Red Hat OpenShift Service on AWS 4

Install ROSA Classic clusters

Installing, accessing, and deleting Red Hat OpenShift Service on AWS (ROSA) clusters.

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Legal Notice

Abstract

This document provides information on how to install Red Hat OpenShift Service on AWS (ROSA) clusters. The document also provides details on how to access a cluster, configure identity providers, revoke cluster access, and delete a cluster.

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CHAPTER 1. CREATING A ROSA CLUSTER WITH STS USING THE DEFAULT OPTIONS

NOTE

If you are looking for a quickstart guide for ROSA, see Red Hat OpenShift Service on AWS quickstart guide.

Create a Red Hat OpenShift Service on AWS (ROSA) cluster quickly by using the default options and automatic AWS Identity and Access Management (IAM) resource creation. You can deploy your cluster by using Red Hat OpenShift Cluster Manager or the ROSA CLI (**rosa**).

The procedures in this document use the **auto** modes in the ROSA CLI (**rosa**) and OpenShift Cluster Manager to immediately create the required IAM resources using the current AWS account. The required resources include the account-wide IAM roles and policies, cluster-specific Operator roles and policies, and OpenID Connect (OIDC) identity provider.

Alternatively, you can use **manual** mode, which outputs the **aws** commands needed to create the IAM resources instead of deploying them automatically. For steps to deploy a ROSA cluster by using **manual** mode or with customizations, see Creating a cluster using customizations .

Next steps

- Ensure that you have completed the AWS prerequisites.

NOTE

ROSA CLI 1.2.7 introduces changes to the OIDC provider endpoint URL format for new clusters. Red Hat OpenShift Service on AWS cluster OIDC provider URLs are no longer regional. The AWS CloudFront implementation provides improved access speed and resiliency and reduces latency.

Because this change is only available to new clusters created by using ROSA CLI 1.2.7 or later, existing OIDC-provider configurations do not have any supported migration paths.

1.1. OVERVIEW OF THE DEFAULT CLUSTER SPECIFICATIONS

You can quickly create a Red Hat OpenShift Service on AWS (ROSA) cluster with the AWS Security Token Service (STS) by using the default installation options. The following summary describes the default cluster specifications.

Table 1.1. Default ROSA with STS cluster specifications

Component	Default specifications
Accounts and roles	● Default IAM role prefix: **ManagedOpenShift** ● No cluster admin role created

Component	Default specifications
Cluster settings	● Default cluster version: Latest ● Default AWS region for installations using the Red Hat OpenShift Cluster Manager Hybrid Cloud Console: us-east-1 (US East, North Virginia) ● Default AWS region for installations using the ROSA CLI (**rosa**): Defined by your **aws** CLI configuration ● Default EC2 IMDS endpoints (both v1 and v2) are enabled ● Availability: Single zone for the data plane ● Monitoring for user-defined projects: Enabled
Encryption	● Cloud storage is encrypted at rest ● Additional etcd encryption is not enabled ● The default AWS Key Management Service (KMS) key is used as the encryption key for persistent data
Control plane node configuration	● Control plane node instance type: m5.2xlarge (8 vCPU, 32 GiB RAM) ● Control plane node count: 3
Infrastructure node configuration	● Infrastructure node instance type: r5.xlarge (4 vCPU, 32 GiB RAM) ● Infrastructure node count: 2
Compute node machine pool	● Compute node instance type: m5.xlarge (4 vCPU 16, GiB RAM) ● Compute node count: 2 ● Autoscaling: Not enabled ● No additional node labels
Networking configuration	● Cluster privacy: Public ● No cluster-wide proxy is configured

Component	Default specifications
Classless Inter-Domain Routing (CIDR) ranges	● Machine CIDR: 10.0.0.0/16 ● Service CIDR: 172.30.0.0/16 ● Pod CIDR: 10.128.0.0/16 ● Host prefix: /23
Cluster roles and policies	● Mode used to create the Operator roles and the OpenID Connect (OIDC) provider: **auto** NOTE For installations that use OpenShift Cluster Manager on the Hybrid Cloud Console, the **auto** mode requires an admin-privileged OpenShift Cluster Manager role. ● Default Operator role prefix: **<cluster_name>-<4_digit_random_string>**
Cluster update strategy	● Individual updates ● 1 hour grace period for node draining

1.2. UNDERSTANDING AWS ACCOUNT ASSOCIATION

Before you can use Red Hat OpenShift Cluster Manager on the Red Hat Hybrid Cloud Console to create Red Hat OpenShift Service on AWS (ROSA) clusters that use the AWS Security Token Service (STS), you must associate your AWS account with your Red Hat organization. You can associate your account by creating and linking the following IAM roles.

OpenShift Cluster Manager role

Create an OpenShift Cluster Manager IAM role and link it to your Red Hat organization.
You can apply basic or administrative permissions to the OpenShift Cluster Manager role. The basic permissions enable cluster maintenance using OpenShift Cluster Manager. The administrative permissions enable automatic deployment of the cluster-specific Operator roles and the OpenID Connect (OIDC) provider using OpenShift Cluster Manager.

You can use the administrative permissions with the OpenShift Cluster Manager role to deploy a cluster quickly.

User role

Create a user IAM role and link it to your Red Hat user account. The Red Hat user account must exist in the Red Hat organization that is linked to your OpenShift Cluster Manager role.
The user role is used by Red Hat to verify your AWS identity when you use the OpenShift Cluster Manager Hybrid Cloud Console to install a cluster and the required STS resources.

Additional resources

- For detailed steps to create and link the OpenShift Cluster Manager and user IAM roles, see Associating your AWS account with your Red Hat organization .

1.3. AMAZON VPC REQUIREMENTS FOR NON-PRIVATELINK ROSA CLUSTERS

To create an Amazon VPC, You must have the following:

- An internet gateway,
- A NAT gateway,
- Private and public subnets that have internet connectivity provided to install required components.

You must have at least one single private and public subnet for Single-AZ clusters, and you need at least three private and public subnets for Multi-AZ clusters.

Additional resources

- For more information about the default components required for an AWS cluster, see Default VPCs in the AWS documentation.
- For instructions on creating a VPC in the AWS console, see Create a VPC in the AWS documentation.

1.4. CREATING A CLUSTER QUICKLY USING OPENSHIFT CLUSTER MANAGER

When using Red Hat OpenShift Cluster Manager to create a Red Hat OpenShift Service on AWS (ROSA) cluster that uses the AWS Security Token Service (STS), you can select the default options to create the cluster quickly.

Before you can use OpenShift Cluster Manager to deploy ROSA with STS clusters, you must associate your AWS account with your Red Hat organization and create the required account-wide STS roles and policies.

1.4.1. Associating your AWS account with your Red Hat organization

Before using Red Hat OpenShift Cluster Manager on the Red Hat Hybrid Cloud Console to create Red Hat OpenShift Service on AWS (ROSA) clusters that use the AWS Security Token Service (STS), create an OpenShift Cluster Manager IAM role and link it to your Red Hat organization. Then, create a user IAM role and link it to your Red Hat user account in the same Red Hat organization.

Prerequisites

- You have completed the AWS prerequisites for ROSA with STS.
- You have available AWS service quotas.
- You have enabled the ROSA service in the AWS Console.

- You have installed and configured the latest ROSA CLI (**rosa**) on your installation host.

  NOTE

  To successfully install ROSA clusters, use the latest version of the ROSA CLI.

- You have logged in to your Red Hat account by using the ROSA CLI.
- You have organization administrator privileges in your Red Hat organization.

Procedure

1. Create an OpenShift Cluster Manager role and link it to your Red Hat organization:

   NOTE

   To enable automatic deployment of the cluster-specific Operator roles and the OpenID Connect (OIDC) provider using the OpenShift Cluster Manager Hybrid Cloud Console, you must apply the administrative privileges to the role by choosing the *Admin OCM role* command in the **Accounts and roles**step of creating a ROSA cluster. For more information about the basic and administrative privileges for the OpenShift Cluster Manager role, see *Understanding AWS account association*.

   NOTE

   If you choose the *Basic OCM role* command in the **Accounts and roles**step of creating a ROSA cluster in the OpenShift Cluster Manager Hybrid Cloud Console, you must deploy a ROSA cluster using manual mode. You will be prompted to configure the cluster-specific Operator roles and the OpenID Connect (OIDC) provider in a later step.

   ```
   $ rosa create ocm-role
   ```

   Select the default values at the prompts to quickly create and link the role.

2. Create a user role and link it to your Red Hat user account:

   ```
   $ rosa create user-role
   ```

   Select the default values at the prompts to quickly create and link the role.

   NOTE

   The Red Hat user account must exist in the Red Hat organization that is linked to your OpenShift Cluster Manager role.

1.4.2. Creating the account-wide STS roles and policies

Before using the Red Hat OpenShift Cluster Manager Hybrid Cloud Console to create Red Hat OpenShift Service on AWS (ROSA) clusters that use the AWS Security Token Service (STS), create the required account-wide STS roles and policies, including the Operator policies.

Prerequisites

- You have completed the AWS prerequisites for ROSA with STS.
- You have available AWS service quotas.
- You have enabled the ROSA service in the AWS Console.
- You have installed and configured the latest ROSA CLI (**rosa**) on your installation host. Run **rosa version** to see your currently installed version of the ROSA CLI. If a newer version is available, the CLI provides a link to download this upgrade.
- You have logged in to your Red Hat account by using the ROSA CLI.

Procedure

1. Check your AWS account for existing roles and policies:

   ```
   $ rosa list account-roles
   ```

2. If they do not exist in your AWS account, create the required account-wide STS roles and policies:

   ```
   $ rosa create account-roles
   ```

   Select the default values at the prompts to quickly create the roles and policies.

1.4.3. Creating an OpenID Connect configuration

When using a Red Hat OpenShift Service on AWS cluster, you can create the OpenID Connect (OIDC) configuration prior to creating your cluster. This configuration is registered to be used with OpenShift Cluster Manager.

Prerequisites

- You have installed and configured the latest Red Hat OpenShift Service on AWS (ROSA) CLI, **rosa**, on your installation host.

Procedure

- To create your OIDC configuration alongside the AWS resources, run the following command:

  ```
  $ rosa create oidc-config --mode=auto  --yes
  ```

  This command returns the following information.

  #### Example output

  ```
  ? Would you like to create a Managed (Red Hat hosted) OIDC Configuration Yes
  I: Setting up managed OIDC configuration
  I: To create Operator Roles for this OIDC Configuration, run the following command and
  remember to replace <user-defined> with a prefix of your choice:
   rosa create operator-roles --prefix <user-defined> --oidc-config-id 13cdr6b
  If you are going to create a Hosted Control Plane cluster please include '--hosted-cp'
  ```

```
I: Creating OIDC provider using 'arn:aws:iam::4540112244:user/userName'
? Create the OIDC provider? Yes
I: Created OIDC provider with ARN 'arn:aws:iam::4540112244:oidc-
provider/dvbwgdztaeq9o.cloudfront.net/13cdr6b'
```

When creating your cluster, you must supply the OIDC config ID. The CLI output provides this value for **--mode auto**, otherwise you must determine these values based on **aws** CLI output for **--mode manual**.

- Optional: you can save the OIDC configuration ID as a variable to use later. Run the following command to save the variable:

  ```
  $ export OIDC_ID=<oidc_config_id> 1
  ```

  1 In the example output above, the OIDC configuration ID is 13cdr6b.

- View the value of the variable by running the following command:

  ```
  $ echo $OIDC_ID
  ```

  Example output

  ```
  13cdr6b
  ```

Verification

- You can list the possible OIDC configurations available for your clusters that are associated with your user organization. Run the following command:

  ```
  $ rosa list oidc-config
  ```

  Example output

  ```
  ID                              MANAGED  ISSUER URL
  SECRET ARN
  2330dbs0n8m3chkkr25gkkcd8pnj3lk2  true
  https://dvbwgdztaeq9o.cloudfront.net/2330dbs0n8m3chkkr25gkkcd8pnj3lk2
  233hvnrjoqu14jltk6lhbhf2tj11f8un  false    https://oidc-r7u1.s3.us-east-1.amazonaws.com
  aws:secretsmanager:us-east-1:242819244:secret:rosa-private-key-oidc-r7u1-tM3MDN
  ```

1.4.4. Creating a cluster with the default options using OpenShift Cluster Manager

When using Red Hat OpenShift Cluster Manager on the Red Hat Hybrid Cloud Console to create a Red Hat OpenShift Service on AWS (ROSA) cluster that uses the AWS Security Token Service (STS), you can select the default options to create the cluster quickly. You can also use the admin OpenShift Cluster Manager IAM role to enable automatic deployment of the cluster-specific Operator roles and the OpenID Connect (OIDC) provider.

Prerequisites

- You have completed the AWS prerequisites for ROSA with STS.

- You have available AWS service quotas.
- You have enabled the ROSA service in the AWS Console.
- You have installed and configured the latest ROSA CLI (**rosa**) on your installation host. Run **rosa version** to see your currently installed version of the ROSA CLI. If a newer version is available, the CLI provides a link to download this upgrade.
- You have verified that the AWS Elastic Load Balancing (ELB) service role exists in your AWS account.
- You have associated your AWS account with your Red Hat organization. When you associated your account, you applied the administrative permissions to the OpenShift Cluster Manager role. For detailed steps, see *Associating your AWS account with your Red Hat organization* .
- You have created the required account-wide STS roles and policies. For detailed steps, see *Creating the account-wide STS roles and policies* .

Procedure

1. Navigate to OpenShift Cluster Manager and select **Create cluster**.
2. On the **Create an OpenShift cluster** page, select **Create cluster** in the **Red Hat OpenShift Service on AWS (ROSA)** row.
3. Verify that your AWS account ID is listed in the **Associated AWS accounts** drop-down menu and that the installer, support, worker, and control plane account role Amazon Resource Names (ARNs) are listed on the **Accounts and roles** page.

   NOTE

   If your AWS account ID is not listed, check that you have successfully associated your AWS account with your Red Hat organization. If your account role ARNs are not listed, check that the required account-wide STS roles exist in your AWS account.

4. Click **Next**.
5. On the **Cluster details** page, enter a **Cluster name**. Leave the default values in the remaining fields and click **Next**.

   NOTE

   Cluster creation generates a domain prefix as a subdomain for your provisioned cluster on **openshiftapps.com**. If the cluster name is less than or equal to 15 characters, that name is used for the domain prefix. If the cluster name is longer than 15 characters, the domain prefix is randomly generated to a 15 character string. To customize the subdomain, select the **Create custom domain prefix** checkbox, and enter your domain prefix name in the **Domain prefix** field.

6. To deploy a cluster quickly, leave the default options in the **Cluster settings**, **Networking**, **Cluster roles and policies**, and **Cluster updates** pages and click **Next** on each page.
7. On the **Review your ROSA cluster** page, review the summary of your selections and click **Create cluster** to start the installation.

Verification

- You can check the progress of the installation in the **Overview** page for your cluster. You can view the installation logs on the same page. Your cluster is ready when the **Status** in the **Details** section of the page is listed as **Ready**.

  NOTE

  If the installation fails or the cluster **State** does not change to **Ready** after about 40 minutes, check the installation troubleshooting documentation for details. For more information, see *Troubleshooting installations*. For steps to contact Red Hat Support for assistance, see *Getting support for Red Hat OpenShift Service on AWS*.

1.5. CREATING A CLUSTER QUICKLY USING THE CLI

When using the Red Hat OpenShift Service on AWS (ROSA) CLI, **rosa**, to create a cluster that uses the AWS Security Token Service (STS), you can select the default options to create the cluster quickly.

Prerequisites

- You have completed the AWS prerequisites for ROSA with STS.
- You have available AWS service quotas.
- You have enabled the ROSA service in the AWS Console.
- You have installed and configured the latest ROSA CLI (**rosa**) on your installation host. Run **rosa version** to see your currently installed version of the ROSA CLI. If a newer version is available, the CLI provides a link to download this upgrade.
- You have logged in to your Red Hat account by using the ROSA CLI.
- You have verified that the AWS Elastic Load Balancing (ELB) service role exists in your AWS account.

Procedure

1. Create the required account-wide roles and policies, including the Operator policies:

   ```
   $ rosa create account-roles --mode auto
   ```

   NOTE

   When using **auto** mode, you can optionally specify the **-y** argument to bypass the interactive prompts and automatically confirm operations.

2. Create a cluster with STS using the defaults. When you use the defaults, the latest stable OpenShift version is installed:

   ```
   $ rosa create cluster --cluster-name <cluster_name> \ ①
   --sts --mode auto ②
   ```

1 Replace **<cluster_name>** with the name of your cluster.

2 When you specify **--mode auto**, the **rosa create cluster** command creates the cluster-specific Operator IAM roles and the OIDC provider automatically. The Operators use the OIDC provider to authenticate.

> NOTE
>
> If your cluster name is longer than 15 characters, it will contain an autogenerated domain prefix as a sub-domain for your provisioned cluster on ***.openshiftapps.com**.
>
> To customize the subdomain, use the **--domain-prefix** flag. The domain prefix cannot be longer than 15 characters, must be unique, and cannot be changed after cluster creation.

