



Administering RBMS

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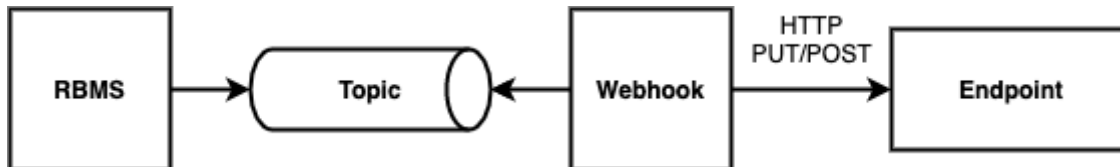
Table of Contents

1. Administration	3
1.1. Managing Webhooks	3
1.1.1. Viewing Webhooks	4
1.1.2. Adding Webhooks	4
1.1.3. Disabling a Webhook	5
1.1.4. Enabling a Webhook	5
1.1.5. Reset a Webhook	5
1.1.6. Viewing Webhook Statistics	7
1.1.7. Retrying Failed Webhook Invocations	8
1.2. Managing Users	9
1.2.1. Viewing all existing users	9
1.2.2. Adding users	9
1.2.3. Removing users	10
1.2.4. Resetting Password	10
1.3. Managing Roles	10
1.3.1. Viewing list of roles	10
1.4. Creating Roles	11
1.4.1. Removing roles	11
1.5. Managing Access Keys	11
1.5.1. Viewing list of access keys	11
1.6. Creating Access Keys	12
1.6.1. Revoking an access key	13
1.6.2. Validating an access key	13
1.6.3. Restoring an revoked access key	13
1.7. Scopes	14
2. Managing Jobs	17
2.1. Viewing job list	17
2.2. Viewing job task list	18
2.3. Viewing task flow	19
2.4. Viewing task details	20
2.5. Canceling a Job	21
2.6. Removing a Job	22
2.7. Configuring Job Settings	22

1. Administration

1.1. Managing Webhooks

A webhooks is a registered HTTP endpoint that forwards notifications from RBMS to an external endpoint.



RBMS stores a *domain event* if a status in RBMS has changed. An event is only created when the transaction was committed. An event is not fired when the transaction rolls back.

The events are grouped in different topics:

- **element**, the element topic contains all element-related messages
- **image**, the image topic contains all image-related messages

An event has a descriptive name that describes what state change is being reported. All events have a unique ID to identify different instances of the same event unambiguously.

For example, the *ElementRenamedEvent* informs about an element being renamed. The event is stored in the element topic.

A webhook subscribes a topic and calls the configured endpoint for all events that match the specified name filter. By default, the message send to the endpoint contains the JSON representation of the domain event. An optional template allows rewriting the event message.

The authentication can be done via HTTP Basic Authorization or bearer token. RBMS stores the provided credentials AES-protected in the database.



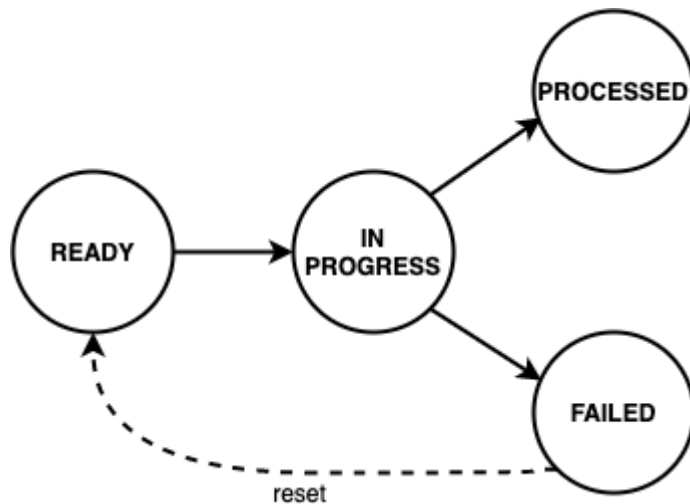
The AES secret and initialization vector (IV) can be specified in the **master.secret** and **master.iv** environment variables.

