same or alternative locations
- Can be used with traditional backup, restoration, and cluster techniques to provide a high level of data protection and data availability
- Allows administrators to offload resource-intensive backup and reporting operations to standby systems
- The primary database can be either a single-instance Oracle database or an Oracle Real Application Clusters (RAC) database

Prerequisites

Before performing the procedures in this section, your environment must meet the following minimum requirements:

- HPE DMA version 10.40 (or later) with the Advanced Database Provisioning Solution Pack installed
- Servers running one of the following operating systems:
  - Linux (any version that is supported by Oracle and HPE DMA)
  - AIX
  - Solaris

- Oracle 11.2.0.x or 12.1.0.x with the following Oracle configuration:

  The Oracle Grid Infrastructure is installed on both the primary cluster servers and the standby cluster servers.

  The Oracle database software is installed on all cluster servers.

  Your primary database and your primary cluster already exist.

  Tip: The following HPE DMA workflows can help you achieve this configuration:

  HPE DMA Oracle - Provision or Upgrade Grid Infrastructure

  HPE DMA Oracle - Provision Database Software

  HPE DMA Oracle - Provision Database

- The primary node of the primary cluster is able to `ssh` as root to ALL nodes in the standby cluster.
- Licenses for Oracle Database and HPE DMA.

Tip: For detailed instructions to provision the required Oracle clustered environment using HPE DMA, see *Standardize Oracle RAC Provisioning Using HPE DMA*, available at: softwaresupport.hp.com

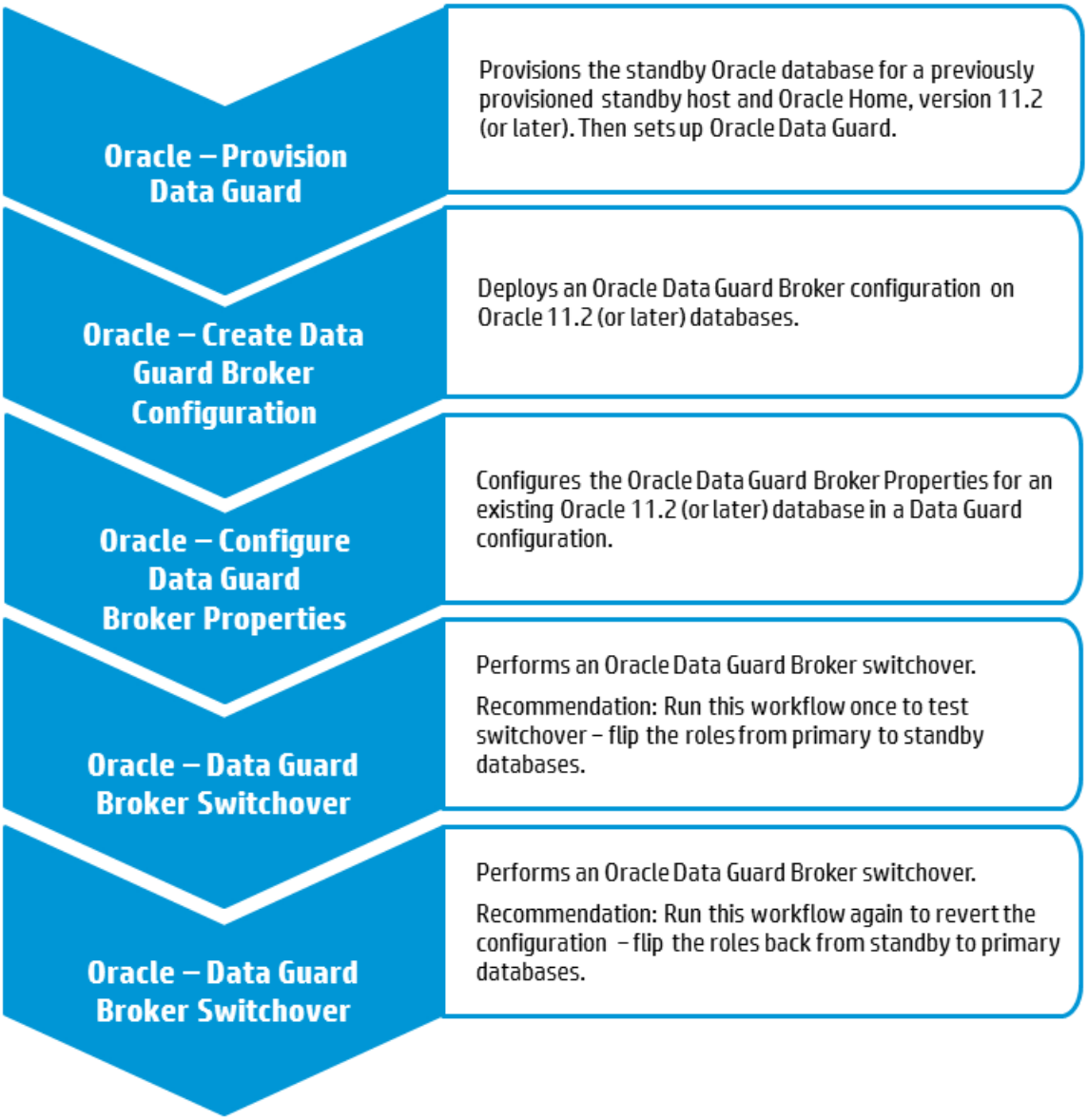
Tip: If you are configuring data guard in an Oracle Grid standalone environment, the prerequisites are appropriately simplified. For detailed instructions to provision this environment, see *Standardize Oracle Grid Standalone Provisioning Using HPE DMA*, available at softwaresupport.hp.com

Process Overview

Patching Oracle Grid Infrastructure with HPE DMA is a simple, one-step process. All required checks and steps to patch an Oracle Grid infrastructure—including the Grid Home, all Database Homes, and the databases—have been implemented in a single HPE DMA workflow.

Use the following HPE DMA workflow to standardize the process of applying an Oracle Patch Set Update (PSU):

Use the following HPE DMA workflows to standardize the process of provisioning, configuring, and verifying Oracle Data Guard:

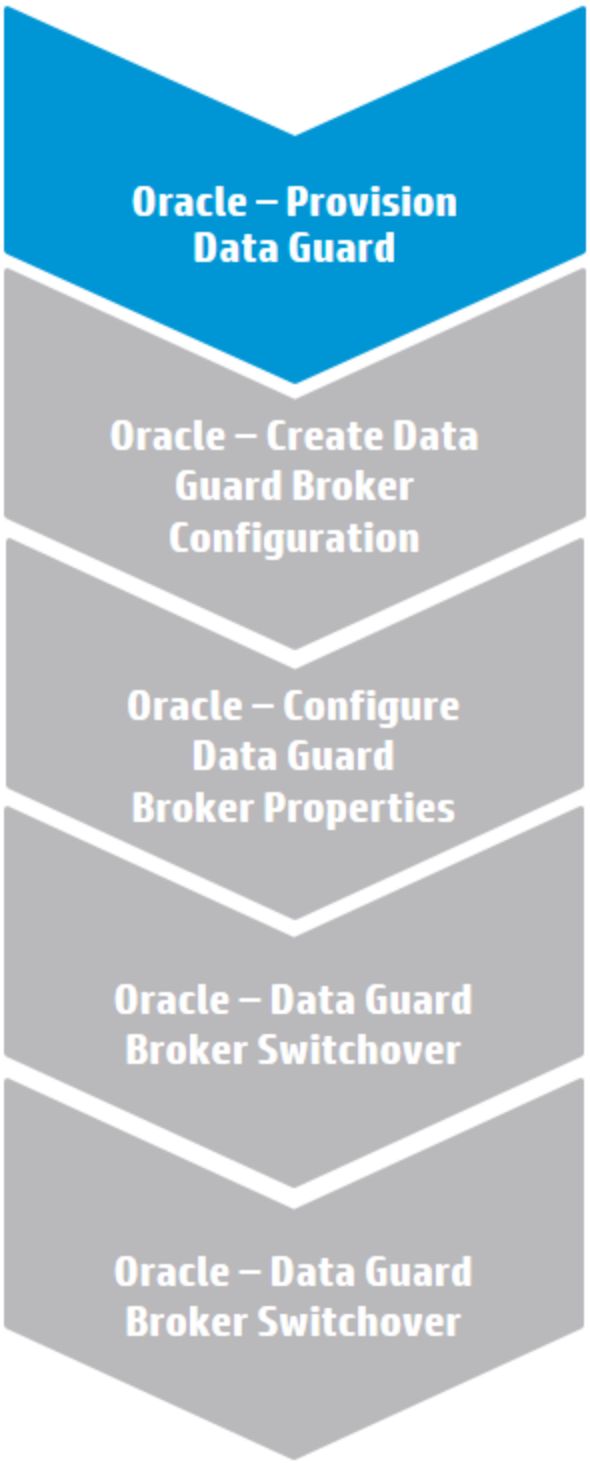


Tip: You can verify that Data Guard Broker switchover works by first flipping the roles from the primary to the standby databases (workflow 4 in the diagram). After you are confident that is successful, revert back to the primary databases (workflow 5 in the diagram).

The following section provides detailed information required to run the workflow.

The following sections provide detailed information required to run each workflow.

Workflow 1: Oracle - Provision Data Guard



This section provides detailed information required to run the Oracle - Provision Data Guard v3 workflow. This workflow regenerates the RSA keys for the Oracle user, sets up passwordless SSH login, and adds the details of all nodes on all the nodes in `/etc/host` file.

Make sure to use the latest (highest version number) of this workflow.

Solution pack

This workflow requires the Advanced Database Provisioning Solution Pack.

Parameters to expose

None

Input parameters

When you deploy the Oracle - Provision Data Guard v3 workflow, specify input parameter values for the following steps.[1]

Note: Bold text in the following tables indicates that you must specify a value for the parameter.

Make sure to use the latest (highest version number) of this workflow.

Step: Gather Parameters for Provision Oracle Data Guard v2

Parameter	Description	Example Value
Database Protection Mode	Required: Data Guard database protection mode. Valid values are: Maximum Performance Transactions commit after the redo data required to recover those transactions is written to the online redo log Maximum Availability Transactions commit after the redo data is written to the online redo log and the standby redo log on at least one synchronized standby database Maximum Protection Similar to Maximum Availability, except that the primary database shuts down if it cannot write its redo stream to at least one synchronized standby database	Maximum Availability
Oracle OS User	Required: Oracle OS username used to derive primary node database properties.	oracle
Oracle sys Password	Required: SYS Password for the primary and secondary databases.	●●●

[1]Make sure to use the latest (highest version number) of this workflow.

Step: Gather Parameters for Provision Oracle Data Guard v2, continued

Parameter	Description	Example Value
Primary Node Hostnames	Required: Comma-separated list of primary database server host names or IP addresses. If more than one IP address/hostname is entered, it indicates that the primary database is on RAC.	dma-rac1.mycompany.com, dma-rac2.mycompany.com
Standby DB Prefix Name	Required: Prefix that is appended to the DB_NAME to become the DB_UNIQUE_NAME for the standby databases.	DR
Standby Node Hostnames	Required: Comma-separated list of up to 30 standby database server host names or IP addresses. If more than one IP address/hostname is entered, it indicates that the standby database is on RAC.	dma-rac3.mycompany.com, dma-rac4.mycompany.com

Step: Gather Advanced Parameters for Provision Oracle Data Guard

Parameter	Description	Example Value
Archive Lag Target	Optional: Specifies the maximum time (in seconds) by which the standby database can lag behind the primary database. Valid values are 0 (zero) or 60-7200 seconds. If you specify Archive Lag Target, you must also specify Standby DB Unique Name. .	600
Change Remote Login PasswordFile on Primary	Optional: Set to Yes if HPE DMA is permitted to change the value of the Remote_Login_Passwordfile init.ora parameter to EXCLUSIVE (if it is not already set to EXCLUSIVE on the primary database). The default is Yes.	?
Data Guard Standby Type	Optional: The type of standby databases that you are configuring. Valid values are Physical, Logical, or Snapshot (only Physical is currently	Physical

Step: Gather Advanced Parameters for Provision Oracle Data Guard, continued

Parameter	Description	Example Value
	implemented). The default is Physical.	
DB File Name Convert	Optional: Used only if the primary and standby database datafiles will reside in different locations on the respective servers. Specify an even number of strings: "string1","string2","string3", "string4",... where string 1 is a sequence of characters in the primary database datafile name, string 2 is a sequence of characters in the first standby database datafile name, string 3 is a sequence of characters in the second primary database datafile name, string 4 is a sequence of characters in the second standby database datafile name, and so on. Each string must be delimited with single or double quotes. For example: "newyork","chicago","newyork", "atlanta".	?
Listener File Location	Optional: Fully-qualified filename for the listener file. This is only needed for non-standard installs. Do not specify if using the default file $ORACLE_ HOME/network/admin/listener.ora or the listener runs from a non-ASM home while ASM is in use.	?
Location for Controlfiles on Standby Server	Optional: Comma-separated list of fully-qualified controlfile filenames to create multiple copies of the controlfile on the standby database. By default, only one controlfile is generated on the standby database. The paths must already exist on the target servers.	?
Log Archive Dest 1	Optional: The target destination for the archived logfiles on the primary database (if it is not already set in the primary database). The default is none.	?