3. Check the status of your cluster:

```
$ rosa describe cluster --cluster <cluster_name|cluster_id>
```

The following **State** field changes are listed in the output as the cluster installation progresses:

- **waiting (Waiting for OIDC configuration)**
- **pending (Preparing account)**
- **installing (DNS setup in progress)**
- **installing**
- **ready**

> NOTE
>
> If the installation fails or the **State** field does not change to **ready** after about 40 minutes, check the installation troubleshooting documentation for details. For more information, see *Troubleshooting installations*. For steps to contact Red Hat Support for assistance, see *Getting support for Red Hat OpenShift Service on AWS*.

4. Track the progress of the cluster creation by watching the OpenShift installer logs:

```
$ rosa logs install --cluster <cluster_name|cluster_id> --watch 1
```

1 Specify the **--watch** flag to watch for new log messages as the installation progresses. This argument is optional.

1.6. NEXT STEPS

- Accessing a ROSA cluster

1.7. ADDITIONAL RESOURCES

- For steps to deploy a ROSA cluster using manual mode, see Creating a cluster using customizations.

- For more information about the AWS Identity Access Management (IAM) resources required to deploy Red Hat OpenShift Service on AWS with STS, see About IAM resources for clusters that use STS.

- For details about optionally setting an Operator role name prefix, see About custom Operator IAM role prefixes.

- For information about the prerequisites to installing ROSA with STS, see AWS prerequisites for ROSA with STS.

- For details about using the **auto** and **manual** modes to create the required STS resources, see Understanding the auto and manual deployment modes.

- For more information about using OpenID Connect (OIDC) identity providers in AWS IAM, see Creating OpenID Connect (OIDC) identity providers in the AWS documentation.

- For more information about troubleshooting ROSA cluster installations, see Troubleshooting installations.

- For steps to contact Red Hat Support for assistance, see Getting support for Red Hat OpenShift Service on AWS.

CHAPTER 2. CREATING A ROSA CLUSTER WITH STS USING CUSTOMIZATIONS

Create a Red Hat OpenShift Service on AWS (ROSA) cluster with the AWS Security Token Service (STS) using customizations. You can deploy your cluster by using Red Hat OpenShift Cluster Manager or the ROSA CLI (**rosa**).

With the procedures in this document, you can also choose between the **auto** and **manual** modes when creating the required AWS Identity and Access Management (IAM) resources.

2.1. UNDERSTANDING THE AUTO AND MANUAL DEPLOYMENT MODES

When installing a Red Hat OpenShift Service on AWS (ROSA) cluster that uses the AWS Security Token Service (STS), you can choose between the **auto** and **manual** modes to create the required AWS Identity and Access Management (IAM) resources.

auto mode

With this mode, the ROSA CLI (**rosa**) immediately creates the required IAM roles and policies, and an OpenID Connect (OIDC) provider in your AWS account.

manual mode

With this mode, **rosa** outputs the **aws** commands needed to create the IAM resources. The corresponding policy JSON files are also saved to the current directory. By using **manual** mode, you can review the generated **aws** commands before running them manually. **manual** mode also enables you to pass the commands to another administrator or group in your organization so that they can create the resources.

IMPORTANT

If you opt to use **manual** mode, the cluster installation waits until you create the cluster-specific Operator roles and OIDC provider manually. After you create the resources, the installation proceeds. For more information, see *Creating the Operator roles and OIDC provider using OpenShift Cluster Manager*.

For more information about the AWS IAM resources required to install ROSA with STS, see *About IAM resources for clusters that use STS*.

2.1.1. Creating the Operator roles and OIDC provider using OpenShift Cluster Manager

If you use Red Hat OpenShift Cluster Manager to install your cluster and opt to create the required AWS IAM Operator roles and the OIDC provider using **manual** mode, you are prompted to select one of the following methods to install the resources. The options are provided to enable you to choose a resource creation method that suits the needs of your organization:

AWS CLI (aws)

With this method, you can download and extract an archive file that contains the **aws** commands and policy files required to create the IAM resources. Run the provided CLI commands from the directory that contains the policy files to create the Operator roles and the OIDC provider.

The Red Hat OpenShift Service on AWS (ROSA) CLI,rosa

You can run the commands provided by this method to create the Operator roles and the OIDC provider for your cluster using **rosa**.

If you use **auto** mode, OpenShift Cluster Manager creates the Operator roles and the OIDC provider automatically, using the permissions provided through the OpenShift Cluster Manager IAM role. To use this feature, you must apply admin privileges to the role.

2.2. UNDERSTANDING AWS ACCOUNT ASSOCIATION

Before you can use Red Hat OpenShift Cluster Manager on the Red Hat Hybrid Cloud Console to create Red Hat OpenShift Service on AWS (ROSA) clusters that use the AWS Security Token Service (STS), you must associate your AWS account with your Red Hat organization. You can associate your account by creating and linking the following IAM roles.

OpenShift Cluster Manager role

Create an OpenShift Cluster Manager IAM role and link it to your Red Hat organization.
You can apply basic or administrative permissions to the OpenShift Cluster Manager role. The basic permissions enable cluster maintenance using OpenShift Cluster Manager. The administrative permissions enable automatic deployment of the cluster-specific Operator roles and the OpenID Connect (OIDC) provider using OpenShift Cluster Manager.

You can use the administrative permissions with the OpenShift Cluster Manager role to deploy a cluster quickly.

User role

Create a user IAM role and link it to your Red Hat user account. The Red Hat user account must exist in the Red Hat organization that is linked to your OpenShift Cluster Manager role.
The user role is used by Red Hat to verify your AWS identity when you use the OpenShift Cluster Manager Hybrid Cloud Console to install a cluster and the required STS resources.

Additional resources

- For detailed steps to create and link the OpenShift Cluster Manager and user IAM roles, see Creating a cluster with customizations by using OpenShift Cluster Manager .

2.3. ARN PATH CUSTOMIZATION FOR IAM ROLES AND POLICIES

When you create the AWS IAM roles and policies required for Red Hat OpenShift Service on AWS (ROSA) clusters that use the AWS Security Token Service (STS), you can specify custom Amazon Resource Name (ARN) paths. This enables you to use role and policy ARN paths that meet the security requirements of your organization.

You can specify custom ARN paths when you create your OCM role, user role, and account-wide roles and policies.

If you define a custom ARN path when you create a set of account-wide roles and policies, the same path is applied to all of the roles and policies in the set. The following example shows the ARNs for a set of account-wide roles and policies. In the example, the ARNs use the custom path **/test/path/dev/** and the custom role prefix **test-env**:

- **arn:aws:iam::<account_id>:role/test/path/dev/test-env-Worker-Role**
- **arn:aws:iam::<account_id>:role/test/path/dev/test-env-Support-Role**

- **arn:aws:iam::<account_id>:role/test/path/dev/test-env-Installer-Role**
- **arn:aws:iam::<account_id>:role/test/path/dev/test-env-ControlPlane-Role**
- **arn:aws:iam::<account_id>:policy/test/path/dev/test-env-Worker-Role-Policy**
- **arn:aws:iam::<account_id>:policy/test/path/dev/test-env-Support-Role-Policy**
- **arn:aws:iam::<account_id>:policy/test/path/dev/test-env-Installer-Role-Policy**
- **arn:aws:iam::<account_id>:policy/test/path/dev/test-env-ControlPlane-Role-Policy**

When you create the cluster-specific Operator roles, the ARN path for the relevant account-wide installer role is automatically detected and applied to the Operator roles.

For more information about ARN paths, see Amazon Resource Names (ARNs) in the AWS documentation.

Additional resources

- For the steps to specify custom ARN paths for IAM resources when you create Red Hat OpenShift Service on AWS clusters, see Creating a cluster using customizations .

2.4. SUPPORT CONSIDERATIONS FOR ROSA CLUSTERS WITH STS

The supported way of creating a Red Hat OpenShift Service on AWS (ROSA) cluster that uses the AWS Security Token Service (STS) is by using the steps described in this product documentation.

IMPORTANT

You can use **manual** mode with the ROSA CLI (**rosa**) to generate the AWS Identity and Access Management (IAM) policy files and **aws** commands that are required to install the STS resources.

The files and **aws** commands are generated for review purposes only and must not be modified in any way. Red Hat cannot provide support for ROSA clusters that have been deployed by using modified versions of the policy files or **aws** commands.

2.5. AMAZON VPC REQUIREMENTS FOR NON-PRIVATELINK ROSA CLUSTERS

To create an Amazon VPC, You must have the following:

- An internet gateway,
- A NAT gateway,
- Private and public subnets that have internet connectivity provided to install required components.

You must have at least one single private and public subnet for Single-AZ clusters, and you need at least three private and public subnets for Multi-AZ clusters.

Additional resources

- For more information about the default components required for an AWS cluster, see Default VPCs in the AWS documentation.
- For instructions on creating a VPC in the AWS console, see Create a VPC in the AWS documentation.

2.6. CREATING AN OPENID CONNECT CONFIGURATION

When using a Red Hat OpenShift Service on AWS cluster, you can create the OpenID Connect (OIDC) configuration prior to creating your cluster. This configuration is registered to be used with OpenShift Cluster Manager.

Prerequisites

- You have installed and configured the latest Red Hat OpenShift Service on AWS (ROSA) CLI, **rosa**, on your installation host.

Procedure

- To create your OIDC configuration alongside the AWS resources, run the following command:

  ```
  $ rosa create oidc-config --mode=auto  --yes
  ```

  This command returns the following information.

  #### Example output

  ```
  ? Would you like to create a Managed (Red Hat hosted) OIDC Configuration Yes
  I: Setting up managed OIDC configuration
  I: To create Operator Roles for this OIDC Configuration, run the following command and
  remember to replace <user-defined> with a prefix of your choice:
   rosa create operator-roles --prefix <user-defined> --oidc-config-id 13cdr6b
  If you are going to create a Hosted Control Plane cluster please include '--hosted-cp'
  I: Creating OIDC provider using 'arn:aws:iam::4540112244:user/userName'
  ? Create the OIDC provider? Yes
  I: Created OIDC provider with ARN 'arn:aws:iam::4540112244:oidc-
  provider/dvbwgdztaeq9o.cloudfront.net/13cdr6b'
  ```

  When creating your cluster, you must supply the OIDC config ID. The CLI output provides this value for **--mode auto**, otherwise you must determine these values based on **aws** CLI output for **--mode manual**.

  - Optional: you can save the OIDC configuration ID as a variable to use later. Run the following command to save the variable:

    ```
    $ export OIDC_ID=<oidc_config_id> 1
    ```

    1 In the example output above, the OIDC configuration ID is 13cdr6b.

  - View the value of the variable by running the following command:

    ```
    $ echo $OIDC_ID
    ```

Example output

```
13cdr6b
```

Verification

- You can list the possible OIDC configurations available for your clusters that are associated with your user organization. Run the following command:

```
$ rosa list oidc-config
```

Example output

```
ID                                 MANAGED  ISSUER URL
SECRET ARN
2330dbs0n8m3chkkr25gkkcd8pnj3lk2  true
https://dvbwgdztaeq9o.cloudfront.net/2330dbs0n8m3chkkr25gkkcd8pnj3lk2
233hvnrjoqu14jltk6lhbhf2tj11f8un  false    https://oidc-r7u1.s3.us-east-1.amazonaws.com
aws:secretsmanager:us-east-1:242819244:secret:rosa-private-key-oidc-r7u1-tM3MDN
```

2.7. CREATING A CLUSTER USING CUSTOMIZATIONS

Deploy a Red Hat OpenShift Service on AWS (ROSA) with AWS Security Token Service (STS) cluster with a configuration that suits the needs of your environment. You can deploy your cluster with customizations by using Red Hat OpenShift Cluster Manager or the ROSA CLI (**rosa**).

2.7.1. Creating a cluster with customizations by using OpenShift Cluster Manager

When you create a Red Hat OpenShift Service on AWS (ROSA) cluster that uses the AWS Security Token Service (STS), you can customize your installation interactively by using Red Hat OpenShift Cluster Manager.

IMPORTANT

Only public and AWS PrivateLink clusters are supported with STS. Regular private clusters (non-PrivateLink) are not available for use with STS.

Prerequisites

- You have completed the AWS prerequisites for ROSA with STS.
- You have available AWS service quotas.
- You have enabled the ROSA service in the AWS Console.
- You have installed and configured the latest ROSA CLI (**rosa**) on your installation host. Run **rosa version** to see your currently installed version of the ROSA CLI. If a newer version is available, the CLI provides a link to download this upgrade.
- You have verified that the AWS Elastic Load Balancing (ELB) service role exists in your AWS account.

- If you are configuring a cluster-wide proxy, you have verified that the proxy is accessible from the VPC that the cluster is being installed into. The proxy must also be accessible from the private subnets of the VPC.

Procedure

1. Navigate to OpenShift Cluster Manager and select **Create cluster**.

2. On the **Create an OpenShift cluster** page, select **Create cluster** in the **Red Hat OpenShift Service on AWS (ROSA)** row.

3. If an AWS account is automatically detected, the account ID is listed in the **Associated AWS accounts** drop-down menu. If no AWS accounts are automatically detected, click **Select an account → Associate AWS account** and follow these steps:

   a. On the **Authenticate** page, click the copy button next to the **rosa login** command. The command includes your OpenShift Cluster Manager API login token.

   > **NOTE**
   >
   > You can also load your API token on the OpenShift Cluster Manager API Token page on OpenShift Cluster Manager.

   b. Run the copied command in the CLI to log in to your ROSA account.

   ```
   $ rosa login --token=<api_login_token> 1
   ```

   1 Replace **<api_login_token>** with the token that is provided in the copied command.

   #### Example output

   ```
   I: Logged in as '<username>' on 'https://api.openshift.com'
   ```

   c. On the **Authenticate** page in OpenShift Cluster Manager, click **Next**.

   d. On the **OCM role** page, click the copy button next to the **Basic OCM role** or the **Admin OCM role** commands.
   The basic role enables OpenShift Cluster Manager to detect the AWS IAM roles and policies required by ROSA. The admin role also enables the detection of the roles and policies. In addition, the admin role enables automatic deployment of the cluster-specific Operator roles and the OpenID Connect (OIDC) provider by using OpenShift Cluster Manager.

   e. Run the copied command in the CLI and follow the prompts to create the OpenShift Cluster Manager IAM role. The following example creates a basic OpenShift Cluster Manager IAM role using the default options:

   ```
   $ rosa create ocm-role
   ```

   #### Example output

   ```
   I: Creating ocm role
   ? Role prefix: ManagedOpenShift 1
   ? Enable admin capabilities for the OCM role (optional): No 2
   ```

```
? Permissions boundary ARN (optional): 3
? Role Path (optional): 4
? Role creation mode: auto 5
I: Creating role using 'arn:aws:iam::<aws_account_id>:user/<aws_username>'
? Create the 'ManagedOpenShift-OCM-Role-<red_hat_organization_external_id>' role?
Yes
I: Created role 'ManagedOpenShift-OCM-Role-<red_hat_organization_external_id>' with
ARN 'arn:aws:iam::<aws_account_id>:role/ManagedOpenShift-OCM-Role-
<red_hat_organization_external_id>'
I: Linking OCM role
? OCM Role ARN: arn:aws:iam::<aws_account_id>:role/ManagedOpenShift-OCM-Role-
<red_hat_organization_external_id>
? Link the 'arn:aws:iam::<aws_account_id>:role/ManagedOpenShift-OCM-Role-
<red_hat_organization_external_id>' role with organization '<red_hat_organization_id>'?
Yes 6
I: Successfully linked role-arn 'arn:aws:iam::<aws_account_id>:role/ManagedOpenShift-
OCM-Role-<red_hat_organization_external_id>' with organization account
'<red_hat_organization_id>'
```

1. Specify the prefix to include in the OCM IAM role name. The default is **ManagedOpenShift**. You can create only one OCM role per AWS account for your Red Hat organization.

2. Enable the admin OpenShift Cluster Manager IAM role, which is equivalent to specifying the **--admin** argument. The admin role is required if you want to use **Auto** mode to automatically provision the cluster-specific Operator roles and the OIDC provider by using OpenShift Cluster Manager.

3. Optional: Specify a permissions boundary Amazon Resource Name (ARN) for the role. For more information, see Permissions boundaries for IAM entities in the AWS documentation.

4. Specify a custom ARN path for your OCM role. The path must contain alphanumeric characters only and start and end with /, for example **/test/path/dev/**. For more information, see *ARN path customization for IAM roles and policies* .

5. Select the role creation mode. You can use **auto** mode to automatically create the OpenShift Cluster Manager IAM role and link it to your Red Hat organization account. In **manual** mode, the ROSA CLI generates the **aws** commands needed to create and link the role. In **manual** mode, the corresponding policy JSON files are also saved to the current directory. **manual** mode enables you to review the details before running the **aws** commands manually.