Unauthenticated endpoint calls are also supported.

A webhook invocation is considered *successful* if a HTTP success family status code is returned. For all other status codes the invocation is considered as failed.

A webhook can retry all failed messages. In addition, a webhook can be reset to a certain message to process this message and all subsequent messages again.

The complete message processing lifecycle is shown below:



New domain event messages are *READY* for being processed. The state changes to *IN PROGRESS* when the processing has begun and eventually to *PROCESSED* if the endpoint processed the message successfully and to *FAILED* otherwise respectively.

A webhook can be disabled to temporarily suspend the event processing. All events that occurred while the webhook was disabled are processed when the webhook gets enabled again unless the event got dropped because the topic buffering capacity was exceeded.

1.1.1. Viewing Webhooks

To view the list of webhooks

1. Click the **Administration** tab.
2. Click **Webhooks** in the left navigation pane. The list of all webhooks appear.
3. Click the name of the webhook that you want to view.

1.1.2. Adding Webhooks

To add a webhook

1. Click the **Administration** tab.
2. Click **Webhooks** in the left navigation pane. The list of all webhooks appear.
3. Click **Add webhook**
4. Specify the general, subscription and authentication information about the webhook.
5. Click **Save webhook**.

1.1.3. Disabling a Webhook

To disable a webhook

1. Click the **Administration** tab.
2. Click **Webhooks** in the left navigation pane. The list of all webhooks appear.
3. Select the webhook to be disabled.
4. Click **Disable webhook**.

1.1.4. Enabling a Webhook

To enable a webhook

1. Click the **Administration** tab.
2. Click **Webhooks** in the left navigation pane. The list of all webhooks appear.
3. Select the webhook to be enabled.
4. Click **Enable webhook**.

1.1.5. Reset a Webhook

To reset a webhook

1. Click the **Administration** tab.
2. Click **Webhooks** in the left navigation pane. The list of all webhooks appear.
3. Select the webhook to be reset.
4. Click **Message Queue** in the left navigation pane. The list of the last 100 processed messages appear.
5. Enter the event ID in the **Filter** field and click **Filter**.
6. Open the displayed message.

Administration

Manage webhooks, access keys and user accounts



Images Inventory Metrics Jobs Logs Administration

Logout

Webhooks

Access Keys

Access Key Validator

Users

Roles

Element_Updates

webhook

undefined

Settings

Template

Message Queue

Statistics

Webhooks > Element_Updates > Message Queue > 206b1481-8f85-40e8-9955-59140df96744

Message History

Review the message history of all processed messages and optionally reset the webhook to a previous message.

Event ID	206b1481-8f85-40e8-9955-59140df96744
Topic	element
Event Name	ElementRemovedEvent
Event Payload	<pre>{ "group_id": "434e53da-ba28-4c32-9556-d47a490d4d8b", "group_name": "blr", "group_type": "pod", "element_id": "d441e2ee-1038-45e2-ad7f-4254ffb2c826", "element_name": "leaf-a", "element_role": "accessleaf", "administrative_state": "NEW" }</pre>
Rewritten Message	<pre>{ "event_id": "206b1481-8f85-40e8-9955-59140df96744", "event_name": "ElementRemovedEvent", "message": { "group_id": "434e53da-ba28-4c32-9556-d47a490d4d8b", "group_name": "blr", "group_type": "pod", "element_id": "d441e2ee-1038-45e2-ad7f-4254ffb2c826", "element_name": "leaf-a", "element_role": "accessleaf", "administrative_state": "NEW" }, "topic_name": "element", "date_created": "2020-07-08T21:24:11.025+02:00" }</pre>
Date Created	08-JUL-2020 21:24:11.025

Reset message

Reset webhook

- Click **Reset webhook** to process the message and all subsequent messages again. The message queue view appears.

