IT Operations Compliance

Software Version: 1.20

Linux, Solaris, AIX, HP-UX, and Windows

User Guide

Hewlett Packard Enterprise

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Contents

Get started

To use HPE ITOC, review the following requirements:

- HPE ITOC uses HTTPS and runs on port 9000, which is the default. If you customize HPE ITOC, contact your HPE ITOCadministrator to determine whether the port or protocol has changed.

- The ITOC Organizations Administration UI runs on port 9200. If you customize HPE ITOC, contact your administrator to determine whether the port or protocol has changed.

- You must use a browser that supports HPE ITOC. A minimum screen resolution of 1024x768 is supported. As a best practice, a screen resolution of 1280x1024 is recommended. For information about supported browsers, see the *HPE ITOC 1.20 Support Matrix*.

Log in and log out of HPE ITOC

The HPE ITOC host name must be resolvable from your Windows client server.

Log in

1. From your browser, use the following URL to log into ITOC:

   `https://<ITOC_hostname>:9000`

2. Accept the certificate that appears in the Security warning.

3. The HPE ITOC login screen appears. Enter the user name and password you created during the installation.

4. Click **Log In**.

The HPE ITOC Dashboard is displayed.

Log out

In the upper right corner of the HPE ITOC dashboard, click the account user name drop-down list, and click **Log Out**.

Where to go from here

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-

-

Sidebar menu

For quick and direct navigation to and from any view in HPE ITOC, use the **Sidebar Menu**. You can show or hide this menu in the views. By default, it is hidden.

The navigation selections are the same as the widgets in the dashboard.

- To show the Sidebar Menu, in the upper left sub-heading, select the ☰ icon.

- To hide the Sidebar Menu, click **Dashboard** in the subheading.

Menu options are displayed based on the user's permissions.

Back navigation

From any view in HPE ITOC, click the ⟨ icon in the sub-heading to return to the page shown next to

the icon. The following example shows that you can navigate back to the **Dashboard** from the **Business Services** page:
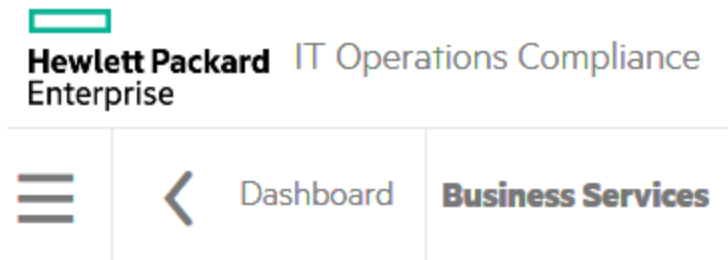
The Dashboard

The Dashboard appears when you log in to HPE ITOC, providing you with a comprehensive overview of HPE ITOCresults in your environment. The Dashboard layout is designed to help you navigate easily and intuitively within HPE ITOC.

View the ITOC Dashboard

You can navigate to the Dashboard from anywhere in HPE ITOC by clicking **Dashboard** just below the organization logo.

Click the Sidebar Menu icon ☰ to display a list of navigation links within HPE ITOC.
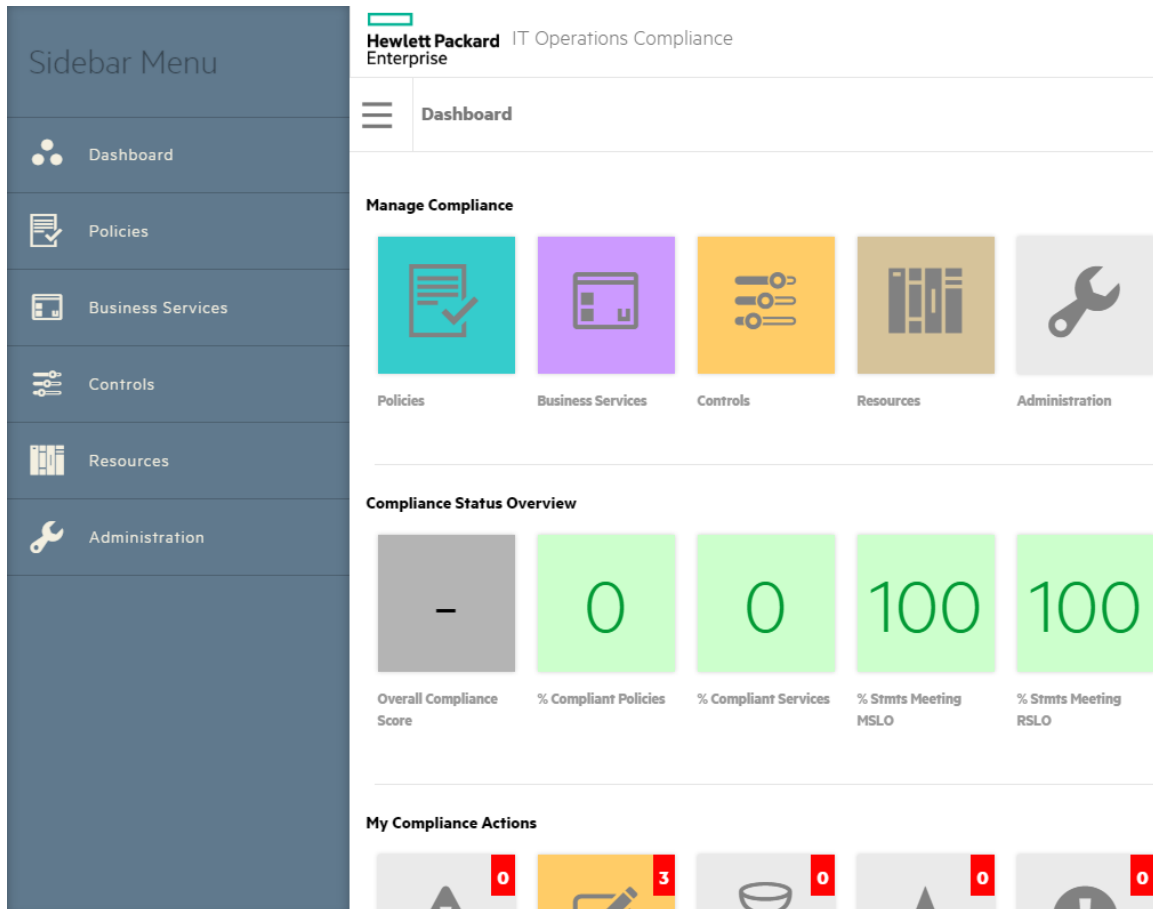
Based on your roles and permissions, you may not see all widgets shown in the illustration above. For more information about roles and permissions, see the *HPE ITOC 1.20 Administration Guide*.

Manage compliance

Use the widgets in the **Manage Compliance** section to navigate to the main HPE ITOC sections.
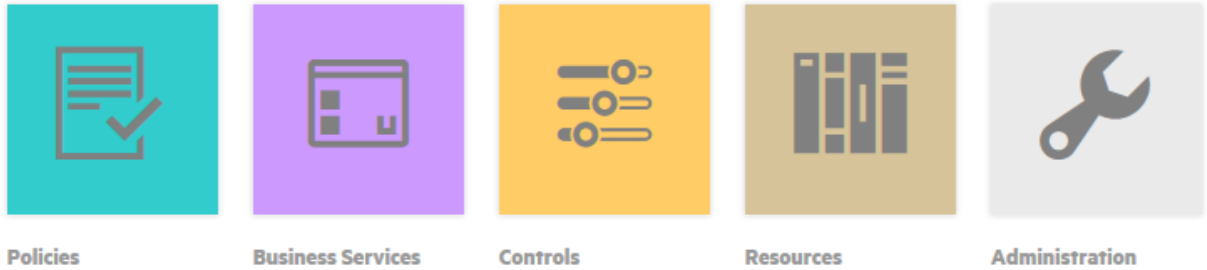
- "Policies" on page 25

- "Business services" on page 39

- "Controls" on page 52

- "Resources" on page 60

- Administration (for more information, see the *HPE ITOC 1.20 Administration Guide*)

Compliance status overview

To view the **Compliance Status Overview** section, you must be logged in with the Read All permission. The widgets provide an overview of the compliance status across the system.

If no compliance data is available, the [icon] icon appears in the widget.
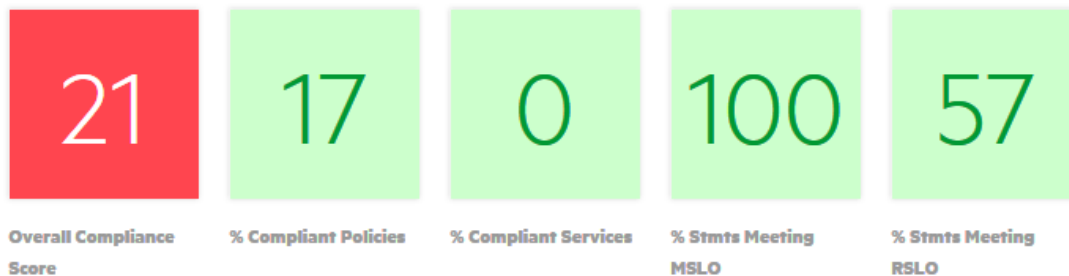
You can hover over a widget to view further details on compliance policies, business services, and SoAs.

Overall compliance score

The number on the **Overall Compliance Score** widget represents the overall percentage of compliant rule-resource pairs across all compliance policies and business services in the system.

Compliance is indicated by the widget color:

- If the number meets the compliance threshold, the widget is the same green as the compliance bar in the following figure.
- If the number is less than the compliance threshold, the widget is red.
- If no SoAs are in production state or if a scan has not yet been run, the widget is gray.

In the previous illustration, the default compliance threshold of 100 is used. Because the overall compliance score is 21, the compliance threshold is not met, and the **Overall Compliance Score** widget is red.

When the user hovers over the **Overall Compliance Score** widget, a compliance bar is displayed, with colors indicating compliance.
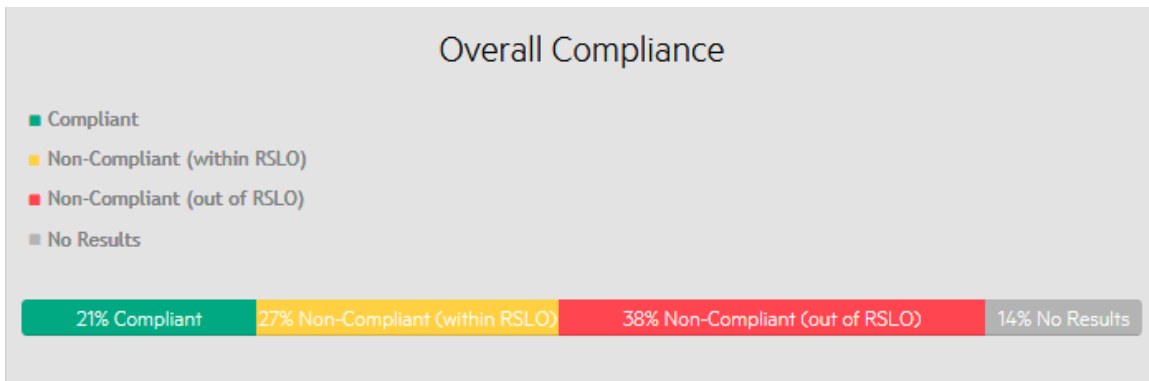
- Green - Percentage of compliant rule-resource pairs. The number is the same as displayed in the widget.
- Orange – Percentage of non-compliant rule-resource pairs that are within remediation service level objective (RSLO).
- Red – Percentage of non-compliant rule-resource pairs that are out of RSLO.
- Gray – Percentage of rule-resource pairs that have not been evaluated or are unknown.

% Compliant Policies

The number on the **% Compliant Policies** widget represents the percentage of policies in the system that are compliant based on the compliance threshold. A single policy is deemed to be compliant if the percentage of rule-resource pairs across all of the business services that need to comply with the policy meets the compliance threshold.
When you hover over the widget, the policies by compliance rating chart displays. The chart color indicates compliance:

- Green – Percentage of compliant policies. The number is the same as displayed in the widget.

- Red – Percentage of non-compliant policies.

- Gray – Percentage of policies with unknown compliance status.

% Compliant Services

The number on the **% Compliant Services** widget represents the percentage of business services in the system that are compliant based on the compliance threshold. A single business service is considered compliant if the percentage of rule-resource pairs across all of the policies with which it must comply meets the compliance threshold.

When you hover over the widget, the business services by compliance rating chart displays. The chart color indicates compliance:

- Green – Percentage of compliant business services. The number is the same as displayed in the widget.

- Red – Percentage of non-compliant business services.

- Gray – Percentage of business services with unknown compliance status.

% Stmts Meeting MSLO

The number on the **% Stmts Meeting MSLO** widget represents the percentage of SoAs in the system that are meeting measurement SLO. Even if any one rule-resource pair does not meet MSLO, the entire SoA is considered having not met MSLO.

When you hover over the widget, the percentage of SoAs meeting MSLO pie chart displays. The chart color indicates compliance:

- Green – Percentage of SoAs meeting MSLO. The number is the same as displayed in the widget.

- Red – Percentage of SoAs not meeting MSLO.

% Stmts Meeting RSLO

The number on the **% Stmts Meeting RSLO** widget represents the percentage of SoAs in the system that are meeting remediation SLO. If any one rule-resource pair is not meeting RSLO, then the entire SoA is not meeting RSLO. Only the rule-resource pairs that were previously scanned and evaluated as not compliant are considered.
When you hover over the widget, the percentage of SoAs meeting RSLO pie chart displays. The chart color indicates compliance:

- Green – Percentage of SoAs meeting RSLO. The number is the same as displayed in the widget.

- Red – Percentage of SoAs not meeting RSLO.

My Compliance Actions

The widgets in the **My Compliance Actions** section help users identify actions they need to perform and items that need attention. The view is personalized based on the user's permissions.
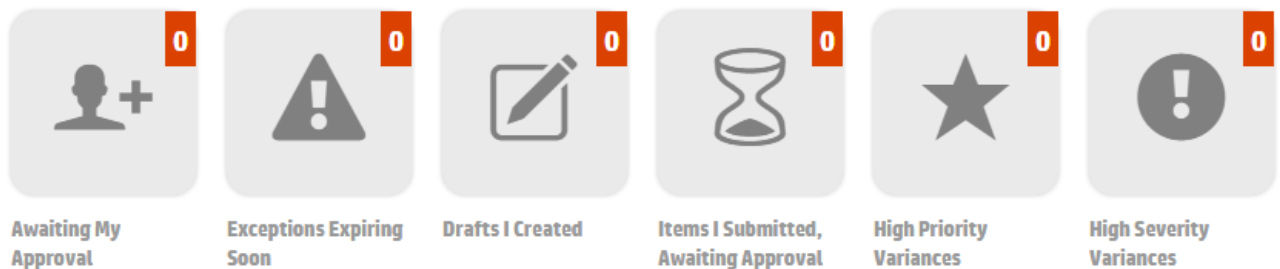
If the number displayed in the top right corner of a **My Compliance Actions** widget is 0, the widget is gray and is not clickable.

For more information about user permissions, see the *HPE ITOC 1.20 Administration Guide*.

Awaiting My Approval

Use the **Awaiting My Approval** widget to go directly to an object revision that has been submitted for your approval, and approve the object revision. For information on approving object revisions, see "Workflow and lifecycle states" on page 36.

To see the **Awaiting My Approval** widget is not shown in the above illustration. To see this widget, you must be logged in with one of the following approver permissions:

- Approve Policies

- Approve Business Services

- Approve Statements of Applicability

- Read and Approve Controls

The number in the top right of the widget is the number of revisions across revisioned objects that have been submitted, and the user is the named Approver.