6. Link the OpenShift Cluster Manager IAM role to your Red Hat organization account.

f. If you opted not to link the OpenShift Cluster Manager IAM role to your Red Hat organization account in the preceding command, copy the **rosa link** command from the OpenShift Cluster Manager **OCM role** page and run it:

```
$ rosa link ocm-role <arn> 1
```

1. Replace **<arn>** with the ARN of the OpenShift Cluster Manager IAM role that is included in the output of the preceding command.

g. Select **Next** on the OpenShift Cluster Manager **OCM role** page.

h. On the **User role** page, click the copy button for the **User role** command and run the command in the CLI. Red Hat uses the user role to verify your AWS identity when you install a cluster and the required resources with OpenShift Cluster Manager.
Follow the prompts to create the user role:

```
$ rosa create user-role
```

Example output

```
I: Creating User role
? Role prefix: ManagedOpenShift ①
? Permissions boundary ARN (optional): ②
? Role Path (optional): [? for help] ③
? Role creation mode: auto ④
I: Creating ocm user role using 'arn:aws:iam::<aws_account_id>:user/<aws_username>'
? Create the 'ManagedOpenShift-User-<red_hat_username>-Role' role? Yes
I: Created role 'ManagedOpenShift-User-<red_hat_username>-Role' with ARN
'arn:aws:iam::<aws_account_id>:role/ManagedOpenShift-User-<red_hat_username>-
Role'
I: Linking User role
? User Role ARN: arn:aws:iam::<aws_account_id>:role/ManagedOpenShift-User-
<red_hat_username>-Role
? Link the 'arn:aws:iam::<aws_account_id>:role/ManagedOpenShift-User-
<red_hat_username>-Role' role with account '<red_hat_user_account_id>'? Yes ⑤
I: Successfully linked role ARN 'arn:aws:iam::<aws_account_id>:role/ManagedOpenShift-
User-<red_hat_username>-Role' with account '<red_hat_user_account_id>'
```

① Specify the prefix to include in the user role name. The default is **ManagedOpenShift**.

② Optional: Specify a permissions boundary Amazon Resource Name (ARN) for the role. For more information, see Permissions boundaries for IAM entities in the AWS documentation.

③ Specify a custom ARN path for your user role. The path must contain alphanumeric characters only and start and end with /, for example **/test/path/dev/**. For more information, see *ARN path customization for IAM roles and policies* .

④ Select the role creation mode. You can use **auto** mode to automatically create the user role and link it to your OpenShift Cluster Manager user account. In **manual** mode, the ROSA CLI generates the **aws** commands needed to create and link the role. In **manual** mode, the corresponding policy JSON files are also saved to the current directory. **manual** mode enables you to review the details before running the **aws** commands manually.

⑤ Link the user role to your OpenShift Cluster Manager user account.

i. If you opted not to link the user role to your OpenShift Cluster Manager user account in the preceding command, copy the **rosa link** command from the OpenShift Cluster Manager **User role** page and run it:

```
$ rosa link user-role <arn> ①
```

① Replace **<arn>** with the ARN of the user role that is included in the output of the preceding command.

j. On the OpenShift Cluster Manager **User role** page, click **Ok**.

k. Verify that the AWS account ID is listed in the **Associated AWS accounts** drop-down menu on the **Accounts and roles** page.

l. If the required account roles do not exist, a notification is provided stating that **Some account roles ARNs were not detected**. You can create the AWS account-wide roles and policies, including the Operator policies, by clicking the copy buffer next to the **rosa create account-roles** command and running the command in the CLI:

```
$ rosa create account-roles
```

Example output

```
I: Logged in as '<red_hat_username>' on 'https://api.openshift.com'
I: Validating AWS credentials...
I: AWS credentials are valid!
I: Validating AWS quota...
I: AWS quota ok. If cluster installation fails, validate actual AWS resource usage against
https://docs.openshift.com/rosa/rosa_getting_started/rosa-required-aws-service-
quotas.html
I: Verifying whether OpenShift command-line tool is available...
I: Current OpenShift Client Version: 4.0
I: Creating account roles
? Role prefix: ManagedOpenShift ①
? Permissions boundary ARN (optional): ②
? Path (optional): [? for help] ③
? Role creation mode: auto ④
I: Creating roles using 'arn:aws:iam::<aws_account_number>:user/<aws_username>'
? Create the 'ManagedOpenShift-Installer-Role' role? Yes ⑤
I: Created role 'ManagedOpenShift-Installer-Role' with ARN 'arn:aws:iam::
<aws_account_number>:role/ManagedOpenShift-Installer-Role'
? Create the 'ManagedOpenShift-ControlPlane-Role' role? Yes ⑥
I: Created role 'ManagedOpenShift-ControlPlane-Role' with ARN 'arn:aws:iam::
<aws_account_number>:role/ManagedOpenShift-ControlPlane-Role'
? Create the 'ManagedOpenShift-Worker-Role' role? Yes ⑦
I: Created role 'ManagedOpenShift-Worker-Role' with ARN 'arn:aws:iam::
<aws_account_number>:role/ManagedOpenShift-Worker-Role'
? Create the 'ManagedOpenShift-Support-Role' role? Yes ⑧
I: Created role 'ManagedOpenShift-Support-Role' with ARN 'arn:aws:iam::
<aws_account_number>:role/ManagedOpenShift-Support-Role'
I: To create a cluster with these roles, run the following command:
rosa create cluster --sts
```

① Specify the prefix to include in the OpenShift Cluster Manager IAM role name. The default is **ManagedOpenShift**.

IMPORTANT

You must specify an account-wide role prefix that is unique across your AWS account, even if you use a custom ARN path for your account roles.

2 Optional: Specify a permissions boundary Amazon Resource Name (ARN) for the role. For more information, see Permissions boundaries for IAM entities in the AWS documentation.

3 Specify a custom ARN path for your account-wide roles. The path must contain alphanumeric characters only and start and end with /, for example **/test/path/dev/**. For more information, see *ARN path customization for IAM roles and policies* .

4 Select the role creation mode. You can use **auto** mode to automatically create the account wide roles and policies. In **manual** mode, the ROSA CLI generates the **aws** commands needed to create the roles and policies. In **manual** mode, the corresponding policy JSON files are also saved to the current directory. **manual** mode enables you to review the details before running the **aws** commands manually.

5 6 7 8 Creates the account-wide installer, control plane, worker and support roles and corresponding IAM policies. For more information, see *Account-wide IAM role and policy reference*.

NOTE

In this step, the ROSA CLI also automatically creates the account-wide Operator IAM policies that are used by the cluster-specific Operator policies to permit the ROSA cluster Operators to carry out core OpenShift functionality. For more information, see *Account-wide IAM role and policy reference*.

m. On the **Accounts and roles** page, click **Refresh ARNs** and verify that the installer, support, worker, and control plane account role ARNs are listed.
If you have more than one set of account roles in your AWS account for your cluster version, a drop-down list of **Installer role** ARNs is provided. Select the ARN for the installer role that you want to use with your cluster. The cluster uses the account-wide roles and policies that relate to the selected installer role.

4. Click **Next**.

NOTE

If the **Accounts and roles** page was refreshed, you might need to select the checkbox again to acknowledge that you have read and completed all of the prerequisites.

5. On the **Cluster details** page, provide a name for your cluster and specify the cluster details:

   a. Add a **Cluster name**.

   b. Optional: Cluster creation generates a domain prefix as a subdomain for your provisioned cluster on **openshiftapps.com**. If the cluster name is less than or equal to 15 characters, that name is used for the domain prefix. If the cluster name is longer than 15 characters, the

domain prefix is randomly generated to a 15 character string.
To customize the subdomain, select the **Create custom domain prefix**checkbox, and enter your domain prefix name in the **Domain prefix** field. The domain prefix cannot be longer than 15 characters, must be unique within your organization, and cannot be changed after cluster creation.

c. Select a cluster version from the **Version** drop-down menu.

d. Select a cloud provider region from the **Region** drop-down menu.

e. Select a **Single zone** or **Multi-zone** configuration.

f. Leave **Enable user workload monitoring**selected to monitor your own projects in isolation from Red Hat Site Reliability Engineer (SRE) platform metrics. This option is enabled by default.

g. Optional: Select **Enable additional etcd encryption**if you require etcd key value encryption. With this option, the etcd key values are encrypted, but not the keys. This option is in addition to the control plane storage encryption that encrypts the etcd volumes in Red Hat OpenShift Service on AWS clusters by default.

NOTE

By enabling etcd encryption for the key values in etcd, you will incur a performance overhead of approximately 20%. The overhead is a result of introducing this second layer of encryption, in addition to the default control plane storage encryption that encrypts the etcd volumes. Consider enabling etcd encryption only if you specifically require it for your use case.

h. Optional: Select **Encrypt persistent volumes with customer keys**if you want to provide your own AWS Key Management Service (KMS) key Amazon Resource Name (ARN). The key is used for encryption of persistent volumes in your cluster.

IMPORTANT

Only persistent volumes (PVs) created from the default storage class are encrypted by default.

PVs created by using any other storage class are only encrypted if the storage class is configured to be encrypted.

i. Optional. To create a customer managed KMS key, follow the procedure for Creating symmetric encryption KMS keys.

IMPORTANT

The EBS Operator role is required in addition to the account roles to successfully create your cluster.

This role must be attached with the **ManagedOpenShift-openshift-cluster-csi-drivers-ebs-cloud-credentials** policy, an IAM policy required by ROSA to manage back-end storage through the Container Storage Interface (CSI).

For more information about the policies and permissions that the cluster Operators require, see *Methods of account-wide role creation* .

Example EBS Operator role

"arn:aws:iam::<aws_account_id>:role/<cluster_name>-xxxx-openshift-cluster-csi-drivers-ebs-cloud-credent"

After you create your Operator roles, you must edit the *Key Policy* in the **Key Management Service (KMS)** page of the AWS Console to add the roles.

i. Click **Next**.

6. On the **Default machine pool** page, select a **Compute node instance type**

NOTE

After your cluster is created, you can change the number of compute nodes in your cluster, but you cannot change the compute node instance type in the default machine pool. The number and types of nodes available to you depend on whether you use single or multiple availability zones. They also depend on what is enabled and available in your AWS account and the selected region.

7. Optional: Configure autoscaling for the default machine pool:

   a. Select **Enable autoscaling** to automatically scale the number of machines in your default machine pool to meet the deployment needs.

   b. Set the minimum and maximum node count limits for autoscaling. The cluster autoscaler does not reduce or increase the default machine pool node count beyond the limits that you specify.

      - If you deployed your cluster using a single availability zone, set the **Minimum node count** and **Maximum node count**. This defines the minimum and maximum compute node limits in the availability zone.

      - If you deployed your cluster using multiple availability zones, set the **Minimum nodes per zone** and **Maximum nodes per zone**. This defines the minimum and maximum compute node limits per zone.

NOTE

Alternatively, you can set your autoscaling preferences for the default machine pool after the machine pool is created.

8. If you did not enable autoscaling, select a compute node count for your default machine pool:

    - If you deployed your cluster using a single availability zone, select a **Compute node count** from the drop-down menu. This defines the number of compute nodes to provision to the machine pool for the zone.

    - If you deployed your cluster using multiple availability zones, select a **Compute node count (per zone)** from the drop-down menu. This defines the number of compute nodes to provision to the machine pool per zone.

9. Optional: Select an EC2 Instance Metadata Service (IMDS) configuration - **optional** (default) or **required** - to enforce use of IMDSv2. For more information regarding IMDS, see Instance metadata and user data in the AWS documentation.

    IMPORTANT

    The Instance Metadata Service settings cannot be changed after your cluster is created.

10. Optional: Expand **Edit node labels** to add labels to your nodes. Click **Add label** to add more node labels and select **Next**.

11. In the **Cluster privacy** section of the **Network configuration** page, select **Public** or **Private** to use either public or private API endpoints and application routes for your cluster.

    IMPORTANT

    The API endpoint cannot be changed between public and private after your cluster is created.

    Public API endpoint

    Select **Public** if you do not want to restrict access to your cluster. You can access the Kubernetes API endpoint and application routes from the internet.

    Private API endpoint

    Select **Private** if you want to restrict network access to your cluster. The Kubernetes API endpoint and application routes are accessible from direct private connections only.

    IMPORTANT

    If you are using private API endpoints, you cannot access your cluster until you update the network settings in your cloud provider account.

12. Optional: If you opted to use public API endpoints, by default a new VPC is created for your cluster. If you want to install your cluster in an existing VPC instead, select **Install into an existing VPC**.

WARNING

You cannot install a ROSA cluster into an existing VPC that was created by the OpenShift installer. These VPCs are created during the cluster deployment process and must only be associated with a single cluster to ensure that cluster provisioning and deletion operations work correctly.

To verify whether a VPC was created by the OpenShift installer, check for the **owned** value on the **kubernetes.io/cluster/<infra-id>** tag. For example, when viewing the tags for the VPC named **mycluster-12abc-34def**, the **kubernetes.io/cluster/mycluster-12abc-34def** tag has a value of **owned**. Therefore, the VPC was created by the installer and must not be modified by the administrator.

NOTE

If you opted to use private API endpoints, you must use an existing VPC and PrivateLink and the **Install into an existing VPC**and **Use a PrivateLink** options are automatically selected. With these options, the Red Hat Site Reliability Engineering (SRE) team can connect to the cluster to assist with support by using only AWS PrivateLink endpoints.

13. Optional: If you are installing your cluster into an existing VPC, select **Configure a cluster-wide proxy** to enable an HTTP or HTTPS proxy to deny direct access to the internet from your cluster.

14. Click **Next**.

15. If you opted to install the cluster in an existing AWS VPC, provide your **Virtual Private Cloud (VPC) subnet settings**.

    NOTE

    You must ensure that your VPC is configured with a public and a private subnet for each availability zone that you want the cluster installed into. If you opted to use PrivateLink, only private subnets are required.

    a. Optional: Expand **Additional security groups** and select additional custom security groups to apply to nodes in the machine pools created by default. You must have already created the security groups and associated them with the VPC you selected for this cluster. You cannot add or edit security groups to the default machine pools after you create the cluster. By default, the security groups you specify will be added for all node types. Uncheck the **Apply the same security groups to all node types (control plane, infrastructure and worker)** checkbox to select different security groups for each node type.

       For more information, see the requirements for *Security groups* under *Additional resources*.

16. If you opted to configure a cluster-wide proxy, provide your proxy configuration details on the **Cluster-wide proxy** page:

    a. Enter a value in at least one of the following fields:

- Specify a valid **HTTP proxy URL**.
- Specify a valid **HTTPS proxy URL**.
- In the **Additional trust bundle** field, provide a PEM encoded X.509 certificate bundle. The bundle is added to the trusted certificate store for the cluster nodes. An additional trust bundle file is required unless the identity certificate for the proxy is signed by an authority from the Red Hat Enterprise Linux CoreOS (RHCOS) trust bundle.
  If you use an MITM transparent proxy network that does not require additional proxy configuration but requires additional certificate authorities (CAs), you must provide the MITM CA certificate.

  NOTE

  If you upload an additional trust bundle file without specifying an HTTP or HTTPS proxy URL, the bundle is set on the cluster but is not configured to be used with the proxy.

b. Click **Next**.

For more information about configuring a proxy with Red Hat OpenShift Service on AWS, see *Configuring a cluster-wide proxy*.

17. In the **CIDR ranges** dialog, configure custom classless inter-domain routing (CIDR) ranges or use the defaults that are provided and click **Next**.

    NOTE

    If you are installing into a VPC, the **Machine CIDR** range must match the VPC subnets.

    IMPORTANT

    CIDR configurations cannot be changed later. Confirm your selections with your network administrator before proceeding.

18. Under the **Cluster roles and policies** page, select your preferred cluster-specific Operator IAM role and OIDC provider creation mode.
    With **Manual** mode, you can use either the **rosa** CLI commands or the **aws** CLI commands to generate the required Operator roles and OIDC provider for your cluster. **Manual** mode enables you to review the details before using your preferred option to create the IAM resources manually and complete your cluster installation.

    Alternatively, you can use **Auto** mode to automatically create the Operator roles and OIDC provider. To enable **Auto** mode, the OpenShift Cluster Manager IAM role must have administrator capabilities.

    NOTE

    If you specified custom ARN paths when you created the associated account-wide roles, the custom path is automatically detected and applied to the Operator roles. The custom ARN path is applied when the Operator roles are created by using either **Manual** or **Auto** mode.

19. Optional: Specify a **Custom operator roles prefix**for your cluster-specific Operator IAM roles.

    NOTE

    By default, the cluster-specific Operator role names are prefixed with the cluster name and random 4-digit hash. You can optionally specify a custom prefix to replace **<cluster_name>-<hash>** in the role names. The prefix is applied when you create the cluster-specific Operator IAM roles. For information about the prefix, see *About custom Operator IAM role prefixes* .

20. Select **Next**.

21. On the **Cluster update strategy** page, configure your update preferences:

    a. Choose a cluster update method:

    - Select **Individual updates** if you want to schedule each update individually. This is the default option.

    - Select **Recurring updates** to update your cluster on your preferred day and start time, when updates are available.

      IMPORTANT

      Even when you opt for recurring updates, you must update the account-wide and cluster-specific IAM resources before you upgrade your cluster between minor releases.

      NOTE

      You can review the end-of-life dates in the update life cycle documentation for Red Hat OpenShift Service on AWS. For more information, see *Red Hat OpenShift Service on AWS update life cycle* .

    b. If you opted for recurring updates, select a preferred day of the week and upgrade start time in UTC from the drop-down menus.

    c. Optional: You can set a grace period for **Node draining** during cluster upgrades. A **1 hour** grace period is set by default.

    d. Click **Next**.