Administration

Manage webhooks, access keys and user accounts



Images Inventory Metrics Jobs Logs Administration

Logout

[Webhooks](#)
[Access Keys](#)
[Access Key Validator](#)
[Users](#)
[Roles](#)

Element_Updates webhook

Settings

Template

Message Queue

Statistics

Element_Updates

webhook

Webhooks > Element_Updates > Message History

Message Queue

Review the Element_Updates webhook message queue

Filter

Filter

Filter messages by correlation ID

Messages

Date Modified	Event Name	Correlation ID	State	Execution Time
13-JUL-2020 01:29:05.504	ElementSettingsUpdatedEvent	-	READY	-
13-JUL-2020 01:28:57.169	ElementSettingsUpdatedEvent	-	READY	-
13-JUL-2020 01:28:48.152	ElementSettingsUpdatedEvent	-	READY	-
13-JUL-2020 01:28:37.973	ElementSettingsUpdatedEvent	-	READY	-
13-JUL-2020 01:28:30.475	ElementSettingsUpdatedEvent	-	READY	-
13-JUL-2020 01:28:21.149	ElementSettingsUpdatedEvent	-	READY	-
13-JUL-2020 01:18:28.139	ElementConfigStoredEvent	-	READY	-
13-JUL-2020 01:18:11.853	ElementConfigStoredEvent	-	READY	-
08-JUL-2020 21:24:11.025	ElementRemovedEvent	-	READY	-
08-JUL-2020 21:24:08.440	ElementSettingsUpdatedEvent	-	PROCESSED	6 ms
08-JUL-2020 21:24:04.911	ElementSettingsUpdatedEvent	-	PROCESSED	6 ms
08-JUL-2020 21:24:00.623	ElementSettingsUpdatedEvent	-	PROCESSED	12 ms
08-JUL-2020 21:18:00.157	ElementSettingsUpdatedEvent	-	PROCESSED	29 ms
08-JUL-2020 21:17:56.021	ElementAddedEvent	-	PROCESSED	9 ms
08-JUL-2020 21:11:27.296	ElementRemovedEvent	-	PROCESSED	16 ms

1.1.6. Viewing Webhook Statistics

The webhook statistics provides information about processing times and the message count grouped by the processing state.

To view the webhook statistics

1. Click the **Administration** tab.
2. Click **Webhooks** in the left navigation pane. The list of all webhooks appear.
3. Select the webhook for which to retry the failed invocations.
4. Click **Statistics** in the left navigation pane. The webhook statistics appear.

Administration

Manage webhooks, access keys and user accounts



Images Inventory Metrics Jobs Logs Administration [Logout](#)

[Webhooks](#)
[Access Keys](#)
[Access Key Validator](#)
[Users](#)
[Roles](#)

Element_Updates webhook

[Settings](#)
[Template](#)
[Message Queue](#)
[Statistics](#)

[Webhooks](#) > [Element_Updates](#) > Webhook Statistics

Webhook Statistics

View the message processing statistics and try to process failed messages again.

Message Statistics

Message State	Message Count	Min Exec Time	Avg Exec Time	Max Exec Time	Exec Time Stddev
PROCESSED	174	3 ms	16.413794 ms	131 ms	22.141975 ms
FAILED	0	-	-	-	-
IN_PROGRESS	0	-	-	-	-
READY	0	-	-	-	-

[Reset failed messages](#)

1.1.7. Retrying Failed Webhook Invocations

To retry failed webhook invocations

1. Click the **Administration** tab.
2. Click **Webhooks** in the left navigation pane. The list of all webhooks appear.
3. Select the webhook for which to retry the failed invocations.
4. Click **Statistics** in the left navigation pane. The message statistics appear.

Administration

Manage webhooks, access keys and user accounts



Images Inventory Metrics Jobs Logs Administration [Logout](#)

[Webhooks](#)
[Access Keys](#)
[Access Key Validator](#)
[Users](#)
[Roles](#)

Element_Updates webhook

[Settings](#)
[Template](#)
[Message Queue](#)
[Statistics](#)

[Webhooks](#) > [Element_Updates](#) > Webhook Statistics

Webhook Statistics

View the message processing statistics and try to process failed messages again.