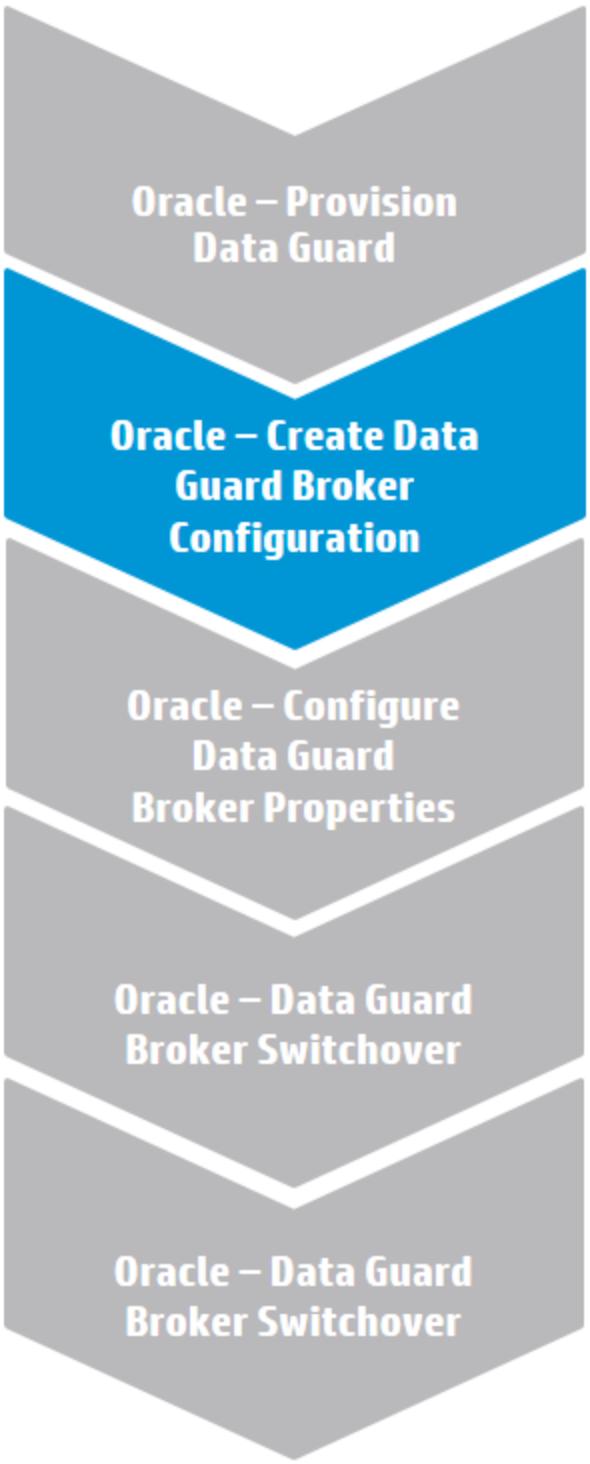
Step: Gather Advanced Parameters for Provision Oracle Data Guard, continued

Parameter	Description	Example Value
Log File Name Convert	Optional: Used only if the primary and standby redo log files will reside in different locations on the respective servers. Specify an even number of strings: "string1","string2","string3", "string4",... where string 1 is a sequence of characters in the primary database redo log file name, string 2 is a sequence of characters in the first standby database redo log file name, string 3 is a sequence of characters in the second primary database redo log file name, string 4 is a sequence of characters in the second standby database redo log file name, and so on. Each string must be delimited with single or double quotes. For example: "newyork","chicago","newyork", "atlanta".	?
Number of RMAN Auxiliary Channels	Optional: Number of RMAN (Recovery Manger) auxiliary channels to be used during the RMAN duplicate database process.	?
Number of RMAN Primary Channels	Optional: Number of RMAN (Recovery Manger) primary channels to be used during the RMAN duplicate database process. The default is 2.	?
Oratab File Location	Optional: Fully-qualified path to the oratab file. The default is /etc/oratab	?
Password File password	Optional: The password to set in the password file orapw. The default is the Oracle sys Password.	?
Primary DB Listener Port Number	Optional: Port number for the primary database listener. The default is the Oracle default.	?
Standby DB Listener Port Number	Optional: Port number for the standby database listener. The default is the Oracle default.	?
Tnsnames File Location	Optional: Fully-qualified filename for	?

Step: Gather Advanced Parameters for Provision Oracle Data Guard, continued

Parameter	Description	Example Value
	the TNS (Transparent Network Substrate) file. This is only needed for non-standard installs. Do not specify if using the default file $ORACLE_ HOME/network/admin/tnsnames.ora	
Update oratab file on Standby Servers	Optional: Set to Yes to update the oratab file on standby servers. The default is Yes.	?

Workflow 2: Oracle - Create Data Guard Broker Configuration



This section provides detailed information required to run the Oracle - Create Data Guard Broker Configuration workflow.

Solution pack

This workflow requires the Advanced Database Provisioning Solution Pack.

Parameters to expose

None

Input parameters

When you deploy the Oracle - Create Data Guard Broker Configuration workflow, specify input parameter values for the following steps.

Note: Bold text in the following tables indicates that you must specify a value for the parameter.

Note: HPE DMA uses the latest (highest version number) of steps.

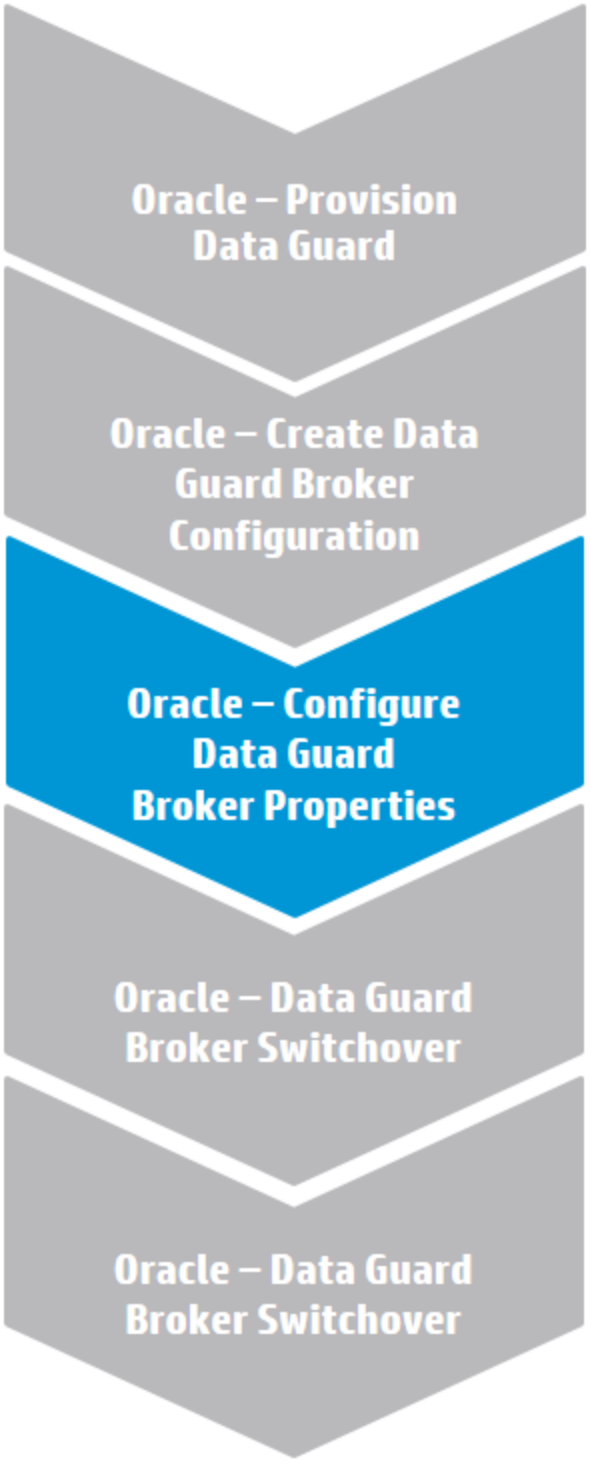
Step: Gather Parameters for Create Data Guard Broker Configuration

Parameter	Description	Example Value
Data Guard Broker Config Name	Required: The name that will be assigned to the Broker configuration that you are creating.	broker12c
Data Guard Standby Type	Required: The type of standby databases that you are configuring. Valid values are Physical, Logical, or Snapshot (only Physical is currently implemented).	Physical
Oracle sys Password	Required: SYS Password for the primary and secondary databases.	●●●
Primary Node Hostnames	Required: Comma-separated list of primary database server host names or IP addresses. If more than one IP address/hostname is entered, it indicates that the primary database is on RAC.	dma-rac1.mycompany.com, dma-rac2.mycompany.com *Use the same value(s) as the Primary Node Hostnames parameter for the Oracle - Provision Data Guard v3 deployment.*
Standby Connect Identifier	Required: Comma-separated list of the connect strings used to connect to the standby databases. These are defined in the `tnsnames.ora` file. Make sure that the `tnsnames.ora` file on every database and instance that is part of the configuration	DRorca *Use the value of the Standby DB Prefix Name parameter for the Oracle - Provision Data Guard v3 deployment plus the target's primary database name.*

Step: Gather Parameters for Create Data Guard Broker Configuration, continued

Parameter	Description	Example Value
	contains an entry for these connect identifiers.	
Standby Node Hostnames	Required: Comma-separated list of up to 30 standby database server host names or IP addresses. If more than one IP address/hostname is entered, it indicates that the standby database is on RAC.	dma-rac3.mycompany.com, dma-rac4.mycompany.com *Use the same value(s) as the Standby Node Hostnames parameter for the Oracle - Provision Data Guard v3 deployment.*

Workflow 3: Oracle - Configure Data Guard Broker Properties



This section provides detailed information required to run the Oracle - Configure Data Guard Broker Properties workflow.

Solution pack

This workflow requires the Advanced Database Provisioning Solution Pack.

Parameters to expose

None

Input parameters

When you deploy the Oracle - Configure Data Guard Broker Properties workflow, specify input parameter values for the following steps.

Note: Bold text in the following tables indicates that you must specify a value for the parameter.

Note: HPE DMA uses the latest (highest version number) of steps.

Step: Gather Parameters for Configure Data Guard Broker Properties

Parameter	Description	Example Value
Archive Lag Target	Optional: Specifies the maximum time (in seconds) by which the standby database can lag behind the primary database. Valid values are 0 (zero) or 60-7200 seconds. If you specify Archive Lag Target, you must also specify Standby DB Unique Name.	600
Broker Config State	Optional: Enables or disables Broker management of the primary and all standby databases in the specified Broker configuration. Valid values are ENABLE or DISABLE.	ENABLE
Disable Standby DB	Optional: Comma-separated list of up to 30 standby databases for which Broker management will be disabled. For Oracle - Configure Data Guard Broker Properties - not yet implemented.	
LogXptMode	Optional: Sets the redo transport service on the specified standby databases. Valid Values are SYNC or ASYNC.	SYNC

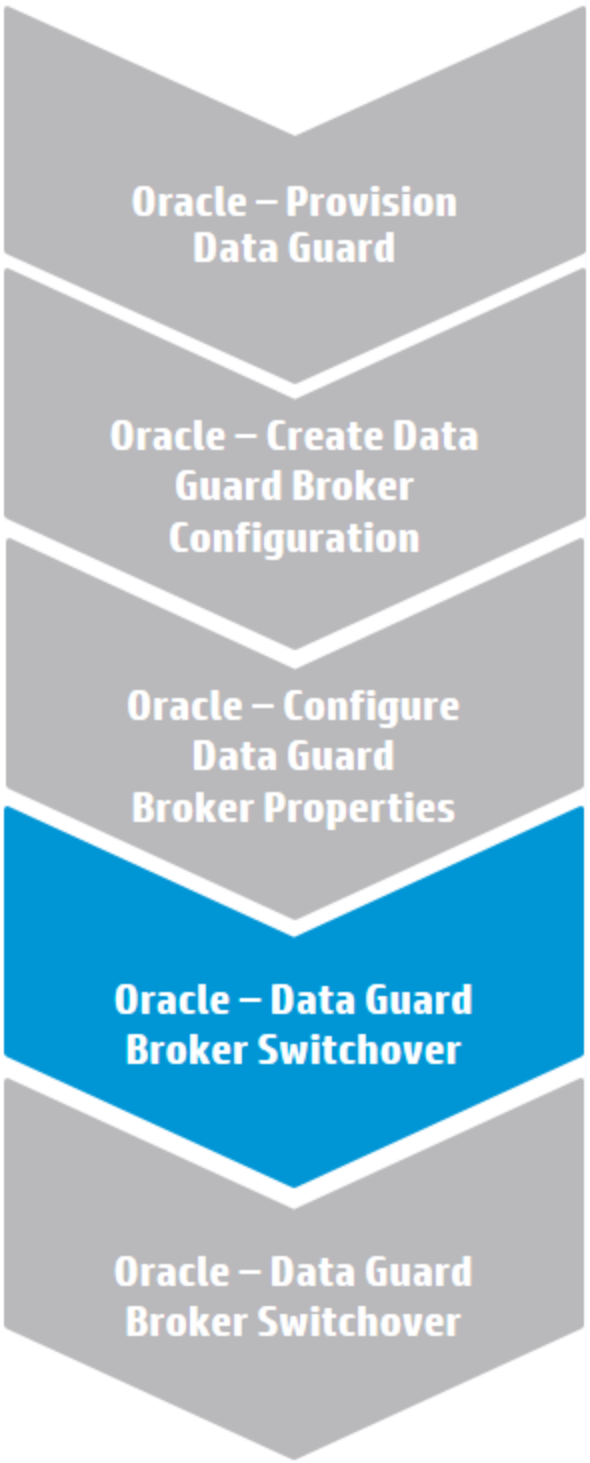
Step: Gather Parameters for Configure Data Guard Broker Properties, continued

