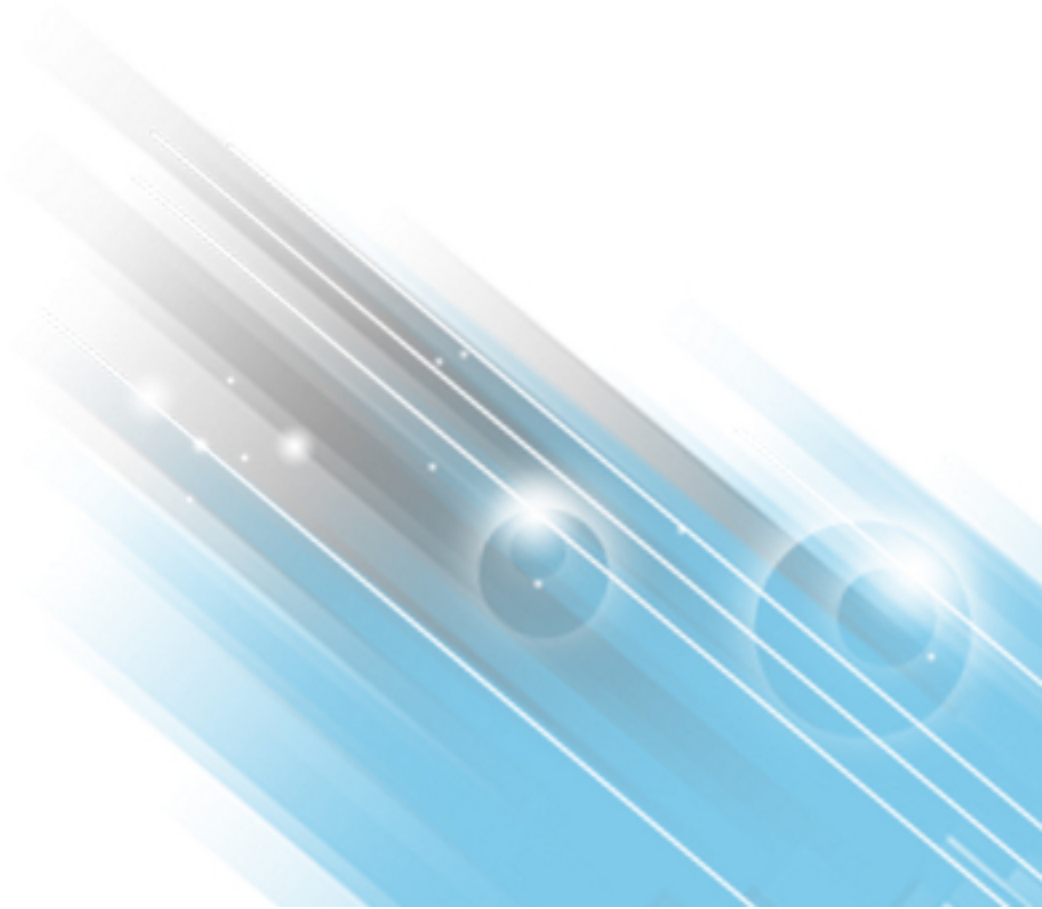
HP Database and Middleware Automation

Software Version: 10.30.000.000
Linux, Solaris, AIX, HP-UX and Windows®

Database Compliance User Guide



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

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

Document Changes

Chapter	Version	Changes
Compliance Quick Start	10.01	Updated Quick Start instructions and screen images for HP DMA 10.01.
Title Page Legal Notices	10.10	Updated version number, software release date, document release date, and copyright date range.

Document Changes, continued

Chapter	Version	Changes
Compliance Quick Start	10.10	Updated Quick Start instructions and screen images for HP DMA 10.10.
About HP DMA Solution Packs	10.10	Added overview topic: About HP DMA Solution Packs.
Prerequisites for this Workflow	10.10	Removed operating systems from prerequisites for the Check Sybase Compliance workflow. See *HP DMA Support Matrix* for complete list of supported products and platforms.
Title Page Legal Notices	10.20	Updated version number, software release date, document release date, and copyright date range.
Compliance Quick Start	10.20	Removed the Quick Start chapter. In the "How to Run this Workflow" sections, pointed to the *HP DMA Quick Start Tutorial*.
Workflow Details	10.20	Added the Run DB2 Compliance Audit workflow.
MS SQL - Compliance Audit	10.20.100	Added capability to specify the Windows domain user at runtime for the SQL Server workflow.
Title Page Legal Notices Entire guide	10.21	Updated version number, software release date, document release date, and copyright date range. Updated document template.
What this Solution Includes	10.21	Referenced the *HP DMA Support Matrix* for the complete list of supported database product versions.
Title Page Legal Notices	10.22	Updated version number, software release date, document release date, and copyright date range.
Title Page Legal Notices Entire guide	10.30	Updated version number, software release date, document release date, and copyright date range. Updated to new documentation template.
Deprecated Workflows Workflow Details	10:30	Deprecated workflows: • Run Oracle Compliance Audit • Run SQL Server Compliance Audit • Run Sybase Compliance Audit • Run DB2 Compliance Audit Added Replacement workflows: • Oracle - Compliance Audit • MS SQL - Compliance Audit • Sybase - Compliance Audit • DB2 - Compliance Audit Updated parameters for replacement workflows.

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About HP DMA Solution Packs

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

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

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

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

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

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

Audience

This solution is designed for the following people:

- Database engineers who are responsible for establishing and maintaining database security processes. In most cases, a mandate has been delivered by the security team to bring the environment into compliance with specific standards and benchmarks. It is typically the database engineer's responsibility to ensure that this happens.
- Database administrators who are responsible for establishing, maintaining, and reporting on security compliance.

To use this solution effectively, you should be familiar with the pertinent security configuration benchmarks for the database products used in your environment. You should also be familiar with the terms used in those benchmarks (see the Additional Resources on page 112).

Document Map

The following table shows you how to navigate this guide:

Topic	Description
The Database Compliance Solution	General information about this solution, including what it contains and what it does.
Workflow Details	Information about each of the workflows included in this solution, including: prerequisites, how it works, how to run it, sample scenarios, and a list of input parameters.
Reference Information	Detailed mappings of the CIS benchmark to the PCI and SOX benchmarks for each database product, links to database product documentation, and links to more information about HP DMA.
Tips and Best Practices	Simple procedures that you can use to accomplish a variety of common HP DMA tasks.
Troubleshooting	Tips for solving common problems.

Important Terms

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

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

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

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

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

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

Additional terms are defined in the Glossary on page 127.

Chapter 1: The Database Compliance Solution

The HP DMA Database Compliance solution provides tools that you can use to audit your database environment for compliance with a specific security benchmark. These tools enable you to:

- Assess the level of compliance across your database environment
- Identify security vulnerabilities present in a specific database instance
- Expedite the resolution of database configuration issues
- Reduce the complexity and cost of performing compliance audits
- Schedule regular "lights-out" automated compliance audits

By consistently using the tools provided in this solution, you can better protect sensitive information, reduce the risk of unauthorized access, and accurately demonstrate compliance with relevant security benchmarks.

What this Solution Includes

This solution includes the following workflows. You can run these workflows on demand or create a schedule to run fully automated "lights out" compliance audits at regular intervals.

Workflow Name	Database Product Audited
Oracle - Compliance Audit	Oracle Database Server
MS SQL - Compliance Audit	Microsoft SQL Server
Sybase - Compliance Audit	Sybase Adaptive Server Enterprise
DB2 - Compliance Audit	IBM DB2 LUW

For specific database product versions supported by each workflow, see the *HP Database and Middleware Automation Support Matrix* available on the HP Software Support web site:

https://softwaresupport.hp.com/

Deprecated Workflows

The following workflows have been deprecated and replaced in the solution pack:

Workflow Name	Purpose	HP DMA Version
Run Oracle Compliance Audit	Enables you to audit an Oracle Database instance for compliance with security benchmarks. This workflow's functionality has been incorporated into the Oracle - Compliance Audit workflow.	10.30
Run SQL Server Compliance Audit	Enables you to audit a Microsoft SQL Server instance for compliance with security benchmarks. This workflow's functionality has been incorporated into the MS SQL - Compliance Audit workflow.	10.30
Run Sybase Compliance Audit	Enables you to audit a Sybase Adaptive Server Enterprise instance for compliance with security benchmarks. This workflow's functionality has been incorporated into the Sybase - Compliance Audit workflow.	10.30
Run DB2 Compliance Audit	Enables you to audit an IBM DB2 LUW instance for compliance with security benchmarks. This workflow has been replaced by the DB2 - Compliance Audit workflow. The functionality is the same.	10.30

Tip: Documentation for the deprecated workflows is available in the *HP DMA Database Compliance User Guide* for the prior HP DMA version—10.22. These documents are available on the HP Software Support web site: https://softwaresupport.hp.com/

What this Solution Does

The workflows in this solution perform a compliance audit against the following security benchmarks:

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

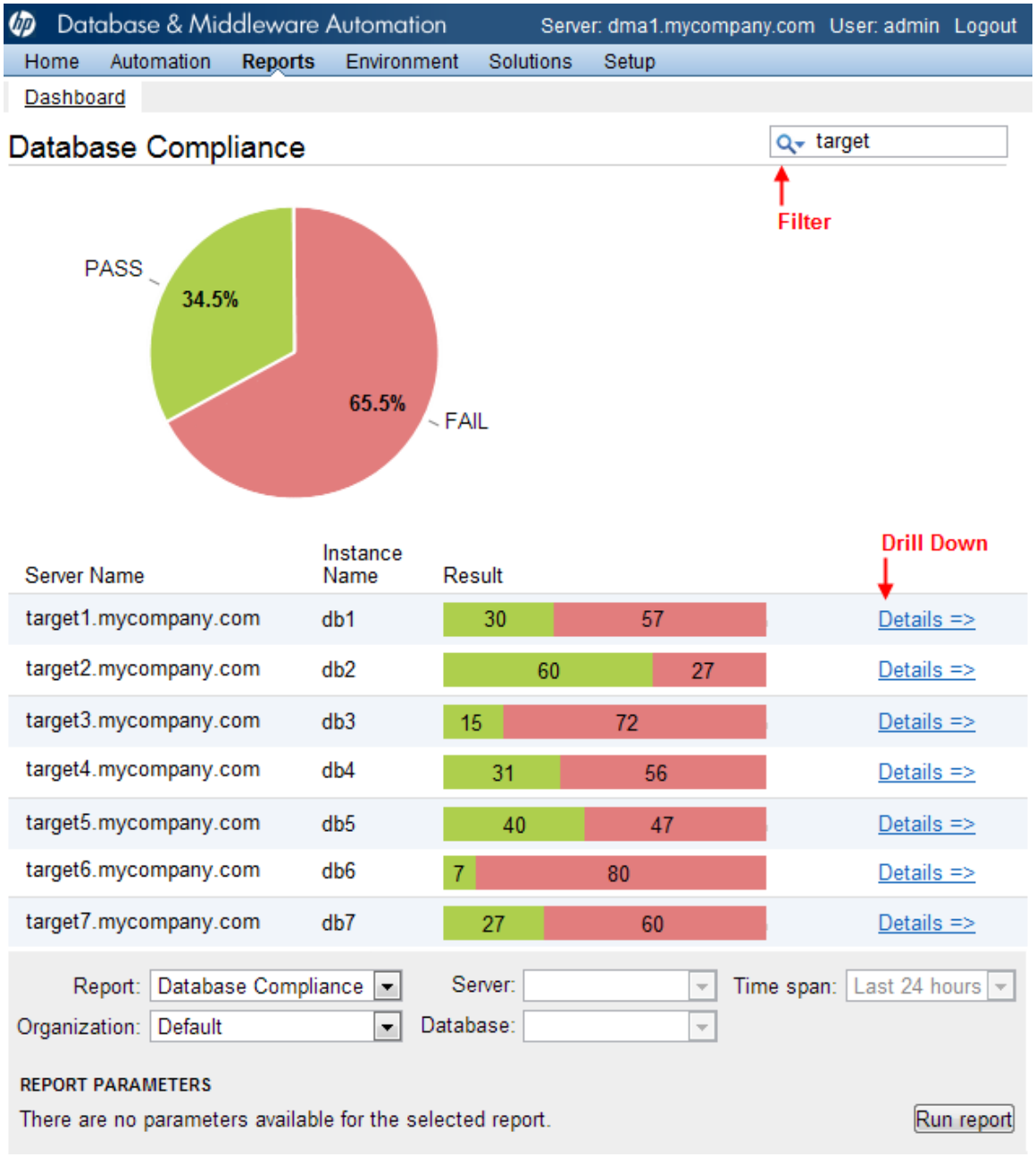
- Sarbanes-Oxley (SOX) requirements

These benchmarks document the settings and procedures required for the secure installation, configuration, and operation of a specific database environment. By bringing your environment into compliance with these benchmarks, you can better protect it from related threats. For information about the specific security benchmark versions implemented in this solution, see Compliance Benchmark Information on page 92.

This solution provides three types of reports that you can use to actively track compliance status in your environment and satisfy compliance reporting requirements.

Database Compliance Report

This summary report shows you the number of compliance checks that passed and failed for each database instance in your environment that was audited.