Message Statistics

Message State	Message Count	Min Exec Time	Avg Exec Time	Max Exec Time	Exec Time Stddev
PROCESSED	174	3 ms	16.413794 ms	131 ms	22.141975 ms
FAILED	0	-	-	-	-
IN_PROGRESS	0	-	-	-	-
READY	0	-	-	-	-

[Reset failed messages](#)

1. Click **Reset failed messages** to reset all failed messages to ready state.

1.2. Managing Users



This section outlines how to manage users in the RBMS built-in user repository. If RBMS is connected to an authorization service the users are configured in the authorization service.

1.2.1. Viewing all existing users

To view all existing users

1. Click the **Administration** tab.
2. Click **Users** in the left navigation pane. The list of all existing users appear.

Administration

Manage Leitstand

Images Inventory Metrics Jobs Logs Administration



Logout

Webhooks

Users

Roles

Access Keys

Access Key Validator

Users

Overview of all existing users

Filter

Filter

Filter users by name or user ID

Users

User Name	Family Name	Given Name	Email Address
chris	Chris	-	chris@rtbrick.com
joy	Joy	-	joy@rtbrick.com
martin	Martin	-	martin@rtbrick.com
ctrlid	ctrlid	-	-

Add user

3. Click the name of the user whose details you want to view.

1.2.2. Adding users

You can add a new users to the user repository.

To add a user

1. Click the **Administration** tab.
2. Click **Users** in the left navigation pane. The list of all existing users appear.
3. On the **Users** page, click **Add user**.
4. Specify user details such as username, password, and access token.
5. Click **Add user**.

1.2.3. Removing users

To remove a user

1. Click the **Administration** tab.
2. Click **Users** in the left navigation pane. The list of all existing users appear.
3. Click the name of the user whom you want to remove.
4. On the **User Settings** page, click **Remove user**.

1.2.4. Resetting Password

To reset a user password

1. Click the **Administration** tab.
2. Click **Users** in the left navigation pane. The list of all existing users appear.
3. Click the name of the user whom you want to remove.
4. On the **User Settings** page, click **Reset password**. The **Reset Password** page appears.
5. Enter the new password.
6. Re-type the new password in order to detect accidental typos.
7. Click **Reset Password**.

1.3. Managing Roles



This section outlines how to manage roles in the RBMS built-in user repository. If RBMS is connected to an authorization service the roles are be configured in the authorization service. See [Scopes](#) for more information about the existing access scopes.

1.3.1. Viewing list of roles

To view the list of roles

1. Click the **Administration** tab.
2. Click **Roles** in the left navigation pane. The list of all existing users appear.
image::admin_roles.png[]
2. Click the role that you want to view or modify.

1.4. Creating Roles

To create a role

1. Click the **Administration** tab.
2. Click **Roles** in the left navigation pane. The list of all existing users appear.
3. On the **Roles** page, click **Add role**.
4. Specify the details of the new role such as role name, Accessible Resource Scopes, and description.
5. Click **Add role**.

1.4.1. Removing roles

To remove a role

1. Click the **Administration** tab.
2. Click **Roles** in the left navigation pane. The list of all existing roles appear.
3. Click the role that you want to remove.
4. On the **Role** <rolename> page, click **Remove role**.

1.5. Managing Access Keys

1.5.1. Viewing list of access keys

To view the list of all existing access keys

1. Click the **Administration** tab.
2. Click **Access Keys** in the left navigation pane. The list of all existing access keys appear.

Administration

Manage Leitstand


[Images](#) [Inventory](#) [Metrics](#) [Jobs](#) [Logs](#) [Administration](#)
[Logout](#)[Webhooks](#)[Users](#)[Roles](#)**Access Keys**[Access Key Validator](#)

Access Keys

Listing of all existing access keys.

Filter

[Filter](#)

Filter access keys by name

Access Keys

List of all issued and valid access keys. An access key can be revoked in order to be invalidated. Access keys are immutable. The modification of an access key requires to issue a new access key.