Parameter	Description	Example Value
	SYNC ensures the highest level of data protection for the primary database, but it also incurs the highest performance impact. You must use SYNC for maximum protection and maximum availability modes. ASYNC offers a moderate grade of data protection for the primary database and incurs a lower performance impact than SYNC.	
Oracle sys Password	Required: SYS Password for the primary and secondary databases.	●●●
Primary Node Hostnames	Required: Comma-separated list of primary database server host names or IP addresses. If more than one IP address/hostname is entered, it indicates that the primary database is on RAC.	dma-rac1.mycompany.com, dma-rac2.mycompany.com *Use the same value(s) as the Primary Node Hostnames parameter for the Oracle - Provision Data Guard v3 and Oracle - Create Data Guard Broker Configuration deployments.*
RedoTransmit	Optional: Start or stop the redo transport services from the primary database to all standby databases. Valid values TRANSPORT-ON or TRANSPORT-OFF.	TRANSPORT-ON
Standby DB State	Optional: Start or stop the Redo Apply services on the specified physical standby database. Valid values are APPLY-ON or APPLY-OFF. If you specify the Standby DB State, you must also specify the Standby DB Unique Name.	APPLY-ON
Standby DB Unique Name	Optional: Unique name of the standby database whose property is being changed (see Standby DB State, Archive Lag Target).	
Standby Node Hostnames	Required: Comma-separated list of up to 30 standby database server host names or IP addresses.	dma-rac3.mycompany.com, dma-rac4.mycompany.com *Use the same value(s) as the*

Step: Gather Parameters for Configure Data Guard Broker Properties, continued

Parameter	Description	Example Value
	If more than one IP address/hostname is entered, it indicates that the standby database is on RAC.	*Standby Node Hostnames parameter for the Oracle - Provision Data Guard v3 and Oracle - Create Data Guard Broker Configuration deployments.*

Workflow 4: Oracle - Data Guard Broker Switchover #1



This section provides detailed information required to run the Oracle - Data Guard Broker Switchover workflow.

Note: This section instructs you to run this workflow two times. This first time describes how to test

switchover by switching the databases from primary to standby.

Solution pack

This workflow requires the Advanced Database Provisioning Solution Pack.

Parameters to expose

None

Input parameters

When you deploy the Oracle - Data Guard Broker Switchover workflow, specify input parameter values for the following steps.

Note: Bold text in the following tables indicates that you must specify a value for the parameter.

Note: HPE DMA uses the latest (highest version number) of steps.

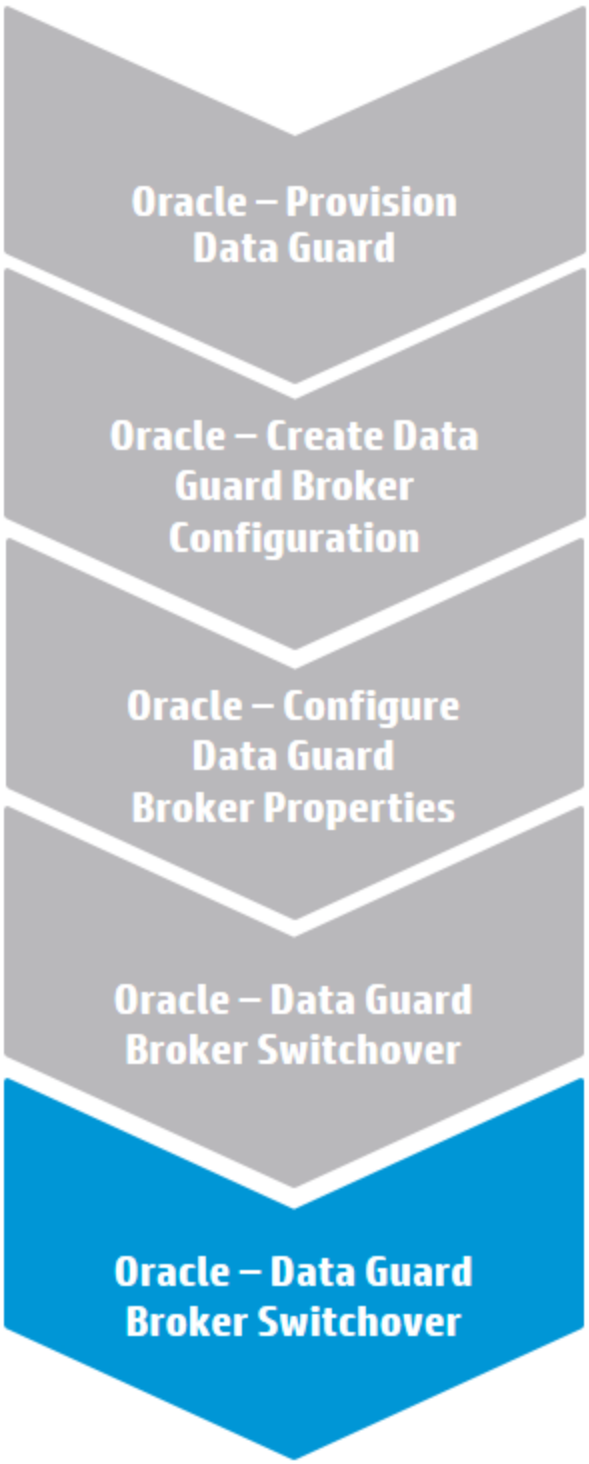
Step: Gather Parameters for Data Guard Broker Switchover

Parameter	Description	Example Value
Oracle Account	Required: The user who owns ORACLE_HOME.	oracle
Oracle sys Password	Required: SYS Password for the primary and secondary databases.	●●●
Primary Node Hostnames	Required: Comma-separated list of primary database server host names or IP addresses. If more than one IP address/hostname is entered, it indicates that the primary database is on RAC.	dma-rac1.mycompany.com, dma-rac2.mycompany.com *Use the same value(s) as the Primary Node Hostnames parameter for the Oracle - Provision Data Guard v3, Oracle - Create Data Guard Broker Configuration, and Oracle - Configure Data Guard Broker Properties deployments.*
Standby Node Hostnames	Required: Comma-separated list of up to 30 standby database server host names or IP addresses. If more than one IP address/hostname is entered, it indicates that the standby database is on RAC.	dma-rac3.mycompany.com, dma-rac4.mycompany.com *Use the same value(s) as the Standby Node Hostnames parameter for the Oracle - Provision Data Guard v3, Oracle - Create Data Guard Broker Configuration, and Oracle - Configure Data Guard Broker Properties deployments.*

Step: Gather Parameters for Data Guard Broker Switchover, continued

Parameter	Description	Example Value
Swtichover DB Unique Name	Required if the Switchover or Failover task is specified: Unique name of the standby database that will become the primary database in a switchover or failover operation.	DRorca *Use same value as the Standby Connect Identifier for the Oracle - Create Data Guard Broker Configurationdeployment.*

Workflow 5: Oracle - Data Guard Broker Switchover #2



This section provides detailed information required to run the Oracle - Data Guard Broker Switchover workflow.

Note: This section instructs you to run this workflow two times. This second time describes how to

revert the switchover by switching the databases back from standby to primary.

Solution pack

This workflow requires the Advanced Database Provisioning Solution Pack.

Parameters to expose

None

Input parameters

When you deploy the Oracle - Data Guard Broker Switchover workflow, specify input parameter values for the following steps.

Note: This section instructs you to run this workflow two times. This first time describes how to test switchover by switching the databases from primary to standby.

Note: HPE DMA uses the latest (highest version number) of steps.

Step: Gather Parameters for Data Guard Broker Switchover

Parameter	Description	Example Value
Oracle Account	Required: The user who owns ORACLE_HOME.	oracle
Oracle sys Password	Required: SYS Password for the primary and secondary databases.	●●●
Primary Node Hostnames	Required: Comma-separated list of primary database server host names or IP addresses. If more than one IP address/hostname is entered, it indicates that the primary database is on RAC.	dma-rac3.mycompany.com, dma-rac4.mycompany.com *To switch back to the standby database, use the same value(s) as the Standby Node Hostnames parameter for the Oracle - Provision Data Guard v3, Oracle - Create Data Guard Broker Configuration, and Oracle - Configure Data Guard Broker Properties deployments.*
Standby Node Hostnames	Required: Comma-separated list of up to 30 standby database server host names or IP addresses. If more than one IP address/hostname is entered, it indicates that the standby database is on RAC.	dma-rac1.mycompany.com, dma-rac2.mycompany.com *To switch back to the primary database, use the same value(s) as the Primary Node Hostnames parameter for the Oracle - Provision Data Guard v3, Oracle - Create Data Guard Broker Configuration,*

Step: Gather Parameters for Data Guard Broker Switchover, continued

Parameter	Description	Example Value
		and Oracle - Configure Data Guard Broker Properties deployments.
Swtichover DB Unique Name	Required if the Switchover or Failover task is specified: Unique name of the standby database that will become the primary database in a switchover or failover operation.	orca *Use the primary target's database name.*

FAQs

What if I don't want to meet all of the prerequisites?

If you want to override the normal system prerequisites, do the following:

1. Set the Ignore System Prerequisites value to Y before you execute the deployment:

   Workflow: Oracle - Provision or Upgrade Grid Infrastructure

   Step: Gather Advanced Parameters for Provision Grid Infrastructure

   Parameter: Ignore System Prerequisites[1]

2. Set the runInstaller Parameters value to `-ignoreSysPrereqs` before you execute the deployment:

   Workflow: Oracle - Provision Database Software

   Step: Gather Advanced Parameters for Provision Oracle Software

   Parameter: runInstaller Parameters1

[1]This parameter is hidden by default and must be exposed when you make a copy of the workflow.

What if I get a failure on the Oracle installer that the ASM disk is not a valid device?

The raw device must exist and be owned by `oracle` (the user who owns the Oracle Home).

1. Verify that the raw device exists and is owned by oracle:

   ```
   ls -l /dev/raw/raw1
   ```

2. Look for a line similar to the following:

   ```
   crw-rw----. 1 oracle oinstall 162, 1 Mar 12 14:24 /dev/raw/raw1
   ```

3. If the device does not exist or is not owned by `oracle`, run the following commands:

   ```
   raw /dev/raw/raw1 /dev/sdc1
   chown oracle:oinstall /dev/raw/raw1
   ```

What if I get an error message that the `/u01/app` directory doesn't exist?

The `/u01/app` directory must exist and be owned by `oracle` (the user who owns the Oracle Home).

1. Create the directory:

   ```
   mkdir /u01/app
   ```

2. Change the ownership:

   ```
   chown -R oracle:oinstall /u01/app
   ```

What if I get a failure in the install log related to the virtual IP address or SCAN virtual IP address?

If you get a failure related to virtual IP addresses, check the following:

1. Ensure that the virtual IP address and SCAN virtual IP address resolve in DNA and are in `/etc/hosts`
2. Ensure that your public name, virtual IP address, and SCAN virtual IP address are all in the same subnet.

What if I get an error referencing the public, private, or virtual IP addresses?

If HPE DMA gives an error referencing the public, private, or virtual IP addresses, verify that the values specified for CLUSTER - Grid Node List are in the required format:

node1-public:node1-private:node1-virtual,node2-public:node2-private:node2-virtual

Workflow:	Oracle - Provision or Upgrade Grid Infrastructure
Step:	Gather Advanced Parameters for Provision Grid Infrastructure
Parameter:	CLUSTER - Grid Node List

Provisioning Grid Infrastructure

This section describes how to use Database and Middleware Automation (HPE DMA) to create a repeatable, standardized “gold image” for provisioning an Oracle Grid Infrastructure for a standalone server (also known as an Oracle Restart), the Oracle Database software, and then an Oracle database.

What Oracle Grid standalone does

The Oracle Grid standalone server software allows an Oracle database to use Automatic Storage Management (ASM) local or remote storage. It enables the user to use these features of Oracle 11gR2 Oracle Restart:

- Start automatically with the server
- Manage the configuration and restart the database

Prerequisites

Before performing the procedures in this section, your environment must meet the following minimum requirements:

- A server running one of the following operating systems:

  Linux (any version that is supported by Oracle and HPE DMA)

  AIX

  Solaris

  This server must meet the Oracle requirements for installing 12c (see Oracle Database Online Documentation 12c Release 1 (12.1) for more information).
- A raw disk (or disks) available to be mounted and used by Oracle ASM. The device cannot be formatted, but it may be partitioned.
- Storage:

A staging directory with 8 gigabytes available to unzip the Oracle Grid Infrastructure and Oracle Database binaries.