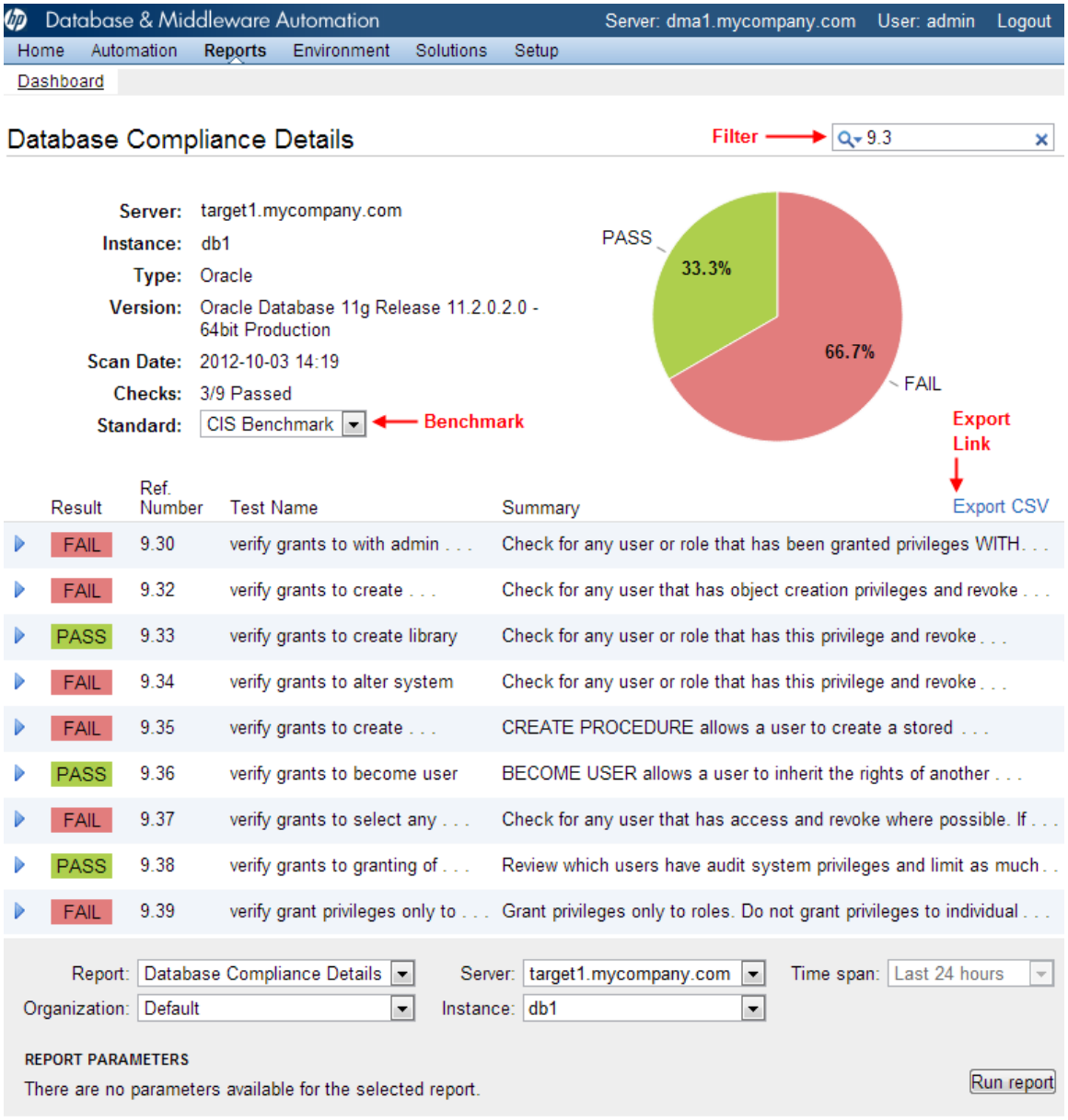


In this example, the report is filtered such that only those servers in the Default organization whose host names include the string "target" appear in the list. The pie chart shows the percentage of CIS benchmark checks that passed and failed for the database instances in the filtered list.

You can drill down to the detailed audit results for a specific database instance by clicking the Details link for that instance.

Database Compliance Detail Report

The Database Compliance Detail report shows you the result of each benchmark check performed for a specific database instance.



In this report, you can specify which compliance benchmark (CIS, PCI, or SOX) is used to format the results. The pie chart shows the percentage of checks in the specified benchmark that passed and failed for this particular database instance.

You can filter this report based on the information associated with each compliance check. In this example, only those checks that contain the string "9.3" appear in the table. Both the pie chart and the Checks indicator change when you apply filter conditions.

You can export the contents of this report to a comma-separated value (CSV) file. This is useful, for example, if you want to include the detailed results in a spreadsheet.

Compliance Audit Results Email

You can instruct the workflows in this solution to send an email message containing the results of the compliance audit for each target database instance. This email message contains the result of every benchmark check performed. It is formatted according to the benchmark that you specify.

You can use the HP DMA scheduling feature to run fully automated "lights-out" compliance audits. The email report can be sent to any valid email address, enabling you to analyze the detailed results from any email-enabled device.

The following example shows the beginning of the compliance audit results email message for a CIS audit.

Note: The email message contains the result of every check performed. Only the first five checks are shown here.

From: CISComplianceAuditor@mycompany.com

Sent: Thursday, September 6, 2012 8:42 AM

To: DBAdminTeam@mycompany.com, DBAdminMgr@mycompany.com

Subject: Weekly Oracle Database Compliance Audit Results for db1 on target1.mycompany.com

Compliance Audit Results

Compliance CIS Number	Compliance Test Name	Test Result	Reason
1.13	Oracle software owner host account	PASS	Locking the user account will deter attackers from leveraging this account in brute force authentication attacks

Compliance Audit Results, continued

2.09	Default Accounts (created by Oracle)	FAIL	The default Oracle installation locks and expires the installation accounts. These accounts should be left locked and expired unless absolutely necessary. Check to ensure these accounts have not been unlocked.Lock and expire the system accounts.
2.05	listener.ora	FAIL	The listener must not be called by the default name as it is commonly known. A distinct name must be selected.Edit $ORACLE_HOME/network/admin/listener.ora and change the default name.
2.13	Service or SID name	PASS	Do not use the default SID or service name of ORCL. It is commonly know and used in many automated attacks.

Supported Products and Platforms

Hardware Requirements

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

For database product hardware and software requirements, see the pertinent Database Product Documentation on page 111.

Software Requirements

The latest HP DMA solution packs require the latest HP DMA platform. To use the latest solution packs, update the HP DMA platform. HP DMA 10.30.000.000 solution packs are supported on HP DMA 10.30.000.000 (and later).

Operating Systems

The HP DMA Database Compliance workflows are supported on Red Hat Enterprise Linux, Solaris, AIX, HP-UX, and Windows platforms.

For specific target operating system versions supported by each workflow, see the *HP Database and Middleware Automation Support Matrix* available on the HP Software Support web site:

https://softwaresupport.hp.com/

Chapter 2: Workflow Details

This solution pack contains the following workflows:

- Oracle - Compliance Audit on the next page
- MS SQL - Compliance Audit on page 39
- Sybase - Compliance Audit on page 58
- DB2 - Compliance Audit on page 75

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 database compliance 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 Use this Workflow" topic for each workflow.

The information presented here assumes the following:

- HP DMA is installed and operational.
- At least one suitable target server is available (see Supported Products and Platforms on page 19).
- You are logged in to the HP DMA web interface.
- You have permission to create, edit, and deploy copies of the workflows included in this solution pack.

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

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 understand how the CIS benchmarks for Oracle Database map to the PCI and SOX requirements, see Compliance Benchmark Mappings for Oracle Database on page 93.

For links to the CIS, PCI, and SOX standards, see Additional Resources on page 112.

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 HP DMA solution packs require the latest HP DMA platform. To use the latest solution packs, update the HP DMA platform. HP DMA 10.30.000.000 solution packs are supported on HP DMA 10.30.000.000 (and later).
- You have installed the Database Compliance solution pack.

For more information about prerequisites for Oracle Database, refer to the Oracle Database Product Documentation on page 111.

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 HP DMA server. You can configure the mail server in the path below:

DMA setup > Configuration > Outgoing Mail > Server.

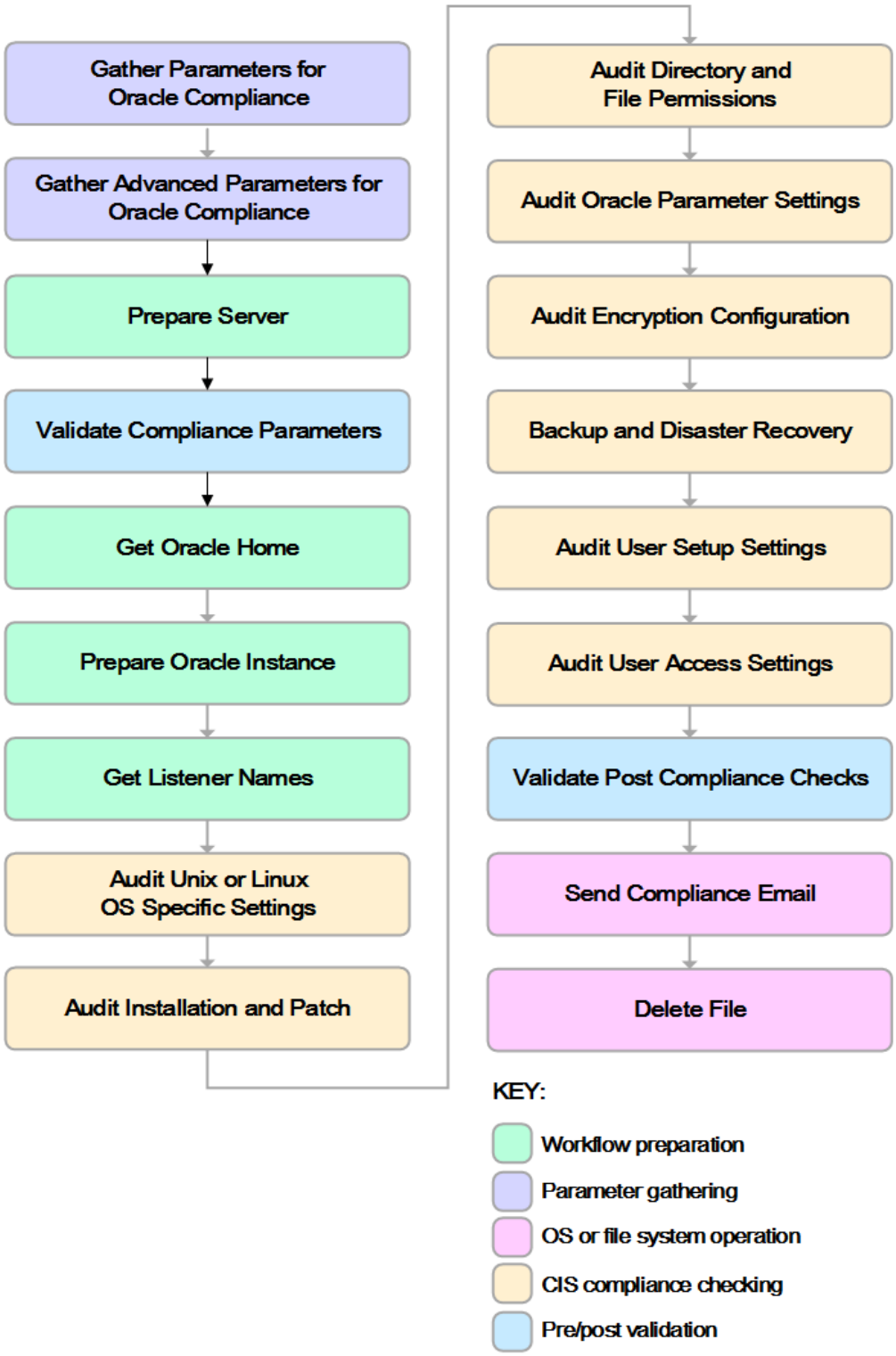
Validation Checks Performed

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

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.


Gather Parameters for Oracle Compliance
Gather Advanced Parameters for Oracle Compliance
Prepare Server
Validate Compliance Parameters
Get Oracle Home
Prepare Oracle Instance
Get Listener Names
Audit Unix or Linux OS Specific Settings
Audit Installation and Patch
Audit Directory and File Permissions
Audit Oracle Parameter Settings
Audit Encryption Configuration
Backup and Disaster Recovery
Audit User Setup Settings
Audit User Access Settings
Validate Post Compliance Checks
Send Compliance Email
Delete File
KEY:
Workflow preparation
Parameter gathering
OS or file system operation
CIS compliance checking
Pre/post validation

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.

Steps Used in Oracle Compliance Audit, continued

Workflow Step	Description
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 Permissions	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.
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 HP 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 37.

How to Run this Workflow

The following instructions show you how to customize and run the Oracle - Compliance Audit workflow in your environment.

Tip: For detailed instructions to run HP DMA workflows—using the Oracle - Compliance Audit workflow as an example—see *HP 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 - Compliance Audit on page 37.

Note: Before following this procedure, review the Prerequisites for this Workflow on page 22, and ensure that all requirements are satisfied.

To use the Run Oracle Compliance Audit workflow:

1. Create a deployable copy of the workflow (see "Create a Deployable Workflow" in *HP DMA Quick Start Tutorial*).
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

Parameters Defined in this Step: Gather Parameters for Oracle Compliance , continued

Parameter Name	Default Value	Required	Description
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 How to Expose Additional Workflow Parameters on page 119.

See Parameters for Oracle - Compliance Audit on page 37 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 (see "Create a Deployment" in *HP DMA Quick Start Tutorial* for instructions).
6. On the Parameters tab, specify values for the required parameters listed in step 2 and any additional parameters that you have exposed.You do not need to specify values for those

parameters whose default values are appropriate for your environment.