Name	Date Created	Description
CTRLD	27-MAY-2020 13:59:28.673	Allows CTRLD to update inventory records and to declare tasks as completed.
rtb-image	10-JUN-2020 18:12:38.399	

[Add access key](#)

- Click the name of the access key that you want to view or modify.

1.6. Creating Access Keys

To create an access key

- Click the **Administration** tab.
- Click **Access Keys** in the left navigation pane. The list of all existing access keys appear.
- On the **Access Keys** page, click **Add access key**.

Administration

Manage Leitstand


[Images](#) [Inventory](#) [Metrics](#) [Jobs](#) [Logs](#) [Administration](#)
[Logout](#)[Webhooks](#)[Users](#)[Roles](#)**Access Keys**[Access Key Validator](#)[Access keys](#)

New Access Key

Issue a new access key

Accesskey

Key Name

A unique key name that also forms the user login ID for all requestes authenticated by this key

Scopes

- Specify the details of the new access key such as key name, scopes, and description.

5. Click **Create access key**.

1.6.1. Revoking an access key

To revoke an access key

1. Click the **Administration** tab.
2. Click **Access Key** in the left navigation pane. The list of all existing access keys appear.
3. Click the access key that you want to revoke.
4. On the <access key name> **accesskey** page, click **Revoke access key**.

1.6.2. Validating an access key

The validating access key feature enables you to validate an encoded access key.

To validate an access key

1. Click the **Administration** tab.
2. Click **Access Key Validator** in the left navigation pane.

Administration

Manage Leitstand

Images Inventory Metrics Jobs Logs Administration



Logout

Webhooks
Users
Roles
Access Keys
Access Key Validator

Access Key Validator

Validate an encoded access key

Encoded Access Key

Access Key

Enter the access key to be validated.

Validate

3. In the **Access Key** text box, enter the access key to be validated.
4. Click **Validate**.

1.6.3. Restoring an revoked access key

To restore an accidentally revoked access key

1. Click the **Administration** tab.
2. Click the **Access Key Validator** in the left navigation pane.
3. Paste the access key to be restored in the text area.
4. Click **Validate**.

Administration

Manage webhooks, access keys and user accounts



Images Inventory Metrics Jobs Logs Administration [Logout](#)

[Webhooks](#)
[Access Keys](#)
[Access Key Validator](#)
[Users](#)
[Roles](#)

Access Key Validator

Validate an encoded access key

Revoked Access Key

The access key has been revoked. Click the restore button to re-enable the access key.

[Done](#)
[Restore](#)

5. Click **Restore** to restore the revoked access key.

Administration

Manage webhooks, access keys and user accounts



Images Inventory Metrics Jobs Logs Administration [Logout](#)

[Webhooks](#)
[Access Keys](#)
[Access Key Validator](#)
[Users](#)
[Roles](#)

Access Key Validator

Validate an encoded access key

Access Key ID	51cc8619-5310-4f63-a411-2620a8c8c4ec
Access Key Name	OSS_IT
Date Created	08-SEP-2020 14:17:18.494
Scopes	<ul style="list-style-type: none"> ivt.read

[Done](#)

1.7. Scopes

Access to RBMS is granted through an access token. The access token is either issued by an OAuth2 compliant authorization service or by RBMS itself, depending on whether RBMS delegates to an authorization service or the RBMS built-in user repository is used.

The access token conveys the list of *scopes* the user is allowed to access. The table below lists all existing scopes:

Scope	Description
-------	-------------

adm	Full access to the RBMS administration API and UI.
adm.read	Readonly access to the RBMS administration API and UI.
adm.accesskey	Full access to the RBMS access key administration API and UI.
adm.accesskey.read	Readonly access to the RBMS access key administration API and UI.
adm.user	Full access to the RBMS user management API and UI.
adm.user.read	Readonly access to the RBMS user management API and UI.
adm.webhook	Full access to the RBMS webhook management API and UI.
adm.webhook.read	Readonly access to the RBMS webhook management API and UI.
ctrlld	Full access to all CTRLD actions that can be triggered from RBMS.
ctrlld.reinstall	Permission to trigger CTRLD to run ZTP sequence for an software image upgrade again.
ctrlld.settings	Permissions to update the CTRLD settings on the switch via RBMS.
ivt	Full access to the resource inventory.
ivt.read	Readonly access to the resource inventory.
ivt.element	Manage elements in the resource inventory.
ivt.element.settings	Manage element settings in the resource inventory.
ivt.element.config	Manage element configuration in the resource inventory.
ivt.element.dns	Manage element DNS records in the resource inventory.
ivt.element.module	Manage element hardware module information in the resource inventory.
ivt.group	Manage element groups in the resource inventory.