If the number is greater than 0, click the widget to navigate to the **Awaiting My Approval** page. Objects are grouped by type - as you scroll down the page, you see the **Policies**, **Business Services**, **Controls**, and **Statements of Applicability** awaiting approval.

☰ ‹ Dashboard	**Items Requiring My Approval**		
Items Requiring My Approval			
ID	Name	Revision	Submitted By
Policies			
POL0017	person service test policy	1 (Submitted)	PersonService Test on 2/10/15 3:55 PM
Business Services			
SVC00017	person service test service	1 (Submitted)	PersonService Test on 2/10/15 3:55 PM

- **ID** - Object ID

- **Name** - Object name

- **Revision** - Object revision number and lifecycle state

- **Submitted By** - Name of the submitter; date and time submitted

Exceptions Expiring Soon

Use the **Exceptions Expiring Soon** widget to go directly to an SoA ID link, where you can create a new revision to extend the exception expiration date or delete the exception. To see the **Exceptions Expiring Soon** widget, the user must be logged in with the Read All permission.

The number in the top right of the widget is the number of exceptions across all non-Obsolete SoAs that are expiring within 30 days or have already expired.

If the number is greater than 0, click the widget to navigate to the **Exceptions Expiring Soon** page, which lists exceptions grouped by SoAs. Select an SoA to view further details.

- **STMT_0000001 Revision 2 (Production)** - The SoA ID, revision, and lifecycle state.
- **Reason** - Reason for the exception.
- **Expiration Date** - Date the exception is no longer valid.

Drafts I Created

Use the **Drafts I Created** widget to track your work-in-progress revisions.
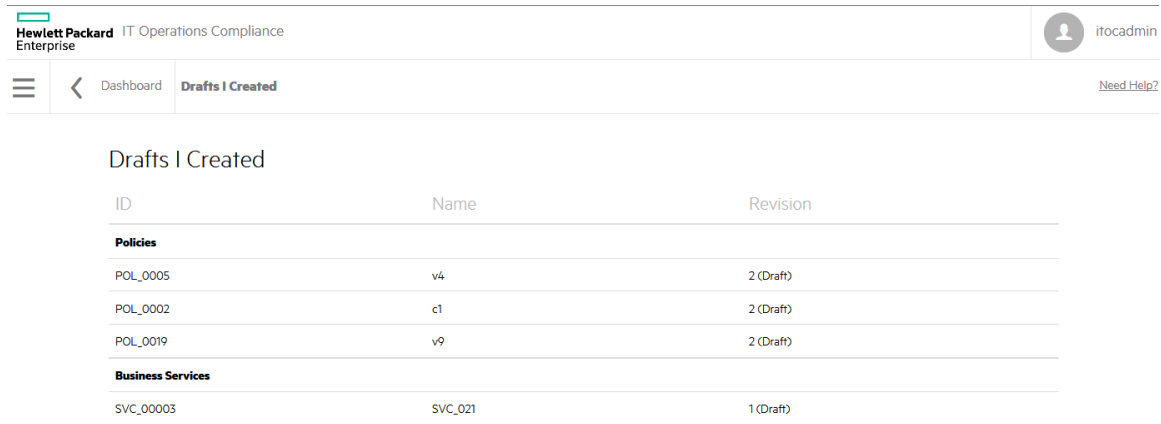
To see the **Drafts I Created** widget, the user must be logged in with one of the following authoring permissions:

- Write Policies
- Write Business Services

- Write Statements of Applicability

- Read and Write Controls

The number in the top right of the widget is the number of revisions in draft state created by the user. These include **New** (Object), **New Draft Revision**, or an object the user imported that is in draft state.

If the number is greater than 0, click the widget to navigate to the **Drafts I Created** page. Objects are grouped by type - as you scroll down the page, you see the revisions of the **Compliance Policies**, **Business Services**, **Controls**, and **Statements of Applicability** created by the user. The following example shows the **Policies** and some of the **Controls** the user created.

- **ID** - Object ID

- **Name** - Object name

- **Revision** - Object revision number and lifecycle state

Items I Submitted, Awaiting Approval

Use the **Items I Submitted, Awaiting Approval** widget to see which approvers need to review your business objects and remind them to perform the review.

To see the **Items I Submitted, Awaiting Approval** widget, the user must be logged in with one of the following authoring permissions:

- Write Policies

- Write Business Services

- Write Statements of Applicability

- Read and Write Controls

The number in the top right of the widget is the number of revisions that the user submitted for approval and are in Submitted state.

If the number is greater than 0, click the widget to navigate to the **Items I Submitted, Awaiting Approval** page. Objects are grouped by type; as you scroll down the page, you see the revisions of the **Policies**, **Business Services**, **Controls**, and **Statements of Applicability** you submitted.

- **ID** - Object ID

- **Name** - Object name

- **Revision** - Object revision number and lifecycle state

- **Submitted Date** - Date and time submitted

High Priority Variances

Use the **High Priority Variances** widget to identify high-priority variances. To view the **High Priority Variances** widget, the user must be logged in with the Read All permission.

Business services have a priority (Gold, Silver, or Bronze). A high-priority variance occurs if a rule-resource pair from a Gold business service is found to be non-compliant (see "View business services in HPE ITOC" on page 40).

The number in the top right of the widget is the number of SoAs associated with a Gold priority business service that has any non-compliances.

If the number is greater than 0, click the tile to navigate to the **High Priority Variances** list page.

- **ID** - Link to the SoA with the variances

- **Compliance Score** - The overall compliance score

- Whether the SoA is **Meeting MSLO**

- Whether the SoA is **Meeting RSLO**

- **Policy Name** - Name of the policy

- **Business Service Name** - Name of the business service

To see specific rule-resource pair details, click on the non-compliant links in each widget on the SoA.

High Severity Variances

Use the **High Severity Variances** widget to identify high-severity variances. To view the **High Severity Variances** widget, the user must be logged in with the Read All permission.

Policy requirements have a severity (High, Medium, or Low), so any SoA that has non-compliant rule-resource pairs associated with a high-severity requirement are of high severity (see "Manage policies" on page 28).

The number in the top right of the widget is the number of SoAs with non-compliance for rule-resource pairs related to a high-severity requirement.

If the number is greater than 0, click the tile to navigate to the **High Severity Variances** list page.

Hewlett Packard Enterprise IT Operations Compliance

itocadmin

☰ ‹ Dashboard **High Severity Variances**

High Severity Variances

ID	Compliance Score	Meeting MSLO	Meeting RSLO	Policy Name	Business Service Name
STMT_0000002	⛔ 0	✅ Yes	⛔ No	c1	b1
STMT_0000005	⛔ 0	✅ Yes	⛔ No	v3	b2
STMT_0000006	⛔ 0	✅ Yes	⛔ No	v4	b2
STMT_0000007	⛔ 0	✅ Yes	✅ Yes	v6	b2

- **ID** - Links to the SoA with the variances

- **Compliance Score** - Overall compliance score.

- Whether the SoA is **Meeting MSLO**

- Whether the SoA is **Meeting RSLO**

- **Policy Name** - Name of the policy

- **Business Service Name** - Name of the business service

To see the rule-resource pairs for high-severity requirements, go to each SoA, sort the widgets by severity, and click the non-compliant links for the high-severity widgets.

View user profile

Use the options in the menu in the upper right corner of the screen to learn about the HPE ITOC system and user.

itocadmin

Help
About HPE ITOC

User Profile

Log Out
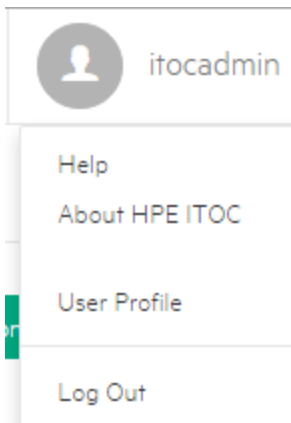
Help

Click **Help** to see HPE ITOC online documentation. As you work in HPE ITOC, you can click on the **Need Help?** text below the user name to view context-sensitive help.

About HPE ITOC

Click **About HPE ITOC** to see information about your HPE ITOC system.

HPE IT Operations Compliance

Version: 1.2.0

Server Version: 1.2.0 (Build #11)

UI Version: 1.2.0 (Build #25)

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OK

- **Version:** HPE ITOC version
- **Server Version:** HPE ITOC and build versions
- **UI Version:** HPE ITOC user interface versions
- Copyright information for this version of HPE ITOC

User profile

To view user roles and permissions:

1. Log into HPE ITOC.

2. Click your name or role in the top right of the Dashboard ("itocadmin" in the following example):

   Hewlett Packard Enterprise IT Operations Compliance   itocadmin

   ☰ **Dashboard**   Need Help?
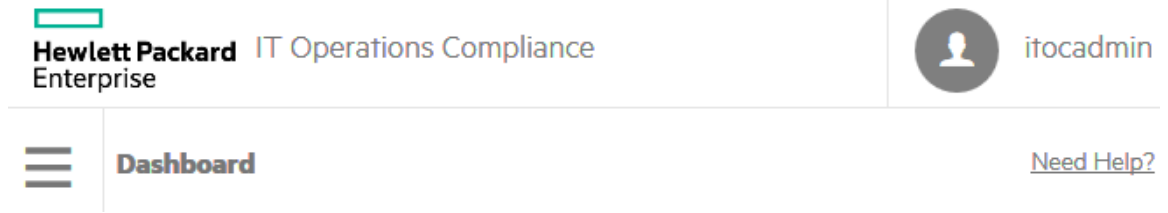
3. Select **User Profile** from the menu.

User Profile

Organization:

> public

Username:

> itocadmin

First Name:

> ITOC

Last Name:

> Admin

Email:

>

Roles:

> Business Administrators
> Business Service Authors
> Control Authors
> Policy Authors
> Resource Administrators
> System Administrators

Permissions:

> Business Administration
> Read All
> Read and Write Controls
> Read and Write Maintenance Windows
> Read and Write Resources
> System Administration
> Write Business Services
> Write Policies

OK

4. Click **OK**.

Log out

Click **Logout** to exit HPE ITOC.

Keyboard navigation

The following hotkeys allow you to use your keyboard to navigate easily within HPE ITOC.

Hotkey	Page
Ctrl+Shift+1	Dashboard
Ctrl+Shift+2	Policies
Ctrl+Shift+3	Business Services
Ctrl+Shift+4	Controls
Ctrl+Shift+5	Resources
Ctrl+Shift+6	Administration

Policies
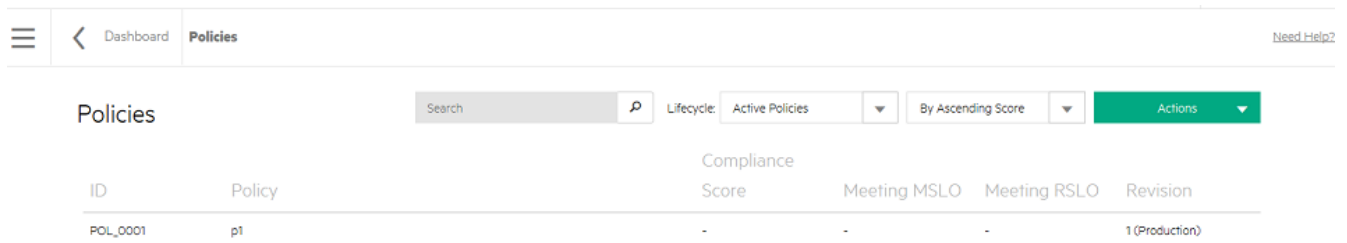
A policy is a system representation of a corporate regulatory or government policy, such as PCI, SOX, or FISMA. In HPE ITOC, each policy has a hierarchy of requirements, with each requirement having one or more rules. provides policy content that can be downloaded from HPE Live Network and imported into HPE ITOC).

For information about downloading content from HPE LN and importing into HPE ITOC, see HPE LN Content.

For information about downloading content from HPE LN and importing into HPE ITOC, see the *HPE ITOC 1.20 Installation and Setup Guide.*

View policies in HPE ITOC

The **Policies** page lists all policies in an environment.

- Use the **Search** field to find a specific policy. Type the full or partial name of the policy in the **Search** field, and click the ⬚ icon.

- Use the **Lifecycle** list to filter policies by lifecycle state. Available options are **Active Policies** (default), **Draft Revisions**, **Submitted Revisions**, **Approved Revisions**, **Production Policies**, or **Obsolete Policies**.

  For example, if you are logged in as a user in a consumer organization and want create an SoA to test your business service against a public policy, you can view public organization policies (which say "Public" at the end of their names) when you filter by Production Policies.

- Click the second list to sort policies **By Ascending Score** (default), **By Descending Score**, **By Name**, or **By ID**.

- Use **Actions** to create a new policy.

The overall **Policies** view shows:

- **ID** of a policy

- **Policy** name

- **Compliance Score** - Overall compliance score for policies in production across all business services. The number displayed is the percentage of compliant rules across all applicable resources in all of the applicable business services. The icon and color indicate whether or not it is compliant based on the compliance threshold.

- Whether the policy is **Meeting MSLO**.

- Whether the policy is **Meeting RSLO**.

- **Revision** number and lifecycle state.

  - The policy revision number used when viewing details about the policy in this row.

  - Results for policies filtered by revisions in draft, submitted, or approved state may show multiple revisions of the same policy.

  - Results for policies filtered for active, production, or obsolete state show only one revision per policy listed.

Select a policy to view further details.

Create a new policy

Use the following steps to create a new policy.

1. Navigate to the **Policies** list.

2. From **Actions**, select **New Policy.**

   The **New Policy** dialog box is displayed.

New Policy

Name:

Description:

Char Count: 0/4000

Effective Date:

12/16/15 | Pick Date

Default Measurement SLO:

Within 1 Month ▼

Default Remediation SLO (in days):

14

OK | Cancel

3. Complete the following fields:

   ○ **Name:** (required) - Enter a policy name.

   ○ **Description:** (optional) - Enter a policy description.

   ○ **Effective Date:** - Use the **Pick Date** calendar to select an effective date. The default is today's date.

   ○ **Default Measurement SLO:** - The measurement SLO is the time frame in which a business service must be measured against a particular policy. Select a default measurement SLO (the system default is **Within 1 Month**). This SLO value is the default used when you create a new SoA with this policy (see "Create a new Statement of Applicability" on page 71).

   ○ **Default Remediation SLO (in days):** - The remediation SLO is the time frame in which a non-compliant IT resource needs to be remediated against a particular requirement. Enter a default remediation SLO (default is 14 days). This SLO value is the default used when you create a new SoA with this policy (see "Create a new Statement of Applicability" on page 71).

4. Press **OK** to create revision 1 of a new policy in draft state.

From the **Details** view, you can add, edit, or delete requirements and rules.

Use the **Actions** dropdown list to submit the policy to the next workflow state.

Where to go from here

Create an SoA to tie the policy to a business service.

Manage policies

This section describes how to view, author, and edit policies.

Policy header

When you select a policy, information about that policy appears in a new view. The policy header is the bar that appears directly beneath the HPE ITOC tabs.
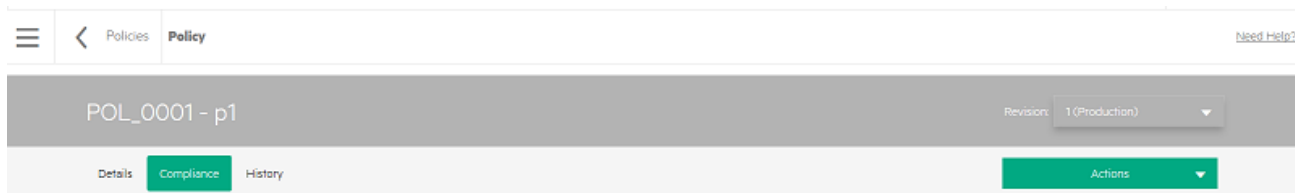
- The overall compliance score is the number on the left side of the header, showing that the policy in the example is 0 percent compliant.