7. On the Targets tab, specify one or more targets for this deployment.
8. Save the deployment (click **Save** in the lower right corner).
9. Run the workflow using this deployment (see "Run Your Workflow" in *HP DMA Quick Start Tutorial* for instructions).

To verify the results:

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

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:

This workflow provides three different types of compliance reports (within this document, each of the reports uses an Oracle database in the examples):

Report Type	Description
Compliance Audit Results Email	You can instruct the workflows in this solution to send an email message containing the results of the compliance audit for each target database instance. This email message contains the result of every benchmark check performed. It is formatted according to the benchmark that you specify.
Database Compliance Report	This summary report shows you the number of compliance checks that passed and failed for each database instance in your environment that was audited.
Database Compliance Detail Report	The Database Compliance Detail report shows you the result of each benchmark check performed for a specific database instance.

To access the Compliance Audit Results Email, be sure to specify your email address in the Email Addresses to Receive Report parameter when you create your deployment.

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

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. See How to Expose Additional Workflow Parameters on page 119.

Be sure that the default values for all remaining input parameters are appropriate for your environment (see Parameters for Oracle - Compliance Audit on page 37).

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

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. See How to Expose Additional Workflow Parameters on page 119.

Be sure that the default values for all remaining input parameters are appropriate for your environment (see Parameters for Oracle - Compliance Audit on page 37).

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

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. See How to Expose Additional Workflow Parameters on page 119.

Be sure that the default values for all remaining input parameters are appropriate for your environment (see Parameters for Oracle - Compliance Audit on page 37).

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

In the scenario, all scorable checks are performed, and the compliance audit report is displayed only on the HP 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 (see How to Expose Additional Workflow Parameters on page 119). 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: 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.
Latest Patch	no default	optional	Most recent Oracle patch installed on this Oracle Home.

MS SQL - Compliance Audit

The MS SQL - Compliance Audit workflow enables you to audit a Microsoft SQL Server instance for compliance with the following security benchmark requirements:

- 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 for a SQL Server instance. The audit identifies compliance related problems with a SQL Server instance.

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 understand how the CIS benchmarks for Microsoft SQL Server map to the PCI and SOX requirements, see Compliance Benchmark Mappings for Microsoft SQL Server.

For links to the CIS, PCI, and SOX standards, see Additional Resources on page 112.

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 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 MS SQL - Compliance Audit workflow:

- The latest HP DMA solution packs require the latest HP DMA platform. To use the latest solution packs, update the HP DMA platform. HP DMA 10.30.000.000 solution packs are supported on HP DMA 10.30.000.000 (and later).
- You have installed the Database Compliance solution pack.

The workflow must be able to:

- Execute `reg.exe` (Windows Server command-line registry tool), `wmic.exe` (Windows Management Instrumentation Command-line tool), and "`net`" Windows utilities on the target server. These utilities are included in the base Windows Server installations.
- Log in to the SQL Server instance using Windows-authenticated login credentials.
- Read system tables and execute system procedures upon connecting to the SQL Server instance.

For more information about prerequisites for Microsoft SQL Server, refer to the Microsoft SQL Server Documentation on page 111.

How this Workflow Works

This workflow performs the following actions:

- Prepares to run the workflow by gathering information about the target SQLServerInstance and validating parameter values.
- Audits the various configuration settings specified in the pertinent CIS, SOX, or PCI benchmark.
- Composes and sends an email containing the results of the audit.

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

DMA setup > Configuration > Outgoing Mail > Server.

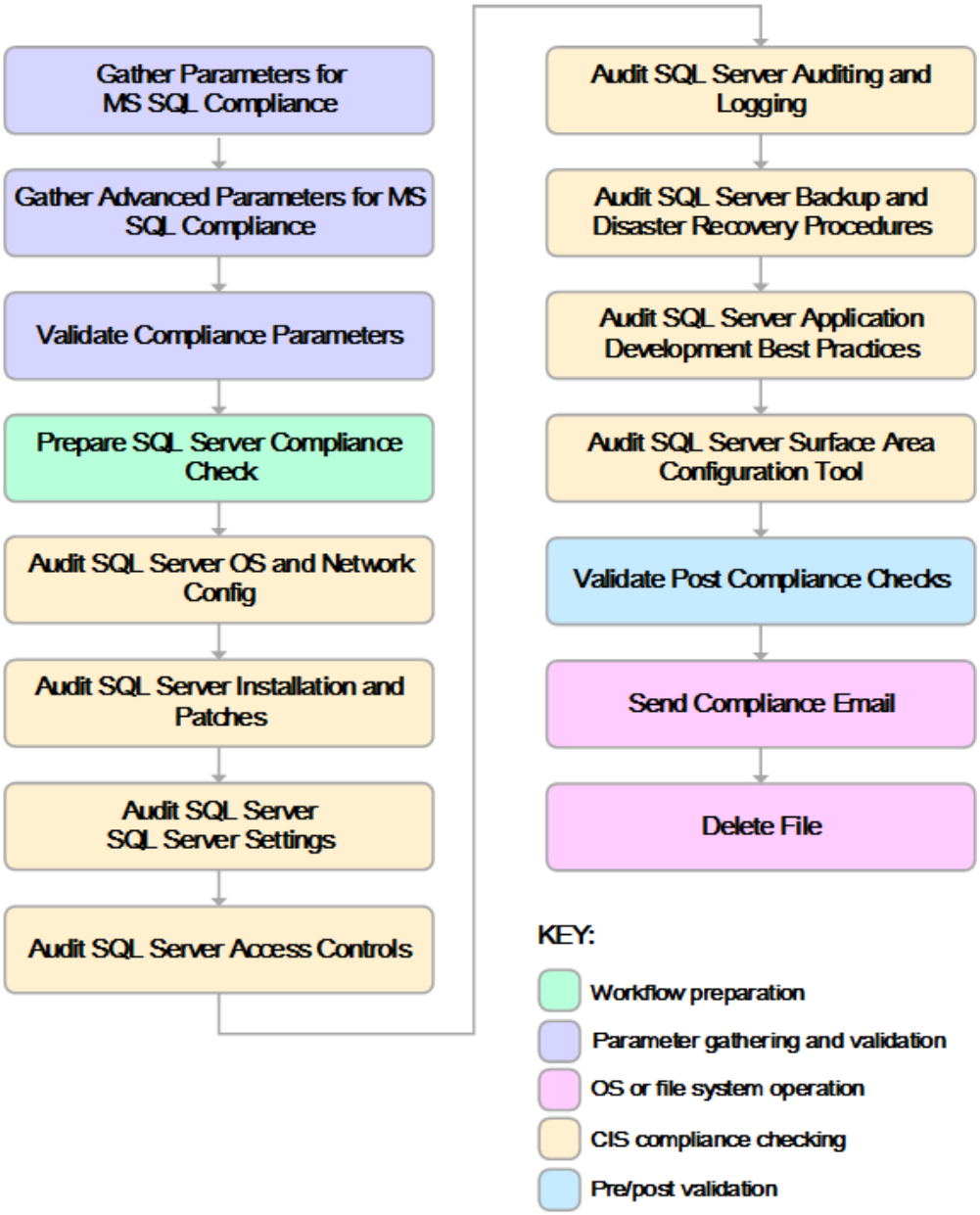
Validation Checks Performed

This workflow validates the following conditions:

1. Either `sqlcmd.exe` or `osql.exe` must be installed on the target machine.
2. Any Excluded Checks specified by the user refer to actual CIS, SOX, or PCI benchmark checks.
3. Any email addresses specified are valid addresses.
4. The workflow can create the temporary file that will store the compliance check results.

Steps Executed

The MS SQL - 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.



Steps Used by Run MS SQL Compliance Audit

Workflow Step	Description
Gather Parameters for MS SQL Compliance	This step gathers two pieces of information: (1) the type of compliance audit to perform and (2) the list of compliance checks to exclude from the audit.
Gather Advanced Parameters for MS SQL 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 latest available SQL Server build and the Windows domain user.
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 SQL Server Compliance Check	This step determines whether workflow can perform the following actions on the target system: • Check database connectivitiy • Query the registry • Check the registry for SQL Server • Execute Windows Management Instrumentation (WMI) API calls • Execute the `net user /?` command If the workflow can perform all of these actions, it is capable of running the Center for Internet Security (CIS) Security Configuration Benchmark compliance tests.
Audit SQL Server OS and Network Config	This step audits the scorable recommendations in Section 1, Operating System and Network Specific Configuration, of the Center for Internet Security (CIS) Security Configuration Benchmark for Microsoft SQL Server 2005, version 2.0.0 (December 2011).

Steps Used by Run MS SQL Compliance Audit, continued

Workflow Step	Description
Audit SQL Server Installation and Patches	This step audits the scorable recommendations in Section 2, SQL Server Installation and Patches, of the Center for Internet Security (CIS) Security Configuration Benchmark for Microsoft SQL Server 2005, version 2.0.0 (December 2011).
Audit SQL Server SQL Server Settings	This step audits the scorable recommendations in Section 3, SQL Server Settings, of the Center for Internet Security (CIS) Security Configuration Benchmark for Microsoft SQL Server 2005, version 2.0.0 (December 2011).
Audit SQL Server Access Controls	This step audits the scorable recommendations in Section 4, Access Controls, of the Center for Internet Security (CIS) Security Configuration Benchmarks for Microsoft SQL Server 2005, version 2.0.0 (December 2011).
Audit SQL Server Auditing and Logging	This step audits the scorable recommendations in Section 5, Auditing and Logging, of the Center for Internet Security (CIS) Security Configuration Benchmark for Microsoft SQL Server 2005, version 2.0.0 (December 2011).
Audit SQL Server Backup and Disaster Recovery Procedures	This step audits the scorable recommendations in Section 6, Backup and Disaster Recovery Procedures, of the Center for Internet Security (CIS) Security Configuration Benchmark for Microsoft SQL Server 2005, version 2.0.0 (December 2011).
Audit SQL Server Application Development Best Practices	This step audits the scorable recommendations in Section 8, Application Development Best Practices, of the Center for Internet Security (CIS) Security Configuration Benchmarks for Microsoft SQL Server 2005, version 2.0.0 (December 2011).
Audit SQL Server Surface Area Configuration Tool	This step audits the scorable recommendations in Section 9, Surface Area Configuration Tool, of the Center for Internet Security (CIS) Security Configuration Benchmarks for Microsoft SQL Server 2005, version 2.0.0 (December 2011).

Steps Used by Run MS SQL Compliance Audit, continued

Workflow Step	Description
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 HP DMA Console. It also creates (or updates) the compliance metadata fields for the target. 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 MS SQL - Compliance Audit on page 56.

How to Run this Workflow

The following instructions show you how to customize and run the MS SQL - Compliance Audit workflow in your environment.

Tip: For detailed instructions to run HP DMA workflows—using the Oracle - Compliance Audit workflow as an example—see *HP 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 MS SQL - Compliance Audit on page 56.

Note: Before following this procedure, review the Prerequisites for this Workflow on page 40, and ensure that all requirements are satisfied.

To use the Run MS SQL Compliance Audit workflow:

1. Create a deployable copy of the workflow (see "Create a Deployable Workflow" in *HP DMA Quick Start Tutorial*).
2. Determine the values that you will specify for the following parameters:

   Parameters Defined in this Step: Gather Parameters for SQL Server 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

Parameters Defined in this Step: Gather Parameters for SQL Server Compliance , continued

Parameter Name	Default Value	Required	Description
Excluded 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.

Parameters Defined in this Step: Advanced Parameter for MS SQL 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 Build to Check for	no default	optional	The latest build of Microsoft SQL Server 2005, according to Microsoft. Ensure that instance is at least patched up to indicated build level. Example value would be “5058” for SQL 2012’s SP2. If no value is given, the related Compliance check will be skipped.

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 How to Expose Additional Workflow Parameters on page 119.

See Parameters for MS SQL - Compliance Audit 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 (see How to Expose Additional Workflow Parameters on page 119). 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 (see "Create a Deployment" in *HP DMA Quick Start Tutorial* for instructions).
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 (see "Run Your Workflow" in *HP DMA Quick Start Tutorial* for instructions).

To verify the results:

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

Information about each compliance check is displayed in the step output on the Console (and the History page) for each of the audit 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:

This workflow provides three different types of compliance reports (within this document, each of the reports uses an Oracle database in the examples):

Report Type	Description
Compliance Audit Results Email	You can instruct the workflows in this solution to send an email message containing the results of the compliance audit for each target database instance. This email message contains the result of every benchmark check performed. It is formatted according to the benchmark that you specify.
Database Compliance Report	This summary report shows you the number of compliance checks that passed and failed for each database instance in your environment that was audited.
Database Compliance Detail Report	The Database Compliance Detail report shows you the result of each benchmark check performed for a specific database instance.

To access the Compliance Audit Results Email, be sure to specify your email address in the Email Addresses to Receive Report parameter when you create your deployment.

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 MS SQL - Compliance Audit workflow.

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

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

- Section 7: Replication
- Section 9: Surface Area Configuration Tool

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	7.*,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.

Parameter Name	Example Value	Description
Email Addresses to Receive Report	SQLDBAdminTeam@mycompany.com, SQLDBAdminMgr@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. See How to Expose Additional Workflow Parameters on page 119.

Be sure that the default values for all remaining input parameters are appropriate for your environment (see Parameters for MS SQL - Compliance Audit).

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

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	SQLDBAdminTeam@mycompany.com, SQLDBAdminMgr@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. See How to Expose Additional Workflow Parameters on page 119.

Be sure that the default values for all remaining input parameters are appropriate for your environment (see Parameters for MS SQL - Compliance Audit).