ivt.group.settings	Manage element group settings in the resource inventory.
ivt.image	Manage software images in the resource inventory.
ivt.rack	Manage racks in the resource inventory.
job	Full access to the RBMS job API and UI.
job.read	Readonly access to the RBMS job API and UI
job.task	Manage job tasks via RBMS Job API or UI.
tmy	Full access to the RBMS metric API and UI.
tmy.read	Readonly access to the RBMS metric API and UI.
tmy.metrics	Full access to manage RBMS metrics.
tmy.metrics.read	Readonly access to metrics.



Scopes are *cumulative* by convention. For example, the `ivt.element` scope includes the `ivt.element.settings` scope.



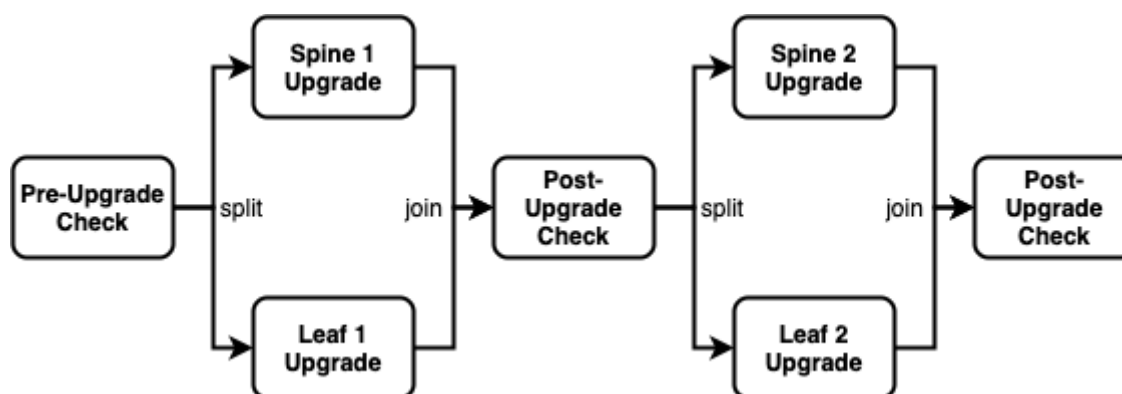
For UI access always grant the read scope in combination with a specific write scope to avoid trouble. For example, grant `ivt.element.settings` in combination with `ivt.read`. Otherwise a user might not be able to navigate to the view to apply the changes.

2. Managing Jobs

RBMS includes a job scheduler used by the network management applications to run management jobs. A job is a set of tasks that are executed in a specified order.

The task execution flow is defined by the application creating the job. Tasks can be executed sequentially or in parallel. Parallel execution flows can be joined to continue with a single flow. Technically speaking a job is described as *state engine*. Each task represents a node in the the state engine. The transition between tasks form the execution flow.

The figure below shows a simplified execution flow for a fabric upgrade.



The *Pre-Upgrade Check* task runs all checks to test whether the fabric can be upgraded. If the fabric passes all checks the execution flow is splitted to run the *Spine 1 Upgrade* and *Spine 2 Upgrade* in parallel. The *Post-Upgrade Check* waits for both upgrades to be completed before it runs the checks to test whether the upgrade was successful. If both switch upgrade were successful the job upgrades the two remaining switches in parallel. Finally another *Post-Uograde Check* is executed to check whether the upgrade was successful.