  The header background color indicates the policy's compliance state:

  ○ Green - Compliant based on the compliance threshold

  ○ Red - Not compliant based on the compliance threshold

  ○ Gray - Not calculated or unknown

- Policy ID - "POL_0001" in the example.

- Policy name - "p1" in the example.

- **Revision** - Revisions of this policy and the lifecycle for each revision.

Policy details

Navigate to the **Details** tab of a policy in draft state to view information about the policy, edit policy properties, and modify policy requirements and rules.

Edit the details of a policy

1. From a policy in Draft state, click **Actions** > **Edit Properties**.

Edit Properties

Name:

CIS Apache Tomcat Server 6.0 Benchmark v1.0.0

Description:

This document is intended for system and application administrators, security specialists, auditors, help desk, and platform deployment personnel who plan to develop, deploy, assess, or secure solutions that incorporate Apache Tomcat on a Linux platform

Char Count: 253/4000

Effective Date:

6/24/15   Pick Date

Default Measurement SLO:

Within 1 Month

Default Remediation SLO (in days):

14
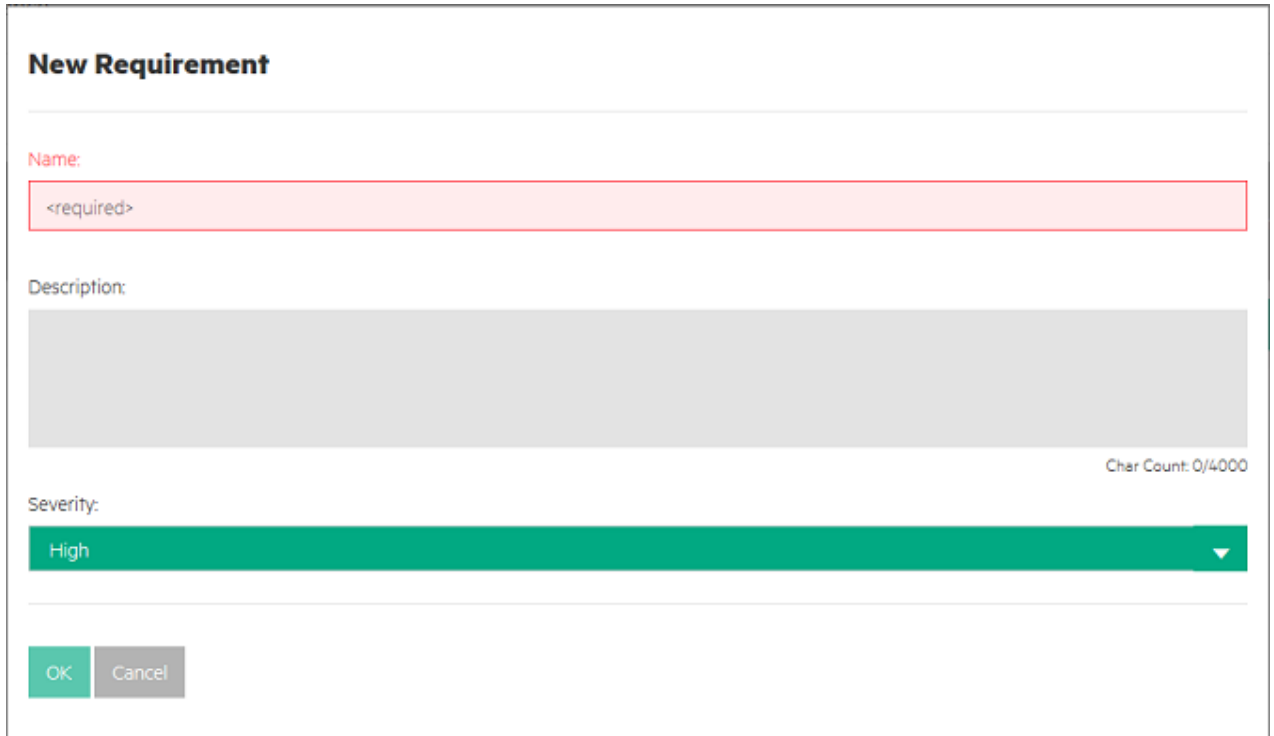
OK   Cancel

2. The Edit Properties dialog appears. Modify the policy as needed.

3. Click **OK**.

Modify the requirements of a policy

From the **Details** view of the policy in draft state, you can use the **Requirements** table to add or delete requirements and rules.

1. Click the [+] icon next to Requirements to create a new requirement at the top level.

2. The New Requirement dialog appears.

New Requirement

Name:

Description:

Char Count: 0/4000

Severity:

High ▼

OK   Cancel

Complete the following fields:

- **Name** (required): Name of the requirement

- **Description**: Description of the requirement

- **Severity**: Use the dropdown list to select the level of severity (high, medium, low)

3. Click **OK**.

Requirements 1, 2, and 3 in the following figure are examples of top requirements. Highlight the requirement, and use the icons next to the requirement to modify its level, edit its value, add a sub-requirement, and a rule.

↑ Move up: Move the requirement branch up. In this example, clicking the icon results in Requirement 2 displaying above Requirement 1.

↓ Move down: Move the requirement branch down. In this example, clicking the icon results in Requirement 2 displaying below Requirement 3.

◆ Indent: Indent this requirement branch, making this requirement branch a sub-requirement of requirement 1.

◩ Edit: Edit this requirement.

＋ Add a sub-requirement: Add a sub-requirement as a child of a requirement.

✄ Delete: Delete this requirement branch and its children, including rules.

Modify the sub-requirement of a policy

Depending on a sub-requirement's place in the structure, you can move the sub-requirement up, down, indent, or outdent it.

- To be moved up or down, a sub-requirement must have sibling requirements above or below.

- To be indented, a sub-requirement needs a sibling above it. You can outdent ◀ this sub-requirement to make it one level higher.

Modify the rules of a policy

The rule scope limits the controls that can be associated with a rule, based on the control's applicable scope. When a scan is run, the system matches the resource type to the rule scope and performs the compliance check for the applicable matches, which are rule-resource pair matches.

One requirement can have multiple rules. You need to define a rule for each resource type to evaluate compliance with the requirement (for example, one rule that uses the Windows control and another that uses the Linux control). A complex requirement may need multiple rules to evaluate its compliance.

1. To create or add a rule, click the icon. The **Add Rule** dialog appears.

Add Rule

◉ New Rule   ○ Find Rule

New Rule

Type:

Scope:

Control: Search   🔍

Rule Name:

OK   Cancel
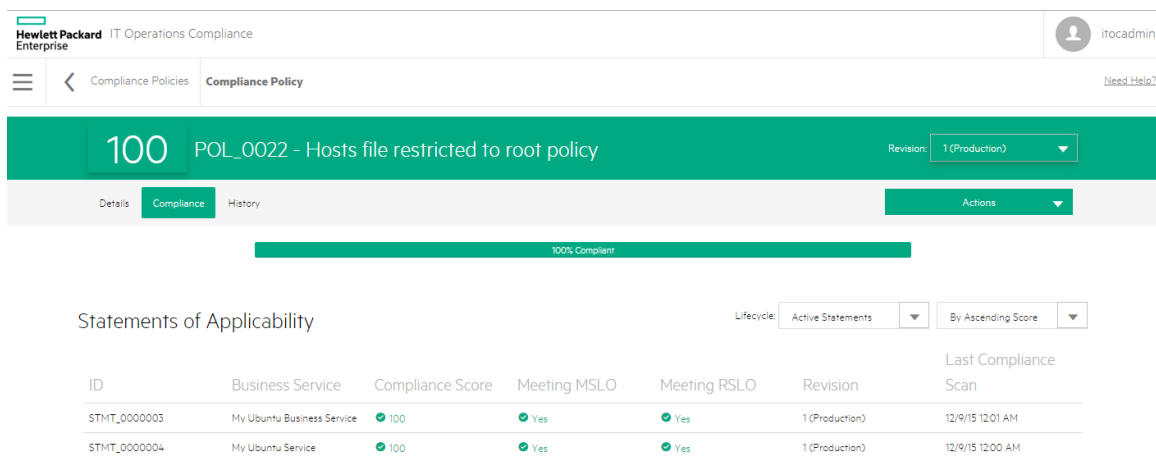
2. Complete the following fields:

   ○ **Type** (required): Set the type of rule (**Evaluation** or **Evaluation and Remediation**).

   ○ **Scope** (required) - Select the resource type to which this rule applies (**Platform** or **Software**).

   ○ **Control** (required) - The list of available controls shows controls with a production revision only, filtered by the **Type** and **Scope** selected. Select a control from the dropdown list or search

   for a specific control by entering text the Search box and clicking the 🔍 icon.

   ○ **Rule Name** - The field defaults to the selected control name. You can customize this field.

3. Press **OK**.

Hover over a rule to edit rule name or parameter values, or to delete the rule.

1. To edit a rule, click the ✎ icon. The **Edit Rule** dialog appears.

2. Modify the rule as needed and click **OK**.

Policy compliance

The Compliance view of a policy is visible only for the revision of the policy that is in production state. The compliance view is based on the last compliance job for all SoAs that include the policy. This view shows an aggregation of job results for this policy across business services:

The policy compliance bar in this view displays the overall compliance score for the policy across all business services that need to comply with this policy. The example shows:

- 100% Compliant (green) - 100 percent compliance in MSLO.

- Non-Compliant (within RSLO) (orange) - Percent of rules are not in compliance within the remediation SLO.

- Non-Compliant (out of RSLO**)** (red) - Percent of rules that must comply with this policy are not in compliance and are out of RSLO.

- Unknown (gray) - Percent of rules have not been scanned or have failed.

The **Statements of Applicability** table shows SoAs for this policy.

The **Compliance Score** column is sorted by **Ascending Score** and shows business services that are performing poorly against a policy.

The following information is shown in this view:

- **ID** - SoA ID

- **Business Service** - The business service that needs to comply with this policy.

- **Compliance Score** - The icon and color indicate whether or not the policy is compliant based on the compliance threshold.

- Whether the SoA is **Meeting MSLO**

- Whether the SoA is **Meeting RSLO**

- **Revision** - SOA revision and lifecycle state.

- **Last Compliance Scan** - Date and time on which the last compliance scan was run.

You can filter SoAs by lifecycle state and sort them by compliance score or ID. Results for SoAs filtered by revisions in draft, submitted, or approved state may show multiple revisions of the same SoA. The list can be sorted **By Ascending Score** (default), **By Descending Score**, or **By ID**.

Click on a statement of applicability to view details.

Policy history

The **History** view of a policy shows details about each revision's history, including:

- **Action** - What was done (created, submitted, approved, and so on).

- **Notes** - Information provided by the user who created or modified the policy (approval notes made by the approver, submit notes made by the submitter, and so on).

- **User** - Who performed the action.

- **Date** - Date and time on which the action was performed.

View the history of a policy

You can view the history of a policy in any state.

1. Navigate to the **Policies** tab and click the policy whose history you want to view.

2. Click **History**.

Create a new draft revision

1. Navigate to the **Policies** list and select a policy.

2. Select a revision of the policy on which you want to base your new draft revision.

3. Click **Actions**, and select **New Draft Revision**.

4. Press **OK.**

From the **Details** view, you can edit properties, or add, edit, or delete requirements and rules.

Click **Actions** to submit the policy to the next workflow state.

Workflow and lifecycle states

Policies, business services, controls, and SoA business objects are revision-controlled. Regardless of an object's lifecycle state, a user with write permissions can create a new revision based on the source revision of an object. For example, revision 3 of a policy may be in production state, and revisions 1 and 2 of this policy are obsolete. From revision 3, you can create a revision 4, which starts as a copy of revision 3, is in draft state, and can be edited.

Each revision of a policy, business service, control, and SoA follows a workflow, which consists of predefined lifecycle states. Each object can have multiple revisions, and these revisions can be in multiple lifecycle states, although only one revision of an object can be in production state at a time.
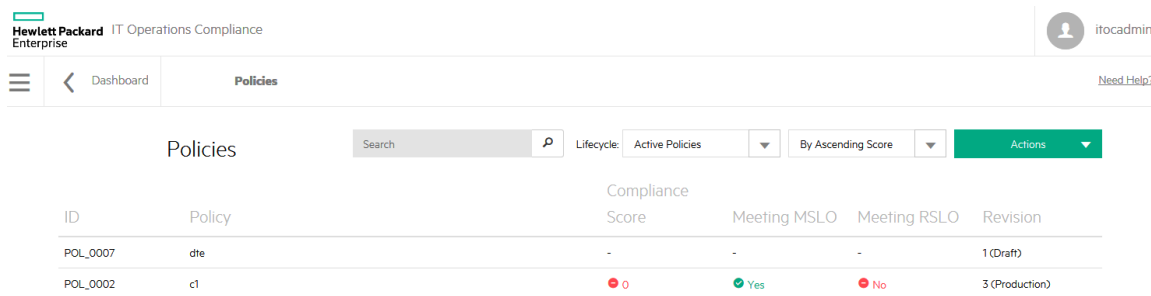
Lifecycle states are as follows:

- Draft - Business objects can be edited only in draft state. Once moved out of draft state, they cannot be changed.

- Submitted - If a business object requires approval, it must be moved into the submitted state. From there, the object can be reviewed and then approved.

- Approved - When a business object is manually or automatically approved, it moves automatically to production (for policies, this occurs on the effective date).

- Production - The production revision is the one that HPE ITOC uses. Only one revision of an object is in production state at a time, and the current production revision is the one always used in a scan or remediation job. When a new revision is promoted, the revision that was previously in production is moved automatically to obsolete state.

- Obsolete - An obsolete revision is no longer in use or out of date. If all revisions of an object are in obsolete state, a user has made the entire object obsolete.

Active revision

An active revision of an object means the object is in a state other than Obsolete. If there is a Production revision of an object, that is the version shown. The following figure shows policies that are currently active.

Lifecycle actions

- New Object or New Draft Revision - A new object or new revision of an object starts in draft state. An object can have many revisions in draft state, all with different edits.

- Submit - Depending on the workflow, a revision moves to submitted, production, or approved state.

- Approve - This action can only be performed by the approver specified by the user when the business object was submitted. It moves a revision from submitted to production or approved, based on the effective date.

- Comment - Any user with approve or write permissions can make comments.

- Reject - Returns a revision from submitted to draft state. This action can be performed only by the named approver or submitter of the revision.

- Make Obsolete - Can only be done when the object is not used in an active revision of an object. Results in the object not being available for use in the future. Not reversible.

Workflows

Use the Administration tab to change the workflow for a business object. This action requires business administration permission.

About the Approval Required workflow

In the Approval Required workflow

1. The submitter chooses from a list of users with the approver permission for the object type.

2. The approver must approve the object for it to move into production.

About the Auto-Approval Required workflow

In the Auto-Approval workflow, an object can be moved into production without approval. If the policy's effective date is in the future, a policy moves into approved state until the effective date.