For ASM disks, a minimum of 5 gigabytes combined for logical storage (more may be required for your environment).

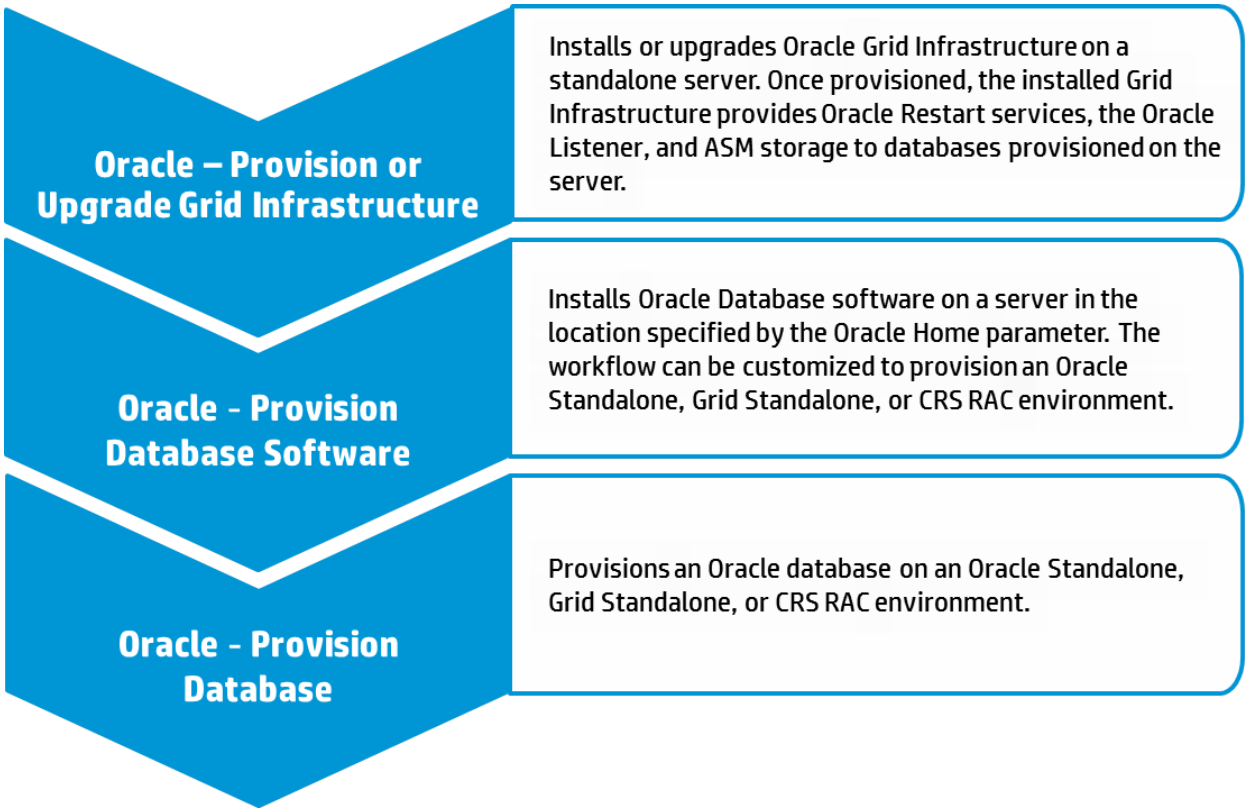
A minimum of 30 gigabytes on the partition to install Oracle Grid Infrastructure and Oracle Database Homes (more may be required for your environment).

- Licenses for Oracle Database and HPE DMA.

Process Overview

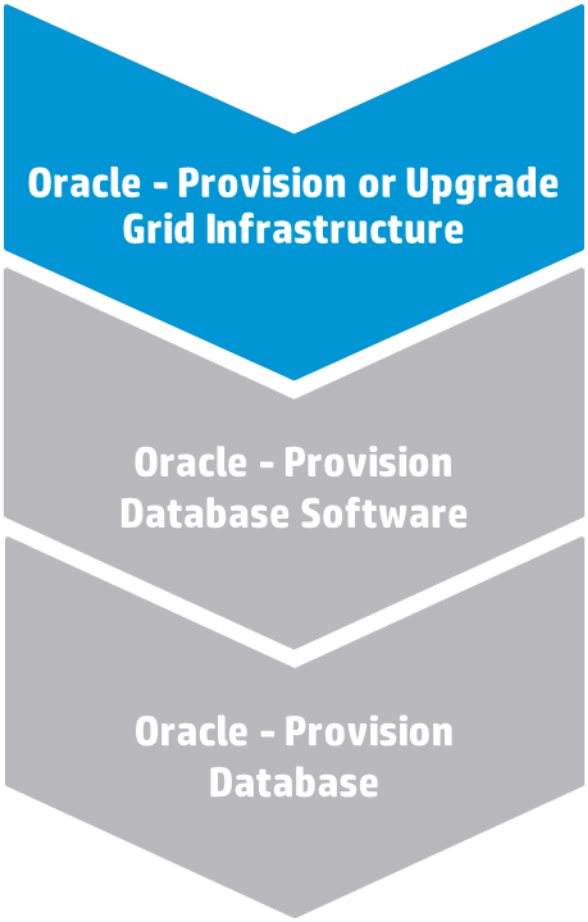
Patching Oracle Grid Infrastructure with HPE DMA is a simple, one-step process. All required checks and steps to patch an Oracle Grid infrastructure—including the Grid Home, all Database Homes, and the databases—have been implemented in a single HPE DMA workflow.

Use the following HPE DMA workflows to standardize the process of provisioning Oracle Grid standalone server, software, and database:



The following sections provide detailed information required to run each workflow.

Workflow 1: Oracle - Provision or Upgrade Grid Infrastructure



This section provides detailed information required to run the Oracle - Provision or Upgrade Grid Infrastructure workflow.

Solution pack

This workflow requires the Advanced Database Provisioning Solution Pack.

Parameters to expose

None

Input parameters

When you deploy the Oracle - Provision or Upgrade Grid Infrastructure workflow, specify input parameter values for the following steps.

Note: Bold text in the following tables indicates that you must specify a value for the parameter.

Step: Gather Parameters for Provision Grid Infrastructure

Parameter	Description	Example Value
ASM Diskgroup List	Required: A comma-separated list of the diskgroups that you are creating, with each diskgroup containing a comma-separated list of its associated disks.	ASMDATA(/dev/raw/raw1)
ASM Groups	Required: The operating system groups that manage ASM. The syntax is: ASMGroup:ASMDBA:ASMOper	oinstall:dba:oinstall
ASM Password	Required: The password for provisioning an Oracle database using ASM storage. The default is Manager1.	●●●
CRS Base	Required: The location of the Oracle Base directory. This is where the admin directory is located.	`/u01/app/grid`
CRS Home	Required: The location where the CRS software will be installed. The default is: `/u01/app/oracle/product/12.1.0/grid1`	`/u01/app/oracle/product/12.1.0/grid1`
Oracle Software	Required: A comma-separated list of the Oracle Database software (CRS) archive files (`.zip` or `.cpio.gz`).[1]	`linuxamd64_12c_grid_1of2.zip, linuxamd64_12c_grid_2of2.zip`

Step: Gather Advanced Parameters for Provision Grid Infrastructure

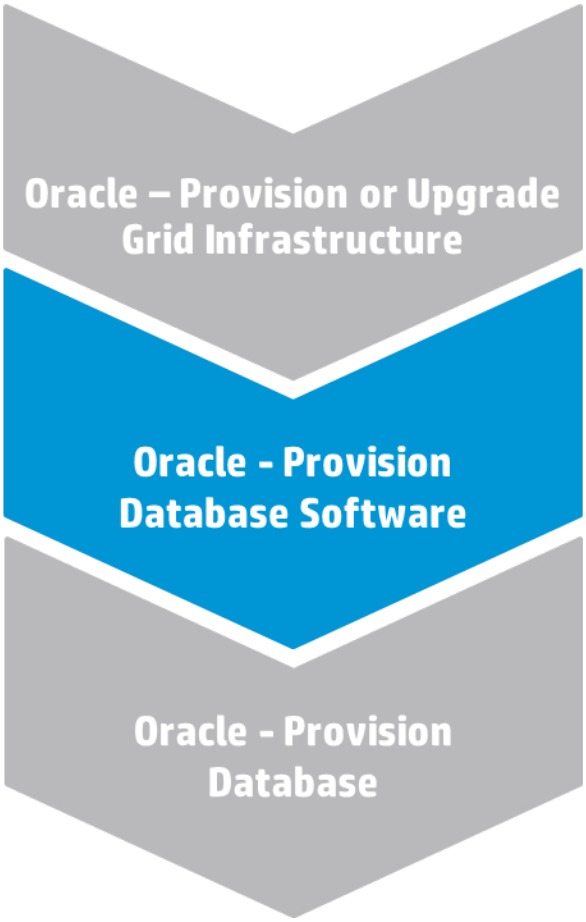
Parameter	Description	Example Value
CLUSTER - Grid Node List	Optional: A comma-separated list of the Grid Infrastructure nodes. Must be in the format: node1-public:node1-private:node1-virtual, node2-public:node2-private:node2-virtual	
CLUSTER - Scan Info	Optional: The Oracle single Client Access name and port that you will use to reference this cluster without specifying a specific node.	
Download Location	Required: The location where the CRS archive has been (or will be) downloaded.	`/tmp`
Extract Location	Required: The directory location where the CRS archive has been	`/tmp`

[1] If the file(s) are not found on the target server(s), they will be downloaded from the software repository.

Step: Gather Advanced Parameters for Provision Grid Infrastructure, continued

Parameter	Description	Example Value
	(or will be) extracted.	
Trust SSL Certificates	Deprecated: HPE DMA no longer uses this workflow parameter to determine whether the workflow will trust any Secure Sockets Layer (SSL) certificate used to connect to the HPE DMA web server. HPE DMA now uses the `com.hp.dma.conn.trustAllCertificates` parameter in the `dma.xml` file.	
Upgrade to Oracle 12	Optional: Set to True if you are upgrading an existing Oracle 11g Grid Infrastructure to Oracle 12 Grid Infrastructure. The default is False.	False
Web Service Password	Optional: Password for the HPE DMA Discovery web service API.	●●●
Web Service User	Optional: User who is capable of modifying the managed environment by using the HPE DMA Discovery web service API.	

Workflow 2: Oracle - Provision Database Software



This section provides detailed information required to run the Oracle - Provision Database Software workflow.[1]

Solution pack

This workflow requires the Database Provisioning Solution Pack.

Parameters to expose

None

Input parameters

When you deploy the Oracle - Provision Database Software workflow, specify input parameter values for the following steps.[2]

[1]Make sure to use the latest (highest version number) of this workflow.
[2]HPE DMA uses the latest (highest version number) of steps.

Note: Bold text in the following table indicates that you must specify a value for the parameter.

Step: Gather Parameters for Provision Oracle Software

Parameter	Description	Example Value
Oracle Account	Optional (required only if inventory does not exist): The Oracle user that will own the Oracle Home.	oracle
Oracle Base	Optional (required only if Oracle Home has not been set up): The fully-qualified path to the Oracle base directory where the admin directories will be located.	`/u01/app/oracle`
Oracle Home	Optional (required only if Oracle Home has not been set up): The fully-qualified pathname where the Oracle Home will be created. If the specified directory does not exist, it will be created.	`/u01/app/oracle/product/12.1.0/dbhome_1`
Oracle Software	Optional (required only if Oracle Home has not been set up): A comma-separated list of the Oracle Database software archive files.s[1]	`linuxamd64_12c_database_1of2.zip, linuxamd64_12c_database_2of2.zip`

Step: Gather Advanced Parameters for Provision Oracle Software

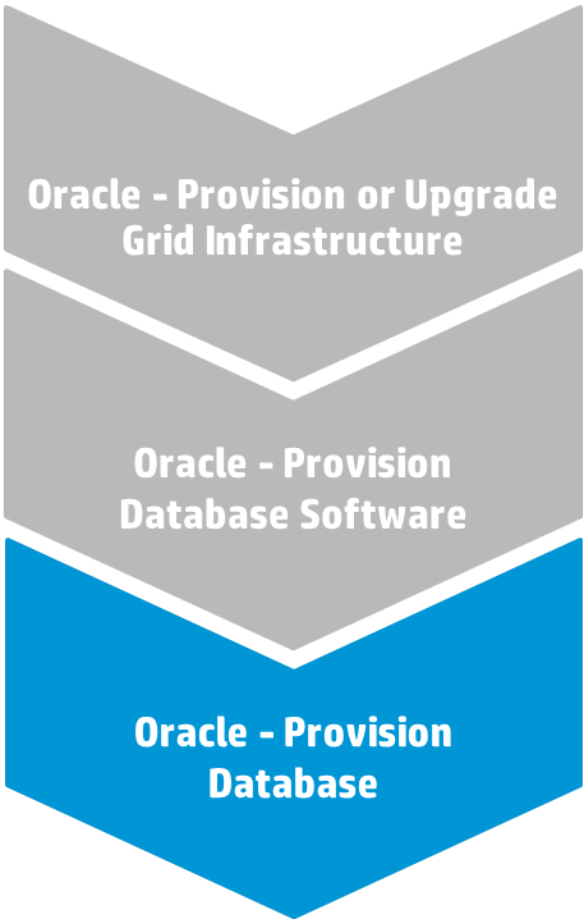
Parameter	Description	Example Value
Cluster Nodes	Optional (required when provisioning a RAC database): Comma-separated list of nodes to install software on. Leave blank for non-clustered environments.	
Download Location	Optional: The directory where input files already exist or to which files will be downloaded from the software repository.	`/tmp`
Extract Location	Optional: The directory location where the Oracle database software archives will be extracted. It will be cleaned up at end of workflow execution. If not specified, a default will be created.	`/tmp`

[1] If the file(s) are not found on the target server(s), they will be downloaded from the software repository.