Scenario 3: Perform a Full SOX Compliance Audit, Email the Results, and Configure Windows Domain User Using Runtime Parameters

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

Note: You may want to run this workflow against a MS SQL instance that can only be accessed by a Windows user with a temporary password. By using a runtime parameter for the password, you can ensure that the password used is always the latest.

To specify the Windows domain user at the time you execute a deployment with runtime parameters, perform the following additional steps:

1. When you make a copy of the workflow, expand the appropriate step, and then set the Windows domain user parameters—Instance Account and Instance Password—to **- User selected -**.
2. When you create a deployment from the copy of the workflow, set the parameter types to **Runtime Value**.
3. When you execute the deployment, specify the Windows domain user account and password.

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	SQLDBAdminTeam@mycompany.com, SQLDBAdminMgr@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.

Parameter Name	Example Value	Description
Instance Account	Domain\DomainUserAcct **Note:** Enter at runtime.	The Windows account that will perform the compliance audit.
Instance Password	DomainUserPswd **Note:** Enter at runtime.	The password for the Windows account that will perform the compliance audit.
Latest Build to Check for	5058	The latest build of Microsoft SQL Server 2005, according to Microsoft. Ensure that instance is at least patched up to indicated build level. Example value would be “5058” for SQL 2012’s SP2. If no value is given, the related Compliance check will be skipped.

Note: Some of these parameters are not exposed by default in the deployment. See How to Expose Additional Workflow Parameters on page 119.

Be sure that the default values for all remaining input parameters are appropriate for your environment (see Parameters for MS SQL - Compliance Audit).

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

In the scenario, all scorable checks are performed, and the compliance audit report is displayed only on the HP 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 SQL Server inventory 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 MS SQL - Compliance Audit).

Parameters for MS SQL - 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 (see How to Expose Additional Workflow Parameters on page 119). 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 MS SQL 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 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.

Parameters Defined in this Step: Gather Advanced Parameters for MS SQL 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.

Parameters Defined in this Step: Gather Advanced Parameters for MS SQL Compliance, continued

Parameter Name	Default Value	Required	Description
Instance Account	no default	optional	The Windows account that will perform the compliance audit.
Instance Password	no default	optional	The password for the Windows account that will perform the compliance audit.
Latest Build to Check for	no default	optional	The latest build of Microsoft SQL Server 2005, according to Microsoft. Ensure that instance is at least patched up to indicated build level. Example value would be “5058” for SQL 2012’s SP2. If no value is given, the related Compliance check will be skipped.

Sybase - Compliance Audit

The Sybase - Compliance Audit workflow enables you to audit a Sybase Adaptive Server Enterprise instance for compliance with the following security benchmark requirements:

- 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 for a Sybase ASE instance. The audit iidentifies up to 31 compliance related problems with a Sybase ASE instance.

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 understand how the CIS benchmarks for Sybase ASE database map to the PCI and SOX requirements, see Compliance Benchmark Mappings for Sybase ASE.

For links to the CIS, PCI, and SOX standards, see Additional Resources on page 112.

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 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 Sybase - Compliance Audit workflow:

- The latest HP DMA solution packs require the latest HP DMA platform. To use the latest solution packs, update the HP DMA platform. HP DMA 10.30.000.000 solution packs are supported on HP DMA 10.30.000.000 (and later).
- You have installed the Database Compliance solution pack.

This workflow runs against a Sybase ASE instance by default. You can also run it at the Database level, however, by making a copy and modifying the `Target Level`.

This workflow requires unchallenged `sudo` access to a user (typically `root`) who can access all required files and directories.

`isql` must be installed and accessible via the user/password settings stored in metadata. You may find these setting in the Environment screen.

For more information about prerequisites for Sybase Adaptive Server Enterprise, refer to the Sybase Adaptive Server Enterprise Documentation on page 111.

How this Workflow Works

This workflow performs the following actions:

- Prepares to run the workflow by gathering information about the target Sybase Adaptive Server Enterprise instance and validating parameter values.
- Audits the various configuration settings specified in the pertinent CIS, SOX, or PCI benchmark.
- Composes and sends an email containing the results of the audit.

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

DMA setup > Configuration > Outgoing Mail > Server.

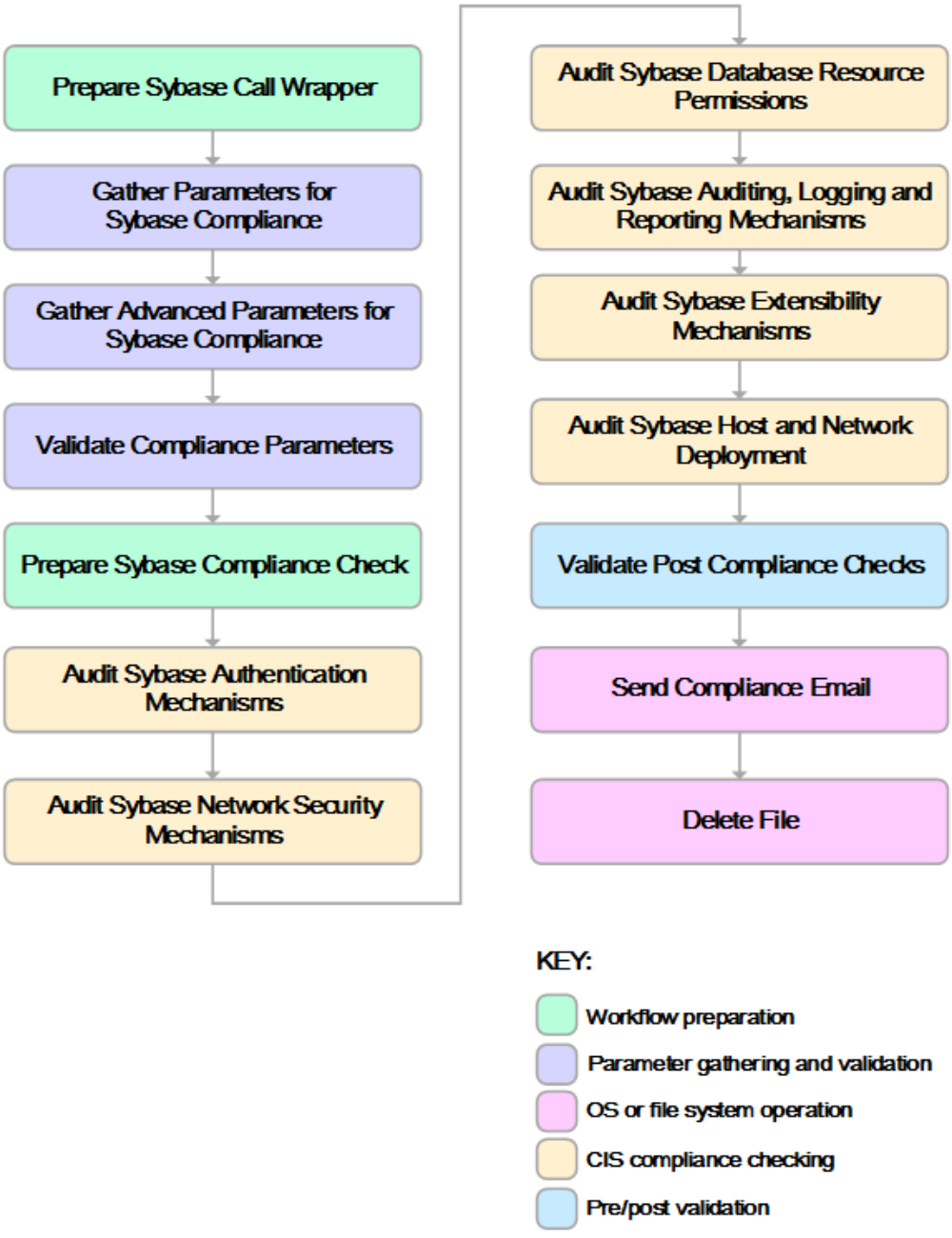
Validation Checks Performed

This workflow validates the following conditions:

1. Any Excluded Checks specified by the user refer to actual CIS, SOX, or PCI benchmark checks.
2. Any email addresses specified are valid addresses.
3. The workflow can create the temporary file that will store the compliance check results.

Steps Executed

The Sybase - 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.



Steps Used by Sybase Compliance Audit

Workflow Step	Description
Prepare Sybase Call Wrapper	This step constructs the commands that will be used to execute subsequent workflow steps as either the OS administrative user or the owner of the Sybase ASE installation.
Gather Parameters for Sybase Compliance	This step gathers two types of information: the list of compliance checks to exclude from the audit, and basic information about the Sybase ASE installation.
Gather Advanced Parameters for Sybase 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 passwords for the various Sybase ASE user roles.
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 Sybase Compliance Check	This step checks for database connectivity, verifies that the list of checks to be excluded from this compliance audit is properly formatted, and verifies that the email addresses specified are properly formatted.
Audit Sybase Authentication Mechanisms	This step audits the scorable recommendations in Section 1, Authentication Mechanisms, of the Center for Internet Security (CIS) Security Configuration Benchmark for Sybase Adaptive Server Enterprise (ASE) 15.0, version 1.1.0 (December 2011). Checks not implemented: 1.5 - Remove unused accounts and change default passwords

Steps Used by Sybase Compliance Audit, continued

Workflow Step	Description
Audit Sybase Network Security Mechanisms	This step audits the scorable recommendations in Section 2, Network Security Mechanisms, of the Center for Internet Security (CIS) Security Configuration Benchmark for Sybase Adaptive Server Enterprise (ASE) 15.0, version 1.1.0 (December 2011).
Audit Sybase Database Resource Permissions	This step audits the scorable recommendations in Section 3, Database Resource Permissions, of the Center for Internet Security (CIS) Security Configuration Benchmark for Sybase Adaptive Server Enterprise (ASE) 15.0, version 1.1.0 (December 2011).
Audit Sybase Auditing, Logging and Reporting Mechanisms	This step audits the scorable recommendations in Section 4, Auditing, Logging and Reporting Mechanisms, of the Center for Internet Security (CIS) Security Configuration Benchmark for Sybase Adaptive Server Enterprise (ASE) 15.0, version 1.1.0 (December 2011).
Audit Sybase Extensibility Mechanisms	This step audits the scorable recommendations in Section 5, Extensibility Mechanisms, of the Center for Internet Security (CIS) Security Configuration Benchmark for Sybase Adaptive Server Enterprise (ASE) 15.0, version 1.1.0 (December 2011)
Audit Sybase Host and Network Deployment	This step audits the scorable recommendations in Section 6, Host and Network Deployment, of the Center for Internet Security (CIS) Security Configuration Benchmark for Sybase Adaptive Server Enterprise (ASE) 15.0, version 1.1.0 (December 2011)
Validate Post Sybase Compliance Checks	This step reads the temporary file that contains the results of the compliance audit and prints the audit results to the HP DMA Console. It also creates (or updates) the compliance metadata fields for the target. 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 Sybase - Compliance

Audit on page 73.

How to Run this Workflow

The following instructions show you how to customize and run the Sybase - Compliance Audit workflow in your environment.

Tip: For detailed instructions to run HP DMA workflows—using the Oracle - Compliance Audit workflow as an example—see *HP 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 Sybase - Compliance Audit on page 73.

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

To use the Run Sybase Compliance Audit workflow:

1. Create a deployable copy of the workflow (see "Create a Deployable Workflow" in *HP DMA Quick Start Tutorial*).
2. Determine the values that you will specify for the following parameters:

   Parameters Defined in this Step: Prepare Sybase Call Wrapper

Parameter Name	Default Value	Required	Description
Call Wrapper	see description	optional	Command that will execute this step (or subsequent steps) as a specific user. For UNIX targets, the default is: `/opt/hp/dma/client/jython.sh` running as root For Windows targets, the default is: `jython` running as Administrator
Sybase OS User Name	sybase	required	OS user who owns the Sybase ASE installation directory.

Parameters Defined in this Step: Gather Parameters for Sybase Compliance

Parameter Name	Default Value	Required	Description
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.

Parameters Defined in this Step: Gather Advanced Parameters for Sybase 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
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.

Parameters Defined in this Step: Audit Sybase Host and Network Deployment

Parameter Name	Default Value	Required	Description
EBF Patch Level	no default	optional	Latest Express Bug Fix (EBF) patch level available from Sybase.
ESD Patch Level	no default	optional	Latest Electronic Software Distibution (ESD) patch level available from Sybase.

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 How to Expose Additional Workflow Parameters on page 119.

See Parameters for Sybase - Compliance Audit on page 73 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 (see "Create a Deployment" in *HP DMA Quick Start Tutorial* for instructions).
6. On the Parameters tab, specify values for the required parameters listed in step 2 and any additional parameters that you have exposed.You do not need to specify values for those parameters whose default values are appropriate for your environment.
7. On the Targets tab, specify one or more targets for this deployment.
8. Save the deployment (click **Save** in the lower right corner).
9. Run the workflow using this deployment (see "Run Your Workflow" in *HP DMA Quick Start Tutorial* for instructions).

To verify the results:

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

Information about each compliance check is displayed in the step output on the Console (and the History page) for each of the audit steps.

A summary of the compliance audit is also displayed in the step output for the Validate Post Sybase Compliance Checks step.

To view the reports:

This workflow provides three different types of compliance reports (within this document, each of the reports uses an Oracle database in the examples):

Report Type	Description
Compliance Audit Results Email	You can instruct the workflows in this solution to send an email message containing the results of the compliance audit for each target database instance. This email message contains the result of every benchmark check performed. It is formatted according to the benchmark that you specify.
Database Compliance Report	This summary report shows you the number of compliance checks that passed and failed for each database instance in your environment that was audited.
Database Compliance Detail Report	The Database Compliance Detail report shows you the result of each benchmark check performed for a specific database instance.