Business services

The business service object in HPE ITOC is a set of IT resources with customer-defined relationships to one another. These relationships can be viewed in a topology, as shown below.
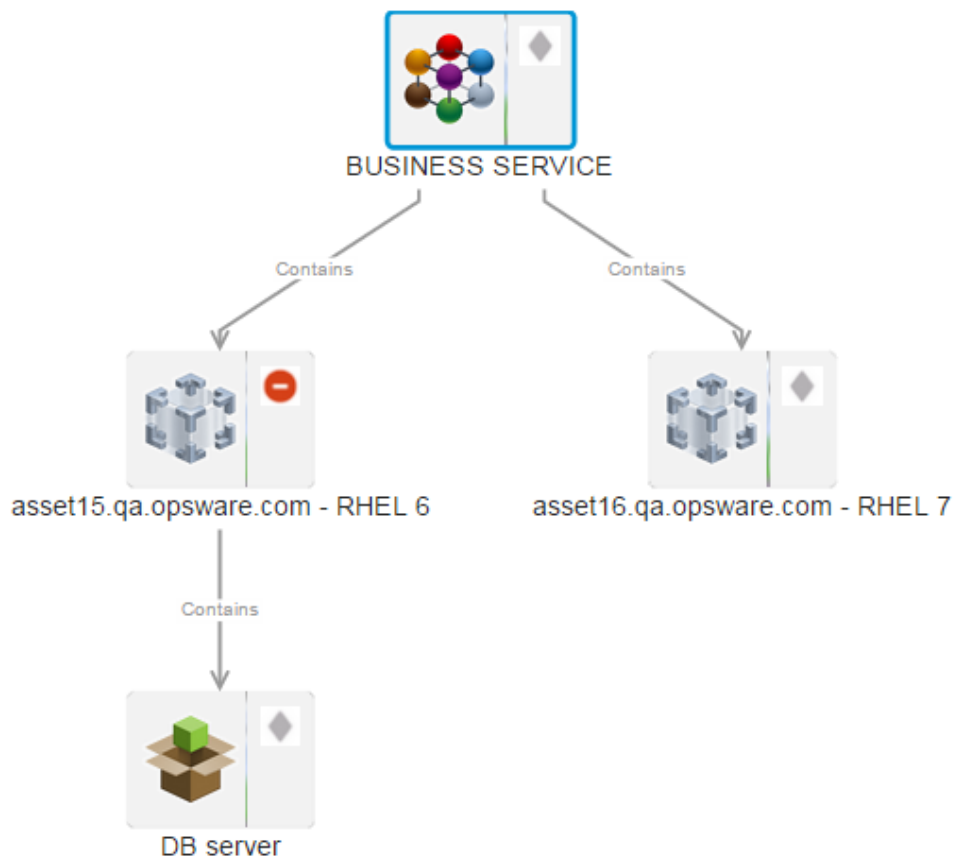
Each business service must comply with one or many policies. These business service-to-policy relationships are defined in the SoA.
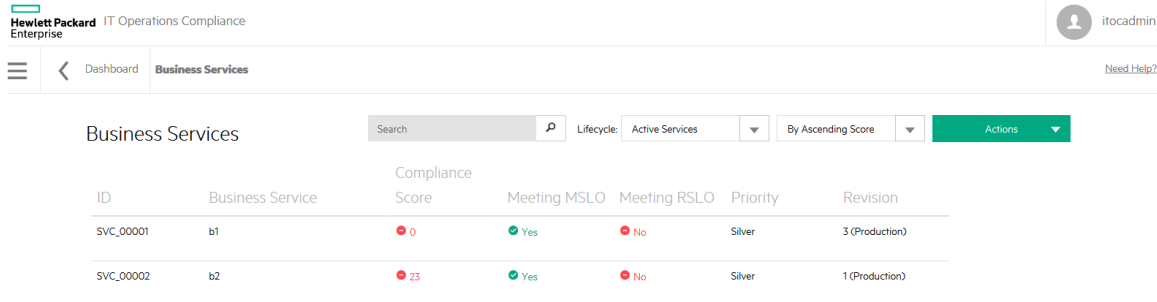
In HPE ITOC, business services follow the Auto-Approval workflow.

HPE ITOC business services help:

- "View business services in HPE ITOC" on the next page

- "Create a new business service" on page 41

- "Import business services and resources" on page 62

- "Manage business services" on page 43

- "Create a new draft revision" on page 51

View business services in HPE ITOC

The **Business Services** page lists the business services in your environment.

- Use the **Search** field to find a specific business service. Type the full or partial name of the

  business service in the **Search** field, and click the [search icon] icon.

- Use the **Lifecycle:** list to filter business services by lifecycle state or sort by compliance score, name, or ID. Available options are **Active Services** (default), **Draft Revisions**, **Submitted Revisions**, **Approved Revisions**, **Production Services**, or **Obsolete Services**.

- Click the second list to sort **By Ascending Score** (default), **By Descending Score**, **By Priority**, **By Name**, or **By ID**.

- Click **Actions** to create a new business service or import a business service.

The overall Business Services view shows:

- **ID** of the business service
- **Business Service** name
- **Compliance Score** - Overall compliance score for business services in production across all policies. The number displayed is the percentage of resources within the business service that are compliant with rules within the policies. The icon and color indicate whether or not it is compliant based on the compliance threshold.
- Whether the business service is **Meeting MSLO**.
- Whether the business service is **Meeting RSLO**.
- **Priority** - Priority of the business service (Gold, Silver, or Bronze)
- Business Service **Revision** number and lifecycle state.
  - The business service revision number used when viewing details about the business service in this row.

  - Results for business services filtered by draft, submitted, or approved state may show multiple revisions of the same business service.

  - Results for business services filtered by active, production, or obsolete state show only one revision per business service listed.

Select a business service to view further details.

Create a new business service

1. Navigate to the **Business Services** list.

2. From **Actions**, select **New Business Service**.

3. The **New Business Service** dialog appears. Complete the following fields:

   - **Name** (required) - Enter a name for the business service.

   - **Description** (optional) - Enter a description.

   - **Priority** - Select **Gold**, **Silver**, or **Bronze**.

New Business Service

Name:

Description:

Char Count: 0/4000

Priority:

Silver

OK   Cancel

4. Press **OK** to create revision 1 of a new business service object in draft state.

From the **Details** view, you can add resources to the business service topology. Use the **Actions** dropdown list to submit the policy to the next workflow state.
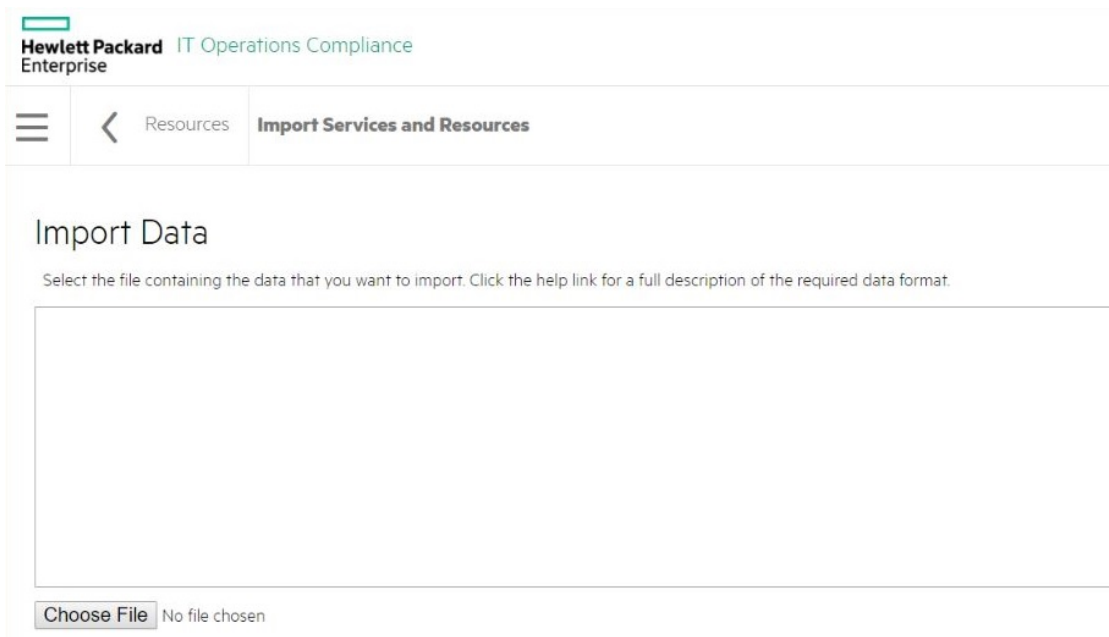
Where to go from here

Create an SoA to tie the business service to a policy.

Import business services and resources

Use the following task to import a business service or resource:

1. Navigate to the **Business Services** or **Resources** list.

2. From the **Actions** list, select **Import Business Services** or **Import Resources**.

3. The **Import Data** screen appears. Browse and select the file containing the data you want to import.

4. Press **Start Import**.

5. After several moments, the **Import Results** screen appears.

- ○ **Created Resources** - Resources that were imported successfully onto your system.
  - • **Source Ref** - Name of the imported source.
  - • **Source URL** - URL of the imported source.
  - • **ID** - Resource ID.
- ○ **Failed Resources** - Resources that failed to import onto your system.
- ○ **Skipped Resources** - Resources that were skipped during this import.
- ○ **Updated Resources** - Resources that were updated in this import.
- ○ **Created Services** - Business services that were imported successfully onto your system.
- ○ **Failed Services** - Business services that failed to import onto your system.
- ○ **Skipped Services** - Business services that were skipped during this import.
- ○ **Updated Services** - Business services that were updated in this import.

See "How to write JSON files for services and resources import" on page 83 for more information about configuring files for HPE ITOC import.

Manage business services

This section describes how to view, author, and modify business services.

Business service header

When you select a business service, information about that business service appears in a new view. The business service header is the bar that appears directly beneath the HPE ITOC tabs:
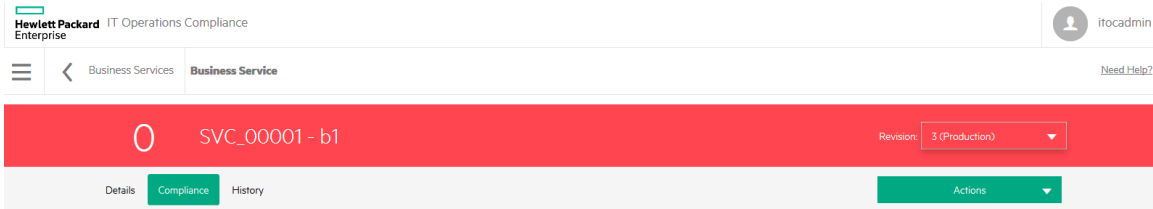
- The overall compliance score is the number on the left side of the header. The business service in the example is 0 percent compliant.

- The header background color indicates the business service's compliance state:
  - Green - Compliant based on the compliance threshold.

  - Red - Not compliant based on the compliance threshold.

  - Gray - Not calculated or unknown.

- Business Service ID - "SVC_00001" in the example.

- Business Service Name - "b1" in the example.

- **Revision** - Revisions of this business service and lifecycle state for each revision.

Business service details

Navigate to the **Details** view of a business service in draft state to view information about a specific business service, edit business service properties, and modify the business service topology.

The default view shows the resource topology as a graph. Use the dropdown list on the right to show the topology as a table.

The resource topology tables shows:

- **ID** of the resource.
- **Resource** name.

- **Type** of resource

- **Compliance Score** of the resource.

- **Status** of the resource.

Edit the properties of a business service

1. From a business service in draft state, click **Actions** to select **Edit Properties**.

2. The **Edit Properties** dialog appears. Modify the business service information as needed.

3. Click **OK**.

Modify business service topology

Use the icons described in this section to add a resource to the business service topology and specify its relationship within the topology. You can edit a business service in draft state only.

-**Add** resource to topology. To add a resource, select a node in the topology to enable the button.

- Remove resource from topology. To remove a resource, select a node in the topology to enable the button.

- **Zoom in**

- **Zoom out**

- **Fit screen**

- **Reset zoom**

Add a new resource to the topology

1. Click the [+] icon. The **Add to Topology** dialog appears.

Add to Topology

Filter for and then select the resource to be added to the topology. Also specify the relationship with respect to the selected resource 'BUSINESS SERVICE'.

Choose Resource:

Status is:

Active Resources ▼

Type is:

Platform ▼

Name contains:

Search

▼

Relationship:

Contains ▼

OK   Cancel

2. Complete the following information about the resource to be added to the topology:

   ○ **Status is:** - Use the dropdown list to filter resources by status. Available options are **Active Resources**, **Defined Resources**, **Managed Resources**, and **Install Failed**.

   ○ **Type is:** - Use the dropdown list to filter resources by type.

   ○ **Name contains**: - To find a specific resource, enter the complete or partial name of the resource you want to use.

3. Click **Search** to find the resource you want to add.

4. Use the dropdown list to find the existing resource to which you want to add the new resource.

5. Click **Contains** or **Depends on** to determine the relationship between the newly added resource and the existing resource.

6. Click **OK**.

Remove a resource from the topology

1. Click the ![scissors icon] icon. The **Remove from Topology** dialog appears.

   The dialog confirms the resource or resource relationship you want to remove and notifies you of any "orphaned" resources that may also be removed as a result of this action.

2. Click **OK**.

Business service compliance

The business service compliance view is visible only for the revision of the business service that is in production state. This view is based on the last compliance job for all SoAs that include the business service and shows an aggregation of job results for this business service.

The business service compliance bar in this view displays the overall compliance score for the business service across all policies for which it must comply. The business service compliance bar in the example shows:

- 62% Compliant (green) - 62 percent compliance in MSLO

- 1% Non-Compliant (within RSLO) (orange) - 1 percent non-compliant within RSLO

- 29% Non-Compliant (out of RSLO) (red) - 29 percent not in compliance and out of remediation or measurement SLO

- 8% Unknown (gray) - 8 percent unknown or not calculated

The **Statements of Applicability** table shows SoAs for this business service. The following information is shown in this view:

- **ID** - SoA ID

- **Policy** - The policy with which this service needs to comply

- **Compliance Score** - The icon and color indicate whether or not the policy is compliant based on the compliance threshold

- Whether the SoA is **Meeting Measurement SLO**

- Whether the SoA is **Meeting Remediation SLO**

- **Revision** - SoA revision and lifecycle state.

- **Last Compliance Scan** - Date and time on which the last compliance scan was run

You can filter SoAs by lifecycle state, and sort them by compliance score or ID. Results for SoAs filtered by revisions in draft, submitted, or approved state may show multiple revisions of the same SoA. The list can be sorted **By Ascending Score** (default), **By Descending Score**, or **By ID**.

Click on a statement of applicability to view further details.

Business service history

The business service **History** view shows details about each revision's history, including:

- **Action** - What was done (created, submitted, and so on).

- **Notes** - Information provided by the user who created or modified the business service.

- **User** - Who performed the action.

- **Date** - Date and time the action was performed.

View the history of a business service

1. Navigate to the **Business Services** tab, and click the business service whose history you want to view.

2. Click **History**.

Create a new draft revision

1. Navigate to the **Business Services** list and select a business service.

2. Select a revision of the business service on which you want to base your new draft revision.

3. Click **Actions**, and select **New Draft Revision**.

4. Click **OK** after reading the confirmation message.

From the **Details** view, you can edit properties and add or remove resources from the business service topology (see "Business services" on page 39). Use **Actions** to submit the business service to the next workflow state (see "Workflow and lifecycle states" on page 36).

Controls

Controls define what to measure, how to evaluate compliance, and how to remediate non-compliance. A control is a reusable, shared function or test used in a policy to create a rule, and it is associated to policy requirements through rules.

The same control can be used multiple times in the same policy. For example, a generic control that checks the status of a service can be used for multiple requirements within a policy to check whether many different services are enabled or disabled. In another example, one control may work across multiple Red Hat versions, but you may want to use a different value for evaluation for Red Hat 6 than used for Red Hat 7.