    NOTE

    In the event of critical security concerns that significantly impact the security or stability of a cluster, Red Hat Site Reliability Engineering (SRE) might schedule automatic updates to the latest z-stream version that is not impacted. The updates are applied within 48 hours after customer notifications are provided. For a description of the critical impact security rating, see Understanding Red Hat security ratings .

22. Review the summary of your selections and click **Create cluster** to start the cluster installation.

23. If you opted to use **Manual** mode, create the cluster-specific Operator roles and OIDC provider manually to continue the installation:

    a. In the **Action required to continue installation** dialog, select either the **AWS CLI** or the **ROSA CLI** tab and manually create the resources:

    - If you opted to use the **AWS CLI** method, click **Download .zip**, save the file, and then extract the AWS CLI command and policy files. Then, run the provided **aws** commands in the CLI.

      NOTE

      You must run the **aws** commands in the directory that contains the policy files.

    - If you opted to use the **ROSA CLI** method, click the copy button next to the **rosa create** commands and run them in the CLI.

      NOTE

      If you specified custom ARN paths when you created the associated account-wide roles, the custom path is automatically detected and applied to the Operator roles when you create them by using these manual methods.

    b. In the **Action required to continue installation** dialog, click **x** to return to the **Overview** page for your cluster.

    c. Verify that the cluster **Status** in the **Details** section of the **Overview** page for your cluster has changed from **Waiting** to **Installing**. There might be a short delay of approximately two minutes before the status changes.

    NOTE

    If you opted to use **Auto** mode, OpenShift Cluster Manager creates the Operator roles and the OIDC provider automatically.

> IMPORTANT
>
> The EBS Operator role is required in addition to the account roles to successfully create your cluster.
>
> This role must be attached with the **ManagedOpenShift-openshift-cluster-csi-drivers-ebs-cloud-credentials** policy, an IAM policy required by ROSA to manage back-end storage through the Container Storage Interface (CSI).
>
> For more information about the policies and permissions that the cluster Operators require, see *Methods of account-wide role creation* .
>
> **Example EBS Operator role**
>
> **"arn:aws:iam::<aws_account_id>:role/<cluster_name>-xxxx-openshift-cluster-csi-drivers-ebs-cloud-credent"**
>
> After you create your Operator roles, you must edit the *Key Policy* in the **Key Management Service (KMS)** page of the AWS Console to add the roles.

Verification

- You can monitor the progress of the installation in the **Overview** page for your cluster. You can view the installation logs on the same page. Your cluster is ready when the **Status** in the **Details** section of the page is listed as **Ready**.

> NOTE
>
> If the installation fails or the cluster **State** does not change to **Ready** after about 40 minutes, check the installation troubleshooting documentation for details. For more information, see *Troubleshooting installations*. For steps to contact Red Hat Support for assistance, see *Getting support for Red Hat OpenShift Service on AWS*.

Additional resources

- create cluster in *Managing objects with the ROSA CLI*
- Methods of account-wide role creation

2.7.2. Creating a cluster with customizations using the CLI

When you create a Red Hat OpenShift Service on AWS (ROSA) cluster that uses the AWS Security Token Service (STS), you can customize your installation interactively.

When you run the **rosa create cluster --interactive** command at cluster creation time, you are presented with a series of interactive prompts that enable you to customize your deployment. For more information, see *Interactive cluster creation mode reference* .

After a cluster installation using the interactive mode completes, a single command is provided in the output that enables you to deploy further clusters using the same custom configuration.

> IMPORTANT
>
> Only public and AWS PrivateLink clusters are supported with STS. Regular private clusters (non-PrivateLink) are not available for use with STS.

Prerequisites

- You have completed the AWS prerequisites for ROSA with STS.
- You have available AWS service quotas.
- You have enabled the ROSA service in the AWS Console.
- You have installed and configured the latest ROSA CLI, **rosa**, on your installation host. Run **rosa version** to see your currently installed version of the ROSA CLI. If a newer version is available, the CLI provides a link to download this upgrade.
- If you want to use a customer managed AWS Key Management Service (KMS) key for encryption, you must create a symmetric KMS key. You must provide the Amazon Resource Name (ARN) when creating your cluster. To create a customer managed KMS key, follow the procedure for Creating symmetric encryption KMS keys .

> **IMPORTANT**
>
> The EBS Operator role is required in addition to the account roles to successfully create your cluster.
>
> This role must be attached with the **ManagedOpenShift-openshift-cluster-csi-drivers-ebs-cloud-credentials** policy, an IAM policy required by ROSA to manage back-end storage through the Container Storage Interface (CSI).
>
> For more information about the policies and permissions that the cluster Operators require, see *Methods of account-wide role creation* .
>
> **Example EBS Operator role**
>
> **"arn:aws:iam::<aws_account_id>:role/<cluster_name>-xxxx-openshift-cluster-csi-drivers-ebs-cloud-credent"**
>
> After you create your Operator roles, you must edit the *Key Policy* in the **Key Management Service (KMS)** page of the AWS Console to add the roles.

Procedure

1. Create the required account-wide roles and policies, including the Operator policies:

   a. Generate the IAM policy JSON files in the current working directory and output the **aws** CLI commands for review:

   ```
   $ rosa create account-roles --interactive \ 1
                         --mode manual 2
   ```

   1 **interactive** mode enables you to specify configuration options at the interactive prompts. For more information, see *Interactive cluster creation mode reference* .

   2 **manual** mode generates the **aws** CLI commands and JSON files needed to create the account-wide roles and policies. After review, you must run the commands manually to create the resources.

   Example output

   –

```
I: Logged in as '<red_hat_username>' on 'https://api.openshift.com'
I: Validating AWS credentials...
I: AWS credentials are valid!
I: Validating AWS quota...
I: AWS quota ok. If cluster installation fails, validate actual AWS resource usage against
https://docs.openshift.com/rosa/rosa_getting_started/rosa-required-aws-service-
quotas.html
I: Verifying whether OpenShift command-line tool is available...
I: Current OpenShift Client Version: 4.0
I: Creating account roles
? Role prefix: ManagedOpenShift 1
? Permissions boundary ARN (optional): 2
? Path (optional): [? for help] 3
? Role creation mode: auto 4
I: Creating roles using 'arn:aws:iam::<aws_account_number>:user/<aws_username>'
? Create the 'ManagedOpenShift-Installer-Role' role? Yes 5
I: Created role 'ManagedOpenShift-Installer-Role' with ARN 'arn:aws:iam::
<aws_account_number>:role/ManagedOpenShift-Installer-Role'
? Create the 'ManagedOpenShift-ControlPlane-Role' role? Yes 6
I: Created role 'ManagedOpenShift-ControlPlane-Role' with ARN 'arn:aws:iam::
<aws_account_number>:role/ManagedOpenShift-ControlPlane-Role'
? Create the 'ManagedOpenShift-Worker-Role' role? Yes 7
I: Created role 'ManagedOpenShift-Worker-Role' with ARN 'arn:aws:iam::
<aws_account_number>:role/ManagedOpenShift-Worker-Role'
? Create the 'ManagedOpenShift-Support-Role' role? Yes 8
I: Created role 'ManagedOpenShift-Support-Role' with ARN 'arn:aws:iam::
<aws_account_number>:role/ManagedOpenShift-Support-Role'
I: To create a cluster with these roles, run the following command:
rosa create cluster --sts
```

1 Specify the prefix to include in the OpenShift Cluster Manager IAM role name. The default is **ManagedOpenShift**.

IMPORTANT

You must specify an account-wide role prefix that is unique across your AWS account, even if you use a custom ARN path for your account roles.

2 Optional: Specifies a permissions boundary Amazon Resource Name (ARN) for the role. For more information, see Permissions boundaries for IAM entities in the AWS documentation.

3 Specify a custom ARN path for your account-wide roles. The path must contain alphanumeric characters only and start and end with /, for example **/test/path/dev/**. For more information, see *ARN path customization for IAM roles and policies* .

4 Select the role creation mode. You can use **auto** mode to automatically create the account wide roles and policies. In **manual** mode, the **rosa** CLI generates the **aws** commands needed to create the roles and policies. In **manual** mode, the corresponding policy JSON files are also saved to the current directory. **manual** mode enables you to review the details before running the **aws** commands manually.

5 6 7 8 Creates the account-wide installer, control plane, worker and support roles and

NOTE

In this step, the ROSA CLI also automatically creates the account-wide Operator IAM policies that are used by the cluster-specific Operator policies to permit the ROSA cluster Operators to carry out core OpenShift functionality. For more information, see *Account-wide IAM role and policy reference*.

b. After review, run the **aws** commands manually to create the roles and policies. Alternatively, you can run the preceding command using **--mode auto** to run the **aws** commands immediately.

2. Optional: If you are using your own AWS KMS key to encrypt the control plane, infrastructure, worker node root volumes, and persistent volumes (PVs), add the ARN for the account-wide installer role to your KMS key policy.

IMPORTANT

Only persistent volumes (PVs) created from the default storage class are encrypted with this specific key.

PVs created by using any other storage class are still encrypted, but the PVs are not encrypted with this key unless the storage class is specifically configured to use this key.

a. Save the key policy for your KMS key to a file on your local machine. The following example saves the output to **kms-key-policy.json** in the current working directory:

```
$ aws kms get-key-policy --key-id <key_id_or_arn> --policy-name default --output text >
kms-key-policy.json 1
```

1 Replace **<key_id_or_arn>** with the ID or ARN of your KMS key.

b. Add the ARN for the account-wide installer role that you created in the preceding step to the **Statement.Principal.AWS** section in the file. In the following example, the ARN for the default **ManagedOpenShift-Installer-Role** role is added:

```
{
  "Version": "2012-10-17",
  "Id": "key-rosa-policy-1",
  "Statement": [
    {
      "Sid": "Enable IAM User Permissions",
      "Effect": "Allow",
      "Principal": {
        "AWS": "arn:aws:iam::<aws_account_id>:root"
      },
      "Action": "kms:*",
      "Resource": "*"
    },
    {
      "Sid": "Allow ROSA use of the key",
      "Effect": "Allow",
      "Principal": {
        "AWS": [
          "arn:aws:iam::<aws_account_id>:role/ManagedOpenShift-Support-Role", 1
          "arn:aws:iam::<aws_account_id>:role/ManagedOpenShift-Installer-Role",
          "arn:aws:iam::<aws_account_id>:role/ManagedOpenShift-Worker-Role",
          "arn:aws:iam::<aws_account_id>:role/ManagedOpenShift-ControlPlane-Role",
          "arn:aws:iam::<aws_account_id>:role/<cluster_name>-xxxx-openshift-cluster-csi-drivers-ebs-cloud-credent" 2
        ]
      },
      "Action": [
        "kms:Encrypt",
        "kms:Decrypt",
        "kms:ReEncrypt*",
        "kms:GenerateDataKey*",
        "kms:DescribeKey"
      ],
      "Resource": "*"
    },
    {
      "Sid": "Allow attachment of persistent resources",
      "Effect": "Allow",
      "Principal": {
        "AWS": [
          "arn:aws:iam::<aws_account_id>:role/ManagedOpenShift-Support-Role", 3
          "arn:aws:iam::<aws_account_id>:role/ManagedOpenShift-Installer-Role",
          "arn:aws:iam::<aws_account_id>:role/ManagedOpenShift-Worker-Role",
          "arn:aws:iam::<aws_account_id>:role/ManagedOpenShift-ControlPlane-Role",
          "arn:aws:iam::<aws_account_id>:role/<cluster_name>-xxxx-openshift-cluster-csi-drivers-ebs-cloud-credent" 4
        ]
      },
      "Action": [
        "kms:CreateGrant",
        "kms:ListGrants",
        "kms:RevokeGrant"
      ],
      "Resource": "*",
      "Condition": {
        "Bool": {
          "kms:GrantIsForAWSResource": "true"
        }
      }
    }
  ]
}
```

1 3 You must specify the ARN for the account-wide role that will be used when you create the ROSA cluster. The ARNs listed in the section must be comma-separated.

2 4 You must specify the ARN for the operator role that will be used when you create the ROSA cluster. The ARNs listed in the section must be comma-separated.

c. Apply the changes to your KMS key policy:

```
$ aws kms put-key-policy --key-id <key_id_or_arn> \ ❶
  --policy file://kms-key-policy.json \ ❷
  --policy-name default
```

❶ Replace **<key_id_or_arn>** with the ID or ARN of your KMS key.

❷ You must include the **file://** prefix when referencing a key policy in a local file.

You can reference the ARN of your KMS key when you create the cluster in the next step.

3. Create a cluster with STS using custom installation options. You can use the **--interactive** mode to interactively specify custom settings:

> **WARNING**
>
> You cannot install a ROSA cluster into an existing VPC that was created by the OpenShift installer. These VPCs are created during the cluster deployment process and must only be associated with a single cluster to ensure that cluster provisioning and deletion operations work correctly.
>
> To verify whether a VPC was created by the OpenShift installer, check for the **owned** value on the **kubernetes.io/cluster/<infra-id>** tag. For example, when viewing the tags for the VPC named **mycluster-12abc-34def**, the **kubernetes.io/cluster/mycluster-12abc-34def** tag has a value of **owned**. Therefore, the VPC was created by the installer and must not be modified by the administrator.

```
$ rosa create cluster --interactive --sts
```

Example output

```
I: Interactive mode enabled.
Any optional fields can be left empty and a default will be selected.
? Cluster name: <cluster_name>
? Domain prefix: <domain_prefix> ❶
? Deploy cluster with Hosted Control Plane (optional): No
? Create cluster admin user: Yes ❷
? Username: user-admin ❸
? Password: [? for help] *************** ❹
? OpenShift version: 4.15.0 ❺
? Configure the use of IMDSv2 for ec2 instances optional/required (optional): ❻
I: Using arn:aws:iam::<aws_account_id>:role/ManagedOpenShift-Installer-Role for the
Installer role ❼
I: Using arn:aws:iam::<aws_account_id>:role/ManagedOpenShift-ControlPlane-Role for the
ControlPlane role
I: Using arn:aws:iam::<aws_account_id>:role/ManagedOpenShift-Worker-Role for the Worker
```

```
role
I: Using arn:aws:iam::<aws_account_id>:role/ManagedOpenShift-Support-Role for the
Support role
? External ID (optional): 8
? Operator roles prefix: <cluster_name>-<random_string> 9
? Deploy cluster using pre registered OIDC Configuration ID:
? Tags (optional) 10
? Multiple availability zones (optional): No 11
? AWS region: us-east-1
? PrivateLink cluster (optional): No
? Install into an existing VPC (optional): Yes 12
? Select availability zones (optional): No
? Enable Customer Managed key (optional): No 13
? Compute nodes instance type (optional):
? Enable autoscaling (optional): No
? Compute nodes: 2
? Additional Security Group IDs (optional): 14
? > [*]  sg-0e375ff0ec4a6cfa2 ('sg-1')
? > [ ]  sg-0e525ef0ec4b2ada7 ('sg-2')
? Machine CIDR: 10.0.0.0/16
? Service CIDR: 172.30.0.0/16
? Pod CIDR: 10.128.0.0/14
? Host prefix: 23
? Encrypt etcd data (optional): No 15
? Disable Workload monitoring (optional): No
I: Creating cluster '<cluster_name>'
I: To create this cluster again in the future, you can run:
   rosa create cluster --cluster-name <cluster_name> --role-arn arn:aws:iam::
<aws_account_id>:role/ManagedOpenShift-Installer-Role --support-role-arn arn:aws:iam::
<aws_account_id>:role/ManagedOpenShift-Support-Role --master-iam-role arn:aws:iam::
<aws_account_id>:role/ManagedOpenShift-ControlPlane-Role --worker-iam-role
arn:aws:iam::<aws_account_id>:role/ManagedOpenShift-Worker-Role --operator-roles-prefix
<cluster_name>-<random_string> --region us-east-1 --version 4.15.0 --additional-compute-
security-group-ids sg-0e375ff0ec4a6cfa2 --additional-infra-security-group-ids sg-
0e375ff0ec4a6cfa2 --additional-control-plane-security-group-ids sg-0e375ff0ec4a6cfa2 --
replicas 2 --machine-cidr 10.0.0.0/16 --service-cidr 172.30.0.0/16 --pod-cidr 10.128.0.0/14 --
host-prefix 23 16
I: To view a list of clusters and their status, run 'rosa list clusters'
I: Cluster '<cluster_name>' has been created.
I: Once the cluster is installed you will need to add an Identity Provider before you can login
into the cluster. See 'rosa create idp --help' for more information.
...
```

1 Optional. When creating your cluster, you can customize the subdomain for your cluster on ***.openshiftapps.com** using the **--domain-prefix** flag. The value for this flag must be unique within your organization, cannot be longer than 15 characters, and cannot be changed after cluster creation. If the flag is not supplied, an autogenerated value is created that depends on the length of the cluster name. If the cluster name is fewer than or equal to 15 characters, that name is used for the domain prefix. If the cluster name is longer than 15 characters, the domain prefix is randomly generated to a 15 character string.

2 3 4 When creating your cluster, you can create a local administrator user for your cluster. Selecting **Yes** then prompts you to create a user name and password for the cluster admin. The user name must not contain /, **:**, or **%**. The password must be at least 14 characters (ASCII-standard) without whitespaces. This process automatically configures

an htpasswd identity provider.