To access the Compliance Audit Results Email, be sure to specify your email address in the Email Addresses to Receive Report parameter when you create your deployment.

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 Sybase - Compliance Audit workflow.

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

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

- Section 5: Extensibility Mechanisms
- Section 6: Host and Network Deployment

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

Parameter Name	Example Value	Description
Excluded Compliance Checks	5.*,6.*	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.
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

Parameter Name	Example Value	Description
Email Addresses to Receive Report	SybaseDBAdminTeam@mycompany.com, SybaseDBAdminMgr@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.

Be sure that the default values for all remaining input parameters are appropriate for your environment (see Parameters for Sybase - Compliance Audit on page 73).

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

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	SybaseDBAdminTeam@mycompany.com, SybaseDBAdminMgr@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. See How to Expose Additional Workflow Parameters on page 119.

Be sure that the default values for all remaining input parameters are appropriate for your environment (see Parameters for Sybase - Compliance Audit on page 73).

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

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	SybaseDBAdminTeam@mycompany.com, SybaseDBAdminMgr@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. See How to Expose Additional Workflow Parameters on page 119.

Be sure that the default values for all remaining input parameters are appropriate for your environment (see Parameters for Sybase - Compliance Audit on page 73).

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

In the scenario, all scorable checks are performed, and the compliance audit report is displayed only on the HP 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 Sybase ASE inventory 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 Sybase - Compliance Audit on the next page).

Parameters for Sybase - 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 (see How to Expose Additional Workflow Parameters on page 119). 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: Prepare Sybase Call Wrapper

Parameter Name	Default Value	Required	Description
Call Wrapper	see description	optional	Command that will execute this step (or subsequent steps) as a specific user. For UNIX targets, the default is: `/opt/hp/dma/client/jython.sh` running as root For Windows targets, the default is: `jython` running as Administrator
Sybase OS User Name	sybase	required	OS user who owns the Sybase ASE installation directory.

Additional Parameters Defined in this Step: Gather Parameters for Sybase Compliance

Parameter Name	Default Value	Required	Description
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.

Additional Parameters Defined in this Step: Gather Advanced Parameters for Sybase 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
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.
OPER Role Password	no default	optional	Password for the Sybase ASE oper_role (operator) role.
SA Role Password	no default	optional	Password for the Sybase ASE sa_role (system administrator) role.
SSO Role Password	no default	optional	Password for the Sybase ASE sso_role (system security officer) role.
Sybase Role Password	no default	optional	Password for the sybase_ts_role (Sybase technical support) role.

Additional Parameters Defined in this Step: Audit Sybase Host and Network Deployment

Parameter Name	Default Value	Required	Description
EBF Patch Level	no default	optional	Latest Express Bug Fix (EBF) patch level available from Sybase.
ESD Patch Level	no default	optional	Latest Electronic Software Distibution (ESD) patch level available from Sybase.

DB2 - Compliance Audit

The DB2 - Compliance Audit workflow enables you to audit a IBM DB2 LUW instance for compliance with the following security benchmark requirements:

- Center for Internet Security (CIS) security configuration benchmarks for DB2 Database Server 8, 9, 9.5 version 1.1.0, December 2009
- Payment Card Industry (PCI) data security standard version 2.0, October 2010
- Sarbanes-Oxley (SOX) requirements Sarbanes-Oxley Act of 2002 Section 302

The workflow performs CIS Level 1 and Level 2 auditing and identifies compliance related problems with a DB2 instance.

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.

Although this workflow runs at the database level, the compliance report is generated only at the DB2 instance level; hence, in such cases, if the same workflow runs for another database created on the same DB2 instance, then there will be redundant results in the instance level compliance check report.

To understand how the CIS benchmarks for DB2 map to the PCI and SOX requirements, see Compliance Benchmark Mappings for IBM DB2.

For links to the CIS, PCI, and SOX standards, see Additional Resources on page 112.

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 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 DB2 - Compliance Audit workflow:

- The latest HP DMA solution packs require the latest HP DMA platform. To use the latest solution packs, update the HP DMA platform. HP DMA 10.30.000.000 solution packs are supported on HP DMA 10.30.000.000 (and later).
- You have installed the Database Compliance solution pack.

The workflow, which by default runs against a DB2 database, requires the following:

- The user (typically root) has unchallenged `sudo` access and can access all required files and directories.
- The DB2 instance and database must exist on the target machine, and the user running the workflow must have sufficient privileges to run the required DB2 commands and queries against the DB2 system table on the target machine.
- Login credentials must be stored in metadata.
- Certain DB2 feature compliance checks require a DB2 license (as recommended by IBM) to ensure that the workflow runs.
- DB2 Admin Server related checks are performed only if the Admin server is found on the target DB2 machine (it may have been attached to any DB2 Instance). There cannot be more than one DB2 Admin Server on the target machine.

For more information about prerequisites for DB2, refer to the Compliance Benchmark Mappings for IBM DB2 on page 107.

How this Workflow Works

This workflow performs the following actions:

- Prepares to run the workflow by gathering information about the target DB2 instance and validating parameter values.
- Audits the various configuration settings specified in the pertinent CIS, SOX, or PCI benchmark.
- Composes and sends an email containing the results of the audit.

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

DMA setup > Configuration > Outgoing Mail > Server.

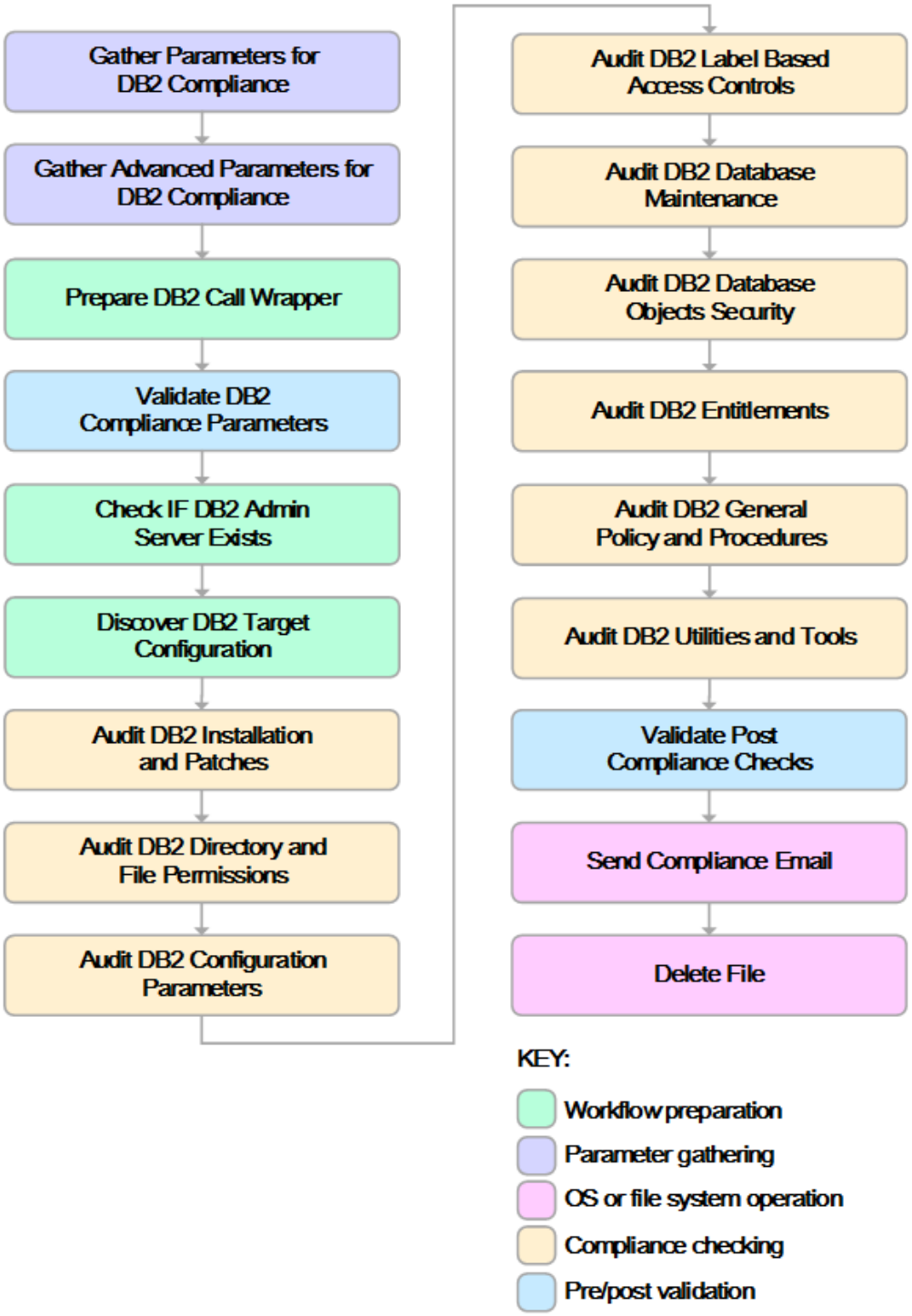
Validation Checks Performed

This workflow validates the following conditions:

1. Any Excluded Checks specified by the user refer to actual CIS, SOX, or PCI benchmark checks.
   a. Any email addresses specified are valid addresses.
2. The workflow can create the temporary file that will store the compliance check results.

Steps Executed

The DB2 - 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.



Steps Used by Run DB2 Compliance Audit

Workflow Step	Description
Gather Parameters for DB2 Compliance	This step sets the default values for all the DB2 configurable parameters used in the compliance audit and in subsequent workflow steps.
Gather Advanced Parameters for DB2 Compliance	This step sets the default values all the DB2 advanced configurable parameters used in the compliance audit and in subsequent workflow steps.
Prepare DB2 Call Wrapper	This step constructs the commands that will be used to execute subsequent workflow steps as either the OS administrative user (root) or the owner of the DB2 instance.
Validate DB2 Compliance Parameters	This step accepts input and default parameters and validates them for the DB2 database.
Check if DB2 Admin Server Exists	This step verifies that there is a DB2 Admin Server on the target machine. If the DAS name is found, then a string is returned with the name.
Discover DB2 Target Configuration	This step discovers any DB2 configurations that have been set up on the target server and uses that information to run the workflow.
Audit DB2 Installation and Patches	This step audits the recommendations in Section 1, Installation and Patches, of the Center for Internet Security (CIS) Configuration Benchmarks for DB2.
Audit DB2 Directory and File Permissions	This step audits the recommendations in Section 2.x , DB2 Directory and File Permissions, of the Center for Internet Security (CIS) Configuration Benchmarks for DB2.
Audit DB2 Configuration Parameters	This step audits the recommendations in Sec 3.x.x, DB2 Configurations, of the Center for Internet Security (CIS) Configuration Benchmarks for DB2.

Steps Used by Run DB2 Compliance Audit, continued

Workflow Step	Description
Audit DB2 Label Based Access Controls	This step audits the recommendations in Section 4.x, Auditing and Logging, of the Center for Internet Security (CIS) Security Configuration Benchmarks for DB2.
Audit DB2 Database Maintenance	This step audits the recommendations in Section 5.x, Database Maintenance, of the Center for Internet Security (CIS) Configuration Benchmarks recommendations for DB2.
Audit DB2 Database Objects Security	This step audits the recommendations in Section 6.x, Securing Database Objects, of the Center for Internet Security (CIS) Security Configuration Benchmarks for DB2.
Audit DB2 Entitlements	This step audits the recommendations in Section 7.x, Entitlements, of the Center for Internet Security (CIS) Security Configuration Benchmarks for DB2.
Audit DB2 General Policy and Procedures	This step audits the recommendations in Section 8.x, General Policy and Procedures, of the Center for Internet Security (CIS) Security Configuration Benchmarks for DB2.
Audit DB2 Utilities and Tools	This step audits the recommendations in Section 9.x, DB2 Utilities and Tools, of the Center of Internet Security (CIS) Configuration Benchmarks for DB2.
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 HP DMA Console. If email addresses were specified, then 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	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 DB2 - Compliance Audit on page 90.

How to Run this Workflow

The following instructions show you how to customize and run the DB2 - Compliance Audit workflow in your environment.

Tip: For detailed instructions to run HP DMA workflows—using the Oracle - Compliance Audit workflow as an example—see *HP 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 DB2 - Compliance Audit.

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

To use the Run DB2 Compliance Audit workflow:

1. Create a deployable copy of the workflow (see "Create a Deployable Workflow" in *HP DMA Quick Start Tutorial*).
2. Determine the values that you will specify for the following parameters:

   Parameters Defined in this Step: Gather Parameters for DB2 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
DB2 Latest Fixpack Number	no default	required	The latest DB2 UDB Fixpack Number for the specific DB2 version against which the DB2 Compliance workflow is running.

Parameters Defined in this Step: Gather Parameters for DB2 Compliance , continued

Parameter Name	Default Value	Required	Description
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 Make sure that the checks specified here correspond with the compliance audit type (CIS, PCI, or SOX) that you are running.

Parameters Defined in this Step: Gather Advanced Parameters for DB2 Compliance

Parameter Name	Default Value	Required	Description
Email Addresses to Receive Report	no default	optional	The email address (or multiple email addresses separated by commas without spaces) to which the compliance test results are sent.

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 How to Expose Additional Workflow Parameters on page 119.