The same control also can be used across multiple policies. Different policies have similar requirements, so use the same controls to evaluate those rules. For example, use the same control to test minimum password length across all policies with that requirement.

Multiple controls may exist that perform the same function; for example, you may have two different scripts (one for Windows and one for Linux) that both test minimum password length.

By default, controls follow the Approval Required workflow. When a new revision of an existing control used in a policy rule is promoted into production, the new revision of the control will be used on the next scan of that policy through the SoA.

HPE provides policy content that can be downloaded from HPE Live Network and imported into HPE ITOC or users can create custom controls with their own scripts.

HPE ITOC controls help:

- Control Rules

- "View controls in HPE ITOC" below

- "Create a new control" on page 54

- "Manage controls" on page 55

- "Create a new draft revision" on page 59

View controls in HPE ITOC

The **Controls** page lists all of the controls in your environment.

- Use the **Search** field to find a specific control. Type the full or partial name of the control in the

  Search field, and click the [icon] icon.

- Use the **Lifecycle** lists to filter controls by lifecycle state. Available options are **Active Controls** (default), **Draft Revisions**, **Submitted Revisions**, **Production Controls**, or **Obsolete Controls**.

  If you are logged in as a user in a consumer organization, you can view public organization policies (which say "Public" at the end of their names) when you filter by **Production Controls**.

- Click the second list to sort controls **By ID** (default) or **By Name**.

- Use **Actions** to create a new control.

The overall **Controls** view shows:

- **ID** of the control.

- **Control** name.

- **Type** of control.

- **Revision** number and lifecycle state.
  - Control revision number used when viewing details about the business service in this row.

  - Results for controls filtered by revisions in draft or submitted state may show multiple versions of the same control.

  - Results for controls filtered by active, production, or obsolete state show only one revision per control listed.

- **Modified By** - Who modified a control.

- **Modified Date** - Date the control was modified.

Select a control to view further details.

Create a new control

provides a library of controls through Live Network that can be imported into HPE ITOC or users can create custom controls. To create a new custom control:

1. Navigate to the **Controls** list.

2. From **Actions**, select **New Control**.

3. The **New Control** dialog appears:

New Control

Name:

Description:

Char Count: 0/4000

Category:

Software Custom Script

Type:

Evaluation

Applicable Scope:

Software
    Application Server
        J2EE Server
            JBoss
                JBoss Application Server 7
        WebLogic
        Websphere
    Database

OK   Cancel

4. Complete the following fields:
   ○ **Name:** (required) - Enter a name.

   ○ **Description**: (optional) - Enter a description.

   ○ **Category:** - Use the dropdown list to select **Software Custom Script** or **Platform Custom Script**.

   ○ **Type:** - Use the dropdown list to set the type of control (**Evaluation** or **Evaluation and Remediation**).

- ○ **Applicable Scope:** - Based on the **Category** selected, you can select from the resource types to which this control will apply. You can use **Ctrl-Click** or **Shift-Click** to make multiple choices.

5. Press **OK** to create revision 1 of a new control in draft state.
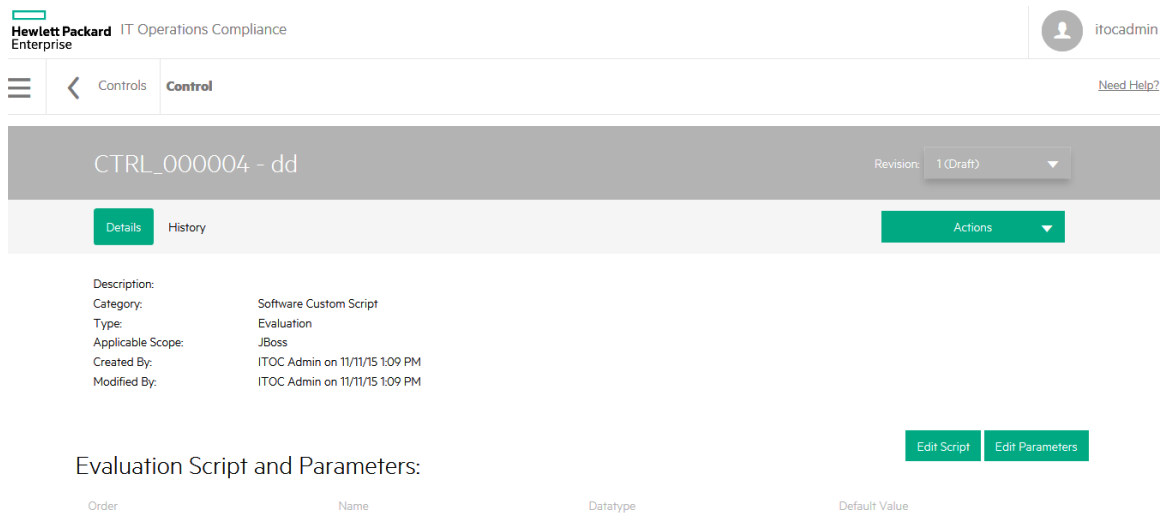
Scripts must be defined in order to submit the control. To define evaluation and remediation scripts, click **Edit Script** or **Edit Parameters**.

6. Click **Actions** to submit the control to the next workflow state.

Manage controls

This section describes how to view, author, and modify controls.

Control header

When you select a control, information about that control appears in a new view. The control header is the bar that appears directly beneath the HPE ITOC tabs:
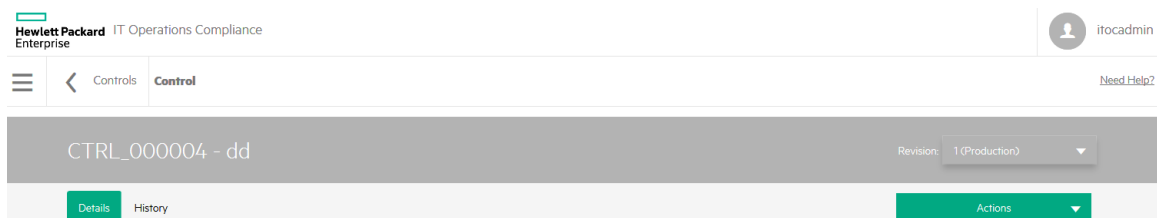
The control header shows:

- Control ID - "CTRL_000004" in the example

- Control name - "dd" in the example

- Revision - Revisions and lifecycle state of this control

- Control details

Navigate to the **Details** view of a control in draft state to view information about a specific control, control, edit control properties, and edit evaluation and remediation scripts and parameters.

Edit control properties

1. From a control in draft state, click **Actions** to select **Edit Properties**.

Edit Properties

Name:

ROBOT_TEST_Control Draft for Workflow Eval_Rem Cat_Plat_Cus_scpt 1450202290

Description:

Test control created for the use in updgrade testing

Char Count: 52/4000

Category:

Platform Custom Script

Type:

Evaluation and Remediation ▼

Applicable Scope:

RHEL 6

RHEL 5
RHEL 6 Compatibles
CentOS 6
OEL 6
RHEL 6
RHEL 7 Compatibles
CentOS 7
OEL 7
RHEL 7

OK   Cancel

2. Information about this control appears. Modify the control as needed.

3. Click **OK**.

Edit evaluation or remediation scripts

1. Click the **Edit Script** button to the right of **Evaluation Script and Parameters** or **Remediation Script and Parameters**.

2. Add or modify content for your script.

3. Click **OK**.

Edit evaluation or remediation parameters

1. Click the **Edit Parameters** button to the right of **Evaluation Script and Parameters** or **Remediation Script and Parameters**.

Edit Parameters

Order	Name	Datatype	Default Value	+
1	stringParam	String ▾	do something	-
2	numberParam	Number ▾	99999	-

OK   Cancel

2. To add a new parameter, click the ﹢ icon on the right.

   ○ **Order** - The order is system-generated.

   ○ **Name** (required) - Enter a name.

   ○ **Datatype** - Select a number, string, or date for the parameter.

   ○ **Default Value** - Set the default value.

     • **Number** - Enter a number in the **Default Value** field.

     • **Date** - The HPE ITOC system provides today's date, which you can modify.

Control history

The Control **History** view shows details about each revision's history, including:

• **Action** - What was done (created, submitted, and so on).

• **Notes** - Information provided by the user who created or modified the control.

• **User** - Who performed the action.

• **Date** - When the action was performed.

View the history of a control

1. Navigate to the **Controls** tab, and click the control whose history you want to view.

2. Click **History**.

Create a new draft revision

1. Navigate to the **Controls** list to select a control to revise.

2. Select a specific control revision.

3. From **Actions**, select **New Draft Revision**.

4. Click **OK** after reading the confirmation message.

From the **Details** view, you can edit properties and add, edit, or delete evaluation and remediation scripts and parameters. Use **Actions** to submit the control to the next workflow state.

Resources

Resources are the HPE ITOC representation of an IT resource in the customer's environment. IT resources are associated with business services, and the same IT resource can be used across different business services. Customers can create their own custom controls to measure compliance for other resource types. Users populate their resource library with their own resources from the datacenter whose compliance they want to track.

HPE ITOC has the following classes of resources:

- **Business Service** - A collection of IT resources with defined relationships to one another (see "Business services" on page 39).

- **Device** - A hardware asset.

- **Group** - A group asset.

- **Platform** - An OS resource.

- **Resource Manager** - An asset through which resources can be accessed.

- **Software** - Includes application server, database, and web server.

- **Unknown** - An unknown resource.

Before configuring any of these resources, ensure that the FQDN used in the minion configuration is resolvable through DNS or by the local `/etc/hosts` file.

View resources in HPE ITOC

The **Resources** page lists all of the IT resources in your environment.

ID	Resource	Type	Status
RES_000002	BUSINESS SERVICE	Business Service	Defined
RES_000003	rh1	RHEL 7	Defined
RES_000004	chestnut24.chestnut.dev.opsware.com	RHEL 6	Defined
RES_000005	chestnut25.chestnut.dev.opsware.com	RHEL 6	Defined
RES_000006	sa mgr	HP Server Automation	Defined
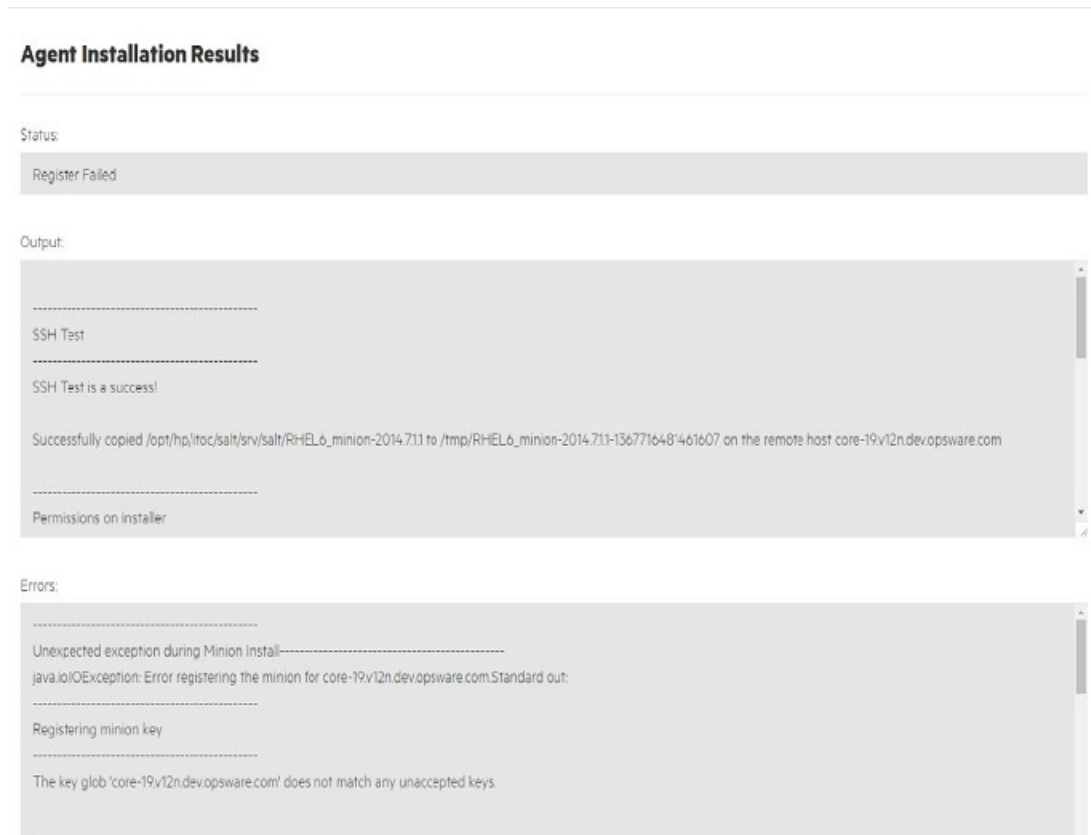
- Use the **Search** field to find a specific resource. Type the full or partial name of the resource in the **Search** field, and click the $\boxed{Q}$ icon.

- Use the **Lifecycle** list to filter resources by lifecycle state. Available options are **Active Resources** (default), **Defined Resources**, **Managed Resources**, **Installing Agent**, **Install Failed**, or **Obsolete Resources**.

- Click the second list to sort resources **By ID** (default) or **By Name**.

- Click **Actions** to create a **New Resource**, **Import Resources**, or **Install Agents**.

The overall **Resources** view shows:

- **ID** of the resource.

- **Resource** name.

- **Type** of resource.

- **Status** of the resource (**Defined**, **Managed**, or **Obsolete**). You can click on the status to see further details.

Agent Installation Results

Status:

Register Failed

Output:

```
------------------------------------------------
SSH Test
------------------------------------------------
SSH Test is a success!

Successfully copied /opt/hp/itoc/salt/srv/salt/RHEL6_minion-2014.7.1.1 to /tmp/RHEL6_minion-2014.7.1.1-1367716648'461607 on the remote host core-19.v12n.dev.opsware.com

------------------------------------------------
Permissions on installer
```

Errors:

```
------------------------------------------------
Unexpected exception during Minion Install------------------------------------------------
java.io.IOException: Error registering the minion for core-19.v12n.dev.opsware.com.Standard out:
------------------------------------------------
Registering minion key
------------------------------------------------
The key glob 'core-19.v12n.dev.opsware.com' does not match any unaccepted keys.
```

Create a resource

1. Navigate to the **Resources** list.

2. Click **Actions**, and select **New Resource**.

3. The **New Resource** dialog appears.
   ○ **Name** (required) - Enter a Name for the resource.

   ○ **Resource Type** - Use the dropdown list to select a resource type. Depending on the resource type you select, different resource attributes are available to specify.

4. Click **OK**.

Import business services and resources

Use the following task to import a business service or resource:

1. Navigate to the **Business Services** or **Resources** list.

2. From the **Actions** list, select **Import Business Services** or **Import Resources**.

3. The **Import Data** screen appears. Browse and select the file containing the data you want to import.

4. Press **Start Import**.

5. After several moments, the **Import Results** screen appears.

- ○ **Created Resources** - Resources that were imported successfully onto your system.
    - • **Source Ref** - Name of the imported source.
    - • **Source URL** - URL of the imported source.
    - • **ID** - Resource ID.
- ○ **Failed Resources** - Resources that failed to import onto your system.
- ○ **Skipped Resources** - Resources that were skipped during this import.
- ○ **Updated Resources** - Resources that were updated in this import.
- ○ **Created Services** - Business services that were imported successfully onto your system.
- ○ **Failed Services** - Business services that failed to import onto your system.
- ○ **Skipped Services** - Business services that were skipped during this import.
- ○ **Updated Services** - Business services that were updated in this import.