Step: Gather Advanced Parameters for Provision Oracle Software, continued

Parameter	Description	Example Value
runInstaller Parameters	Optional: The parameters to pass to the Oracle `runInstaller` command. For example: `-force` or `-ignoreSysPrereqs`[1]	`-ignoreSysPrereqs`

Workflow 3: Oracle - Provision Database



This section provides detailed information required to run the Oracle - Provision Database workflow.

Solution pack

This workflow requires the Database Provisioning Solution Pack.

Parameters to expose

None

[1]This parameter is hidden by default and must be exposed when you make a copy of the workflow.

Input parameters

When you deploy the Oracle - Provision Database workflow, specify input parameter values for the following steps.[1]

Note: Bold text in the following tables indicates that you must specify a value for the parameter.

Step: Gather Parameters for Provision Oracle Database

Parameter	Description	Example Value
Database Name	Required: The name of the database to provision.	orca
Datafile Location	Required: The database file locations.	+ASMDATA *Use a plus sign (+) followed by the same value as the ASM Diskgroup List parameter for the Oracle - Provision or Upgrade Grid Infrastructure deployment.*
Oracle Account	Optional (required only if inventory does not exist): The Oracle user that will own the Oracle Home.	oracle *Use the same value specified for the Oracle Account parameter for the Oracle - Provision Database Software deployment.*
Oracle Base	Required: The fully-qualified path to the Oracle base directory where the admin directories are located.	`/u01/app/oracle/product/12.1.0/dbhome_1` *Use the same value specified for the Oracle Base parameter for the Oracle - Provision Database Software deployment.*
Oracle Home	Optional: The Oracle Home to use if more than one Oracle Home exists in the inventory file(s).	`/u01/app/oracle` *Use the same value specified for the Oracle Base parameter for the Oracle - Provision Database Software deployment.*
Trust SSL Certificates	Deprecated: HPE DMA no longer uses this workflow parameter to determine whether the workflow will trust any Secure Sockets Layer (SSL) certificate used to connect to the HPE DMA web server. HPE DMA now uses the `com.hp.dma.conn.`	

[1]HPE DMA uses the latest (highest version number) of steps.

Step: Gather Parameters for Provision Oracle Database, continued

Parameter	Description	Example Value
	`trustAllCertificates` parameter in the `dma.xml` file.	
Web Service Password	Required: Password for the HPE DMA Discovery web service API.	●●●
Web Service User	Optional: User who is capable of modifying the managed environment by using the HPE DMA Discovery web service API.	

Step: Gather Advanced Parameters for Provision Oracle Database

Parameter	Description	Example Value
ASM Password	Optional (required when provisioning an Oracle database using ASM storage): The password used to manage ASM.[1]	*Use the same value specified for the ASM Password parameter for the Oracle - Provision or Upgrade Grid Infrastructure deployment.*
Cluster Nodes	Optional (required when provisioning a RAC database): Comma-separated list of nodes where this database will run. Leave blank for non-clustered environments.True	
DBCA Template File	Optional: Location of a DBCA template file in the software repository to download. If not specified, a default will be used.	

[1]This parameter is hidden by default and must be exposed when you make a copy of the workflow.

FAQs

What if I don't want to meet all of the prerequisites?

If you want to override the normal system prerequisites, do the following:

1. Set the Ignore System Prerequisites value to Y before you execute the deployment:

   Workflow: Oracle - Provision or Upgrade Grid Infrastructure

   Step: Gather Advanced Parameters for Provision Grid Infrastructure

   Parameter: Ignore System Prerequisites[1]

2. Set the runInstaller Parameters value to `-ignoreSysPrereqs` before you execute the deployment:

   Workflow: Oracle - Provision Database Software

   Step: Gather Advanced Parameters for Provision Oracle Software

   Parameter: runInstaller Parameters1

What if I get a failure on the Oracle installer that the ASM disk is not a valid device?

The raw device must exist and be owned by `oracle` (the user who owns the Oracle Home).

1. Verify that the raw device exists and is owned by oracle:

   ```
   ls -l /dev/raw/raw1
   ```

2. Look for a line similar to the following:

   ```
   crw-rw----. 1 oracle oinstall 162, 1 Mar 12 14:24 /dev/raw/raw1
   ```

3. If the device does not exist or is not owned by `oracle`, run the following commands:

   ```
   raw /dev/raw/raw1 /dev/sdc1
   chown oracle:oinstall /dev/raw/raw1
   ```

[1]This parameter is hidden by default and must be exposed when you make a copy of the workflow.

What if I get an error message that the /u01/app directory doesn't exist?

The /u01/app directory must exist and be owned by oracle (the user who owns the Oracle Home).

1. Create the directory:

   ```
   mkdir /u01/app
   ```

2. Change the ownership:

   ```
   chown -R oracle:oinstall /u01/app
   ```

Provisioning RAC

This section describes how to use Database and Middleware Automation (HPE DMA) to create a repeatable, standardized "gold image" for provisioning an Oracle Grid Cluster Ready Services (CRS), Automatic Storage Management (ASM), and Real Application Clusters (RAC) database.

What Oracle Grid infrastructure for cluster does

The Oracle Grid infrastructure for cluster allows an Oracle database to participate as a RAC database and use common ASM storage across nodes. It enables the user to use these features:

- Start automatically with the server
- Manage the configurations of the database
- Run Oracle Restart
- Use ASM
- Manage nodes in an Oracle cluster
- Manage virtual IP addresses and SCAN virtual IP addresses

Prerequisites

Before performing the procedures in this section, your environment must meet the following minimum requirements:

- A server running one of the following operating systems:

  Linux (any version that is supported by Oracle and HPE DMA)

  AIX

  Solaris

  This server must meet the Oracle requirements for installing 12c (see Oracle Database Online Documentation 12c Release 1 (12.1) for more information).
- A shared raw disk (or disks) to be used across all of the nodes. The disk needs to be available to be mounted and used by Oracle ASM. The device cannot be formatted, but it may be partitioned.

- Storage:

  A staging directory with 8 gigabytes available to unzip the Oracle Grid Infrastructure and Oracle Database binaries.

  For ASM disks, a minimum of 5 gigabytes combined for logical storage (more may be required for your environment).

  A minimum of 30 gigabytes on the partition to install Oracle Grid Infrastructure and Oracle Database Homes (more may be required for your environment).
- Networking

  A separate NIC configured for a VLAN private interconnect on both nodes.

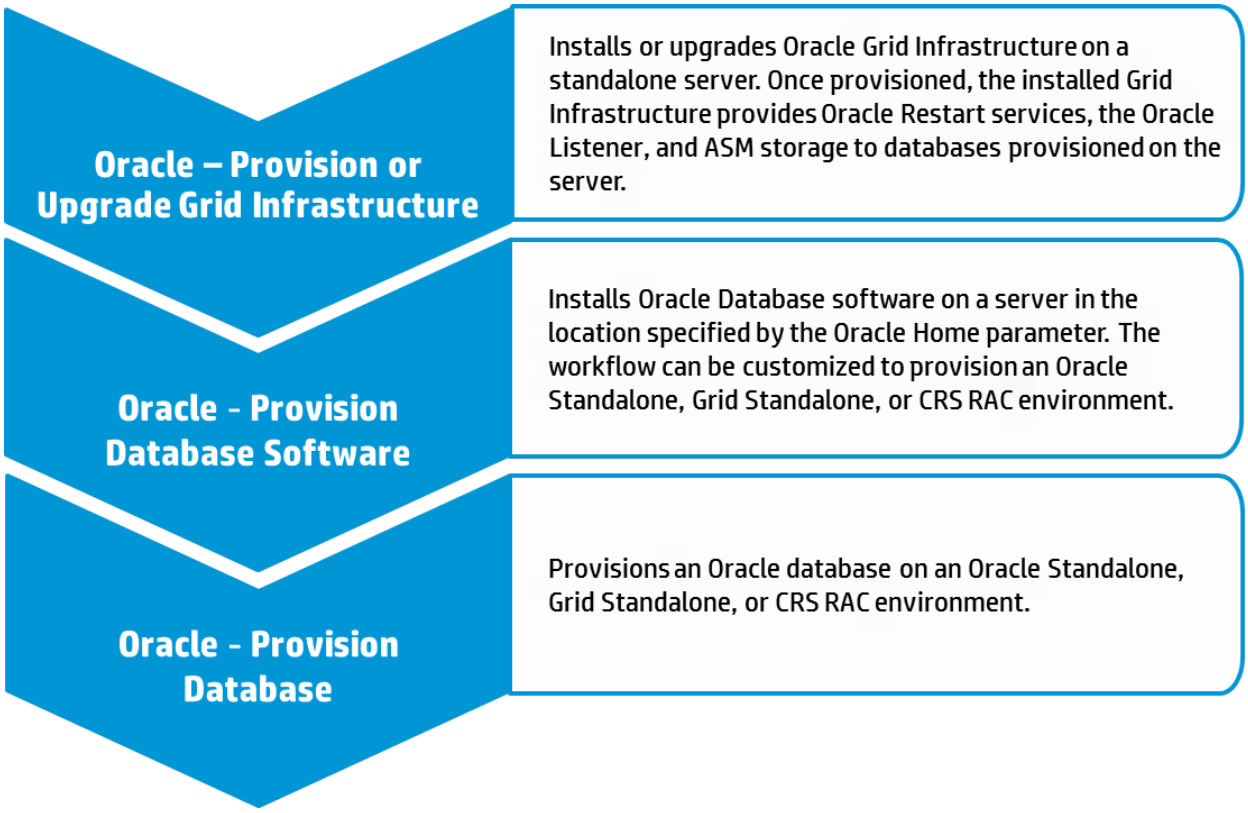
  Virtual IP addresses, one per node.

  A SCAN virtual IP address, one per cluster.
- Licenses for Oracle Database and HPE DMA.

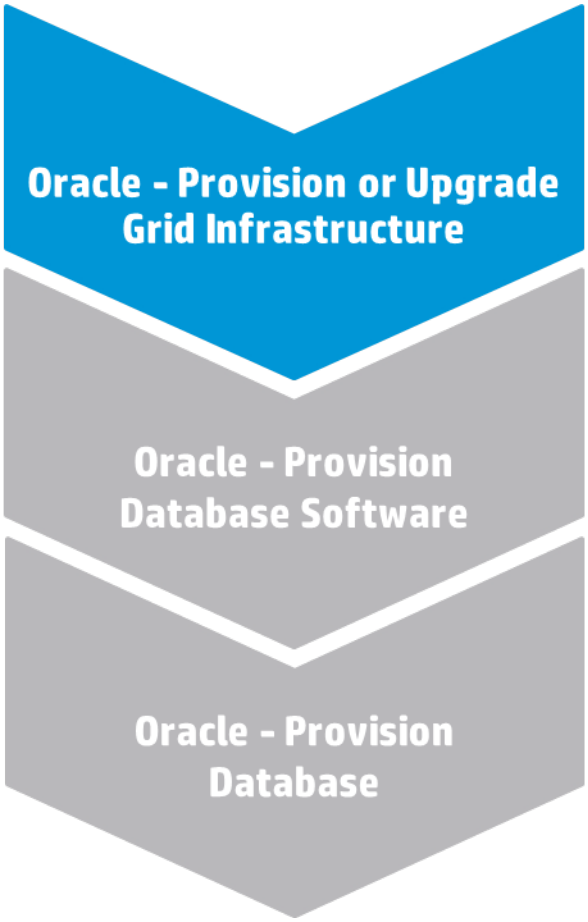
Process Overview

Patching Oracle Grid Infrastructure with HPE DMA is a simple, one-step process. All required checks and steps to patch an Oracle Grid infrastructure—including the Grid Home, all Database Homes, and the databases—have been implemented in a single HPE DMA workflow.

Use the following HPE DMA workflows to standardize the process of provisioning Oracle Grid (CRS), ASM, and database:


Oracle – Provision or Upgrade Grid Infrastructure
Installs or upgrades Oracle Grid Infrastructure on a standalone server. Once provisioned, the installed Grid Infrastructure provides Oracle Restart services, the Oracle Listener, and ASM storage to databases provisioned on the server.
Oracle - Provision Database Software
Installs Oracle Database software on a server in the location specified by the Oracle Home parameter. The workflow can be customized to provision an Oracle Standalone, Grid Standalone, or CRS RAC environment.
Oracle - Provision Database
Provisions an Oracle database on an Oracle Standalone, Grid Standalone, or CRS RAC environment.