An application can program a job task to wait for an explicit confirmation. For example, an operator might want to inspect the state of a switch when a new image has been installed the very first time in the network. The upgrade application can program the *first* post-upgrade check to wait for confirmation before proceeding with the next upgrade.

The job module is a generic job viewer to inspect the state and progress of scheduled jobs. It also allows to confirm that a job can continue.

2.1. Viewing job list

To view the list of jobs

1. Click the **Jobs** tab. The list of currently active or scheduled jobs appear.
2. Optinally filter the job list by job name. The job name can be specied as prefix,

full name of regular expression.

Jobs

Manage jobs and tasks



Images Inventory Metrics **Jobs** Logs Administration

Logout

Job List

Jobs

Review the currently active or scheduled jobs

Filter

l1.pod1.blr

Filter

Search for jobs by pod name, job name, element role or state [Show advanced filtering options](#)

Jobs					
Name	Application	Type	State	Scheduled at	Last modified
l1.pod1.blr	ZTP	generate-config	COMPLETED	26-JUN-2020 00:33:15.824	26-JUN-2020 00:33:38.372
l1.pod1.blr	ztp	generate-config	COMPLETED	18-JUN-2020 01:27:24.606	18-JUN-2020 01:27:27.749
l1.pod1.blr	ztp	generate-config	COMPLETED	18-JUN-2020 01:25:49.554	18-JUN-2020 01:26:25.813
l1.pod1.blr	ztp	generate-config	COMPLETED	18-JUN-2020 00:18:03.567	18-JUN-2020 00:18:07.965
l1.pod1.blr	ztp	generate-config	COMPLETED	18-JUN-2020 00:17:03.380	18-JUN-2020 00:17:12.832
l1.pod1.blr	ztp	generate-config	COMPLETED	18-JUN-2020 00:15:41.806	18-JUN-2020 00:16:41.660
l1.pod1.blr	ztp	generate-config	COMPLETED	17-JUN-2020 22:20:10.072	17-JUN-2020 22:20:54.978
l1.pod1.blr	ztp	generate-config	COMPLETED	17-JUN-2020 22:11:49.700	17-JUN-2020 22:12:25.330
l1.pod1.blr	ztp	generate-config	COMPLETED	17-JUN-2020 22:09:16.960	17-JUN-2020 22:09:22.067

2.2. Viewing job task list

To view the list of job tasks

1. Click the **Jobs** tab. The list of currently active or scheduled jobs appear.
2. Click the name of the job that you want to view. The **Job Tasks** page appears.

Jobs

Manage jobs and tasks



Images Inventory Metrics **Jobs** Logs Administration

Logout

Job List

Jobs > Job Tasks

Job Tasks

Job Summary

General job settings and job process in terms of percentage of completed tasks

Job Application	ztp
Job Type	generate-config
Job Name	l1.pod1.blr
Job Owner	Postman
Job State	COMPLETED
Started at	18-JUN-2020 00:15:41.806

Job Tasks

Review the job tasks and their respective state.

Task List				
Task Type	Task Name	Element	State	Last modified
generate-config	ctrlid	accessleaf l1.pod1.blr	COMPLETED	18-JUN-2020 00:16:41.629
generate-config	running-configuration	accessleaf l1.pod1.blr	COMPLETED	18-JUN-2020 00:16:41.656

Remove

2.3. Viewing task flow

The task flow enables you to inspect taskflow and progress of the selected task.

To view the list of task flow

1. Click the **Jobs** tab. The list of currently active or scheduled jobs appear.
2. Click the name of the job that you want to view.
3. Click **Flow** in the left navigation pane. The **Taskflow** page appears.

Jobs

Manage jobs and tasks



Images Inventory Metrics **Jobs** Logs Administration Logout

[Job List](#)

[Jobs](#) > [Job Tasks](#) > Taskflow

Taskflow

Inspect taskflow and progress of job l1.pod1.blr

l1.pod1.blr

Job Info -

[Settings](#)

[Tasks](#)

Flow

```
graph TD; A["generate-config  
accessleaf  
l1.pod1.blr  
null  
COMPLETED"] --> B["generate-config  
accessleaf  
l1.pod1.blr  
null  
COMPLETED"]
```

2.4. Viewing task details

To view the task details

1. Click the **Jobs** tab. The list of currently active or scheduled jobs appear.
2. Click the name of the job that you want to view. The **Job Tasks** page appears.
3. Click the name of the task that you want to view. The **Job Task** page appears.