See "How to write JSON files for services and resources import" on page 83 for more information about configuring files for HPE ITOC import.

Manage resources

This section describes how to view, author, and edit resources.

Resources header

When you select a resource, information about that resource appears in a new view. The resources header is the bar that appears directly beneath the HPE ITOC tabs:
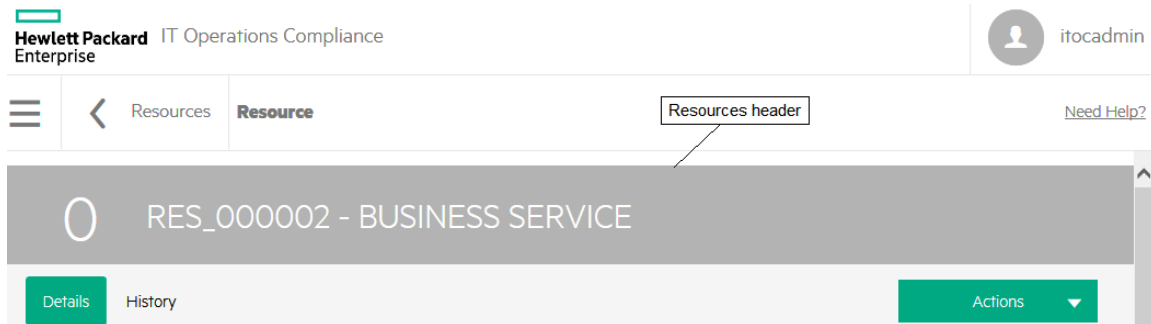
- The overall compliance score is the number on the left side of the header. The compliance of the resource in the example is not calculated or is unknown.
  The header background color indicates the resource's compliance state:

  - Green - Compliant based on the compliance threshold.

  - Red - Not compliant based on the compliance threshold.

  - Gray - Not calculated or unknown.

- Resource ID - "RES_000002" in the example.

- Resource Name - "BUSINESS SERVICE" in the example.

Resource details

Navigate to the **Details** view of a resource in defined state to view information about a specific resource, edit resource properties, and use the **Make Obsolete** action:

Edit resource detail properties

1. Navigate to the **Resources** list, and select the resource you want to edit.

2. From **Actions**, select **Edit Properties**. The **Edit Properties** dialog appears, showing information about this resource.

3. Edit the resource information as needed.

4. Click **OK**.

Use the Make Obsolete action

The **Make Obsolete** action can be performed on a resource that is not part of an active business service or is not being used as the Access Resource Through resource. Once you have made a resource obsolete, it will not be available to be used in a business service in the future. This action is not reversible (see "Workflow and lifecycle states" on page 36).

To use the Make Obsolete action...

The **Make Obsolete** action can be performed on a resource that is not part of an active business service or is not being used as the Access Resource Through resource. Once you have made a resource obsolete, it will not be available to be used in a business service in the future. This action is not reversible (see "Workflow and lifecycle states" on page 36).

1. Navigate to the **Resources** page, and select a resource.

2. From **Actions**, select **Make Obsolete**. The **Make Obsolete** dialog appears.

3. Enter information about this resource in the **Notes** box.

4. Click **OK**.

Resource history

The **Resource History** view shows details about the resource's history, including:

- **Action** - What was done (created, updated, or obsoleted).

- **Notes** - Information provided by the user who created or modified the resource.

- **User** - Who performed the action.

- **Date** - When the action was performed.

View the history of a resource

1. Navigate to the **Resources** tab, and click the resource whose history you want to view.

2. Click **History**.

Install an agent on a resource

This section describes how to install an agent on a resource, prerequisites for installing an agent on certain resources, and post-installation target server configuration.

Prerequisites

- "Prerequisites for an agent on a Windows platform" below

- "Prerequisites for an agent on a SLES platform" on page 68

Prerequisites for an agent on a Windows platform

Select an SSH installation for Windows. HPE ITOC has been tested with the following two SSH installation options for Windows; however, you can use any other similar solution.

- Copssh 64-bit - https://www.itefix.net/copssh

- Bitvise SSH - https://www.bitvise.com/

All the Windows servers on a system must have either Copssh or Bitvise SSH installed. Do not use both.HPE ITOC does not support a mix of Copssh or Bitvise SSH on servers.

By default, the HPE ITOC `application.properties` file is configured to support Copssh as follows (default configurations are shown in bold text):

```
## itoc.rex.salt.minion.windows.temp : salt minion temp dir for windows
## This is an optional property with default value C:/tmp
itoc.rex.salt.minion.windows.temp = C:/tmp


## itoc.rex.salt.minion.windows.pythonloc : salt minion python location for windows
## This is an optional property with default value C:/python27
itoc.rex.salt.minion.windows.pythonloc = C:/python27



## itoc.rex.salt.minion.windows.sshsaltloc : location for salt installation while
access from SSH
## This is an optional property with default value /cygdrive/c/salt
itoc.rex.salt.minion.windows.sshsaltloc = /cygdrive/c/salt



## itoc.rex.salt.minion.windows.sshenvtype : what kind of command set windows ssh
uses (POSIX or Windows)
## This is an optional property with default value POSIX
itoc.rex.salt.minion.windows.sshenvtype = POSIX
```

To use Bitvise instead of Copssh, the `application.properties` file must have the following information (shown in bold text):

```
## itoc.rex.salt.minion.windows.temp : salt minion temp dir for windows
## This is an optional property with default value C:/tmp
itoc.rex.salt.minion.windows.temp = C:/tmp


## itoc.rex.salt.minion.windows.pythonloc : salt minion python location for windows
## This is an optional property with default value C:/python27
itoc.rex.salt.minion.windows.pythonloc = C:/python27


## itoc.rex.salt.minion.windows.sshsaltloc : location for salt installation while
access from SSH
## This is an optional property with default value /cygdrive/c/salt
itoc.rex.salt.minion.windows.sshsaltloc = C:/salt
```

```
## itoc.rex.salt.minion.windows.sshenvtype : what kind of command set windows ssh
uses (POSIX or Windows)
## This is an optional property with default value POSIX
itoc.rex.salt.minion.windows.sshenvtype = **Windows**
```

For both Copssh and Bitvise, the user must ensure that:

- The Python 2.7 64-bit library is installed in the directory specified by
  `itoc.rex.salt.minion.windows.pythonloc`.

- `itoc.rex.salt.minion.windows.sshsaltloc` must be:
  - `%SystemDrive%:/salt` for Bitvise use.

  - `/cygdrive/%SystemDrive%/salt` for Copssh use.

- `itoc.rex.salt.minion.windows.temp` and `itoc.rex.salt.minion.windows.sshsaltloc` are
  pre-created.
  - `itoc.rex.salt.minion.windows.temp` must have read and write permissions for the
    administrator and system users.

  - `itoc.rex.salt.minion.windows.sshsaltloc` must have read permissions.

- All directory names specified in the `application.properties` files must use / as a separator,
  not \.

- Appropriate firewall settings must be updated to allow the SSH server to communicate.

 recommends that the user create a template Windows server with this configuration and clone it for
easy configuration.

Prerequisites for an agent on a SLES platform

This process allows automated agent installation on a SLES platform and is not required for further
HPE ITOC operation and use.

Before you install an agent on a SLES resource, you must configure the following information:

1. Change the following information in the `/etc/ssh/sshd_config` file:
   ```
   #To disable tunneled clear text passwords, change to no here!
   ```
   ```
   #PasswordAuthentication no
   ```
   To:
   ```
   #PasswordAuthentication yes
   ```
2. Restart the SSH daemon.

Install an agent

1. Navigate to the **Resources** list.

2. Click **Actions**, and select **Install Agents**. The **Install Agents** dialog appears.

Install Agents

Filter for and then select the resources on which to install the ITOC agent. Provide the credentials for accessing the resources.

Choose Resources:

Status is:

| Defined Resources | ▼ |

Type is:

| Platform | ▼ |

Name contains:

| |

| Search |

| ▼ |

Force Install:

| Skip if already installed | ▼ |

Install Location:

| /opt/hp/itoc |

SSH Port:

| 22 |

SSH Login:

| root |

SSH Password:

| <required> |

| OK | Cancel |

Choose Resources

- **Status is** - Use the dropdown list to filter resources by status.

- **Type is** - Use the dropdown list to filter resources by type.

- **Name contains** - To find a specific resource, enter the complete or partial name of the resource you want to install.

3. Click **Search**.

4. Use the multi-select list to find existing resources that you want to install an agent on. Other information in this dialog is as follows:

- ○ **Force Install:** - Select **Skip if already installed** (default) or **Always install**.

- ○ **Install Location:** - This field is grayed out and not editable by the user. This is the install location.

- ○ **SSH Port:** - This field is grayed out and not editable by the user. This is the default SSH port.

- ○ **SSH Login:** (required) - Your username for logging into SSH.

- ○ **SSH Password:** (required) - Your password for logging into SSH.

5. Click **OK**.

Statements of Applicability

A Statement of Applicability links a policy to a business service and defines SLOs, maintenance windows, and exceptions. Exceptions are defined to exclude a resource from being tested against a requirement.

SoAs are created manually from a production business service or policy. By default, SoAs follow the Approval Required workflow (see "Workflow and lifecycle states" on page 36). An SoA must be in production state to run a compliance scan and remediation jobs.

View Statements of Applicability in HPE ITOC

Navigate to a production revision of a business service or policy, and see the Compliance view for applicable SoAs. The table shows:

- **ID** of each SoA

- **Policy** or **Business Service** to which each SoA is tied

- **Compliance Score** of each SoA. The color and icon indicate the compliance state based on the compliance threshold

- Whether the SoA is **Meeting Measurement SLO**

- Whether the SoA is **Meeting Remediation SLO**

- **Revision** number and lifecycle state.

- **Last Compliance Scan** of this SoA.

Select an SoA to view further details.

Create a new Statement of Applicability

1. To create a new SoA, navigate to the **Compliance** view of a production business service or policy.

2. Open the business service or policy for which you want to create a new SoA.

3. From **Actions**, select **New Statement of Applicability**, and enter the following information:
   - **Policy** or **Business Service** - The system automatically enters the policy or business service from which you opened the new SoA page.

- **Business Service** or **Policy** (required) - Opposite of the value in the first, pre-populated field. Select a business service or policy.

- **Measurement SLO** - The measurement SLO is the time frame in which a business service must be measured against a particular policy. Select a value from the dropdown list. The default is set based on the policy's default measurement SLO (see "Create a new policy" on page 26).

- **Remediation SLO (in days)** - The remediation SLO is the time frame in which a non-compliant IT resource needs to be remediated against a particular requirement. Enter the remediation SLO. The default is set based on the policy's default remediation SLO (see "Create a new policy" on page 26).

- **Maintenance Windows** - Select the maintenance windows in which you want to run scan and remediation jobs.
  The maintenance windows you select here are the allowable times that the business service is available for scan and/or remediation jobs. When the maintenance window time slot begins, many SoAs can be slated for the same maintenance window, and the jobs are prioritized by the business service priority and will run in a way that optimizes meeting MSLO.

4. Click **OK**.

Manage Statements of Applicability

This section describes how to view, author, and edit SoAs.

SoA header

When you select an SoA, information about it appears in a new view. The SoA header is the bar that appears directly beneath the HPE ITOC tabs:
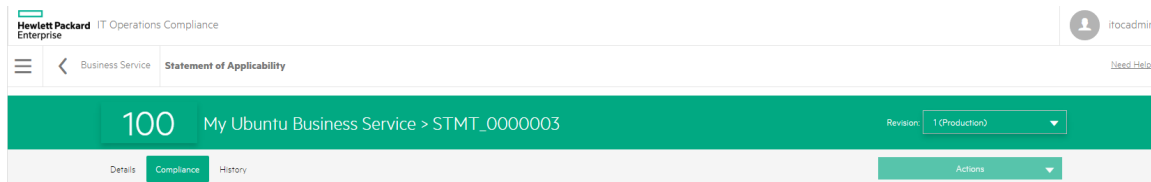
- The overall compliance score is the number on the left side of the header. The business service used to create this SoA is 100 percent compliant.
  The header background color indicates the SoA's compliance state:

- Green - Compliant based on the compliance threshold.

- Red - Not compliant based on the compliance threshold.

- Gray - Not calculated or unknown.

- Name of the policy or business service from which you navigated to the SoA (in this example, a business service named "My Ubuntu Business Service").

- SoA ID - "STMT_0000006" in the example.

- **Revision** - Revisions of this SoA and the lifecycle state.

SoA details

Navigate to the **Details** view of an SoA to view information about a specific SoA, edit SoA properties, view and create SoA exceptions, and edit or delete SoA exceptions.

Edit SoA detail properties

1. From a revision in draft state, click **Actions** to select **Edit Properties**.

2. The **Edit Properties** dialog appears. Modify the SoA as needed.

3. Click **OK**.

View SoA exceptions

An exception is defined in the statement of applicability for a specific resource (within the business service) that is not required to comply with a specific requirement in the policy. SoA exceptions can only be added, edited, and deleted from an SoA in draft state.

Create an exception

1. From an SoA in draft state, click the **New Exception** button.

2. The **New Exception** dialog appears. Complete the following fields:

   ○ **Requirement** (required): Select a requirement. Selecting a top-level requirement includes the selection of any sub-requirements below it.

   ○ **Resource** (required): Select a resource from the business service.

   ○ **Reason** (required) - Enter the reason the exception was created.

   ○ **Expiration Date** (required): Use the **Pick Date** dropdown calendar to select an effective date, which must be a date in the future. The default is today's date.

3. Click **OK**.

Edit an exception

You can edit the properties of an exception in draft state.

1. Navigate to an exception in an SoA that is in draft state.

2. Click the **Name** link in the exception row to edit the exception.

3. The **Edit Exception** dialog appears. Edit the information as needed.

4. Click **OK**.

Delete an exception

1. From an SoA in draft state, click the Delete ✂ icon the exception row.

2. A confirmation message appears, asking if you want to delete the exception.

3. Click **OK**.

SoA compliance
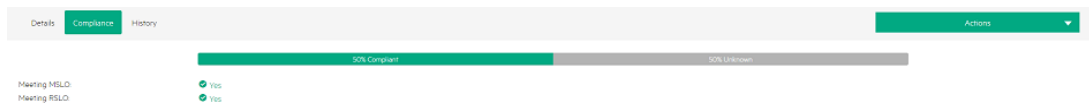
The SoA compliance bar displays the overall compliance score for the SoA. The example shows:

- **90% Compliant** (green) - 90 percent compliance in MSLO.

- **8% Non-Compliant (within RSLO)** (orange) - 8 percent non-compliance in RSLO.

- **Non-Compliant (out of RSLO)** (red) - Non-compliance out of RSLO.

- **2% Unknown** (gray when greater than 0) - 2 percent not calculated or unknown.

- **Meeting MLSO** - Whether the SoA is meeting MSLO.

- **Meeting RSLO** - Whether the SoA is meeting RSLO.

View compliance results

You can view compliance results from an SoA that you have navigated to through a policy or business service. Compliance results shows a widget for each requirement that has one or more rules directly associated with it. Use the dropdown list to view compliance results **By Requirement or By Resource** (by default, results are shown by requirement).

Click the second dropdown list to filter results by **All Results** (default), **With Non-Compliant**, **With Excepted**, or **With Failed**.

Click the third dropdown list to sort results **By Compliance** (default), **By Name**, or **By Severity** (if you selected **By Requirement**) or **By Compliance**, **By Name**, or **By Type** (if you selected **By Resource**).

Click the fourth dropdown list to see results as **View Tiles** or **View Table**.