See Parameters for DB2 - Compliance Audit on page 90 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 (see "Create a Deployment" in *HP DMA Quick Start Tutorial* for instructions).
6. On the Parameters tab, specify values for the required parameters listed in step 2 and any additional parameters that you have exposed.You do not need to specify values for those parameters whose default values are appropriate for your environment.
7. On the Targets tab, specify one or more targets for this deployment.
8. Save the deployment (click **Save** in the lower right corner).
9. Run the workflow using this deployment (see "Run Your Workflow" in *HP DMA Quick Start*

Tutorial for instructions).

To verify the results:

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

Information about each compliance check is displayed in the step output on the Console (and the History page) for each of the audit 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:

This workflow provides three different types of compliance reports (within this document, each of the reports uses an Oracle database in the examples):

Report Type	Description
Compliance Audit Results Email	You can instruct the workflows in this solution to send an email message containing the results of the compliance audit for each target database instance. This email message contains the result of every benchmark check performed. It is formatted according to the benchmark that you specify.
Database Compliance Report	This summary report shows you the number of compliance checks that passed and failed for each database instance in your environment that was audited.
Database Compliance Detail Report	The Database Compliance Detail report shows you the result of each benchmark check performed for a specific database instance.

To access the Compliance Audit Results Email, be sure to specify your email address in the Email Addresses to Receive Report parameter when you create your deployment.

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 DB2 - Compliance Audit workflow.

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

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

- Section 7: Entitlements
- Section 9: DB2 Utilities and Tools

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
DB2 Latest Fixpack Number	8	The latest DB2 UDB Fixpack Number for the specific DB2 version against which the DB2 Compliance workflow is running.

Parameter Name	Example Value	Description
Excluded Compliance Checks	7.*,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.
Email Addresses to Receive Report	DB2DBAdminTeam@mycompany.com, DB2DBAdminMgr@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. See How to Expose Additional Workflow Parameters on page 119.

Be sure that the default values for all remaining input parameters are appropriate for your environment (see Parameters for DB2 - Compliance Audit on page 90).

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

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
DB2 Latest Fixpack Number	8	The latest DB2 UDB Fixpack Number for the specific DB2 version against which the DB2 Compliance workflow is running.
Email Addresses to Receive Report	DB2DBAdminTeam@mycompany.com, DB2DBAdminMgr@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. See How to Expose Additional Workflow Parameters on page 119.

Be sure that the default values for all remaining input parameters are appropriate for your environment (see Parameters for DB2 - Compliance Audit on page 90).

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

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
DB2 Latest Fixpack Number	8	The latest DB2 UDB Fixpack Number for the specific DB2 version against which the DB2 Compliance workflow is running.
Email Addresses to Receive Report	DB2DBAdminTeam@mycompany.com, DB2DBAdminMgr@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. See How to Expose Additional Workflow Parameters on page 119.

Be sure that the default values for all remaining input parameters are appropriate for your environment (see Parameters for DB2 - Compliance Audit on page 90).

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

In the scenario, all scorable checks are performed, and the compliance audit report is displayed only on the HP 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 DB2 inventory 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

Note: Some of these parameters are not exposed by default in the deployment. See How to Expose Additional Workflow Parameters on page 119.

Be sure that the default values for all remaining input parameters are appropriate for your environment (see Parameters for DB2 - Compliance Audit on the next page).

Parameters for DB2 - Compliance Audit

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 119). 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 DB2 Compliance

Parameter Name	Default Value	Required	Description
Compliance Type	CIS	optional	The Compliance type audited by the workflow. Valid values are: CIS, PCI, SOX.
DB2 Latest Fixpack Number	no default	required	The latest DB2 UDB Fixpack Number for the specific DB2 version against which the DB2 Compliance workflow is running.
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 Make sure that the checks specified here correspond with the compliance audit type (CIS, PCI, or SOX) that you are running.

Additional Parameters Defined in this Step: Gather Advanced Parameters for DB2 Compliance

Parameter Name	Default Value	Required	Description
Email Addresses to Receive Report	no default	optional	The email address (or multiple email addresses separated by commas without spaces) to which the compliance test results are sent.
Latest Patch	no default	optional	The latest DB2 UDB Fixpack Number for the specific DB2 version against which the DB2 Compliance workflow is running.

Chapter 3: Reference Information

This chapter contains the following information:

Topic	Description
Compliance Benchmark Information	A list of the specific security benchmarks that are used by the workflows in this solution pack, and the mappings between each CIS benchmark requirement and the corresponding PCI and SOX requirements
Database Product Documentation	Links to product documentation for the database products that these workflows support
Additional Resources	Links for additional contextual information: Security Benchmark documentation and HP DMA documentation.

Compliance Benchmark Information

The workflows in this solution implement compliance audits against the following database security benchmarks:

Benchmark Type	Benchmark Version
Center for Internet Security (CIS)	Security Configuration Benchmarks for: Oracle 9i/10g, version 2.01 (April, 2005) Oracle Database Server 11g, version 1.1.0 (December 2011) Microsoft SQL Server 2005, version 2.0.0 (December 2011) Sybase Adaptive Server Enterprise (ASE) 15.0, version 1.1.0 (December 2011)
Payment Card Industry (PCI)	Data Security Standard version 2.0 (October 2010)
Sarbanes-Oxley (SOX)	Sections 302.2, 302.4b, 302.4c, 302.5

For links to the text of these security benchmarks, see the Security Benchmark Documentation on page 112.

The following topics show you how the CIS compliance checks map to the PCI and SOX requirements for each database product:

- Compliance Benchmark Mappings for Oracle Database
- Compliance Benchmark Mappings for Microsoft SQL Server
- Compliance Benchmark Mappings for Sybase ASE
- Compliance Benchmark Mappings for IBM DB2

Note: Of the three benchmarks, the CIS benchmarks define the most granular security configuration requirements. The workflows do not perform checks for every PCI or SOX requirement. They perform only those technical PCI and SOX checks that map directly to the CIS checks.

Compliance Benchmark Mappings for Oracle Database

This topic lists the CIS checks performed by the Oracle - Compliance Audit workflow and shows you how those checks map to the pertinent PCI and SOX requirements.

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.

Compliance Check Mappings for Oracle Database

CIS Section	CIS	SOX	PCI
Section 1: Operating System Specific Settings	1.*		
Section 2: Installation and Patch	2.02	302.4.3	6.1
	2.05	302.4.3	
	2.06	302.4.3	
	2.07	302.4.3	
	2.08	302.4.3	
	2.09	302.4.3	
	2.1	302.4.3	
	2.11	302.4.3	
	2.12	302.4.3	2.1
	2.13	302.4.3	
	2.14	302.4.3	
Section 3: Oracle Directory and File Permissions	3.01	302.4.3	
	3.02	302.4.3	
	3.03	302.4.3	
	3.04	302.4.3	
	3.05	302.4.3	
	3.06	302.4.3	

Compliance Check Mappings for Oracle Database, continued

CIS Section	CIS	SOX	PCI
	3.07	302.4.3	
	3.08	302.4.3	
	3.09	302.4.3	
	3.1	302.4.3	
	3.11	302.4.3	
	3.12	302.4.3	
	3.13	302.4.3	
	3.14	302.4.3	
	3.15	302.4.3	
	3.16	302.4.3	
	3.17	302.4.3	
	3.18	302.4.3	
	3.19	302.4.3	
	3.2	302.4.3	
	3.21	302.4.3	
	3.22	302.4.3	
	3.23	302.4.3	
	3.24	302.4.3	
	3.25	302.4.3	
	3.26	302.4.3	
Section 4: Oracle Parameter Settings	4.01	302.4.3	
	4.02	302.4.3	
	4.03	302.2	

Compliance Check Mappings for Oracle Database, continued

CIS Section	CIS	SOX	PCI
	4.04	302.2	
	4.05	302.2	
	4.07	302.4.3	
	4.08	302.4.3	
	4.09	302.4.3	
	4.1	302.4.3	
	4.11	302.4.3	
	4.12	302.2	
	4.13	302.4.3	
	4.14	302.4.3	
	4.15	302.4.3	
	4.16	302.4.3	
	4.17	302.4.3	
	4.18	302.4.2	
	4.19	302.4.3	
	4.2	302.4.3	
	4.23	302.4.3	
	4.24	302.4.3	
	4.25	302.4.3	
	4.26	302.4.3	
	4.27	302.2	
	4.28	302.4.3	
	4.29	302.2	

Compliance Check Mappings for Oracle Database, continued

CIS Section	CIS	SOX	PCI
	4.3	302.4.3	
	4.31	302.4.3	
	4.32	302.2	
	4.33	302.4.3	
	4.34	302.4.3	8.5.13.0
	4.35	302.4.3	
	4.35	302.2	
	4.36	302.4.2	
	4.39	302.2	
	4.4	302.2	
	4.41	302.2	
	4.42	302.2	
	4.43	302.4.3	
	4.43	302.2	
Section 5: Encryption Specific Settings	5.02	302.2	2.3
	5.03	302.2	
	5.04	302.2	
	5.05	302.2	
	5.06	302.2	
	5.07	302.2	
	5.08	302.2	
	5.09	302.2	
	5.13	302.4.3	

Compliance Check Mappings for Oracle Database, continued

CIS Section	CIS	SOX	PCI
	5.14	302.4.3	
	5.15	302.4.3	
	5.16	302.2	
	5.21	302.2	
	5.24	302.4.3	
	5.25	302.2	
	5.26	302.2	
Section 7: Backup and Disaster Recovery	7.02	302.4.3	
	7.04	302.4.3	
	7.05	302.4.3	
	7.06	302.4.3	
Section 8: Oracle Profile (User) Setup Settings	8.01	302.2	
	8.02	302.2	8.5.9.0
	8.03	302.2	8.5.12.0
	8.04	302.2	
	8.05	302.2	8.5.14.0
	8.07	302.2	
	8.08	302.2	
	8.09	302.4.3	
	8.1	302.4.3	
	8.11	302.4.3	
	8.12	302.4.3	
	8.13	302.2	

Compliance Check Mappings for Oracle Database, continued

CIS Section	CIS	SOX	PCI
	8.14	302.2	
Section 9: Oracle Profile (User) Access Settings	9.01	302.4.3	
	9.02	302.4.3	
	9.03	302.2	7.1.1
	9.04	302.2	7.1.1
	9.05	302.2	7.1.1
	9.06	302.4.3	7.1.1
	9.07	302.4.3	7.1.1
	9.08	302.2	7.1.1
	9.09	302.4.3	7.1.1
	9.1	302.4.3	7.1.1
	9.11	302.4.3	7.1.1
	9.12	302.4.3	7.1.1
	9.13	302.4.3	7.1.1
	9.14	302.4.3	7.1.1
	9.15	302.2	7.1.1
	9.16	302.4.3	7.1.1
	9.17	302.4.3	7.1.1
	9.18	302.4.3	7.1.1
	9.19	302.4.3	7.1.1
	9.2	302.4.3	7.1.1
	9.22	302.4.3	7.1.1
	9.23	302.4.3	

Compliance Check Mappings for Oracle Database, continued

CIS Section	CIS	SOX	PCI
	9.24	302.4.3	
	9.26	302.2	7.1.1
	9.27	302.2	7.1.1
	9.28	302.2	7.1.1
	9.29	302.2	
	9.3	302.4.3	
	9.31	302.4.3	
	9.32	302.4.3	
	9.33	302.4.3	
	9.34	302.4.3	7.1.1
	9.35	302.2	
	9.36	302.2	7.1.1
	9.37	302.4.3	7.1.1
	9.38	302.4.3	
	9.39	302.4.3	
	9.4	302.2	
	9.41	302.4.3	
	9.42	302.2	7.1.1
	9.43	302.2	
	9.44	302.2	
	9.45	302.2	
	9.46	302.4.3	
	9.47	302.2	

Compliance Check Mappings for Oracle Database, continued

CIS Section	CIS	SOX	PCI
	9.48	302.2	
	9.49	302.2	
	9.52	302.4.3	
	9.54	302.4.3	
	9.55	302.4.3	
	9.56	302.2	

Compliance Benchmark Mappings for Microsoft SQL Server

This topic lists the CIS checks performed by the MS SQL - Compliance Audit workflow and shows you how those checks map to the pertinent PCI and SOX requirements.

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.