5. When creating the cluster, the listed **OpenShift version** options include the major, minor, and patch versions, for example **4.15.0**.

6. Optional: Specify 'optional' to configure all EC2 instances to use both v1 and v2 endpoints of EC2 Instance Metadata Service (IMDS). This is the default value. Specify 'required' to configure all EC2 instances to use IMDSv2 only.

   IMPORTANT

   The Instance Metadata Service settings cannot be changed after your cluster is created.

7. If you have more than one set of account roles for your cluster version in your AWS account, an interactive list of options is provided.

8. Optional: Specify an unique identifier that is passed by Red Hat OpenShift Service on AWS and the OpenShift installer when an account role is assumed. This option is only required for custom account roles that expect an external ID.

9. By default, the cluster-specific Operator role names are prefixed with the cluster name and a random 4-digit hash. You can optionally specify a custom prefix to replace **<cluster_name>-<hash>** in the role names. The prefix is applied when you create the cluster-specific Operator IAM roles. For information about the prefix, see *Defining an Operator IAM role prefix*.

   NOTE

   If you specified custom ARN paths when you created the associated account-wide roles, the custom path is automatically detected. The custom path is applied to the cluster-specific Operator roles when you create them in a later step.

10. Optional: Specify a tag that is used on all resources created by Red Hat OpenShift Service on AWS in AWS. Tags can help you manage, identify, organize, search for, and filter resources within AWS. Tags are comma separated, for example: "key value, data input".

    IMPORTANT

    Red Hat OpenShift Service on AWS only supports custom tags to Red Hat OpenShift resources during cluster creation. Once added, the tags cannot be removed or edited. Tags that are added by Red Hat are required for clusters to stay in compliance with Red Hat production service level agreements (SLAs). These tags must not be removed.

    Red Hat OpenShift Service on AWS does not support adding additional tags outside of ROSA cluster-managed resources. These tags can be lost when AWS resources are managed by the ROSA cluster. In these cases, you might need custom solutions or tools to reconcile the tags and keep them intact.

11. Optional: Multiple availability zones are recommended for production workloads. The default is a single availability zone.

12 Optional: You can create a cluster in an existing VPC, or ROSA can create a new VPC to use.

> **WARNING**
>
> You cannot install a ROSA cluster into an existing VPC that was created by the OpenShift installer. These VPCs are created during the cluster deployment process and must only be associated with a single cluster to ensure that cluster provisioning and deletion operations work correctly.
>
> To verify whether a VPC was created by the OpenShift installer, check for the **owned** value on the **kubernetes.io/cluster/<infra-id>** tag. For example, when viewing the tags for the VPC named **mycluster-12abc-34def**, the **kubernetes.io/cluster/mycluster-12abc-34def** tag has a value of **owned**. Therefore, the VPC was created by the installer and must not be modified by the administrator.

13 Optional: Enable this option if you are using your own AWS KMS key to encrypt the control plane, infrastructure, worker node root volumes, and PVs. Specify the ARN for the KMS key that you added to the account-wide role ARN in the preceding step.

> **IMPORTANT**
>
> Only persistent volumes (PVs) created from the default storage class are encrypted with this specific key.
>
> PVs created by using any other storage class are still encrypted, but the PVs are not encrypted with this key unless the storage class is specifically configured to use this key.

14 Optional: You can select additional custom security groups to use in your cluster. You must have already created the security groups and associated them with the VPC you selected for this cluster. You cannot add or edit security groups for the default machine pools after you create the machine pool. For more information, see the requirements for *Security groups* under *Additional resources*.

15 Optional: Enable this option only if your use case requires etcd key value encryption in addition to the control plane storage encryption that encrypts the etcd volumes by default. With this option, the etcd key values are encrypted but not the keys.

> **IMPORTANT**
>
> By enabling etcd encryption for the key values in etcd, you will incur a performance overhead of approximately 20%. The overhead is a result of introducing this second layer of encryption, in addition to the default control plane storage encryption that encrypts the etcd volumes. Red Hat recommends that you enable etcd encryption only if you specifically require it for your use case.

16 The output includes a custom command that you can run to create a cluster with the same configuration in the future.

As an alternative to using the **--interactive** mode, you can specify the customization options directly when you run the **rosa create cluster** command. Run the **rosa create cluster --help** command to view a list of available CLI options, or see *create cluster* in *Managing objects with the ROSA CLI*.

IMPORTANT

You must complete the following steps to create the Operator IAM roles and the OpenID Connect (OIDC) provider to move the state of the cluster to **ready**.

4. Create the cluster-specific Operator IAM roles:

   a. Generate the Operator IAM policy JSON files in the current working directory and output the **aws** CLI commands for review:

```
$ rosa create operator-roles --mode manual --cluster <cluster_name|cluster_id> 1
```

   1 **manual** mode generates the **aws** CLI commands and JSON files needed to create the Operator roles. After review, you must run the commands manually to create the resources.

   b. After review, run the **aws** commands manually to create the Operator IAM roles and attach the managed Operator policies to them. Alternatively, you can run the preceding command again using **--mode auto** to run the **aws** commands immediately.

NOTE

A custom prefix is applied to the Operator role names if you specified the prefix in the preceding step.

If you specified custom ARN paths when you created the associated account-wide roles, the custom path is automatically detected and applied to the Operator roles.

IMPORTANT

The EBS Operator role is required in addition to the account roles to successfully create your cluster.

This role must be attached with the **ManagedOpenShift-openshift-cluster-csi-drivers-ebs-cloud-credentials** policy, an IAM policy required by ROSA to manage back-end storage through the Container Storage Interface (CSI).

For more information about the policies and permissions that the cluster Operators require, see *Methods of account-wide role creation* . .Example EBS Operator role **"arn:aws:iam::<aws_account_id>:role/<cluster_name>-xxxx-openshift-cluster-csi-drivers-ebs-cloud-credent"**

After you create your Operator roles, you must edit the *Key Policy* in the **Key Management Service (KMS)** page of the AWS Console to add the roles.

5. Create the OpenID Connect (OIDC) provider that the cluster Operators use to authenticate:

   ```
   $ rosa create oidc-provider --mode auto --cluster <cluster_name|cluster_id> 1
   ```

   1 **auto** mode immediately runs the **aws** CLI command that creates the OIDC provider.

6. Check the status of your cluster:

   ```
   $ rosa describe cluster --cluster <cluster_name|cluster_id>
   ```

   Example output

   ```
   Name:                    <cluster_name>
   ID:                      <cluster_id>
   External ID:             <external_id>
   OpenShift Version:       <version>
   Channel Group:           stable
   DNS:                     <cluster_name>.xxxx.p1.openshiftapps.com
   AWS Account:             <aws_account_id>
   API URL:                 https://api.<cluster_name>.xxxx.p1.openshiftapps.com:6443
   Console URL:             https://console-openshift-console.apps.
   <cluster_name>.xxxx.p1.openshiftapps.com
   Region:                  <aws_region>
   Multi-AZ:                false
   Nodes:
    - Master:               3
    - Infra:                2
    - Compute:              2
   Network:
    - Service CIDR:         172.30.0.0/16
    - Machine CIDR:         10.0.0.0/16
    - Pod CIDR:             10.128.0.0/14
    - Host Prefix:          /23
   STS Role ARN:            arn:aws:iam::<aws_account_id>:role/ManagedOpenShift-Installer-
   Role
   Support Role ARN:        arn:aws:iam::<aws_account_id>:role/ManagedOpenShift-Support-
   Role
   Instance IAM Roles:
    - Master:               arn:aws:iam::<aws_account_id>:role/ManagedOpenShift-ControlPlane-
   Role
    - Worker:               arn:aws:iam::<aws_account_id>:role/ManagedOpenShift-Worker-Role
   Operator IAM Roles:
    - arn:aws:iam::<aws_account_id>:role/<cluster_name>-xxxx-openshift-ingress-operator-
   cloud-credentials
    - arn:aws:iam::<aws_account_id>:role/<cluster_name>-xxxx-openshift-cluster-csi-drivers-
   ebs-cloud-credent
    - arn:aws:iam::<aws_account_id>:role/<cluster_name>-xxxx-openshift-machine-api-aws-
   cloud-credentials
    - arn:aws:iam::<aws_account_id>:role/<cluster_name>-xxxx-openshift-cloud-credential-
   operator-cloud-crede
    - arn:aws:iam::<aws_account_id>:role/<cluster_name>-xxxx-openshift-image-registry-
   installer-cloud-creden
   Ec2 Metadata Http Tokens:   optional
   State:                   ready
   ```

```
Private:                    No
Created:                    Oct  1 2021 08:12:25 UTC
Details Page:               https://console.redhat.com/openshift/details/s/<subscription_id>
OIDC Endpoint URL:          https://oidc.op1.openshiftapps.com/<cluster_id>|<oidc_config_id>
\ 1
```

1. The endpoint URL depends on the BYO OIDC configuration. If you are pre-creating the OIDC configuration, the URL ends with the **<oidc_config_id>** value; otherwise, the URL ends with the **<cluster-ID>** value.

The following **State** field changes are listed in the output as the cluster installation progresses:

- **waiting (Waiting for OIDC configuration)**
- **pending (Preparing account)**
- **installing (DNS setup in progress)**
- **installing**
- **ready**

NOTE

If the installation fails or the **State** field does not change to **ready** after about 40 minutes, check the installation troubleshooting documentation for details. For more information, see *Troubleshooting installations*. For steps to contact Red Hat Support for assistance, see *Getting support for Red Hat OpenShift Service on AWS*.

7. Track the progress of the cluster creation by watching the OpenShift installer logs:

```
$ rosa logs install --cluster <cluster_name|cluster_id> --watch 1
```

1 1 Specify the **--watch** flag to watch for new log messages as the installation progresses. This argument is optional.

Additional resources

- Security groups
- Methods of account-wide role creation

2.8. NEXT STEPS

- Accessing a ROSA cluster

2.9. ADDITIONAL RESOURCES

- For more information on configuring a ROSA cluster within a shared virtual private cloud (VPC), see Configuring a shared VPC for ROSA clusters.

- For more information about the AWS Identity Access Management (IAM) resources required to deploy Red Hat OpenShift Service on AWS with STS, see About IAM resources for clusters that use STS.

- For details about optionally setting an Operator role name prefix, see About custom Operator IAM role prefixes.

- For an overview of the options that are presented when you create the AWS IAM resources and clusters by using interactive mode, see Interactive cluster creation mode reference .

- For information about the prerequisites to installing ROSA with STS, see AWS prerequisites for ROSA with STS.

- For more information about using OpenID Connect (OIDC) identity providers in AWS IAM, see Creating OpenID Connect (OIDC) identity providers in the AWS documentation.

- For more information about etcd encryption, see the etcd encryption service definition .

- For information about configuring a proxy with ROSA, see Configuring a cluster-wide proxy .

- For more information about troubleshooting ROSA cluster installations, see Troubleshooting cluster deployments.

- For steps to contact Red Hat Support for assistance, see Getting support for Red Hat OpenShift Service on AWS.

CHAPTER 3. CREATING A ROSA CLUSTER WITH STS USING TERRAFORM

3.1. CREATING A DEFAULT ROSA CLASSIC CLUSTER USING TERRAFORM

Quickly create a Red Hat OpenShift Service on AWS (ROSA) cluster quickly by using a Terraform cluster template that is configured with the default cluster options.

NOTE

- For a quickstart guide for ROSA, see Red Hat OpenShift Service on AWS quickstart guide.
- To install ROSA clusters with the default options by using the CLI or OpenShift Cluster Manager, see Creating a ROSA cluster with STS using the default options.
- For steps to deploy a ROSA cluster by using **manual** mode or with customizations, see Creating a ROSA cluster with STS using customizations .

The cluster creation process described below uses a Terraform configuration that prepares a ROSA Classic AWS Security Token Service (STS) cluster with the following resources:

- An OIDC provider with a managed **oidc-config**
- Prerequisite Operator roles with policies
- IAM account roles with policies
- All other AWS resources required to create a ROSA with STS cluster

Prerequisites

- You have completed the Detailed requirements for deploying ROSA using STS.
- You have completed the Prerequisites for Terraform.

3.1.1. Overview of the default cluster specifications

Table 3.1. Default ROSA with STS cluster specifications

Component	Default specifications
Accounts and roles	- Default IAM role prefix: **rosa-<6-digit-alphanumeric-string>** - No cluster admin role created

Component	Default specifications
Cluster settings	● Default cluster version: **4.15.0** ● Cluster name: **rosa-<6-digit-alphanumeric-string>** ● Default AWS region for installations using the Red Hat OpenShift Cluster Manager Hybrid Cloud Console: us-east-1 (US East, North Virginia) ● Default AWS region for installations using the ROSA CLI (**rosa**): Defined by your **aws** CLI configuration ● Default EC2 IMDS endpoints (both v1 and v2) are enabled ● Availability: Single zone for the data plane ● Monitoring for user-defined projects: Enabled
Encryption	● Cloud storage is encrypted at rest ● Additional etcd encryption is not enabled ● The default AWS Key Management Service (KMS) key is used as the encryption key for persistent data
Control plane node configuration	● Control plane node instance type: m5.2xlarge (8 vCPU, 32 GiB RAM) ● Control plane node count: 3
Infrastructure node configuration	● Infrastructure node instance type: r5.xlarge (4 vCPU, 32 GiB RAM) ● Infrastructure node count: 2
Compute node machine pool	● Compute node instance type: m5.xlarge (4 vCPU 16, GiB RAM) ● Compute node count: 2 ● Autoscaling: Not enabled ● No additional node labels
Networking configuration	● Cluster privacy: Public ● No cluster-wide proxy is configured

Component	Default specifications
Classless Inter-Domain Routing (CIDR) ranges	● Machine CIDR: 10.0.0.0/16 ● Service CIDR: 172.30.0.0/16 ● Pod CIDR: 10.128.0.0/14 ● Host prefix: /23
Cluster roles and policies	● Mode used to create the Operator roles and the OpenID Connect (OIDC) provider: **auto** NOTE For installations that use OpenShift Cluster Manager on the Hybrid Cloud Console, the **auto** mode requires an admin-privileged OpenShift Cluster Manager role. ● Default Operator role prefix: **rosa-<6-digit-alphanumeric-string>**
Cluster update strategy	● Individual updates ● 1 hour grace period for node draining

3.1.2. Creating a default ROSA cluster using Terraform

The cluster creation process outlined below shows how to use Terraform to create your account-wide IAM roles and a ROSA cluster with a managed OIDC configuration.

3.1.2.1. Preparing your environment for Terraform

Before you can create your Red Hat OpenShift Service on AWS cluster by using Terraform, you need to export your offline Red Hat OpenShift Cluster Manager token .

Procedure

1. **Optional**: Because the Terraform files get created in your current directory during this procedure, you can create a new directory to store these files and navigate into it by running the following command:

```
$ mkdir terraform-cluster && cd terraform-cluster
```

2. Grant permissions to your account by using an offline Red Hat OpenShift Cluster Manager token.

3. Copy your offline token, and set the token as an environmental variable by running the following command:

```
$ export RHCS_TOKEN=<your_offline_token>
```

NOTE

This environmental variable resets at the end of each session, such as restarting your machine or closing the terminal.

Verification

- After you export your token, verify the value by running the following command:

```
$ echo $RHCS_TOKEN
```

3.1.2.2. Creating your Terraform files locally

After you set up your offline Red Hat OpenShift Cluster Manager token , you need to create the Terraform files locally to build your cluster. You can create these files by using the following code templates.