The widget color is based on the following:

- **Compliant** - The widget is green if one or more rule-resource pairs are compliant and none are non-compliant (within RSLO) or non-compliant (out of RSLO).

- **Non-Compliant (within RSLO)** - The widget is orange if a requirement has any rule-resource pairs are non-compliant (within RSLO) but no rule-resource pairs that are non-compliant (out of SLO).

- **Non-Compliant (out of RSLO)** - The widget is red if a requirement has any rule-resource pairs are non-compliant (out of RSLO).

- **Unknown** - The widget is gray if there are no rule-resource pairs in any categories.

- Requirement severity (**High**, **Medium**, or **Low**) is displayed on the widget. Users can sort widgets by severity value.

- The numbers on each widget indicates the number of rule-resource pairs.

- You can click on the number link on the widget for more details about test results for these rule-

resource pairs. For example, in the previous illustration, you can click on "3 Non-Compliant (out of SLO)" in the "2.8 2.8 Ensure Plugin Directory Has Appropriate Permissions" widget for further results, which are grouped by rule.

Clicking this rule name shows further details about this rule.

- **ID** - Resource ID

- **Resource** - Resource name. Click on the resource name to see resource details.
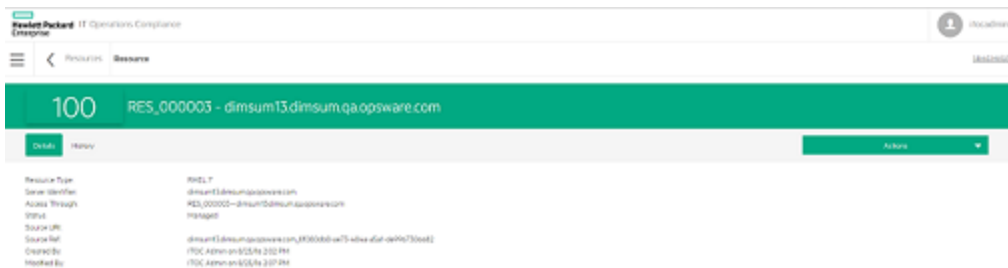
- **Type** - Resource type

- **Scanned** - Date and time this resource was last scanned for compliance

- **Job ID** - ID of the compliance job. Click on the value in the Job ID column for more specific information.

- **Return Code** - Error return code

- **Expected Value:** - Expected information based on the control settings.

- **Old Value:** - Value before the job was run.

- **New Value:** - Value resulting from the job that was run.

- **Output** - Output from the specified control executed against the specified resource

- **Result Details** - May contain errors or results from the control

The widget also may show the number of rule-resource pairs that failed to provide a result (compliant or not compliant) in the most recent scan.

- If there was a previous scan result within MSLO, that result is counted in the numbers shown in the widget.

- If there was no previous result, it remains unknown.

SoA history

The **History** view shows details about each revision's history, including:

- **Action** - What was done (created, submitted, and so on).

- **Notes** - Information provided by the **User** who created or modified the policy or business service.

- **User** - Who performed the action.

- **Date** - When the action was performed.

Viewing the history of an SoA

Select the SoA whose history you want to view, and click **History**.

Create a new draft revision

1. From the **Compliance** view of a business service or policy, select an SoA in the SoA table.

2. Select the SoA revision on which you want to base your new draft revision.

3. Click **Actions**, and select **New Draft Revision**.

4. Click **OK.**

5. Use **Actions** to submit the SoA to the next workflow state.

Scan and remediate

HPE ITOC determines which policy rules to run against which IT resources (within the business service) based on the rule scope and resource type. A compliance scan or remediation job runs against the revision of the current production policy and business service associated with the production revision of the SoA.

HPE ITOC uses a resource type hierarchy to determine which rules to test against which IT resources. For example, if a rule's scope is for Windows, it runs only against resources whose type is Windows or below in the resource- type hierarchy (e.g., it runs on Windows 2012, Windows 2012 R2, etc.).

Scanning and remediation occurs automatically through maintenance windows. However, you may need to run scanning and remediation manually, as described in the following section.

Manually scan and remediate

This section describes how to run a scan compliance or remediation job manually.

Run a scan compliance job

You must have the **Run Scan Compliance Job** permission to perform this task.

1. From the **Dashboard**, **Policy**, or **Business Service** page, navigate to the production policy or business service you want to scan for compliance.

2. Select an SoA in production state.

3. From **Actions**, select **Scan Compliance** to initiate a scan compliance job.
   Your compliance results appear. If any of your IT resources are out of compliance, you can initiate a **Run Remediation** job.

Run a remediation job

You must have the **Run Remediation Job** permission to perform this task.

1. From the **Dashboard**, **Policy**, or **Business Service** page, navigate to the production policy or business service you want to remediate.

2. Select an SoA in production state.

3. From **Actions**, select **Run Remediation** to initiate a remediation job.
   The job remediates non-compliant resources and updates the compliance results.

How to write JSON files for services and resources import

You can import your own business services and resources into HPE ITOC using a JSON file. This topic provides information about the syntax and semantics for this JSON file.

Limitations

The import request must be in the JSON format. To export and import resources, services, or relationships from a different data source, such as UCMDB/CSA, you must first create this JSON file with the desired input.

Security

The import of business services and resources requires the following permissions:

- Write Business Services
- Read and Write Resources

Input JSON format

The following example shows a simple API request body:

```
{
      "canUpdate": true,
      "defaultSourceURI" : "https://ucmdb.hp.com",
      "resources" : [
       {
          "type": "SLES 11",
          "name": "Alpha",
          "ref" : { "sourceRef": "Alpha" },
          "attributes" : [ {"name" : "Hostname", "value" : "Alpha.qa.itoc.com"} ]
       }
      ],
      "services" : [
       {
          "name": "Service1Alpha",
          "ref" : { "sourceRef": "Service1Alpha" },
                  "priority" : "Silver",
                  "relationships" : [
                          {
                                  "target" : { "sourceRef" : "Alpha" },
```

```
                                    "type" : "contains"
                        }
                ]

        }
    ]
}
```

The request body contains the following four major components:

- `canUpdate` - This field specifies if the preexisting entities (such as resources and services) can be updated during the progressive import. If specified as true and if the reference of a preexisting resource or service matches the reference specified in the request body, that preexisting entity will be updated to reflect the new values specified in the request body. If specified as false, that preexisting entity will NOT be updated, and a skipped message is generated for the import results.

- `defaultSourceURI` - The uniform resource identifier (URI) must be valid and is used to abbreviate the references of the referred entities (for resources and services) in the request body. The resource and service references have two parts: `sourceURI` and `sourceRef`. If the `sourceURI` matches the `defaultSourceURI`, then the `sourceURI` can be omitted from the reference.

- List of resources - This list specifies all the resources that are to be imported or updated (if `canUpdate` is true). The resources must be uniquely identified by their references, which consist of a `sourceURI` and a `sourceRef`, as mentioned above. If there is a duplicate reference for a resource found in the database, the preexisting resource is updated if `canUpdate` is true. If `canUpdate` is false, the resource is skipped and reported as such in the response body.
  If the reference is not found in the database, a new resource is created. If the resource definition contains errors, it is reported as failed in the response body, along with a list of errors specifying what is wrong with the import. If a resource reference is specified multiple times in the resources section, the repeating references will be reported as failed, as they can neither be created nor updated (a maximum of only one update is allowed).

- List of services - This list specifies all the services that are to be imported or updated (if `canUpdate` is true). Just like resources, the services too must be uniquely identified by their references, which consist of a `sourceURI` and a `sourceRef`, as mentioned above.
  If the reference is not found in the database, a new service is created. If the service definition contains errors, it is reported as failed in the response, along with a list of errors specifying what is wrong with the import. If a service reference is specified multiple times in the services section, the repeating references will be reported as failed, as they can neither be created nor updated (a maximum of only one update is allowed).

Results

If you try the sample request (above) in the HPE ITOC UI, you will get following result:

Import Results

Created Resources (1)

Source Ref	Source URI	ID
Alpha	https://ucmdb.hp.com	RES_000053

Created Services (1)

Source Ref	Source URI	ID
Service1Alpha	https://ucmdb.hp.com	SVC_00004 (revision 1)

If you try the same import a second time, the subsequent response changes to:

Import Results

Updated Resources (1)

Source Ref	Source URI	ID
Alpha	https://ucmdb.hp.com	RES_000053

Updated Services (1)

Source Ref	Source URI	ID
Service1Alpha	https://ucmdb.hp.com	SVC_00004 (revision 1)

The message for the subsequent import has changed to "Updated" because the first import created the resources and services, and the subsequent import could only update the definitions for the preexisting resources and services.

If you change the `canUpdate` value to false and retry the import, you will receive the following response:

Import Results

Skipped Resources (1)

Source Ref	Source URI	ID
Alpha	https://ucmdb.hp.com	RES_000053

Skipped Services (1)

Source Ref	Source URI	ID
Service1Alpha	https://ucmdb.hp.com	SVC_00004 (revision 0)

In general, for any import, the Results contains up to three sections (which may be applicable depending on the JSON request):

- **Errors** - This list shows the errors for the `defaultSourceURI` specification. Errors messages are as follows:

```
{ 1, "defaultSourceURI exceeds 255 characters" },
{ 2, "Malformed defaultSourceURI" },
{ 3, "A resource definition does not have a ref specified." },
{ 4, "A service definition does not have a ref specified." }
```

- **Resources** - Resources are divided into the following categories. If the `canUpdate` field is false, the updated list will be empty.
  - Created
  - Skipped
  - Updated
  - Failed

- **Services** – Services too are divided into the same categories as Resources. If the `canUpdate` field is false, the updated list will be empty.
  - Created
  - Skipped
  - Updated
  - Failed

Failed error codes

If a service or resource import fails, one of the following messages can specify exactly what may have failed:

For resources

```
{ 101, "'name' {0} exceeds 255 characters" },
{ 102, "'sourceURI' {0} exceeds 255 characters" },
{ 103, "'sourceURI' {0} is malformed" },
{ 104, "'sourceRef' {0} exceeds 255 characters" },
{ 105, "'type' {0} is invalid" },
{ 106, "attribute 'name' {0} exceeds 255 characters" },
{ 107, "attribute 'name' {0} is not valid for 'type' {1}" },
{ 108, "attribute 'value' {0} exceeds 4000 characters" },
{ 109, "attribute 'name' {0} is already specified" },
{ 110, "Missing mandatory attribute 'name' {0} for 'type' {1}" },
{ 111, "'accessThroughRef' {0} is invalid" },
{ 112, "Duplicate ref {0} in the request body, subsequent definitions are being ignored" },
{ 113, "A cyclic or incomplete chain of 'accessThroughRef' relationship was detected on adding or
updating {0} which has an accessRef of {1}" },
{ 114, "An unexpected error was detected on adding or updating {0}, exception is {1}, trace is
{2}" },
{ 115, "accessThroughRef 'sourceURI' {0} exceeds 255 characters" },
{ 116, "accessThroughRef 'sourceURI' {0} is malformed" },
{ 117, "accessThroughRef 'sourceRef' {0} exceeds 255 characters" },
{ 118, "The organization for resource {0} does not allow read access to this resource." },
{ 119, "The organization for resource {0} does not allow write access to this resource." },
{ 120, "One of the attributes for resource does not have a name." },
{ 121, "Resource name must be specified" },
{ 122, "'sourceRef' value is missing for the resource" },
{ 123, "'sourceRef' value is missing for the accessRef" }
{ 124, "'name' {0} preexists for a non obsolete resource" }
{ 125, "'name' {0} is defined multiple times for resources in the request body." }
```

For services

```
{ 201, "'name' {0} exceeds 255 characters" },
{ 202, "'description' {0} exceeds 4000 characters" },
{ 203, "'sourceURI' {0} exceeds 255 characters" },
{ 204, "'sourceURI' {0} is malformed" },
{ 205, "'sourceRef' {0} exceeds 255 characters" },
{ 206, "'rootRef' {0} is invalid" },
{ 207, "Duplicate ref {0} in the request body, subsequent definitions are being ignored" },
{ 208, "'relationship' {0} is already defined" },
{ 209, "'source' {0} unreachable from the 'rootRef' {1}" },
{ 210, "'type' {0} invalid for relationship {1}" },
{ 211, "A cyclic 'relationship' was detected on adding {0}" },
{ 212, "'priority' {0} is invalid" },
{ 213, "relationship 'sourceURI' {0} exceeds 255 characters" },
```

```
{ 214, "relationship 'sourceURI' {0} is malformed" },
{ 215, "relationship 'sourceRef' {0} exceeds 255 characters" },
{ 216, "root 'sourceURI' {0} exceeds 255 characters" },
{ 217, "root 'sourceURI' {0} is malformed" },
{ 218, "root 'sourceRef' {0} exceeds 255 characters" },
{ 219, "'source' {0} is invalid" },
{ 220, "'target' {0} is invalid" },
{ 221, "'target' {0} is same as 'root' {1} in relationship {2}" },
{ 222, "An unexpected error was detected on adding or updating {0}, exception is {1}, trace is
{2}" },
{ 223, "'source' and 'target' can not be same in relation {0}" },
{ 224, "'name' {0} preexists for a non obsolete service" },
{ 225, "The organization for service {0} does not allow read access to this service." },
{ 226, "The organization for service {0} does not allow write access to this service." },
{ 227, "The organization for resource {0} does not allow read access to this resource." },
{ 228, "A relationship {0} can not have a null target" },
{ 229, "An unexpected error was detected on processing organization for resource {0}, exception
is {1}, trace is {2}" },
{ 230, "Service name must be specified" },
{ 231, "'sourceRef' value is missing for the service relation's constituent ref" },
{ 232, "'sourceRef' value is missing for the rootRef" },
{ 233, "'sourceRef' value is missing for the service" }
{ 234, "'name' {0} is defined multiple times for services in the request body. " }
```

Users can fix the errors and then try reimporting.