Workflow 1: Oracle - Provision or Upgrade Grid Infrastructure



This section provides detailed information required to run the Oracle - Provision or Upgrade Grid Infrastructure workflow.

Solution pack

This workflow requires the Advanced Database Provisioning Solution Pack.

Parameters to expose

None

Input parameters

When you deploy the Oracle - Provision or Upgrade Grid Infrastructure workflow, specify input parameter values for the following steps.

Note: Bold text in the following tables indicates that you must specify a value for the parameter.

Step: Gather Parameters for Provision Grid Infrastructure

Parameter	Description	Example Value
ASM Diskgroup List	Required: A comma-separated list of the diskgroups that you are creating, with each diskgroup containing a comma-separated list of its associated disks.	ASMDATA(/dev/raw/raw1)
ASM Groups	Required: The operating system groups that manage ASM. The syntax is: ASMGroup:ASMDBA:ASMOper	This parameter is hidden by default and must be exposed when you make a copy of the workflow. oinstall:dba:oinstall
ASM Password	Required: The password for provisioning an Oracle database using ASM storage. The default is Manager1.	●●●
CRS Base	Required: The location of the Oracle Base directory. This is where the admin directory is located.	`/u01/app/grid`
CRS Home	Required: The location where the CRS software will be installed. The default is: `/u01/app/oracle/product/12.1.0/grid1`	`/u01/app/oracle/product/12.1.0/grid1`
Oracle Software	Required: A comma-separated list of the Oracle Database software (CRS) archive files (`.zip` or `.cpio.gz`).[1]	`linuxamd64_12c_grid_1of2.zip, linuxamd64_12c_grid_2of2.zip`

Step: Gather Advanced Parameters for Provision Grid Infrastructure

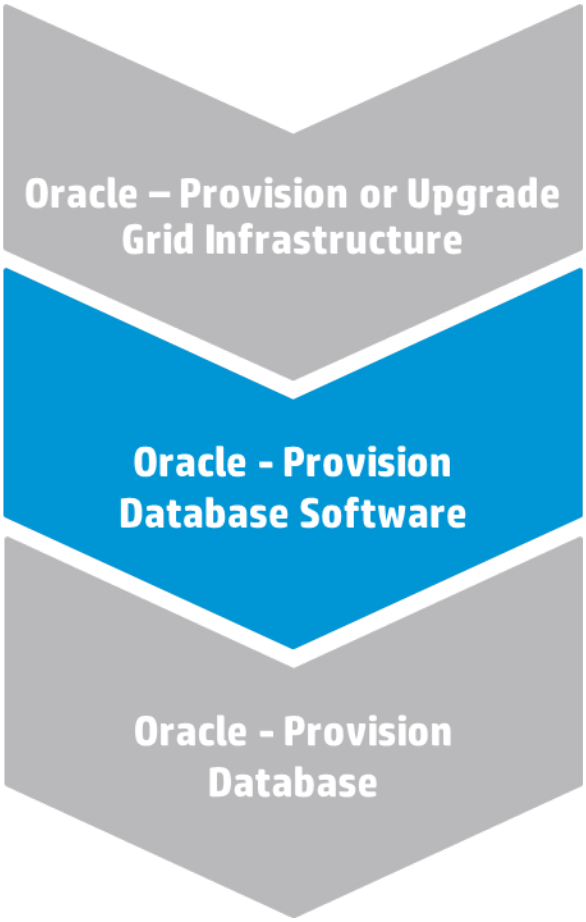
Parameter	Description	Example Value
CLUSTER - Grid Node List	Optional: A comma-separated list of the Grid Infrastructure nodes. Must be in the format: node1-public:node1-private:node1-virtual, node2-public:node2-private:node2-virtual	racnode1:racnode1-priv:racnode1-vip, racnode2:racnode2-priv:racnode2_vip
CLUSTER - Scan Info	Optional: The Oracle single Client Access name and port that you will use to reference this cluster without specifying a specific node.	`rac-scan:1522`

[1] If the file(s) are not found on the target server(s), they will be downloaded from the software repository.

Step: Gather Advanced Parameters for Provision Grid Infrastructure, continued

Parameter	Description	Example Value
Download Location	Required: The location where the CRS archive has been (or will be) downloaded.	`/tmp`
Extract Location	Required: The directory location where the CRS archive has been (or will be) extracted.	`/tmp`
Trust SSL Certificates	Deprecated: HPE DMA no longer uses this workflow parameter to determine whether the workflow will trust any Secure Sockets Layer (SSL) certificate used to connect to the HPE DMA web server. HPE DMA now uses the `com.hp.dma.conn.trustAllCertificates` parameter in the `dma.xml` file.	
Upgrade to Oracle 12	Optional: Set to True if you are upgrading an existing Oracle 11g Grid Infrastructure to Oracle 12 Grid Infrastructure. The default is False.	False
Web Service Password	Optional: Password for the HPE DMA Discovery web service API.	●●●
Web Service User	Optional: User who is capable of modifying the managed environment by using the HPE DMA Discovery web service API.	

Workflow 2: Oracle - Provision Database Software



This section provides detailed information required to run the Oracle - Provision Database Software workflow.[1]

Solution pack

This workflow requires the Database Provisioning Solution Pack.

Parameters to expose

None

Input parameters

When you deploy the Oracle - Provision Database Software workflow, specify input parameter values for the following steps.[2]

[1]Make sure to use the latest (highest version number) of this workflow.
[2]HPE DMA uses the latest (highest version number) of steps.

Note: Bold text in the following tables indicates that you must specify a value for the parameter.

Step: Gather Parameters for Provision Oracle Software

Parameter	Description	Example Value
Oracle Account	Optional (required only if inventory does not exist): The Oracle user that will own the Oracle Home.	oracle
Oracle Base	Optional (required only if Oracle Home has not been set up): The fully-qualified path to the Oracle base directory where the admin directories will be located.	`/u01/app/oracle`
Oracle Home	Optional (required only if Oracle Home has not been set up): The fully-qualified pathname where the Oracle Home will be created. If the specified directory does not exist, it will be created.	`/u01/app/oracle/product/12.1.0/dbhome_1`
Oracle Software	Optional (required only if Oracle Home has not been set up): A comma-separated list of the Oracle Database software archive files.[1]	`linuxamd64_12c_database_1of2.zip, linuxamd64_12c_database_2of2.zip`

Step: Gather Advanced Parameters for Provision Oracle Software

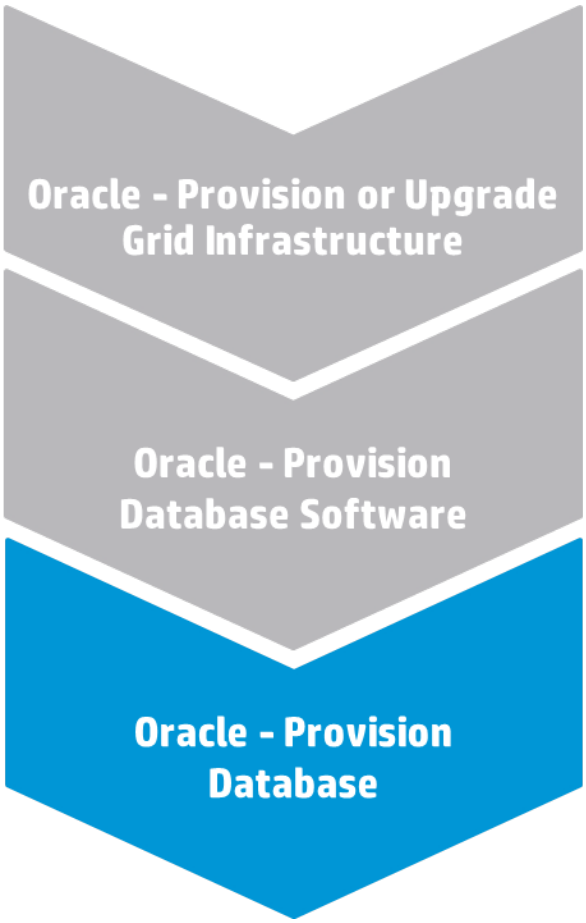
Parameter	Description	Example Value
Cluster Nodes	Optional (required when provisioning a RAC database): Comma-separated list of nodes to install software on. Leave blank for non-clustered environments.	racnode1, racnode2 *Use the same node values as the CLUSTER - Grid Node List parameter for the Oracle - Provision or Upgrade Grid Infrastructure deployment.*
Download Location	Optional: The directory where input files already exist or to which files will be downloaded from the software repository.	/tmp
Extract Location	Optional: The directory location where the Oracle database software archives will be extracted. It will be cleaned up at end of workflow execution. If not specified, a default will be created.	/tmp

[1] If the file(s) are not found on the target server(s), they will be downloaded from the software repository.

Step: Gather Advanced Parameters for Provision Oracle Software, continued

Parameter	Description	Example Value
runInstaller Parameters	Optional: The parameters to pass to the Oracle `runInstaller` command. For example: `-force` or `-ignoreSysPrereqs`[1]	`-ignoreSysPrereqs`

Workflow 3: Oracle - Provision Database



This section provides detailed information required to run the Oracle - Provision Database workflow.[2]

Solution pack

This workflow requires the Database Provisioning Solution Pack.

[1]This parameter is hidden by default and must be exposed when you make a copy of the workflow.
[2]Make sure to use the latest (highest version number) of this workflow.

Parameters to expose

None

Input parameters

When you deploy the Oracle - Provision Database workflow, specify input parameter values for the following steps.[1]

Note: Bold text in the following tables indicates that you must specify a value for the parameter.

Step: Gather Parameters for Provision Oracle Database

Parameter	Description	Example Value
Database Name	Required: The name of the database to provision.	orca
Datafile Location	Required: The database file locations.	+ASMDATA *Use a plus sign (+) followed by the same value as the ASM Diskgroup List parameter for the Oracle - Provision or Upgrade Grid Infrastructure deployment.*
Oracle Account	Optional (required only if inventory does not exist): The Oracle user that will own the Oracle Home.	oracle *Use the same value specified for the Oracle Account parameter for the Oracle - Provision Database Software deployment.*
Oracle Base	Required: The fully-qualified path to the Oracle base directory where the admin directories are located.	`/u01/app/oracle` *Use the same value specified for the Oracle Base parameter for the Oracle - Provision Database Software deployment.*
Oracle Home	Optional: The Oracle Home to use if more than one Oracle Home exists in the inventory file(s).	`/u01/app/oracle/product/12.1.0/dbhome_1` *Use the same value specified for the Oracle Home parameter for the Oracle - Provision Database Software deployment.*

[1]HPE DMA uses the latest (highest version number) of steps.

Step: Gather Parameters for Provision Oracle Database, continued

Parameter	Description	Example Value
Trust SSL Certificates	Deprecated: HPE DMA no longer uses this workflow parameter to determine whether the workflow will trust any Secure Sockets Layer (SSL) certificate used to connect to the HPE DMA web server. HPE DMA now uses the `com.hp.dma.conn.trustAllCertificates` parameter in the `dma.xml` file.	
Web Service Password	Required: Password for the HPE DMA Discovery web service API.	●●●
Web Service User	Required: User who is capable of modifying the managed environment by using the HPE DMA Discovery web service API.	dmawebuser

Step: Gather Advanced Parameters for Provision Oracle Database

Parameter	Description	Example Value
ASM Password	Optional (required when provisioning an Oracle database using ASM storage): The password used to manage ASM.[1]	*Use the same value specified for the ASM Password parameter for the Oracle - Provision or Upgrade Grid Infrastructure deployment.*
Cluster Nodes	Optional (required when provisioning a RAC database): Comma-separated list of nodes where this database will run. Leave blank for non-clustered environments.	racnode1, racnode2 *Use the same value specified for the Cluster Nodes parameter for the Oracle - Provision Database Software deployment.*
DBCA Template File	Optional: Location of a DBCA template file in the software repository to download. If not specified, a default will be used.	