Procedure

1. Create the **account-roles.tf** file by running the following command:

```
$ cat<<-EOF>account-roles.tf
data "rhcs_policies" "all_policies" {}

data "rhcs_versions" "all" {}

module "create_account_roles" {
  source  = "terraform-redhat/rosa-sts/aws"
  version = ">=0.0.15"

  create_account_roles  = true
  create_operator_roles = false

  account_role_prefix    = local.cluster_name
  path                   = var.path
  rosa_openshift_version = regex("^[0-9]+\\\\.[0-9]+", var.rosa_openshift_version)
  account_role_policies  = data.rhcs_policies.all_policies.account_role_policies
  all_versions           = data.rhcs_versions.all
  operator_role_policies = data.rhcs_policies.all_policies.operator_role_policies
  tags                   = var.additional_tags
}

resource "time_sleep" "wait_10_seconds" {
  depends_on = [module.create_account_roles]

  create_duration = "10s"
}
EOF
```

2. Create the **main.tf** file by running the following command:

```
$ cat<<-EOF>main.tf
#
# Copyright (c) 2023 Red Hat, Inc.
#
# Licensed under the Apache License, Version 2.0 (the "License");
# you may not use this file except in compliance with the License.
# You may obtain a copy of the License at
#
#   http://www.apache.org/licenses/LICENSE-2.0
#
# Unless required by applicable law or agreed to in writing, software
# distributed under the License is distributed on an "AS IS" BASIS,
# WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied.
# See the License for the specific language governing permissions and
# limitations under the License.
#

terraform {
  required_providers {
    aws = {
      source  = "hashicorp/aws"
      version = ">= 4.20.0"
    }
    rhcs = {
      version = ">= 1.5.0"
      source  = "terraform-redhat/rhcs"
    }
  }
}

# Export token using the RHCS_TOKEN environment variable
provider "rhcs" {}

provider "aws" {
  region = var.aws_region
  ignore_tags {
    key_prefixes = ["kubernetes.io/"]
  }
}

data "aws_availability_zones" "available" {}

locals {
  # Extract availability zone names for the specified region, limit it to 1
  region_azs = slice([for zone in data.aws_availability_zones.available.names : format("%s",
zone)], 0, 1)
}

resource "random_string" "random_name" {
  length           = 6
  special          = false
  upper            = false
}

locals {
  path = coalesce(var.path, "/")
  sts_roles = {
    role_arn         =
"arn:aws:iam::\${data.aws_caller_identity.current.account_id}:role\${local.path}\${local.cluster_n
ame}-Installer-Role",
    support_role_arn =
"arn:aws:iam::\${data.aws_caller_identity.current.account_id}:role\${local.path}\${local.cluster_n
ame}-Support-Role",
    instance_iam_roles = {
      master_role_arn =
"arn:aws:iam::\${data.aws_caller_identity.current.account_id}:role\${local.path}\${local.cluster_n
ame}-ControlPlane-Role",
      worker_role_arn =
"arn:aws:iam::\${data.aws_caller_identity.current.account_id}:role\${local.path}\${local.cluster_n
ame}-Worker-Role"
    },
    operator_role_prefix = local.cluster_name,
    oidc_config_id       = rhcs_rosa_oidc_config.oidc_config.id
  }
  worker_node_replicas = coalesce(var.worker_node_replicas, 2)
  # If cluster_name is not null, use that, otherwise generate a random cluster name
  cluster_name = coalesce(var.cluster_name, "rosa-\${random_string.random_name.result}")
}

data "aws_caller_identity" "current" {
}

resource "rhcs_cluster_rosa_classic" "rosa_sts_cluster" {
  name                 = local.cluster_name
  cloud_region         = var.aws_region
  multi_az             = false
  aws_account_id       = data.aws_caller_identity.current.account_id
  availability_zones   = ["us-east-1a"]
  tags                 = var.additional_tags
  version              = var.rosa_openshift_version
  compute_machine_type = var.machine_type
  replicas             = local.worker_node_replicas
  autoscaling_enabled  = false
  sts                  = local.sts_roles
  properties = {
    rosa_creator_arn = data.aws_caller_identity.current.arn
  }
  machine_cidr     = var.vpc_cidr_block

  lifecycle {
    precondition {
      condition     = can(regex("^[a-z][-a-z0-9]{0,13}[a-z0-9]\$", local.cluster_name))
      error_message = "ROSA cluster name must be less than 16 characters, be lower case
alphanumeric, with only hyphens."
    }
  }

  depends_on = [time_sleep.wait_10_seconds]
}

resource "rhcs_cluster_wait" "wait_for_cluster_build" {
  cluster = rhcs_cluster_rosa_classic.rosa_sts_cluster.id
  # timeout in minutes
  timeout = 60
}
EOF
```

3. Create the **oidc-provider.tf** file by running the following command:

```
$ cat<<-EOF>oidc-provider.tf
resource "rhcs_rosa_oidc_config" "oidc_config" {
  managed = true
}

data "rhcs_rosa_operator_roles" "operator_roles" {
  operator_role_prefix = local.cluster_name
  account_role_prefix  = local.cluster_name
}

module "oidc_provider" {
  source  = "terraform-redhat/rosa-sts/aws"
  version = "0.0.15"

  create_operator_roles = false
  create_oidc_provider  = true

  cluster_id                  = ""
  rh_oidc_provider_thumbprint = rhcs_rosa_oidc_config.oidc_config.thumbprint
  rh_oidc_provider_url        = rhcs_rosa_oidc_config.oidc_config.oidc_endpoint_url
  tags                        = var.additional_tags
  path                        = var.path
}
EOF
```

4. Create the **operator-roles.tf** file by running the following command:

```
$ cat<<-EOF>operator-roles.tf
module "operator_roles" {
  source  = "terraform-redhat/rosa-sts/aws"
  version = "0.0.15"

  create_operator_roles = true
  create_oidc_provider  = false

  rh_oidc_provider_thumbprint = rhcs_rosa_oidc_config.oidc_config.thumbprint
  rh_oidc_provider_url        = rhcs_rosa_oidc_config.oidc_config.oidc_endpoint_url
  operator_roles_properties   =
data.rhcs_rosa_operator_roles.operator_roles.operator_iam_roles
  tags                        = var.additional_tags
  path                        = var.path
}
EOF
```

5. Create the **variables.tf** file by running the following command:

```
$ cat<<-EOF>variables.tf
variable "rosa_openshift_version" {
  type        = string
  default     = "4.15.0"
  description = "Desired version of OpenShift for the cluster, for example '4.15.0'. If version is
greater than the currently running version, an upgrade will be scheduled."
}

variable "account_role_policies" {
  description = "account role policies details for account roles creation"
  type = object({
    sts_installer_permission_policy             = string
    sts_support_permission_policy               = string
    sts_instance_worker_permission_policy       = string
    sts_instance_controlplane_permission_policy = string
  })
  default = null
}

variable "operator_role_policies" {
  description = "operator role policies details for operator roles creation"
  type = object({
    openshift_cloud_credential_operator_cloud_credential_operator_iam_ro_creds_policy =
string
    openshift_cloud_network_config_controller_cloud_credentials_policy               = string
    openshift_cluster_csi_drivers_ebs_cloud_credentials_policy                       = string
    openshift_image_registry_installer_cloud_credentials_policy                      = string
    openshift_ingress_operator_cloud_credentials_policy                              = string
    openshift_machine_api_aws_cloud_credentials_policy                               = string
  })
  default = null
}

# ROSA Cluster info
variable "cluster_name" {
  default     = null
  type        = string
  description = "Provide the name of your ROSA cluster."
}

variable "additional_tags" {
  default = {
    Terraform   = "true"
  }
  description = "Additional AWS resource tags"
  type        = map(string)
}

variable "path" {
  description = "(Optional) The arn path for the account/operator roles as well as their
policies."
  type        = string
  default     = null
}

variable "machine_type" {
  description = "The AWS instance type used for your default worker pool."
  type        = string
  default     = "m5.xlarge"
}

variable "worker_node_replicas" {
  default     = 2
  description = "Number of worker nodes to provision. Single zone clusters need at least 2
nodes, multizone clusters need at least 3 nodes"
  type        = number
}

variable "autoscaling_enabled" {
  description = "Enables autoscaling. This variable requires you to set a maximum and
minimum replicas range using the 'max_replicas' and 'min_replicas' variables. If the
autoscaling_enabled is 'true', you cannot configure the worker_node_replicas."
  type        = string
  default     = "false"
}

#VPC Info
variable "vpc_cidr_block" {
  type        = string
  description = "The value of the IP address block for machines or cluster nodes for the VPC."
  default     = "10.0.0.0/16"
}

#AWS Info
variable "aws_region" {
  type    = string
  default = "us-east-1"
}
EOF
```

You are ready to initiate Terraform.

3.1.2.3. Using Terraform to create your ROSA cluster

After you create the Terraform files, you must initiate Terraform to provide all of the required dependencies. Then apply the Terraform plan.

IMPORTANT

Do not modify Terraform state files. For more information, see Considerations when using Terraform

Procedure

1. Set up Terraform to create your resources based on your Terraform files, run the following command:

```
$ terraform init
```

2. **Optional**: Verify that the Terraform you copied is correct by running the following command:

```
$ terraform validate
```

Example output

```
Success! The configuration is valid.
```

3. Create your cluster with Terraform by running the following command:

```
$ terraform apply
```

4. The Terraform interface lists the resources to be created or changed and prompts for confirmation. Enter **yes** to proceed or **no** to cancel:

Example output

```
Plan: 39 to add, 0 to change, 0 to destroy.

Do you want to perform these actions?
  Terraform will perform the actions described above.
  Only 'yes' will be accepted to approve.

  Enter a value: yes
```

If you enter **yes**, your Terraform plan starts, creating your AWS account roles, Operator roles, and your ROSA Classic cluster.

Verification

1. Verify that your cluster was created by running the following command:

```
$ rosa list clusters
```

Example output showing a cluster's ID, name, and status:

```
ID                                NAME          STATE  TOPOLOGY
27c3snjsupa9obua74ba8se5kcj11269  rosa-tf-demo  ready  Classic (STS)
```

2. Verify that your account roles were created by running the following command:

```
$ rosa list account-roles
```

Example output

```
I: Fetching account roles
ROLE NAME                           ROLE TYPE      ROLE ARN
OPENSHIFT VERSION  AWS Managed
ROSA-demo-ControlPlane-Role                Control plane  arn:aws:iam::<ID>:role/ROSA-
demo-ControlPlane-Role                4.14              No
ROSA-demo-Installer-Role                  Installer      arn:aws:iam::<ID>:role/ROSA-demo-
Installer-Role                   4.14              No
ROSA-demo-Support-Role                     Support        arn:aws:iam::<ID>:role/ROSA-demo-
Support-Role                     4.14              No
ROSA-demo-Worker-Role                      Worker         arn:aws:iam::<ID>:role/ROSA-demo-
Worker-Role                      4.14              No
```

3. Verify that your Operator roles were created by running the following command:

```
$ rosa list operator-roles
```

Example output showing Terraform-created Operator roles:

```
I: Fetching operator roles
ROLE PREFIX    AMOUNT IN BUNDLE
rosa-demo      6
```

3.1.2.4. Deleting your ROSA cluster with Terraform

Use the **terraform destroy** command to remove all of the resources that were created with the **terraform apply** command.

NOTE

Do not modify your Terraform **.tf** files before destroying your resources. These variables are matched to resources to delete.

Procedure

1. In the directory where you ran the **terraform apply** command to create your cluster, run the following command to delete the cluster:

```
$ terraform destroy
```

2. Enter **yes** to start the role and cluster deletion:

Example output of Terraform confirmation:

```
Plan: 0 to add, 0 to change, 39 to destroy.

Do you really want to destroy all resources?
  Terraform will destroy all your managed infrastructure, as shown above.
  There is no undo. Only 'yes' will be accepted to confirm.

  Enter a value: yes
```

Verification

1. Verify that your cluster was destroyed by running the following command:

```
$ rosa list clusters
```

Example output showing no cluster

```
I: No clusters available
```

2. Verify that the account roles were destroyed by running the following command:

```
$ rosa list account-roles
```

Example output showing no Terraform-created account roles:

```
I: Fetching account roles
I: No account roles available
```

3. Verify that the Operator roles were destroyed by running the following command:

```
$ rosa list operator-roles
```

Example output showing no Terraform-created Operator roles:

```
I: Fetching operator roles
I: No operator roles available
```

CHAPTER 4. INTERACTIVE CLUSTER CREATION MODE REFERENCE

This section provides an overview of the options that are presented when you use the interactive mode to create the OCM role, the user role, and Red Hat OpenShift Service on AWS (ROSA) clusters by using the ROSA CLI (**rosa**).

4.1. INTERACTIVE OCM AND USER ROLE CREATION MODE OPTIONS

Before you can use Red Hat OpenShift Cluster Manager to create Red Hat OpenShift Service on AWS (ROSA) clusters that use the AWS Security Token Service (STS), you must associate your AWS account with your Red Hat organization by creating and linking the OCM and user roles. You can enable interactive mode by specifying the **--interactive** option when you run the **rosa create ocm-role** command or the **rosa create user-role** command.

The following tables describe the interactive OCM role creation mode options:

Table 4.1. **--interactive** OCM role creation mode options

Field	Description
Role prefix	Specify the prefix to include in the OCM IAM role name. The default is **ManagedOpenShift**. You can create only one OCM role per AWS account for your Red Hat organization.
Enable admin capabilities for the OCM role (optional)	Enable the admin OCM IAM role, which is equivalent to specifying the **--admin** argument. The admin role is required if you want to use **auto** mode to automatically provision the cluster-specific Operator roles and the OIDC provider by using OpenShift Cluster Manager.
Permissions boundary ARN (optional)	Specify a permissions boundary Amazon Resource Name (ARN) for the OCM role. For more information, see Permissions boundaries for IAM entities in the AWS documentation.
Role Path (optional)	Specify a custom ARN path for your OCM role. The path must contain alphanumeric characters only and start and end with /, for example /**test**/**path**/**dev**/. For more information, see*ARN path customization for IAM roles and policies*.
Role creation mode	Select the role creation mode. You can use **auto** mode to automatically create the OCM role and link it to your Red Hat organization account. In **manual** mode, the ROSA CLI (**rosa**) generates the **aws** commands needed to create and link the role. In **manual** mode, the corresponding policy JSON files are also saved to the current directory. **manual** mode enables you to review the details before running the **aws** commands manually.
Create the '<ocm_role_name>' role?	Confirm if you want to create the OCM role.

Field	Description
Link the '<ocm_role_arn>' role with organization '<red_hat_organization_id>'?	Confirm if you want to link the OCM role with your Red Hat organization.

The following tables describe the interactive user role creation mode options:

Table 4.2. **--interactive** user role creation mode options

Field	Description
Role prefix	Specify the prefix to include in the user role name. The default is **ManagedOpenShift**.
Permissions boundary ARN (optional)	Specify a permissions boundary Amazon Resource Name (ARN) for the user role. For more information, see Permissions boundaries for IAM entities in the AWS documentation.
Role Path (optional)	Specify a custom ARN path for your user role. The path must contain alphanumeric characters only and start and end with /, for example /**test**/**path**/**dev**/. For more information, see*ARN path customization for IAM roles and policies*.
Role creation mode	Selects the role creation mode. You can use **auto** mode to automatically create the user role and link it to your OpenShift Cluster Manager user account. In **manual** mode, the ROSA CLI generates the **aws** commands needed to create and link the role. In **manual** mode, the corresponding policy JSON files are also saved to the current directory. **manual** mode enables you to review the details before running the **aws** commands manually.
Create the '<user_role_name>' role?	Confirm if you want to create the user role.
Link the '<user_role_arn>' role with account '<red_hat_user_account_id>'?	Confirm if you want to link the user role with your Red Hat user account.

4.2. INTERACTIVE CLUSTER CREATION MODE OPTIONS

You can create a Red Hat OpenShift Service on AWS cluster with the AWS Security Token Service (STS) by using the interactive mode. You can enable the mode by specifying the **--interactive** option when you run the **rosa create cluster** command.

The following table describes the interactive cluster creation mode options:

Table 4.3. **--interactive** cluster creation mode options

Field	Description
Cluster name	Enter a name for your cluster, for example **my-rosa-cluster**.
Domain prefix	Enter a name for the domain prefix for the subdomain of your cluster, for example **my-rosa-cluster**.
Deploy cluster with Hosted Control Plane (optional)	Enable the use of Hosted Control Planes.
Create cluster admin user	Create a cluster administrator user when you create your cluster using the htpasswd identity provider. The username must not contain /, **:**, or **%**. The password must be at least 14 characters (ASCII-standard) without whitespaces.
Deploy cluster using AWS STS	Create an OpenShift cluster that uses the AWS Security Token Service (STS) to allocate temporary, limited-privilege credentials for component-specific AWS Identity and Access Management (IAM) roles. The service enables cluster components to make AWS API calls using secure cloud resource management practices. The default is **Yes**.
OpenShift version	Select the version of OpenShift to install, for example 4. The default is the latest version.
Configure the use of IMDSv2 for ec2 instances optional/required (optional)	Specify whether all EC2 instances will use both v1 and v2 endpoints of EC2 Instance Metadata Service (IMDS)(optional) or only IMDSv2 (required).
Installer role ARN	If you have more than one set of account roles in your AWS account for your cluster version, a list of installer role ARNs are provided. Select the ARN for the installer role that you want to use with your cluster. The cluster uses the account-wide roles and policies that relate to the selected installer role.
External ID (optional)	Specify an unique identifier that is passed by OpenShift Cluster Manager and the OpenShift installer when an account role is assumed. This option is only required for custom account roles that expect an external ID.
Operator roles prefix	Enter a prefix to assign to the cluster-specific Operator IAM roles. The default is the name of the cluster and a 4-digit random string, for example **my-rosa-cluster-a0b1**.
Deploy cluster using pre registered OIDC Configuration ID	Specify if you want to use a preconfigured OIDC configuration or if you want to create a new OIDC configuration as part of the cluster creation process.