JSON example

The following example imports a list of resources, along with a list of services based on those resources.

```
{
    "canUpdate" : true,
    "defaultSourceURI" : "https://ucmdb.hp.com",

    "resources" : [
        {
            "type": "SLES 11",
            "name": "Alpha",
            "ref" : { "sourceRef": "Alpha" },
            "attributes" : [ {"name" : "Hostname", "value" : "Alpha.qa.itoc.com"} ]
        },
        {
            "type": "RHEL 6",
            "name": "Beta",
            "ref" : { "sourceURI" : "https://csa.hp.com", "sourceRef": "Beta" },
            "attributes" : [ {"name" : "Hostname", "value": "Beta.qa.itoc.com"} ]
        },
        {
            "type": "RHEL 6",
            "name": "Gama",
            "ref" : { "sourceURI" : "https://csa2.hp.com", "sourceRef": "Gama" },
            "attributes" : [ {"name" : "Hostname", "value": "Gama.qa.itoc.com"} ],
                    "accessThroughRef" : { "sourceRef": "Alpha" }
        },
        {
```

```
            "type": "RHEL 6",
            "name": "Delta",
            "ref" : { "sourceRef": "Delta" },
            "attributes" : [ {"name" : Hostname", "value": "Delta.qa.itoc.com"} ],
                        "accessThroughRef" : { "sourceRef": "Psi" }
        },
              {
            "type": "RHEL 6",
            "name": "Charlie",
            "ref" : { "sourceRef": "Charlie" },
            "attributes" : [ {"name" : Hostname", "value": "Charlie.qa.itoc.com"} ],
                        "accessThroughRef" : { "sourceRef": "Bravo" }
        },
        {
            "type": "RHEL 6",
            "name": "Bravo",
            "ref" : { "sourceRef": "Bravo" },
            "attributes" : [ {"name" : Hostname", "value": "Bravo.qa.itoc.com"} ],
                        "accessThroughRef" : { "sourceURI" : "https://csa.hp.com", "sourceRef": "Beta" }
        }
        ],

    "services" : [
        {
            "name": "ServiceAlpha",
            "ref" : { "sourceURI" : "https://ucmdb.hp.com", "sourceRef": "ServiceAlpha" },
                    "relationships" : [
                            {
                                    "source" : { "sourceRef" : "Alpha" },
                                    "target" : { "sourceRef" : "Beta" },
                                    "type" : "contains"
                            }
                    ]
        },
        {
            "name": "ServiceAlpha",
            "ref" : { "sourceURI" : "https://ucmdb.hp.com", "sourceRef": "ServiceAlpha" },
                    "priority" : "Silver",
                    "relationships" : [
                            {
                                    "source" : { "sourceRef" : "Alpha" },
                                    "target" : { "sourceURI" : "https://csa.hp.com", "sourceRef" : "Beta" },
                                    "type" : "contains"
        }
                    ]
        },
        {
            "name": "ServiceQ",
            "ref" : { "sourceURI" : "https://ucmdb.hp.com", "sourceRef": "ServiceQ" },
                    "priority" : "Silver",
                    "relationships" : [
                            {
                                    "source" : { "sourceRef" : "Alpha" },
                                    "target" : { "sourceURI" : "https://csa.hp.com", "sourceRef" : "Beta" },
                                    "type" : "contains"
                            }
                    ]
        },
            {
            "name": "ServiceR",
```

```
            "ref" : { "sourceURI" : "https://ucmdb.hp.com", "sourceRef": "ServiceR" },
                  "priority" : "Silver",
                  "relationships" : [
                        {
                              "source" : { "sourceRef" : "Alpha" },
                              "target" : { "sourceURI" : "https://csa.hp.com", "sourceRef" : "Beta" },
                              "type" : "contains"
                        },
                        {
                              "source" : { "sourceURI" : "https://csa.hp.com", "sourceRef" : "Beta" },
                              "target" : { "sourceURI" : "https://csa2.hp.com", "sourceRef" : "Gama" },
                              "type" : "contains"
                        },
                        {
                              "source" : { "sourceURI" : "https://csa2.hp.com", "sourceRef" : "Gama" },
                              "target" : { "sourceRef" : "Delta" },
                              "type" : "contains"
                        }
                  ]
      }
  ]
}
```

- Because the `Alpha` resource has already been imported, that resource is updated. The rest of the resources are created or have failed (if there were any errors in their definitions).

- Similarly, services are either created or listed as failed (if there were any errors in their definitions).

- Because none of the listed services were created previously, there is no updated section for the services.
  The following example shows results for this test case:

Import Results

Created Resources (4)

Source Ref	Source URI	ID
Beta	https://csa.hp.com	RES_000054
Gama	https://csa2.hp.com	RES_000055
Bravo	https://ucmdb.hp.com	RES_000056
Charlie	https://ucmdb.hp.com	RES_000057

Updated Resources (1)

Source Ref	Source URI	ID
Alpha	https://ucmdb.hp.com	RES_000053

Failed Resources (1)

Source Ref	Source URI	Errors
Delta	https://ucmdb.hp.com	111: accessThroughRef (sourceURI: https://ucmdb.hp.com, sourceRef: Psi) is invalid

Created Services (1)

Source Ref	Source URI	ID
ServiceQ	https://ucmdb.hp.com	SVC_00005 (revision 1)

Failed Services (3)

Source Ref	Source URI	Errors
ServiceAlpha	https://ucmdb.hp.com	207: Duplicate ref (sourceURI: https://ucmdb.hp.com, sourceRef: ServiceAlpha) in the request body, subsequent definitions are being ignored
ServiceAlpha	https://ucmdb.hp.com	212: priority null is invalid 220: target (sourceURI: https://ucmdb.hp.com, sourceRef: Beta) is invalid
ServiceR	https://ucmdb.hp.com	220: target (sourceURI: https://ucmdb.hp.com, sourceRef: Delta) is invalid

JSON attributes for resources

The following JSON attributes describe the resources in input JSON:

- `type`: this is the `resourceType` of the resource being imported. See "Specify attributes for resources being imported" below for a complete list of resource types and applicable resource attributes that can be specified. Note that resource attribute types are different from the JSON attributes described here.

- `name`: A unique name qualifying the resource. This name is visible in the UI. The name must be unique across all the organizations in which the resource is visible.

- `ref`: A unique URI/string pair to identify the resource globally throughout the ITOC. Unlike `name`, the `ref` must be unique across all organizations irrespective of the service being visible or invisible for a given organization.

- `accessThroughRef`: Some of the resources do not have corresponding applicable hardware. They must rely on some other resource to be accessed through. `accessThroughRef` specifies the `ref` of the resource through which the specified resource is accessed. If this field is not specified, the `accessThrough` resource of a given resource is assumed to be itself.

- `attributes`: A `name,value` pair listing the applicable attributes of the resource (see "Specify attributes for resources being imported" below).

Specify attributes for resources being imported

This section describes how to specify attribute names for resources.

Each resource has a resource type, and each resource type has a set of predefined attributes. The attribute and its value must be specified while defining the resource in the JSON script. An error occurs if an applicable attribute for a resource type is not specified.

The following list shows attributes for each resource type. This list is organized in hierarchical form. All parent attributes are apply to their children. For example, `Device` has `Vendor` attributes, therefore, all its children also have `Vendor` attributes.

```
{
"resourcetypes":
[
    {"name":"Business Service"
    },
    {"name":"Device",
     "attributes": "Vendor",
     "children":
     [
        {"name":"Compute",
         "attributes": "BiosUUID",
```

```
        "children":
        [
            {"name":"Server"}
        ]
    },
 ]
},
{"name":"Platform"
 "attributes":"Hostname",
 "children":
 [
    {"name":"Microsoft (MS) Windows",
     "children":
     [
        {"name":"MS Windows 7"},
        {"name":"MS Windows 8"},
        {"name":"MS Windows 8.1"},
        {"name":"MS Windows Server 2008 R2"}
        {"name":"MS Windows Server 2012"},
        {"name":"MS Windows Server 2012 R2"}
     ]
    },
    {"name":"Unix",
     "children":
     [
        {"name":"Linux",
         "children":
         [
            {"name":"RHEL Compatibles"
             "children":
             [
                {"name":"RHEL 5 Compatibles",
                 "children":
                 [
                    {"name":"CentOS 5"},
                    {"name":"OEL 5"},
                    {"name":"RHEL 5"}
                 ]
                },
                {"name":"RHEL 6 Compatibles",
                 "children":
                 [
                    {"name":"CentOS 6"},
                    {"name":"OEL 6"},
                    {"name":"RHEL 6"}
                 ]
                },
                {"name":"RHEL 7 Compatibles",
                 "children":
                 [
                    {"name":"CentOS 7"},
                    {"name":"OEL 7"},
                    {"name":"RHEL 7"}
                 ]
                }
             ]
            },
            { "name":"SUSE Compatibles",
              "children":
```

```
                [
                    {"name":"OpenSUSE",
                     "children":
                     [
                         {"name":"OpenSUSE 12"},
                         {"name":"OpenSUSE 13"}
                     ]
                    },
                    {"name":"SUSE Linux Enterprise Server (SLES)",
                     "children":
                     [
                         {"name":"SLES 10"},
                         {"name":"SLES 11"}
                     ]
                    }
                ]
            },
            { "name":"Ubuntu Compatibles",
              "children":
              [
                  {"name":"Ubuntu",
                   "children":
                   [
                       {"name":"Ubuntu 12.04 LTS"},
                       {"name":"Ubuntu 14.04 LTS"}
                   ]
                  },
                  {"name":"Debian",
                   "children":
                   [
                       {"name":"Debian 7"}
                   ]
                  }
              ]
            }
        ]
      },
      {"name":"Oracle Solaris",
       "children":
       [
           {"name":"Oracle Solaris 11"},
           {"name":"Oracle Solaris 11.1"}
       ]
      }
    ]
   }
  ]
 },
 {"name":"Software",
  "children":
  [
      {"name":"Web Server",
       "children":
       [
           {"name":"Apache HTTP Server",
            "attributes":"APACHE_PREFIX;DOCROOT;HTTPD_ROOT",
            "children":
            [
                {"name":"Apache HTTP Server 2.4"}
```

```
        ]
      },
      {"name":"Apache Tomcat",
       "attributes":"CATALINA_HOME;CATALINA_BASE",
       "children":
       [
          {"name":"Apache Tomcat 6"}
       ]
      },
      {"name":"NGINX"}
  ]
},
{"name":"Database",
 "children":
 [
    { "name":"DB2 Database Server",
      "attributes":"dbUser;dbName;dbPassword;DASUser;latestVersion(withFixPack)",
      "children":
      [
          {"name":"DB2 Database Server 8"},
          {"name":"DB2 Database Server 9"},
          {"name":"DB2 Database Server 9.5"},
          {"name":"DB2 Database Server 10.5"}
      ]
    },
    { "name":"MYSQL",
      "attributes":"dbUser;dbPassword;dbName",
      "children":
      [
          {"name":"MySQL Community Server 5.6"}
      ]
    },
    { "name":"MS SQL Server",
      "attributes":"dbUser;dbPassword;instanceName;latestVersion(withServicePack)",
      "children":
      [
          {"name":"MSSQL Server 2005"}
      ]
    },
    { "name":"Oracle",
      "attributes":"instanceName;instanceHome",
      "children":
      [
          {"name":"Oracle 10g"},
          {"name":"Oracle 11g"}
      ]
    },
  ]
},
{"name":"Application Server",
 "children":
 [
    {"name":"J2EE Server",
     "children":
     [
        {"name":"JBoss",
         "attributes":"JBOSS_HOME",
         "children":
         [
```

```
                    {"name":"JBoss Application Server 7"}
                ]
            },
            {"name":"WebLogic"},
            {"name":"Websphere"}
        ]
      }
    ]
  }
 ]
},
]
}
```

JSON attributes for services

- `name`: A unique name qualifying the service. This name is visible in the UI. The name must be unique across all the organizations in which the service is visible.

- `ref`: A unique URI/string pair to identify the service globally throughout the ITOC. Unlike `name`, the `ref` must be unique across all organizations irrespective of the service being visible or invisible for a given organization.

- `description`: A brief description of the service.

- `priority`: Can be one of the following three values: `Gold`, `Silver`, `Bronze`.

- `rootRef` and `relationships`: See "Specify topologies for services being imported" below.

Specify topologies for services being imported

This section describes how to specify topologies for services.

Every service that has a topology specified for it has a `relationships` field specified for it. This field uses the references specified for the predefined resources to populate the service topology. A `rootRef` can be explicitly specified or, if left unspecified, uses a built-in resource called `BUSINESS SERVICE` as the root.

The relationships create the edges in the topology graph. There are two types of relationships: `contains` and `depends_on`.

In the following example, a service is created with an explicit root specified to be a predefined resource - `{ "sourceURI" : "https://csa.hp.com", "sourceRef" : "Beta" }`. The relationships then specify an edge from this root reference to another resource - `{ "sourceRef" : "Alpha" }`.

```
{
    "canUpdate" : true,
    "defaultSourceURI" : "https://ucmdb.hp.com",

    "services" : [
        {
            "name": "ServiceAlpha",
            "ref" : { "sourceURI" : "https://ucmdb.hp.com", "sourceRef": "ServiceAlpha" },
                       "priority" : "Silver",
                       "rootRef" : { "sourceURI" : "https://csa.hp.com", "sourceRef" : "Beta" },
                       "relationships" : [
                               {
                                       "target" : { "sourceRef" : "Alpha" },
                                       "type" : "contains"
                               }
                       ]
        }
    ]
}
```

In the following example, `rootRef` is not specified, so the script uses the implicit root. All the three resources specified in the relationships (`Alpha`, `Gama`, and `Charlie`) will connect to this implicit root.

```
{
    "canUpdate" : true,
    "defaultSourceURI" : "https://ucmdb.hp.com",

    "services" : [
        {
            "name": "ServiceAlpha",
            "ref" : { "sourceURI" : "https://ucmdb.hp.com", "sourceRef": "ServiceAlpha" },
                       "priority" : "Silver",
                       "relationships" : [
                               {
                                       "target" : { "sourceRef" : "Alpha" },
                                       "type" : "contains"
                               },
                               {
                                       "target" : { "sourceURI" : "https://csa2.hp.com", "sourceRef" : "Gama" },
                                       "type" : "contains"
                               },
                               {
                                       "target" : { "sourceRef" : "Charlie" },
                                       "type" : "contains"
                               }
                       ]
        }
    ]
}
```

The following example does not specify the root, so the implicit root is used. However, the relationships include the `source` attribute as well as the `target` attribute. The `source` is connected to the implicit root, and the `target` is then connected to the `source`.

```
{
    "canUpdate" : true,
    "defaultSourceURI" : "https://ucmdb.hp.com",

    "services" : [
```

```
        {
            "name": "ServiceQ",
            "ref" : { "sourceURI" : "https://ucmdb.hp.com", "sourceRef": "ServiceQ" },
                    "priority" : "Silver",
                    "relationships" : [
                            {
                                    "source" : { "sourceRef" : "Alpha" },
                                    "target" : { "sourceURI" : "https://csa.hp.com", "sourceRef" : "Beta" },
                                    "type" : "contains"
                            }
                    ]
        }
    ]
}
```

In the following example, the implicit `root` resource connects to `Alpha`, which in turn connected to `Beta`. Because `Beta` is also specified as the source in the next relationship, it directly connects to the `root`.

```
{
    "canUpdate" : true,
    "defaultSourceURI" : "https://ucmdb.hp.com",
    "services" : [
        {
            "name": "ServiceR",
            "ref" : { "sourceURI" : "https://ucmdb.hp.com", "sourceRef": "ServiceR" },
                    "priority" : "Silver",
                    "relationships" : [
                            {
                                    "source" : { "sourceRef" : "Alpha" },
                                    "target" : { "sourceURI" : "https://csa.hp.com", "sourceRef" : "Beta" },
                                    "type" : "contains"
                            },
                            {
                                    "source" : { "sourceURI" : "https://csa.hp.com", "sourceRef" : "Beta" },
                                    "target" : { "sourceURI" : "https://csa2.hp.com", "sourceRef" : "Gama" },
                                    "type" : "contains"
                            },
                            {
                                    "target" : { "sourceURI" : "https://csa.hp.com", "sourceRef" : "Beta" },
                                    "type" : "contains"
                            }
                    ]
        }
    ]
}
```
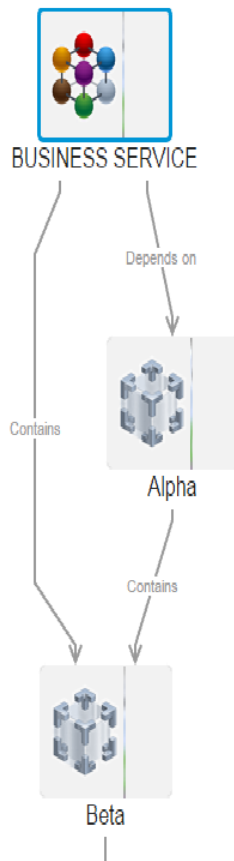
The following figure shows the visual representation of the hierarchy shown above:

Using the relationships (source, target) as well as `rootRef` (implicit or explicit root), it is possible to create arbitrary and complex hierarchies.

Some rules of thumb to remember are:

- Root can be specified implicitly or explicitly.

- If source is not specified in a relationship, `root` is assumed to be the source.

- It is an error to specify cyclic relationships.

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