Compliance Check Mappings for MS SQL Server

CIS Section	CIS	PCI	SOX
Section 1: Operating System and Network Specific Configuration	1.6	2.3	302.2
	1.9.1	2.1	302.2
	1.9.3		302.4.3
	1.9.4		302.4.3
	1.1	2.2.2	302.4.3
	1.13	7.1	302.2
	1.2	7.1	302.2
Section 2: SQL Server Installation and Patches	2.1		302.4.3
	2.2	6.1	302.4.3
	2.3	1.1.5	302.4.3
	2.4		302.4.3
	2.6	8.5.16	302.2
	2.7	2.1	302.2
	2.9	2.2.4	302.4.3
	2.1	10.2	302.4.2
	2.11	2.2.4	302.2
	2.12	2.2.4	302.4.3

Compliance Check Mappings for MS SQL Server, continued

CIS Section	CIS	PCI	SOX
Section 3: SQL Server Settings	3.1	1.1.5	302.2
	3.2.1	2.2.2	302.4.3
	3.2.2	2.2.2	302.4.3
	3.2.3	2.2.2	302.4.3
	3.2.4	2.2.4	302.2
	3.2.5	8.5.16	302.2
	3.2.6		302.4.3
	3.2.7		302.4.3
	3.3		302.4.3
	3.4		302.4.3
	3.5	2.2.4	302.4.3
	3.6		302.4.2
	3.7	2.2.4	302.4.3
	3.8		302.4.2
	3.9		302.4.3
	3.1	2.2.4	302.4.3
	3.16	2.2.4	302.4.2
	3.17	2.2.2	302.4.3
Section 4: Access Controls	4.1	7.1.1	302.2
	4.2	7.1.1	302.2
	4.4	7.1.1	302.2
	4.5	2.1	302.2
	4.7	7.1.1	302.2

Compliance Check Mappings for MS SQL Server, continued

CIS Section	CIS	PCI	SOX
	4.9	7.1.1	302.2
	4.22	2.2.4	302.2
	4.24	7.1.1	302.2
Section 5: Auditing and Logging	5.2	10.2.4	302.5
Section 6: Backup and Disaster Recovery Procedures	6.3		302.4.3
	6.3		302.4.3
	6.5	3.4.1	302.2
	6.6	7.1.1	302.2
Section 7: Replication			
Section 8: Application Development Best Practices	8.1	2.2.4	302.2
	8.3	8.5.16	302.2
	8.9	8.5.16	302.2
	8.1	2.1	302.4.3
Section 9: Surface Area Configuration Tool	9.1	2.2.4	302.2
	9.2	2.2.4	302.4.3
	9.3	2.2.4	302.2
	9.4	2.2.4	302.4.3
	9.6	2.2.4	302.4.3
	9.8	2.2.4	302.4.3
	9.9	2.2.4	302.4.3
	9.1	2.2.4	302.2

Compliance Benchmark Mappings for Sybase ASE

This topic lists the CIS checks performed by the Sybase - Compliance Audit workflow and shows you how those checks map to the pertinent PCI and SOX requirements.

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.

Compliance Check Mappings for Sybase Adaptive Server Enterprise

CIS Section	CIS	PCI	SOX
Section 1: Authentication Mechanisms	1.2		302.4.3
	1.3	2.3	302.4.3
	1.4	2.1	302.4.3
	1.6	8.5.10	302.4.3
	1.7	8.5.13	302.4.3
	1.8	8.5.9	302.4.3
	1.9	8.5.16	404.1.1.1
Section 2: Network Security Mechanisms	2.1		302.4.3
	2.3		302.4.3
	2.4		302.4.3
	2.5.1		302.4.3
	2.5.2		302.4.3
Section 3: Database Resource Permissions	3.1.1		302.4.3
	3.2.1		302.4.3
	3.4		302.4.3
	3.5		302.4.3
	3.5.1		302.4.3
	3.6.1		302.4.3

Compliance Check Mappings for Sybase Adaptive Server Enterprise, continued

CIS Section	CIS	PCI	SOX
	3.6.2		302.4.3
Section 4: Auditing, Logging and Reporting Mechanisms	4.2		302.4.4
	4.3	10.3	302.4.4
	4.6		302.4.4
	4.7		302.4.4
	4.8		302.4.4
Section 5: Extensibility Mechanisms	5.1		302.4.3
	5.2		302.4.3
	5.3.1		302.4.3
	5.3.2		302.4.3
Section 6: Host and Network Deployment	6.6		302.4.3
	6.1		302.4.3
	6.11	6.1	302.4.3

Compliance Benchmark Mappings for IBM DB2

This topic lists the CIS checks performed by the DB2 - Compliance Audit workflow and shows you how those checks map to the pertinent PCI and SOX requirements.

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.

Compliance Check Mappings for IBM DB2

CIS Section	CIS	PCI	SOX
Section 1: Operating System and Network Specific Configuration	1.0.2		
	1.0.4	2.1	302.2
Section 2: DB2 Directory and File Permissions	2.0.1	7.1	302.2
	2.0.2	8.5.16c	302.2
	2.0.3	7.1	302.2
Section 3: DB2 Configurations	3.1.1		
	3.1.2	4.2.3, 4.1	
	3.1.3	7.1	302.2
	3.1.4		
	3.1.5	2.1	302.2
	3.1.6	2.1	302.2
	3.1.7	10.1	
	3.1.8	10.5	
	3.1..9		
	3.1.10		
	3.1.11	7.1	302.2
	3.1.12		

Compliance Check Mappings for IBM DB2, continued

CIS Section	CIS	PCI	SOX
	3.1.13		
	3.1.14		
	3.1.15	10.1	
	3.1.16	7.1	302.2
	3.2.1		
	3.2.2		
	3.2.3	2.2.2, 2.2.4	302.4.3
	3.2.4	3.1.1, 7.1	302.2
	3.2.5	3.1.1, 7.1	302.2
	3.2.6	3.1.1, 7.1	302.2
	3.2.7	3.1.1, 7.1	302.2
	3.2.8	3.1.1, 7.1	302.2
	3.2.9	3.1.1, 7.1	302.2
	3.2.10	3.1.1, 7.1	302.2
	3.2.11		
	3.2.12		
	3.3.1	7.1	302.2
	3.3.2		
	3.3.3	2.2.2, 2.2.4	302.4.3
	3.3.4		
	3.3.5	3.1.1, 7.1	302.2
	3.3.6	3.1.1, 7.1	302.2
	3.3.7	2.2.2	302.4.3

Compliance Check Mappings for IBM DB2, continued

CIS Section	CIS	PCI	SOX
Section 4: Label-Based Access Controls (LBAC)	4.0.1		
	4.0.2		
	4.0.3		
	4.0.4		
	4.0.5		
Section 5: Database Maintenance	5.0.3	2.2	302.4.3
Section 6: Securing Database Objects	6.0.1-6.0.29	2.1, 7.1.1, 7.1.2, 8.1	302.2
	6.0.30	2.1, 7.1.1, 7.1.2, 8.1	302.2
Section 7: Entitlements	7.0.1	7.1.1, 7.1.2, 7.2, 7.2.2	302.2
	7.0.2	7.1.1, 7.1.2, 7.2, 7.2.2	302.2
	7.0.3	7.1.1, 7.1.2, 7.2, 7.2.2	302.2
	7.0.4	7.1.1, 7.1.2, 7.2, 7.2.2	302.2
	7.0.5 - 7.0.13	2.1, 7.1.1, 7.1.2, 8.1	302.2
Section 8: General Policy and Procedures	8.0.1	7.1, 7.1.1	302.2
	8.0.2	7.1, 7.1.1	302.2
	8.0.3	2.2.4	302.4.3
	8.0.4	2.2.4	302.4.3
	8.0.5	2.2.4	302.4.3
	8.0.6	4.1	

Compliance Check Mappings for IBM DB2, continued

CIS Section	CIS	PCI	SOX
	8.0.7	7.1, 7.1.1	302.2
	8.0.8	7.1, 7.1.1	302.2
Section 9: DB2 Utilities and Tools	9.0.1		
	9.0.2		
	9.0.3		
	9.0.4		

Database Product Documentation

The following topics show contain links to documentation for the database products supported by this solution:

Note: The links to the documents listed here were correct as of the publication of this guide.

Oracle Database Product Documentation

The product documentation for Oracle Database Enterprise Edition version 11gis located here:

http://www.oracle.com/pls/db112/homepage

Microsoft SQL Server Documentation

For information about SQL Server, including prerequisites, see the SQL Server documentation available at the following web site:

http://msdn.microsoft.com/en-us/library

Sybase Adaptive Server Enterprise Documentation

SAP provides an extensive documentation library for Sybase ASE at this location:

http://infocenter.sybase.com/help/index.jsp

For information about Adaptive Server specifications—including database requirements based on page size—see this document:

Adaptive Server Specifications

IBM DB2 LUW Documentation

IBM provides an extensive documentation library for DB2 at this location:

http://www-01.ibm.com/support/docview.wss?uid=swg27009474

Additional Resources

See the following resources for additional contextual information about the workflows in this solution pack.

Security Benchmark Documentation

The workflows in this solution perform compliance audits against the following security benchmarks.

Center for Internet Security (CIS) Security Configuration Benchmarks

Oracle 9i/10g, version 2.01 (April, 2005)

http://benchmarks.cisecurity.org/tools2/oracle/CIS_Oracle_Benchmark_v2.01.pdf

Oracle Database Server 11g, version 1.1.0 (December 2011)

http://benchmarks.cisecurity.org/tools2/oracle/CIS_Oracle_11g_Benchmark_v1.1.0.pdf

Microsoft SQL Server 2005, version 2.0.0 (December 2011)

http://benchmarks.cisecurity.org/tools2/sqlserver/CIS_Microsoft_SQL_Server_2005_Benchmark_v2.0.0.pdf

Sybase Adaptive Server Enterprise (ASE) 15.0, version 1.1.0 (December 2011)

http://benchmarks.cisecurity.org/tools2/sybase/CIS_Sybase_ASE_15.0_Benchmark_v1.1.0.pdf

Payment Card Industry (PCI) Data Security Standard version 2.0 (October 2010)

http://pcisecuritystandards.org/documents/pa-dss_v2.pdf

Sarbanes-Oxley (SOX) Sections 302.2, 302.4b, 302.4c, 302.5

Official product-specific SOX benchmarks do not yet exist. Numerous third-party interpretations of the SOX legislation are available online free of charge. For more information, see the pertinent sections of the Sarbanes-Oxley Act of 2002.

Note: The links to the documents listed here were correct as of the publication of this guide.

HP DMA Documentation

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

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

https://softwaresupport.hp.com/

Chapter 4: Tips and Best Practices

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

- How a Solution Pack is Organized on the next page
- How to Expose Additional Workflow Parameters on page 119
- How to Use a Policy to Specify Parameter Values on page 120
- How to Import a File into the Software Repository on page 123

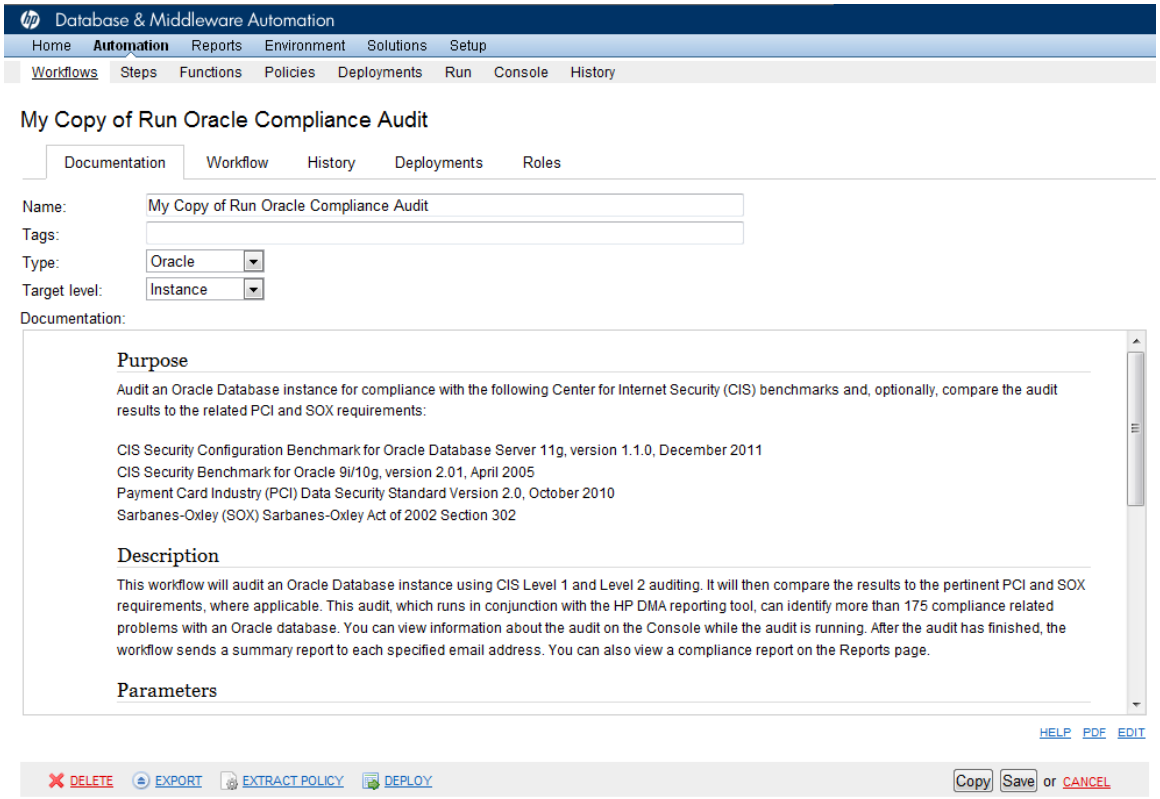
How a Solution Pack is Organized

Note: This topic uses the Oracle - Compliance Audit workflow in the Database Compliance solution pack as an example. The information provided here, however, pertains to any solution pack.