Field	Description
Tags (optional)	Specify a tag that is used on all resources created by Red Hat OpenShift Service on AWS in AWS. Tags can help you manage, identify, organize, search for, and filter resources within AWS. Tags are comma separated, for example: "key value, foo bar". IMPORTANT Red Hat OpenShift Service on AWS only supports custom tags to Red Hat OpenShift resources during cluster creation. Once added, the tags cannot be removed or edited. Tags that are added by Red Hat are required for clusters to stay in compliance with Red Hat production service level agreements (SLAs). These tags must not be removed. Red Hat OpenShift Service on AWS does not support adding additional tags outside of ROSA cluster-managed resources. These tags can be lost when AWS resources are managed by the ROSA cluster. In these cases, you might need custom solutions or tools to reconcile the tags and keep them intact.
Multiple availability zones (optional)	Deploy the cluster to multiple availability zones in the AWS region. The default is **No**, which results in a cluster being deployed to a single availability zone. If you deploy a cluster into multiple availability zones, the AWS region must have at least 3 availability zones. Multiple availability zones are recommended for production workloads.
AWS region	Specify the AWS region to deploy the cluster in. This overrides the **AWS_REGION** environment variable.
PrivateLink cluster (optional)	Create a cluster using AWS PrivateLink. This option provides private connectivity between Virtual Private Clouds (VPCs), AWS services, and your on-premise networks, without exposing your traffic to the public internet. To provide support, Red Hat Site Reliability Engineering (SRE) can connect to the cluster by using AWS PrivateLink Virtual Private Cloud (VPC) endpoints. This option cannot be changed after a cluster is created. The default is **No**.
Machine CIDR	Specify the IP address range for machines (cluster nodes), which must encompass all CIDR address ranges for your VPC subnets. Subnets must be contiguous. A minimum IP address range of 128 addresses, using the subnet prefix **/25**, is supported for single availability zone deployments. A minimum address range of 256 addresses, using the subnet prefix **/24**, is supported for deployments that use multiple availability zones. The default is **10.0.0.0/16**. This range must not conflict with any connected networks.

Field	Description
Service CIDR	Specify the IP address range for services. It is recommended, but not required, that the address block is the same between clusters. This will not create IP address conflicts. The range must be large enough to accommodate your workload. The address block must not overlap with any external service accessed from within the cluster. The default is **172.30.0.0/16**.
Pod CIDR	Specify the IP address range for pods. It is recommended, but not required, that the address block is the same between clusters. This will not create IP address conflicts. The range must be large enough to accommodate your workload. The address block must not overlap with any external service accessed from within the cluster. The default is **10.128.0.0/14**.
Install into an existing VPC (optional)	Install a cluster into an existing AWS VPC. To use this option, your VPC must have 2 subnets for each availability zone that you are installing the cluster into. The default is **No**.
Select availability zones (optional)	Specify the availability zones that are used when installing into an existing AWS VPC. Use a comma-separated list to provide the availability zones. If you specify **No**, the installer selects the availability zones automatically.
Enable customer managed key (optional)	Enable this option to use a specific AWS Key Management Service (KMS) key as the encryption key for persistent data. This key functions as the encryption key for control plane, infrastructure, and worker node root volumes. The key is also configured on the default storage class to ensure that persistent volumes created with the default storage class will be encrypted with the specific KMS key. When disabled, the account KMS key for the specified region is used by default to ensure persistent data is always encrypted. The default is **No**.
Compute nodes instance type	Select a compute node instance type. The default is **m5.xlarge**.
Enable autoscaling (optional)	Enable compute node autoscaling. The autoscaler adjusts the size of the cluster to meet your deployment demands. The default is **No**.
Additional Compute Security Group IDs (optional)	Select the additional custom security group IDs that are used with the standard machine pool created along side the cluster. The default is none selected. Only security groups associated with the selected VPC are displayed. You can select a maximum of 5 additional security groups.

Field	Description
Additional Infra Security Group IDs (optional)	Select the additional custom security group IDs that are used with the infra nodes created along side the cluster. The default is none selected. Only security groups associated with the selected VPC are displayed. You can select a maximum of 5 additional security groups.
Additional Control Plane Security Group IDs (optional)	Select the additional custom security group IDs that are used with the control plane nodes created along side the cluster. The default is none selected. Only security groups associated with the selected VPC are displayed. You can select a maximum of 5 additional security groups.
Compute nodes	Specify the number of compute nodes to provision into each availability zone. Clusters deployed in a single availability zone require at least 2 nodes. Clusters deployed in multiple zones must have at least 3 nodes. The maximum number of worker nodes is 180 nodes. The default value is **2**.
Default machine pool labels (optional)	Specify the labels for the default machine pool. The label format should be a comma-separated list of key-value pairs. This list will overwrite any modifications made to node labels on an ongoing basis.
Host prefix	Specify the subnet prefix length assigned to pods scheduled to individual machines. The host prefix determines the pod IP address pool for each machine. For example, if the host prefix is set to **/23**, each machine is assigned a**/23** subnet from the pod CIDR address range. The default is **/23**, allowing 512 cluster nodes and 512 pods per node, both of which are beyond our supported maximums. For information on the supported maximums, see the Additional resources section below.
Machine pool root disk size (GiB or TiB)	Specify the size of the machine pool root disk. This value must include a unit suffix like GiB or TiB, for example the default value of **300GiB**.

Field	Description
Enable FIPS support (optional)	Enable or disable FIPS mode. The default is **false** (disabled). If FIPS mode is enabled, the Red Hat Enterprise Linux CoreOS (RHCOS) machines that Red Hat OpenShift Service on AWS runs on bypass the default Kubernetes cryptography suite and use the cryptography modules that are provided with RHCOS instead. IMPORTANT To enable FIPS mode for your cluster, you must run the installation program from a {op-system-base-full} computer configured to operate in FIPS mode. For more information about configuring FIPS mode on RHEL, see Installing the system in FIPS mode. When running {op-system-base-full} or Red Hat Enterprise Linux CoreOS (RHCOS) booted in FIPS mode, Red Hat OpenShift Service on AWS core components use the {op-system-base} cryptographic libraries that have been submitted to NIST for FIPS 140-2/140-3 Validation on only the x86_64, ppc64le, and s390x architectures.
Encrypt etcd data (optional)	In Red Hat OpenShift Service on AWS, the control plane storage is encrypted at rest by default and this includes encryption of the etcd volumes. You can additionally enable the **Encrypt etcd data** option to encrypt the key values for some resources in etcd, but not the keys. IMPORTANT By enabling etcd encryption for the key values in etcd, you will incur a performance overhead of approximately 20%. The overhead is a result of introducing this second layer of encryption, in addition to the default control plane storage encryption that encrypts the etcd volumes. Red Hat recommends that you enable etcd encryption only if you specifically require it for your use case.
Disable workload monitoring (optional)	Disable monitoring for user-defined projects. Monitoring for user-defined projects is enabled by default.

Field	Description
Route Selector for ingress (optional)	Specify the route selector for your ingress. The format should be a comma-separated list of key-value pairs. If you do not specify a label, all routes will be exposed on both routers. For legacy ingress support, these labels are inclusion labels; otherwise, they are treated as exclusion labels.
Excluded namespaces for ingress (optional)	Specify the excluded namespaces for your ingress. The format should be a comma-separated list **value1, value2…**. If you do not specify any values, all namespaces will be exposed.
Wildcard Policy (optional, choose 'Skip' to skip selection. The default value will be supplied.)	Choose the wildcard policy for your ingress. The options are **WildcardsDisallowed** and **WildcardsAllowed**. Default is **WildcardsDisallowed**.
Namespace Ownership Policy (optional, choose 'Skip' to skip selection. The default value will be supplied.)	Choose the namespace ownership policy for your ingress. The options are **Strict** and **InterNamespaceAllowed**. The default is **Strict**.

4.3. ADDITIONAL RESOURCES

- For more information about using custom ARN paths for the OCM role, user role, and account-wide roles, see ARN path customization for IAM roles and policies .
- For a list of the supported maximums, see ROSA tested cluster maximums.
- For detailed steps to quickly create a ROSA cluster with STS, including the AWS IAM resources, see Creating a ROSA cluster with STS using the default options .
- For detailed steps to create a ROSA cluster with STS using customizations, including the AWS IAM resources, see Creating a ROSA cluster with STS using customizations .
- For more information about etcd encryption, see the etcd encryption service definition .
- For an example VPC architecture, see this sample VPC architecture.

CHAPTER 5. CREATING AN AWS PRIVATELINK CLUSTER ON ROSA

This document describes how to create a ROSA cluster using AWS PrivateLink.

5.1. UNDERSTANDING AWS PRIVATELINK

A Red Hat OpenShift Service on AWS cluster can be created without any requirements on public subnets, internet gateways, or network address translation (NAT) gateways. In this configuration, Red Hat uses AWS PrivateLink to manage and monitor a cluster to avoid all public ingress network traffic. Without a public subnet, it is not possible to configure an application router as public. Configuring private application routers is the only option.

For more information, see AWS PrivateLink on the AWS website.

IMPORTANT

You can only make a PrivateLink cluster at installation time. You cannot change a cluster to PrivateLink after installation.

5.2. REQUIREMENTS FOR USING AWS PRIVATELINK CLUSTERS

For AWS PrivateLink clusters, internet gateways, NAT gateways, and public subnets are not required, but the private subnets must have internet connectivity provided to install required components. At least one single private subnet is required for Single-AZ clusters and at least 3 private subnets are required for Multi-AZ clusters. The following table shows the AWS resources that are required for a successful installation:

Table 5.1. Required AWS resources

<table>
<tr><th>Component</th><th>AWS Type</th><th>Description</th></tr>
<tr><td>VPC</td><td><ul><li>AWS::EC2::VPC</li><li>AWS::EC2::VPCEndpoint</li></ul></td><td>You must provide a VPC for the cluster to use.</td></tr>
<tr><td>Network access control</td><td><ul><li>AWS::EC2::NetworkAcl</li><li>AWS::EC2::NetworkAclEntry</li></ul></td><td>You must allow access to the following ports:
<table>
<tr><th>Port</th><th>Reason</th></tr>
<tr><td>80</td><td>Inbound HTTP traffic</td></tr>
<tr><td>443</td><td>Inbound HTTPS traffic</td></tr>
<tr><td>22</td><td>Inbound SSH traffic</td></tr>
<tr><td>1024-65535</td><td>Inbound ephemeral traffic</td></tr>
<tr><td>0-65535</td><td>Outbound ephemeral traffic</td></tr>
</table></td></tr>
</table>

Component	AWS Type	Description
Private subnets	- AWS::EC2::Subnet - AWS::EC2::RouteTable - AWS::EC2::SubnetRouteTableAssociation	Your VPC must have private subnets in 1 availability zone for Single-AZ deployments or 3 availability zones for Multi-AZ deployments. You must provide appropriate routes and route tables.

5.3. CREATING AN AWS PRIVATELINK CLUSTER

You can create an AWS PrivateLink cluster using the Red Hat OpenShift Service on AWS (ROSA) CLI, **rosa**.

NOTE

AWS PrivateLink is supported on existing VPCs only.

Prerequisites

- You have available AWS service quotas.
- You have enabled the ROSA service in the AWS Console.
- You have installed and configured the latest Red Hat OpenShift Service on AWS (ROSA) CLI, **rosa**, on your installation host.

Procedure

Creating a cluster can take up to 40 minutes.

1. With AWS PrivateLink, you can create a cluster with a single availability zone (Single-AZ) or multiple availability zones (Multi-AZ). In either case, your machine's classless inter-domain routing (CIDR) must match your virtual private cloud's CIDR. See Requirements for using your own VPC and VPC Validation for more information.

   #### IMPORTANT

   If you use a firewall, you must configure it so that Red Hat OpenShift Service on AWS can access the sites that it requires to function.

   For more information, see the AWS PrivateLink firewall prerequisites section.

   #### NOTE

   If your cluster name is longer than 15 characters, it will contain an autogenerated domain prefix as a sub-domain for your provisioned cluster on ***.openshiftapps.com**.

   To customize the subdomain, use the **--domain-prefix** flag. The domain prefix cannot be longer than 15 characters, must be unique, and cannot be changed after cluster creation.

- To create a Single-AZ cluster:

  ```
  $ rosa create cluster --private-link --cluster-name=<cluster-name> [--machine-cidr=<VPC CIDR>/16] --subnet-ids=<private-subnet-id>
  ```

- To create a Multi-AZ cluster:

  ```
  $ rosa create cluster --private-link --multi-az --cluster-name=<cluster-name> [--machine-cidr=<VPC CIDR>/16] --subnet-ids=<private-subnet-id1>,<private-subnet-id2>,<private-subnet-id3>
  ```

2. Enter the following command to check the status of your cluster. During cluster creation, the **State** field from the output will transition from **pending** to **installing**, and finally to **ready**.

   ```
   $ rosa describe cluster --cluster=<cluster_name>
   ```

   NOTE

   If installation fails or the **State** field does not change to **ready** after 40 minutes, check the installation troubleshooting documentation for more details.

3. Enter the following command to follow the OpenShift installer logs to track the progress of your cluster:

   ```
   $ rosa logs install --cluster=<cluster_name> --watch
   ```

5.4. CONFIGURING AWS PRIVATELINK DNS FORWARDING

With AWS PrivateLink clusters, a public hosted zone and a private hosted zone are created in Route 53. With the private hosted zone, records within the zone are resolvable only from within the VPC to which it is assigned.

The *Let's Encrypt DNS-01* validation requires a public zone so that valid, publicly trusted certificates can be issued for the domain. The validation records are deleted after *Let's Encrypt* validation is complete; however, the zone is still required for issuing and renewing these certificates, which are typically required every 60 days. While these zones usually appear empty, it is serving a critical role in the validation process.

For more information about private hosted zones, see AWS private hosted zones documentation . For more information about public hosted zones, see AWS public hosted zones documentation .

Prerequisites

- Your corporate network or other VPC has connectivity
- UDP port 53 and TCP port 53 ARE enabled across your networks to allow for DNS queries
- You have created an AWS PrivateLink cluster using Red Hat OpenShift Service on AWS

Procedure

1. To allow for records such as **api.<cluster_domain>** and ***.apps.<cluster_domain>** to resolve outside of the VPC, configure a Route 53 Resolver Inbound Endpoint .

2. When you configure the inbound endpoint, select the VPC and private subnets that were used when you created the cluster.

3. After the endpoints are operational and associated, configure your corporate network to forward DNS queries to those IP addresses for the top-level cluster domain, such as **drow-pl-01.htno.p1.openshiftapps.com**.

4. If you are forwarding DNS queries from one VPC to another VPC, configure forwarding rules.

5. If you are configuring your remote network DNS server, see your specific DNS server documentation to configure selective DNS forwarding for the installed cluster domain.

5.5. NEXT STEPS

Configure identity providers

5.6. ADDITIONAL RESOURCES

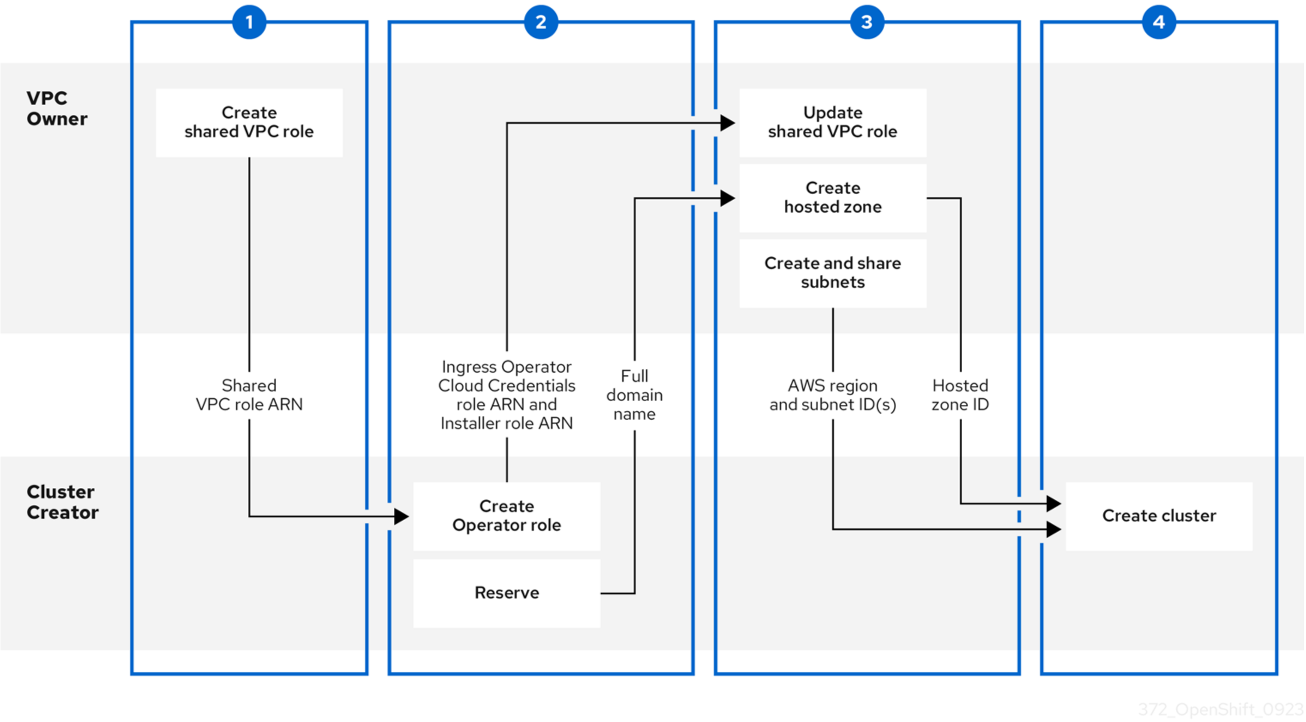
- AWS PrivateLink firewall prerequisites
- Overview of the ROSA with STS deployment workflow
- Deleting a ROSA cluster
- ROSA architecture models

CHAPTER 6. CONFIGURING A SHARED VPC FOR ROSA CLUSTERS

You can create Red Hat OpenShift Service on AWS (ROSA) clusters in shared, centrally-managed AWS virtual private clouds (VPCs).