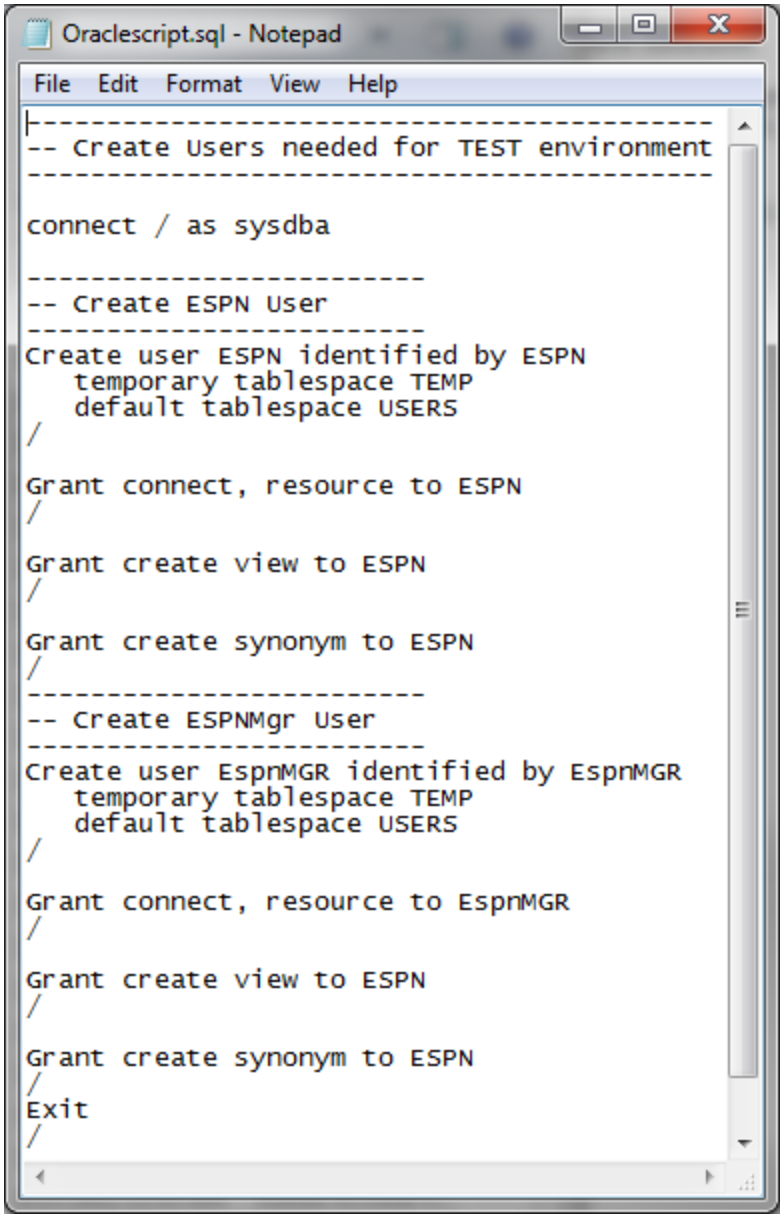
[1]This parameter is hidden by default and must be exposed when you make a copy of the workflow.

Oracle - SQL Release

This workflow deploys and executes an SQL script (or scripts) against target Oracle databases.

This workflow is designed for SQL script transactions to be deployed and executed against target Oracle databases. SQL scripts are stored and downloaded from thesoftware repository .

Before running the Oracle - SQL Release workflow you need to create the SQL script file (or files). For example:



You can customize what the workflow checks in the SQL scripts:

- Oracle database links
- Oracle system grants based on your list of exceptions
- Prohibited SQL statements based on a regular expression

If all the tests pass, the SQL scripts will be deployed and executed against the target Oracle databases.

When you create a deployment there is an option to automatically execute a rollback when an error occurs while running the SQL scripts. This rolls back not only the SQL transaction that generated the error but also the previously committed transactions defined within the deployed SQL script.

There is also an option to specify a rollback file that can be executed at a later time. The rollback SQL file serves as an audit file for future use—it records all SQL transactions performed by the SQL script.

Note: This workflow does not provide any pre-parsing of the SQL scripts.

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, and steps executed
"How to Run this Workflow"	Instructions for running this workflow in your environment
"Sample Scenarios"	Examples of typical parameter values for this workflow
Parameters	List of input parameters for this workflow

Prerequisites for this Workflow

Be sure that the following prerequisites are satisfied before you run the "Oracle - SQL Release" workflow.

Dependencies

- The latest HPE DMA solution packs require the latest HPE DMA platform. To use the latest solution packs, update the HPE DMA platform. HPE DMA10.40 solution packs are supported on HPE DMA10.40 (and later).
- You have installed the Database Compliance solution pack.
- The SQL script must reside on the target server or in the software repository.
- The Oracle instance port must be populated correctly.
- Target servers must be in archive log mode if you desire to execute rollback.
- The target instance has been discovered prior to running this workflow to gather the instance information from the metadata.

Supported Versions of Oracle Database

10gR2 *, 11gR1 *, 11gR2, and 12cR1

* = Out of Oracle standard support

SQL Scripts

You need to create the SQL script file (or files) that manage the release. The files may contain the following Oracle DML and DDL commands:

ALTER INDEX	DELETE	INSERT
CREATE INDEX	DROP INDEX	GRANT PRIVILEGE
CREATE SYNONYM	DROP SYNONYM	REVOKE PRIVILEGE
CREATE VIEW	DROP TABLE	UPDATE
CREATE TABLE	DROP VIEW	
CREATE USER	DROP USER	

Note: Any valid SQL command that is not included in the above table can still be contained in an SQL script, but the workflow's Rollback functionality will not be supported. You need to specify N for the Execute Rollback parameter when you deploy the workflow.

Tip: List the SQL script files in the SQL scripts parameter in the order in which they need to be executed.

OracleSQL Documentation

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

How this Workflow Works

The following information describes how the "Oracle - SQL Release" workflow works.

Overview show

The workflow starts by gathering input parameters and constructing commands that will be used in subsequent steps .

If the SQL scripts do not exist on the specified target location, they are downloaded from the HPE DMA software repository.

Based on the parameters you set when you create your deployment, the workflow will do the following:

- Check the SQL code for Oracle database links—if any are found, the workflow will exit with a failure code.
- Check the SQL code for Oracle system grants specified in the Check System Grants Exception List parameter—if any are found, the workflow will exit with a failure code.
- Check the SQL code for a regular expression specified in the Regular Expression parameter—if it is found, the workflow will exit with a failure code.
- Checks the SQL syntax for errors—if any are found and Check SQL Syntax Ignore Errors is not True, the workflow will exit with a failure code.

If no errors were found (or syntax errors are found and Check SQL Syntax Ignore Errors is True), the workflow creates an SQL*Plus session to run the SQL scripts. Any errors that are on the Acceptable ORA Error list are ignored.

If Execute Rollback is enabled and log archiving is turned on, a rollback SQL script file will be created. If an error occurs during the execution of the SQL scripts a rollback will automatically be performed—as if the SQL scripts had never been executed.

The workflow ends by cleaning up any temporary downloaded files.

Validation Checks Performed show

This workflow validates the SQL scripts in the following ways:

1. If you set the Check Database Links Run Flag to Y, the workflow searches for the @ character to indicate a database link—ignoring any @ characters within single quotes.
2. If you set the Check System Grants Run Flag to Y, the workflow searches the SQL statements for the system grants that you specified in the Check System Grants Exception List parameter.

   For example:

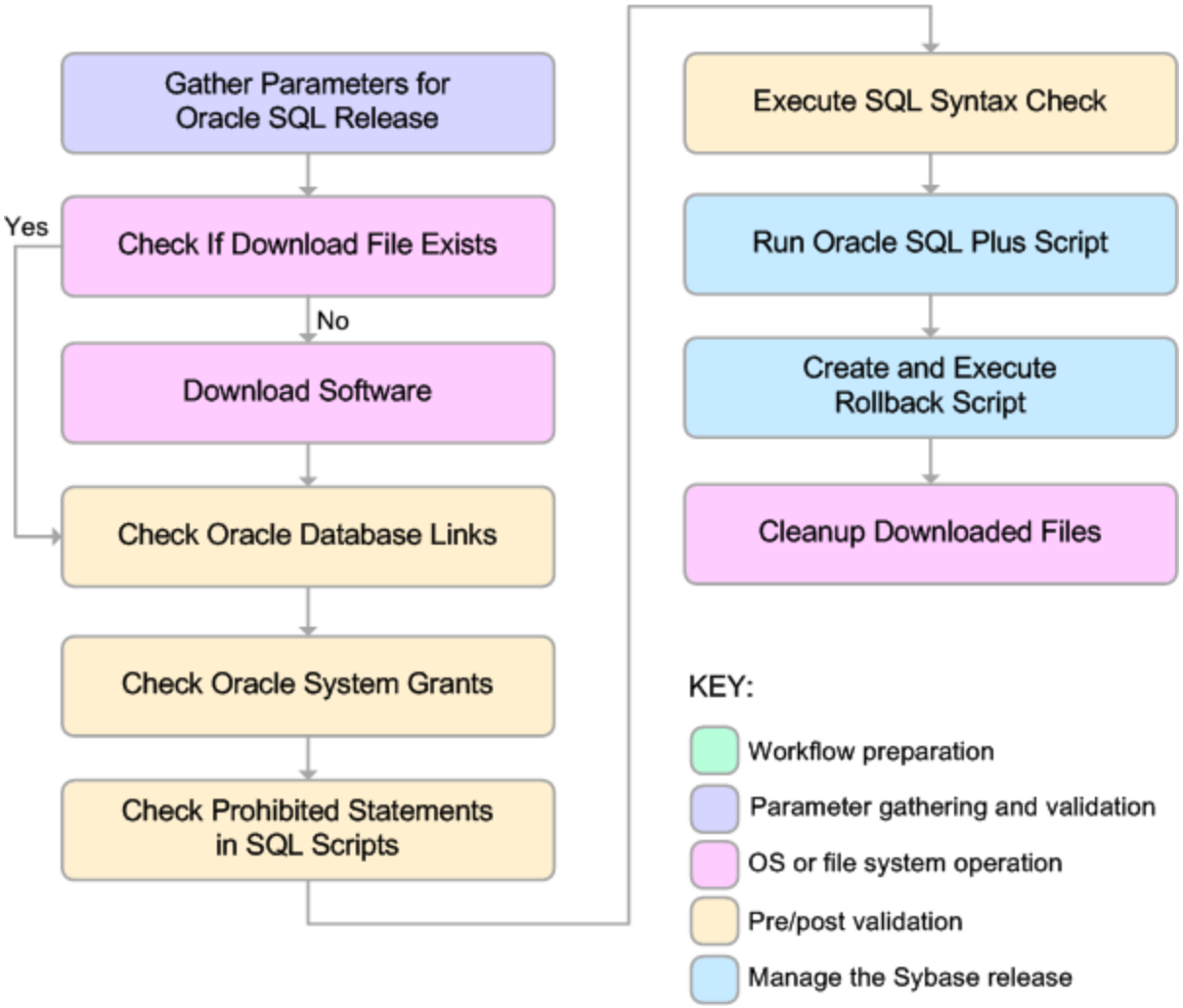
   If you specify CREATE VIEW, the workflow makes sure there are no queries of the form GRANT CREATE VIEW TO myuser.
3. If you set the Check Prohibited Statements Run Flag to Y, the workflow searches the SQL statements for the Regular Expression that you specify.
4. The workflow checks the SQL syntax according to the data type specified in the Check SQL Syntax Database Type parameter. If you set the Check SQL Syntax Ignore Errors to True, any syntax errors will be ignored and the workflow will continue.

If any of the validation checks fail, the workflow will output the offending SQL line to `stdout`, return an error status, and the SQL scripts will not be executed.

Steps Executed show

The "Oracle - SQL Release" 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.

Click each box in the diagram to view additional information about that step.



Steps Used in Oracle - SQL Release

Workflow Step	Description
Gather Parameters for Oracle SQL Release	This step accepts the basic input parameters for the workflow. The parameters will be used in subsequent steps. This step also constructs the commands needed to execute subsequent steps in the workflow as either the OS administrative user or the user who owns the pertinent ORACLE_HOME.
Check if Download File Exists	This step determines whether one or more specified files already exist on the target server.

Steps Used in Oracle - SQL Release, continued

Workflow Step	Description
Download Software	This step downloads a list of files to a specified location on the target server.
Check Oracle Database Links	This step checks the SQL scripts for the use of database links taking care to exclude hardcoded strings. If any are found the workflow will fail.
Check Oracle System Grants	This step checks an SQL script for any system level grants and for specific privileges specified in the Check System Grants Exception List parameter. If any are found the workflow will fail.
Check Prohibited Statements In SQL Scripts	This step applies a regular expression to each SQL statement in an SQL script. Any `regex` matches are output to `stdout`, an error status is returned, and the workflow will fail.
Execute SQL Syntax Check	This step executes an SQL syntax check of the SQL script files. It then reports pass or fail for each file and the number of syntax errors found. If Check SQL Syntax Ignore Errors is set to True, any syntax errors will be ignored and the workflow will continue.
Run Oracle SQL Plus Script	This step executes an SQL*Plus Script. It checks the output for any errors. Any errors that are on the Acceptable ORA Error list are ignored. **Note:** This is designed to be run by the Oracle software owner (typically oracle). If Execute Rollback is enabled, log archiving must be turned on.
Create and Execute Rollback Script	This step creates the rollback SQL script for all actions executed in the SQL release process. If Execute Rollback is enabled and an error occurs during the release process, the step will also execute the rollback SQL script. **Note:** This step is designed to be run as the Oracle software owner (typically oracle). This step is designed to only work with the Run Oracle SQL*Plus Script step and cannot be used standalone since it depends on the log archiving.
Cleanup Downloaded Files	This step removes all temporary downloaded files and archives.

Note: For input parameter descriptions and defaults, see "Parameters for Oracle - SQL Release" on page 302.

How to Run this Workflow

The following instructions show you how to customize and run the "Oracle - SQL Release" workflow in your environment.

Tip: For detailed instructions to run HPE DMA workflows—using the Oracle - Compliance Audit workflow as an example—see HPE DMA Quick Start Tutorial.