Jobs

Manage jobs and tasks



Images Inventory Metrics **Jobs** Logs Administration

Logout

Job List

Jobs > Job Tasks > Task Details

Task Details

Inspect task ZTP details.

l1.pod1.blr

Job Info

+

ZTP

Task Info

-

Details

Pod	blr
Element Role	accessleaf
Job Application	ZTP
Job Type	generate-config
Job Name	l1.pod1.blr
Task Type	generate-config
Task Name	ZTP
Task State	COMPLETED
Date Modified	26-JUN-2020 00:33:38.368

```
{
  "element": {
    "group_id": "434e53da-ba28-4c32-9556-d47a490d4d8b",
    "group_name": "blr",
    "group_type": "pod",
    "element_id": "f166b68c-ebf0-49b6-b1a9-6e7757eee4ce",
    "element_name": "l1.pod1.blr",
    "element_role": "accessleaf",
    "administrative_state": "ACTIVE",
    "mgmt_interfaces": {
```

2.5. Canceling a Job

To cancel a job

1. Click the **Jobs** tab. The list of currently active or scheduled jobs appear.
2. Click the name of the job that you want to view.
3. Click **Tasks** in the left navigation pane. The **Job Tasks** page appears.
4. Click **Cancel job**. The job state changes to cancelled.

Jobs

Manage jobs and tasks



Images Inventory Metrics **Jobs** Logs Administration

Logout

Job List

I1.pod1.blr

Job Info

Settings

Tasks

Flow

Jobs > Job Tasks

Job Tasks

Job Summary

General job settings and job process in terms of percentage of completed tasks

Job Application	ZTP
Job Type	generate-config
Job Name	I1.pod1.blr
Job Owner	martin
Job State	CANCELLED
Started at	14-JUL-2020 11:03:39.563

Job Tasks

Review the job tasks and their respective state.

Task List				
Task Type	Task Name	Element	State	Last modified
generate-config	running-configuration	accessleaf I1.pod1.blr	CANCELLED	14-JUL-2020 11:03:43.663
generate-config	ZTP	accessleaf I1.pod1.blr	CANCELLED	14-JUL-2020 11:03:43.667

Remove

Resume

2.6. Removing a Job

To remove a completed, cancelled or failed job

1. Click the **Jobs** tab. The list of currently active or scheduled jobs appear.
2. Click the name of the job that you want to view.
3. Click **Tasks** in the left navigation pane. The **Job Tasks** page appears.
4. Click **Remove**. A confirmation dialog is displayed.
5. Click **Confirm** to remove the job.

2.7. Configuring Job Settings

To configure the job settings

1. Click the **Jobs** tab. The list of currently active or scheduled jobs appear.
2. Click the name of the job that you want to configure.

Jobs

Manage jobs and tasks



[Images](#) [Inventory](#) [Metrics](#) [Jobs](#) [Logs](#) [Administration](#) [Logout](#)

[Job List](#)

I1.pod1.blr

Job Info

Settings

Tasks

Flow

Jobs > I1.pod1.blr

Job Settings READY

Settings of job I1.pod1.blr

General Settings

Job Name

I1.pod1.blr

A human-friendly job name explaining the purpose of this job.

Job Owner

The user who has scheduled this job.

☐ **Start job immediately**
Starts the job immediately. This option is intended for launching processes in a maintenance window.

☒ **Start job at 15-JUL-2020 11:16**
Schedule a job at the selected date.

☐ **Suspend update when not completed until 15-JUL-2020 15:16**
Suspend execution of all remaining tasks that have not been completed until the selected date.

Save settings

3. Make necessary configurations for the job.
4. Click **Save settings**.