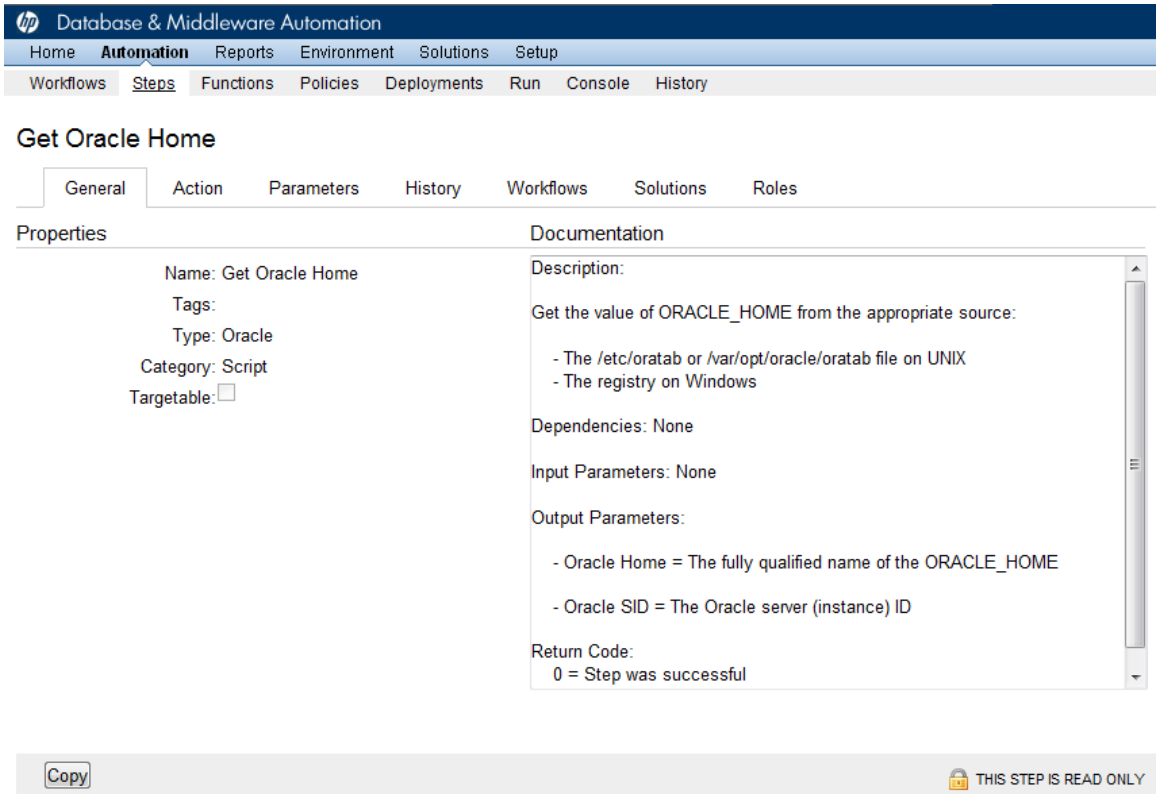
In HP DMA, a **workflow** executes a process —such as installing a software product or checking a database instance for compliance with a specific security benchmark.

A **solution pack** contains one or more related **workflow templates**.

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

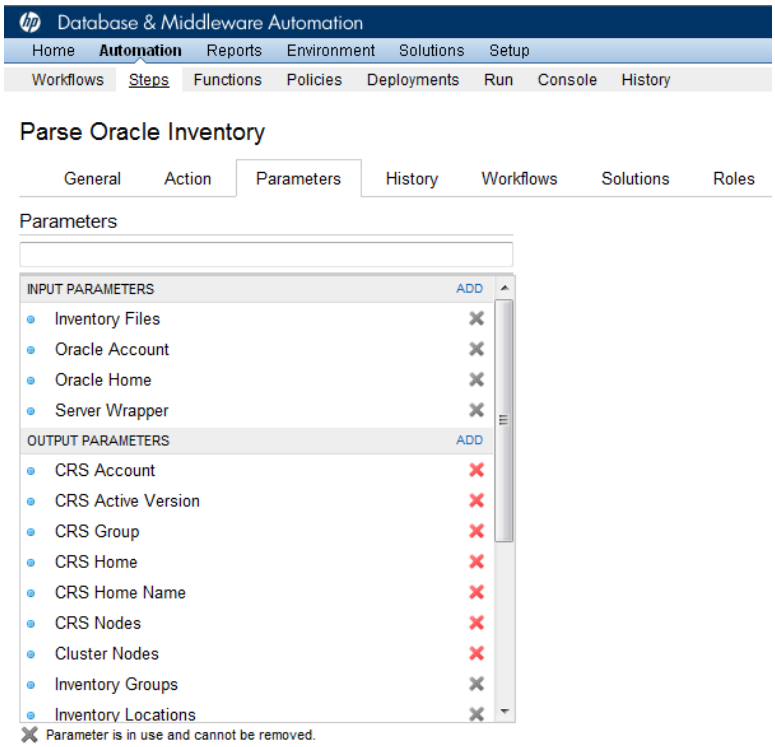


A workflow consists of a sequence of **steps**. Each step performs a very specific task. Each step includes a documentation panel that briefly describes its function.

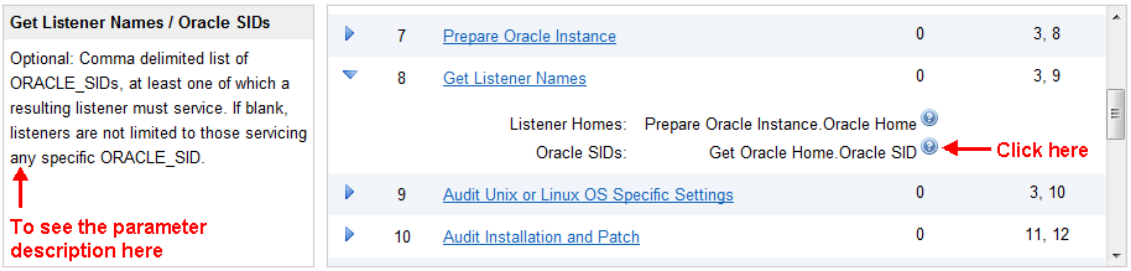


Steps can have input and output **parameters**. Output parameters from one step often serve as input parameters to another step. Steps can be shared among workflows.

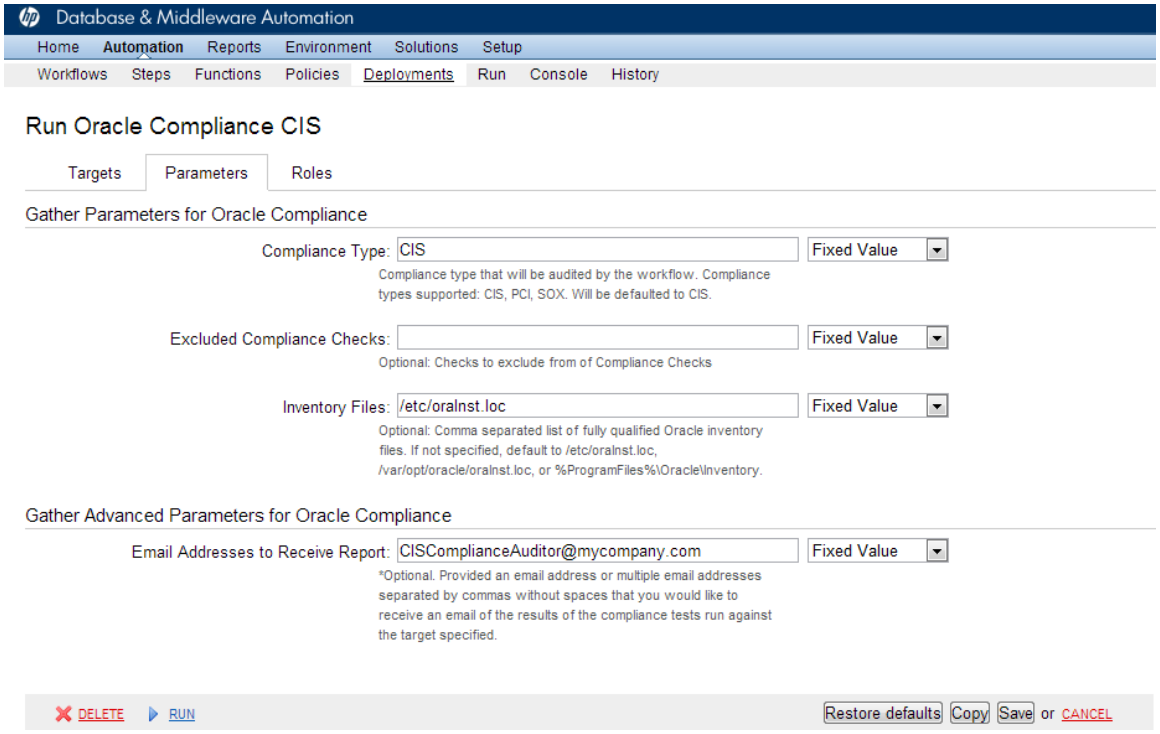
Parameter descriptions are displayed on the Parameters tab for each step in the workflow.



Parameter descriptions are also displayed on the Workflow tab for each workflow.



Parameter descriptions are also displayed on the Parameters tab in the **deployment** (organized by step).



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

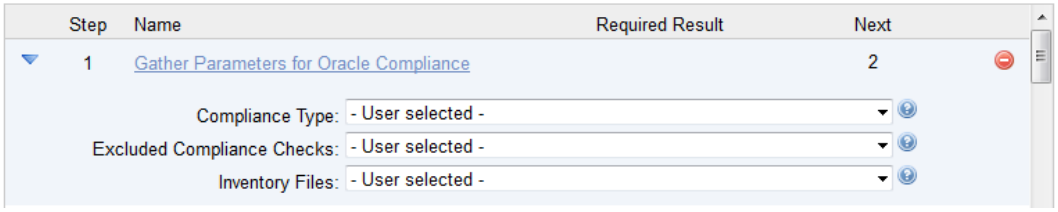
How to Expose Additional Workflow Parameters

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

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

To expose a hidden workflow parameter:

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



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

How to Use a Policy to Specify Parameter Values

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

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

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

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

For more information, see the *HP DMA User Guide*. This document is available on the HP Software Support web site: https://softwaresupport.hp.com/

Create a Policy

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

To create a policy that provides parameter values:

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

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

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

c. Click **Add**.

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

   To remove an attribute, click the **Remove** button.

5. On the Roles tab, grant Read and Write permission to any additional users and groups who will be using this policy. By default, any groups to which you belong have Read and Write permission.
6. Click the **Save** button (lower right corner).

Extract a Policy

An alternative to creating your own policy one attribute at a time is to extract the policy. This automatically creates a reusable policy that provides values for all input parameters associated with a workflow. This is a convenient way to create a policy.

To extract a policy:

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

Reference the Policy in the Deployment

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

To reference policy attributes in a deployment:

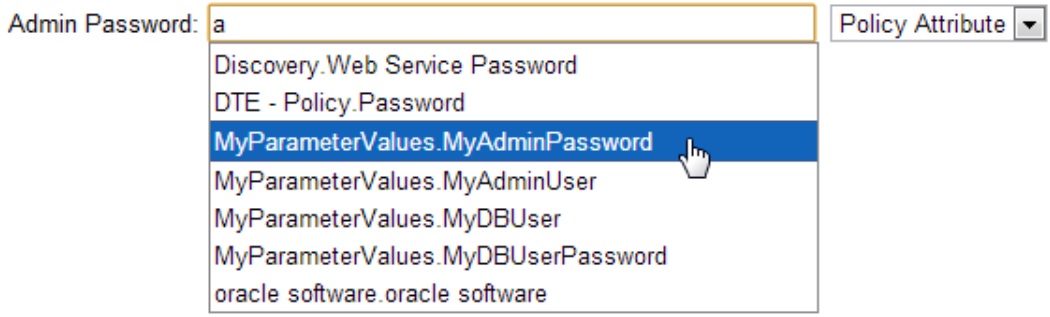
1. Create or access the deployment.

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

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

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

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



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

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

How to Import a File into the Software Repository

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

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

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

To import a file into the HP SA Software Library:

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

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

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

10. Click **Import**.

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

11. Click **Close** after the import is completed.

Chapter 5: Troubleshooting

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

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

Target Type

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

User Permissions and Related Requirements

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

Roles are assigned by the HP Server Automation administrator. They are then registered in HP DMA by your HP DMA administrator.

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

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

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

For more information, see the *HP DMA Administrator Guide*. This document is available on the HP Software Support web site: https://softwaresupport.hp.com/

Discovery in HP DMA

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

You must explicitly initiate the process of discovery—it is not automatic. See the *HP DMA User Guide* for instructions. This document is available on the HP Software Support web site: https://softwaresupport.hp.com/

Glossary

A

automation items

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

B

bridged execution

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

C

capability

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

connector

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

cross-platform

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

custom field

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

D

deployment

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

F

function

Functions are reusable pieces of code that can be included in automation steps. Any common routine or operation that multiple steps perform is a good candidate for a function. Functions can be tagged with keywords indicating the language in which they are written and the operating system with which they work. Functions are “injected” into the step code just prior to step execution.

I

input parameters

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

M

mapping

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

O

organization

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

P

parameters

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

policy
Policies are reusable sets of attributes that can be used as parameter values in deployments. Deployments can reference policy attributes to change the automation behavior. Policies provide values for input parameters. They can contain fixed values or reference Custom Fields. Policies enable HP DMA to manage groups of hundreds or thousands of servers at a time without the need to configure each individual server.

R

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

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

S

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

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

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

steps
Steps contains the actual code used to perform a unit of work detailed in a workflow.

T

target instance
In the context of MS SQL database refresh, the term "target instance" refers to the SQL

Server instance where the database that will be restored resides.

W

workflow

A workflow automates the process followed for an operational procedure. Workflows contain steps, which are linked together to form business logic for a common task. Workflows connect existing tasks in order to perform a new business process by building on existing best practices and processes.

workflow editor

The workflow editor is the tool that you use to assemble steps into workflows. You can map each input parameter to output parameters of previous steps or built-in metadata (such as the server name, instance name, or database name). You can also specify User Selected to expose a parameter in the deployment; this enables the person who creates the deployment to specify a value for that parameter.

workflow templates

A workflow template is a read-only workflow that cannot be deployed. To run one of the workflows included in a solution pack, you must first create a deployable copy of the workflow template and then customize that copy for your environment.