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 Oracle - SQL Release" on page 302.

Note: Before following this procedure, review the "Prerequisites for this Workflow" on page 291, and ensure that all requirements are satisfied.

To use the Oracle - SQL Release workflow:

1. Create a deployable copy of the workflow.
2. Determine the values that you will specify for the following parameters:

Input Parameters for Gather Parameters for Oracle SQL Release

Parameter Name	Default Value	Required	Description
Acceptable ORA Error		optional	Comma-separated list of ORA errors that will be expected (and can be ignored) while running release scripts. For example: ORA-00942
Check Database Links Run Flag	Y	required	Flag to indicate whether the workflow should run the database links check. Valid values are Y (run the check) or N (do not run the check).
Regular Expression Check Prohibited Statements Run Flag Check Prohibited Statements Run Flag		optional	The regular expression to be searched for in all of the SQL scripts to be deployed. If the specified regular expression is found, the workflow exits with a failure. For example: drop\s+table will match all statements that drop a table.
Check Prohibited Statements Run Flag	no default	required	Flag to indicate whether the workflow should run the prohibited statements check. Valid values are Y (run the check) or N (do not run the check).

Input Parameters for Gather Parameters for Oracle SQL Release, continued

Parameter Name	Default Value	Required	Description
Check SQL Syntax Database Type	dbvoracle	optional	Database type used to set the SQL parser. For example: dbvoracle, dbvsybase, dbvmssql, or dbvdb2. See SQL Parser Documentation for valid options.
Check SQL Syntax Ignore Errors	False	optional	Flag to indicate whether the workflow should pass the SQL syntax check regardless of whether or not syntax errors are found. Valid values are True (the check will always pass) or False (the check will fail if syntax errors are present).
Check System Grants Exception List	CREATE VIEW, CREATE SYNONYM, CREATE CLUSTER, CREATE TABLE	optional	Comma-separated list of system privileges that are not allowed in this deployment.
Check System Grants Run Flag	Y	required	Flag to indicate whether the workflow should run the system grants check. Valid values are Y (run the check) or N (do not run the check).
Execute Rollback	no default	required	Flag to indicate whether an automatic rollback will be performed whenever an error is detected during the execution of the SQL scripts. If Y is specified and an error occurs, the workflow exits and rolls back all committed SQL transactions that belong to the deployed SQL scripts. If N is specified, no rollback will be performed in the event of an error.
Oracle OS User	no default	required	The user who owns ORACLE_HOME.
Oracle Password	no default	required	Password for the Oracle Database user.
Oracle User	no default	required	Oracle Database user who will execute the SQL scripts.
Rollback File	no default	required if Execute Rollback is enabled	The file name and path of the rollback script file that records all SQL transactions performed by the SQL scripts. This file can be used to: • Perform an automatic rollback in the event of an error • Execute a rollback at a later time

Input Parameters for Gather Parameters for Oracle SQL Release, continued

Parameter Name	Default Value	Required	Description
			• Serve as an audit file for future use
SQL Scripts	`script.sql`	required	Comma-separated list of SQL script files that will be deployed to the target servers. These files will be downloaded from the software repository if they do not already exist on the target server. SQL script files can have arguments. For example: `MySQLfile1.sql arg1, MySQLfile2.sql arg2 arg3, MySQLfile3.sql` **Note:** List the SQL script files in the order in which they need to be executed.
Staging Directory	`/tmp/`	optional	The directory on the target server where the SQL script file (or files) will be downloaded.

Tip: To avoid having to re-enter passwords whenever they change, you can create a policy to provide them to the workflow.

Note: See "Parameters for Oracle - SQL Release" on page 302 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. 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.
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.

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.

Optional: If you want to further verify the results:

Log in to your database to make sure that whatever you created or modified was actually done.

Sample Scenarios

This topic shows you typical parameter values for different use cases for the "Oracle - SQL Release" workflow.

Scenario 1: Deploy and execute the scripts show

This is a very simple example that you might use in a development environment. None of the optional checks of the SQL scripts are performed. SQL syntax errors will be ignored. The workflow will create an SQL*Plus session to deploy and execute the scripts. It will not save a rollback file. It will not perform an automatic rollback if an error is encountered when executing the SQL scripts.

Archive logging can be off since Execute Rollback is not enabled.

Parameters Defined in this Step: Gather Parameters for Oracle SQL Release

Parameter Name	Example	Description
Check Database Links Run Flag	N	Flag to indicate whether the workflow should run the database links check. Valid values are Y (run the check) or N (do not run the check).
Check Prohibited Statements Run Flag	N	Flag to indicate whether the workflow should run the prohibited statements check. Valid values are Y (run the check) or N (do not run the check).
Check SQL Syntax Database Type	dbvoracle	Database type used to set the SQL parser. For example: dbvoracle, dbvsybase, dbvmssql, or dbvdb2. See SQL Parser Documentation for valid options.
Check SQL Syntax Ignore Errors	True	Flag to indicate whether the workflow should pass the SQL syntax check regardless of whether or not syntax errors are found. Valid values are True (the check will always pass) or False (the check will fail if syntax errors are present).
Check System Grants Run Flag	N	Flag to indicate whether the workflow should run the system grants check. Valid values are Y (run the check) or N (do not run the check).
Execute Rollback	N	Flag to indicate whether an automatic rollback will be performed whenever an error is detected during the execution of the SQL scripts. If Y is specified and an error occurs, the workflow exits and rolls back all committed SQL transactions that belong to the deployed SQL scripts. If N is specified, no rollback will be performed in the event of an error.
Oracle OS User	oracle	The user who owns ORACLE_HOME.
Oracle	tiger	Password for the Oracle Database user.

Parameters Defined in this Step: Gather Parameters for Oracle SQL Release, continued

Parameter Name	Example	Description
Password		
Oracle User	scott	Oracle Database user who will execute the SQL scripts.
SQL Scripts	see description	Comma-separated list of SQL script files that will be deployed to the target servers. These files will be downloaded from the software repository if they do not already exist on the target server. SQL script files can have arguments. For example: `MySQLfile1.sql arg1, MySQLfile2.sql arg2 arg3, MySQLfile3.sql` **Note:** List the SQL script files in the order in which they need to be executed.
SQL Script Output	True	The output of SQL script execution will be displayed on DMA console.

Scenario 2: Check the SQL script files, deploy and execute the scripts, then perform a rollback if an error is encountered show

This is a more complex example that you might use in a production environment where you desire more safeguards.

Archive logging must be enabled for this use case.

The workflow will check the SQL script files for:

- Oracle database links
- The Oracle system grants that are specified in the Exception List parameter
- The regular expression that is specified in the Regular Expression parameter
- SQL syntax errors

If no errors were found in the checks, the workflow creates an SQL*Plus session to deploy and execute the scripts. It will save a rollback file and perform an automatic rollback if an error is encountered when executing the SQL scripts.

Parameters Defined in this Step: Gather Parameters for Oracle SQL Release

Parameter Name	Example	Description
Acceptable ORA Error	ORA-00942	Comma-separated list of ORA errors that will be expected (and can be ignored) while running release scripts. For example: ORA-00942
Check Database Links Run Flag	Y	Flag to indicate whether the workflow should run the database links check. Valid values are Y (run the check) or N (do not run the check).
Check Prohibited Statements Regular Expression	drop\s+table	The regular expression to be searched for in all of the SQL scripts to be deployed. If the specified regular expression is found, the workflow exits with a failure. For example: drop\s+table will match all statements that drop a table.
Check Prohibited Statements Run Flag	Y	Flag to indicate whether the workflow should run the prohibited statements check. Valid values are Y (run the check) or N (do not run the check).
Check SQL Syntax Database Type	dbvoracle	Database type used to set the SQL parser. For example: dbvoracle, dbvsybase, dbvmssql, or dbvdb2. See SQL Parser Documentation for valid options.
Check SQL Syntax Ignore Errors	False	Flag to indicate whether the workflow should pass the SQL syntax check regardless of whether or not syntax errors are found. Valid values are True (the check will always pass) or False (the check will fail if syntax errors are present).
Check System	CREATE VIEW,	Comma-separated list of system privileges that are not allowed in this deployment.

Parameters Defined in this Step: Gather Parameters for Oracle SQL Release, continued

Parameter Name	Example	Description
Grants Exception List	CREATE SYNONYM, CREATE CLUSTER, CREATE TABLE	
Check System Grants Run Flag	Y	Flag to indicate whether the workflow should run the system grants check. Valid values are Y (run the check) or N (do not run the check).
Execute Rollback	Y	Flag to indicate whether an automatic rollback will be performed whenever an error is detected during the execution of the SQL scripts. If Y is specified and an error occurs, the workflow exits and rolls back all committed SQL transactions that belong to the deployed SQL scripts. If N is specified, no rollback will be performed in the event of an error.
Oracle OS User	oracle	The user who owns ORACLE_HOME.
Oracle Password	tiger	Password for the Oracle Database user.
Oracle User	scott	Oracle Database user who will execute the SQL scripts.
Rollback File	`/var/tmp/rollback.sql`	The file name and path of the rollback script file that records all SQL transactions performed by the SQL scripts. This file can be used to: • Perform an automatic rollback in the event of an error • Execute a rollback at a later time • Serve as an audit file for future use
SQL Scripts	see description	Comma-separated list of SQL script files that will be deployed to the target servers. These files will be downloaded from the software repository if they do not already exist on the target server. SQL script files can have arguments. For example: `MySQLfile1.sql arg1, MySQLfile2.sql arg2 arg3, MySQLfile3.sql` **Note:** List the SQL script files in the order in which they need to be executed.

Be sure that the default values for all remaining input parameters are appropriate for your environment (see "Parameters for Oracle - SQL Release" on the next page).

Parameters for Oracle - SQL Release

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. For some parameters, if you do not specify a value for a parameter, a default value is assigned.

Note: Only those parameters that are configurable in a standard deployment are listed here. Input parameters that must be mapped to output parameters of previous steps are not listed.

Input Parameters Defined in this Step: Gather Parameters for Oracle SQL Release

Parameter Name	Default Value	Required	Description
Acceptable ORA Error		optional	Comma-separated list of ORA errors that will be expected (and can be ignored) while running release scripts. For example: ORA-00942
Check Database Links Run Flag	Y	required	Flag to indicate whether the workflow should run the database links check. Valid values are Y (run the check) or N (do not run the check).
Check Prohibited Statements Regular Expression		optional	The regular expression to be searched for in all of the SQL scripts to be deployed. If the specified regular expression is found, the workflow exits with a failure. For example: drop\s+table will match all statements that drop a table.
Check Prohibited Statements Run Flag	no default	required	Flag to indicate whether the workflow should run the prohibited statements check. Valid values are Y (run the check) or N (do not run the check).
Check SQL Syntax Database Type	dbvoracle	optional	Database type used to set the SQL parser. For example: dbvoracle, dbvsybase, dbvmssql, or dbvdb2. See SQL Parser Documentation for valid options.
Check SQL Syntax Ignore Errors	False	optional	Flag to indicate whether the workflow should pass the SQL syntax check regardless of whether or not syntax errors are found. Valid values are True (the check will always pass) or False (the check will fail if syntax errors are present).
Check System Grants Exception List	CREATE VIEW, CREATE SYNONYM, CREATE CLUSTER, CREATE TABLE	optional	Comma-separated list of system privileges that are not allowed in this deployment.

Input Parameters Defined in this Step: Gather Parameters for Oracle SQL Release, continued

Parameter Name	Default Value	Required	Description
Check System Grants Run Flag	Y	required	Flag to indicate whether the workflow should run the system grants check. Valid values are Y (run the check) or N (do not run the check).
Execute Rollback	no default	required	Flag to indicate whether an automatic rollback will be performed whenever an error is detected during the execution of the SQL scripts. If Y is specified and an error occurs, the workflow exits and rolls back all committed SQL transactions that belong to the deployed SQL scripts. If N is specified, no rollback will be performed in the event of an error.
Oracle OS User	no default	required	The user who owns ORACLE_HOME.
Oracle Password	no default	required	Password for the Oracle Database user.
Oracle User	no default	required	Oracle Database user who will execute the SQL scripts.
Rollback File	no default	required if Execute Rollback is enabled	The file name and path of the rollback script file that records all SQL transactions performed by the SQL scripts. This file can be used to: • Perform an automatic rollback in the event of an error • Execute a rollback at a later time • Serve as an audit file for future use
SQL Script Output	False	optional	If True, enables to view the output of SQL script execution on DMA console.
SQL Scripts	`script.sql`	required	Comma-separated list of SQL script files that will be deployed to the target servers. These files will be downloaded from the software repository if they do not already exist on the target server. SQL script files can have arguments. For example: `MySQLfile1.sql arg1, MySQLfile2.sql arg2 arg3, MySQLfile3.sql` **Note:** List the SQL script files in the order in which they need to be executed.
Staging Directory	`/tmp/`	optional	The directory on the target server where the SQL script file (or files) will be downloaded.

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If you have comments about this document, you can contact the documentation team by email. If an email client is configured on this system, click the link above and an email window opens with the following information in the subject line:

Feedback on Workflows for Oracle (Database and Middleware Automation 10.40)

Just add your feedback to the email and click send.

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

We appreciate your feedback!