NOTE

This process requires **two separate** AWS accounts that belong to the same AWS organization. One account functions as the VPC-owning AWS account (**VPC Owner**), while the other account creates the cluster in the cluster-creating AWS account (**Cluster Creator**).



Prerequisites for the VPC Owner

- You have an AWS account with the proper permissions to create roles and share resources.
- The **Cluster Creator's** AWS account is separate from the **VPC Owner's** AWS account.
- Both AWS accounts belong to the same AWS organization.
- You enabled resource sharing from the management account for your organization.
- You have access to the AWS console.

Prerequisites for the Cluster Creator

- You installed the ROSA CLI (**rosa**) 1.2.26 or later.
- You created all of the required ROSA account roles for creating a cluster.
- The **Cluster Creator's** AWS account is separate from the **VPC Owner's** AWS account.

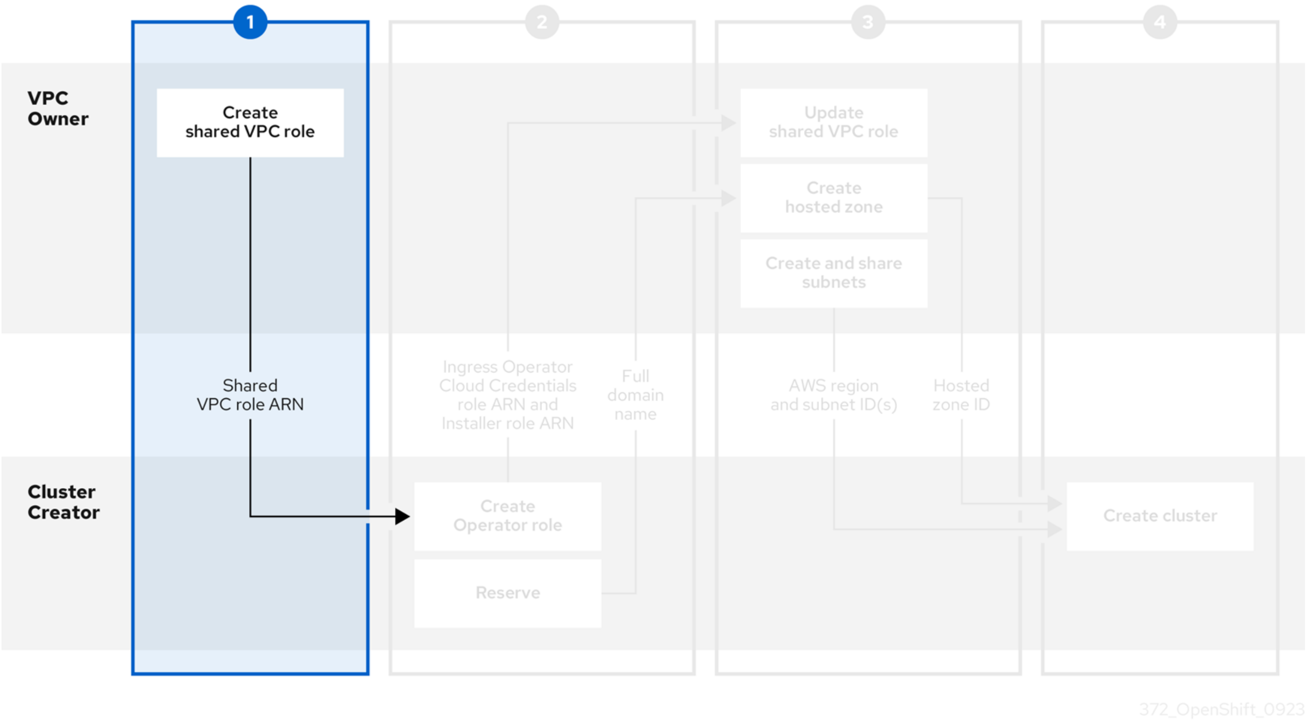
- Both AWS accounts belong to the same AWS organization.

NOTE

Installing a cluster in a shared VPC is supported only for OpenShift 4.12.34 and later, 4.13.10 and later, and all future 4.y-streams.

6.1. STEP ONE - VPC OWNER: CONFIGURING A VPC TO SHARE WITHIN YOUR AWS ORGANIZATION

You can share subnets within a configured VPC with another AWS user account if that account is within your current AWS organization.



Procedure

1. Create or modify a VPC to your specifications in the VPC section of the AWS console.

2. Create a custom policy file to allow for necessary shared VPC permissions that uses the name **SharedVPCPolicy**:

```
$ cat <<EOF > /tmp/shared-vpc-policy.json
{
   "Version": "2012-10-17",
   "Statement": [
      {
         "Effect": "Allow",
         "Action": [
            "route53:ChangeResourceRecordSets",
            "route53:ListHostedZones",
            "route53:ListHostedZonesByName",
            "route53:ListResourceRecordSets",
            "route53:ChangeTagsForResource",
                "route53:GetAccountLimit",
                "route53:GetChange",
                "route53:GetHostedZone",
                "route53:ListTagsForResource",
                "route53:UpdateHostedZoneComment",
                "tag:GetResources",
                "tag:UntagResources"
            ],
            "Resource": "*"
        }
    ]
}
EOF
```

3. Create the policy in AWS:

   ```
   $ aws iam create-policy \
       --policy-name SharedVPCPolicy \
       --policy-document file:///tmp/shared-vpc-policy.json
   ```

   You will attach this policy to a role necessary for the shared VPC permissions.

4. Create a custom trust policy file that grants permission to assume roles:

   ```
   $ cat <<EOF > /tmp/shared-vpc-role.json
   {
       "Version": "2012-10-17",
       "Statement": [
           {
               "Effect": "Allow",
               "Principal": {
                   "AWS": "arn:aws:iam::<Account-ID>:root" 1
               },
               "Action": "sts:AssumeRole"
           }
       ]
   }
   EOF
   ```

   1 The principal will be scoped down after the **Cluster Creator** creates the necessary cluster roles. On creation, you must create a root user placeholder by using the **Cluster Creator's** AWS account ID as **arn:aws:iam::{Account}:root**.

5. Create the IAM role:

   ```
   $ aws iam create-role --role-name <role_name> \ 1
       --assume-role-policy-document file:///tmp/shared-vpc-role.json
   ```

   1 Replace *<role_name>* with the name of the role you want to create.

6. Attach the custom **SharedVPCPolicy** permissions policy:

```
$ aws iam attach-role-policy --role-name <role_name> --policy-arn \ 1
    arn:aws:iam::<AWS_account_ID>:policy/SharedVPCPolicy 2
```

1 Replace *<role_name>* with the name of the role you created.

2 Replace *<AWS_account_ID>* with the **VPC Owner's** AWS account ID.

7. Provide the **SharedVPCRole** ARN to the **Cluster Creator** to continue configuration.

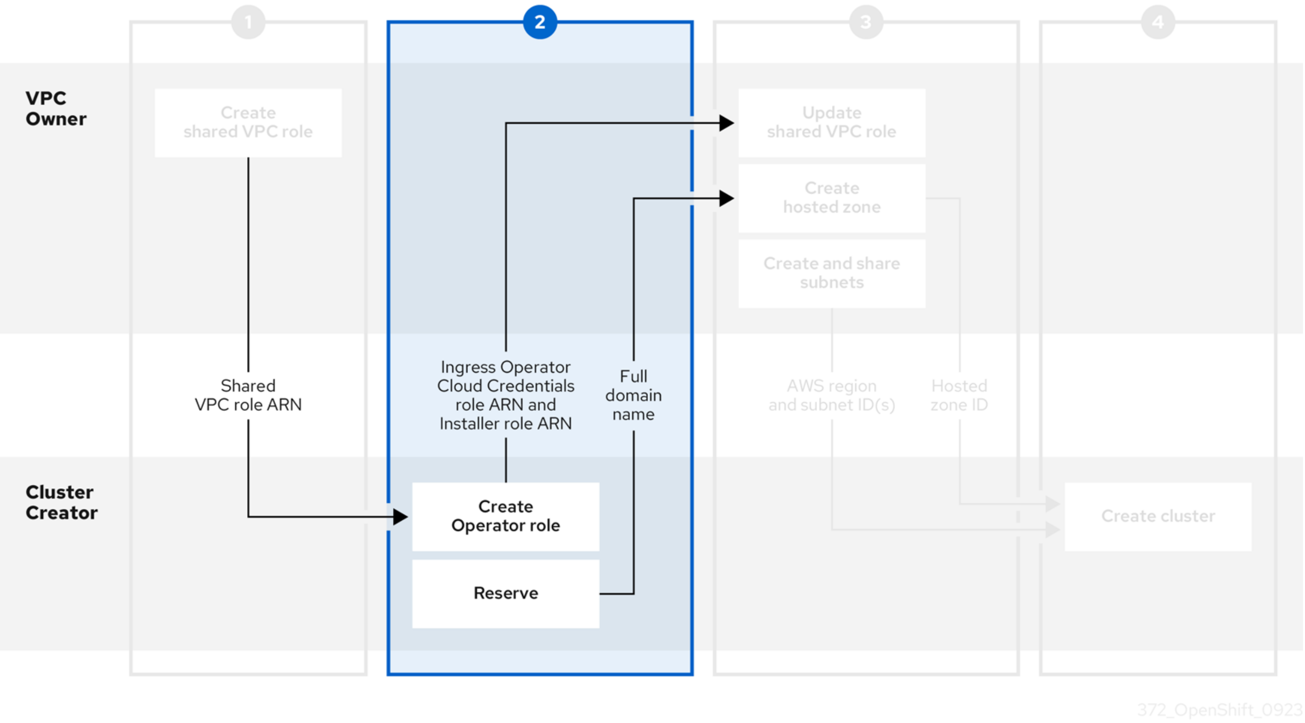
Additional resources

- See the AWS documentation for sharing your AWS resources.

6.2. STEP TWO - CLUSTER CREATOR: RESERVING YOUR DNS AND CREATING CLUSTER OPERATOR ROLES

After the **VPC Owner** creates a virtual private cloud, subnets, and an IAM role for sharing the VPC resources, reserve an **openshiftapps.com** DNS domain and create Operator roles to communicate back to the **VPC Owner**.

> **NOTE**
>
> For shared VPC clusters, you can choose to create the Operator roles after the cluster creation steps. The cluster will be in a **waiting** state until the Ingress Operator role ARN is added to the shared VPC role trusted relationships.



Prerequisites

- You have the **SharedVPCRole** ARN for the IAM role from the **VPC Owner**.

Procedure

1. Reserve an **openshiftapps.com** DNS domain with the following command:

   ```
   $ rosa create dns-domain
   ```

   The command creates a reserved **openshiftapps.com** DNS domain.

   ```
   I: DNS domain '14eo.p1.openshiftapps.com' has been created.
   I: To view all DNS domains, run 'rosa list dns-domains'
   ```

2. Create an OIDC configuration.
   Review this article for more information on the OIDC configuration process. The following command produces the OIDC configuration ID that you need:

   ```
   $ rosa create oidc-config
   ```

   You receive confirmation that the command created an OIDC configuration:

   ```
   I: To create Operator Roles for this OIDC Configuration, run the following command and
   remember to replace <user-defined> with a prefix of your choice:
    rosa create operator-roles --prefix <user-defined> --oidc-config-id
   25tu67hq45rto1am3slpf5lq6jargg
   ```

3. Create the Operator roles by entering the following command:

   ```
   $ rosa create operator-roles --oidc-config-id <oidc-config-ID> 1
      --installer-role-arn <Installer_Role> 2
      --shared-vpc-role-arn <Created_VPC_Role_Arn> 3
      --prefix <operator-prefix> 4
   ```

   1 Provide the OIDC configuration ID that you created in the previous step.

   2 Provide your installer ARN that was created as part of the **rosa create account-roles** process.

   3 Provide the ARN for the role that the **VPC Owner** created.

   4 Provide a prefix for the Operator roles.

   NOTE

   The Installer account role and the shared VPC role must have a one-to-one relationship. If you want to create multiple shared VPC roles, you should create one set of account roles per shared VPC role.

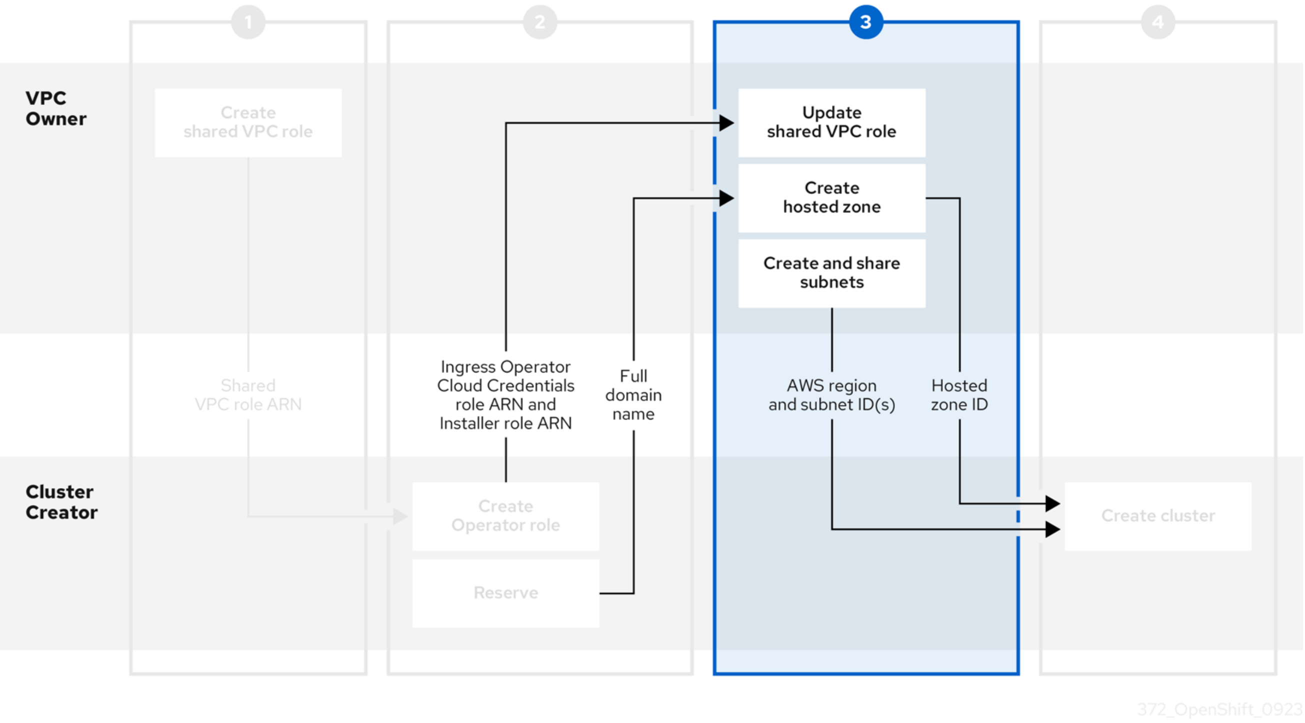
4. After you create the Operator roles, share the full domain name, which is created with **<intended_cluster_name>.<reserved_dns_domain>**, your *Ingress Operator Cloud Credentials* role's ARN, and your *Installer* role's ARN with the **VPC Owner** to continue configuration.
   The shared information resembles these examples:

   - **my-rosa-cluster.14eo.p1.openshiftapps.com**

- **arn:aws:iam::111122223333:role/ManagedOpenShift-Installer-Role**
- **arn:aws:iam::111122223333:role/my-rosa-cluster-openshift-ingress-operator-cloud-credentials**

6.3. STEP THREE - VPC OWNER: UPDATING THE SHARED VPC ROLE AND CREATING HOSTED ZONES

After the **Cluster Creator** provides the DNS domain and the IAM roles, create a private hosted zone and update the trust policy on the IAM role that was created for sharing the VPC.



Prerequisites

- You have the full domain name from the **Cluster Creator**.
- You have the *Ingress Operator Cloud Credentials* role's ARN from the **Cluster Creator**.
- You have the *Installer* role's ARN from the **Cluster Creator**.

Procedure

1. In the Resource Access Manager of the AWS console, create a resource share that shares the previously created public and private subnets with the **Cluster Creator's** AWS account ID.
2. Update the VPC sharing IAM role and add the *Installer* and *Ingress Operator Cloud Credentials* roles to the principal section of the trust policy.

```
{
 "Version": "2012-10-17",
 "Statement": [
  {
  "Sid": "Statement1",
    "Effect": "Allow",
    "Principal": {
     "AWS": [
          "arn:aws:iam::<Cluster-Creator's-AWS-Account-ID>:role/<prefix>-ingress-operator-
cloud-credentials",
          "arn:aws:iam::<Cluster-Creator's-AWS-Account-ID>:role/<prefix>-Installer-Role"
        ]
    },
    "Action": "sts:AssumeRole"
  }
   ]
}
```

3. Create a private hosted zone in the Route 53 section of the AWS console . In the hosted zone configuration, the domain name is **<cluster_name>.<reserved_dns_domain>**. The private hosted zone must be associated with the created VPC.

4. After the hosted zone is created and associated with the VPC, provide the following to the **Cluster Creator** to continue configuration:

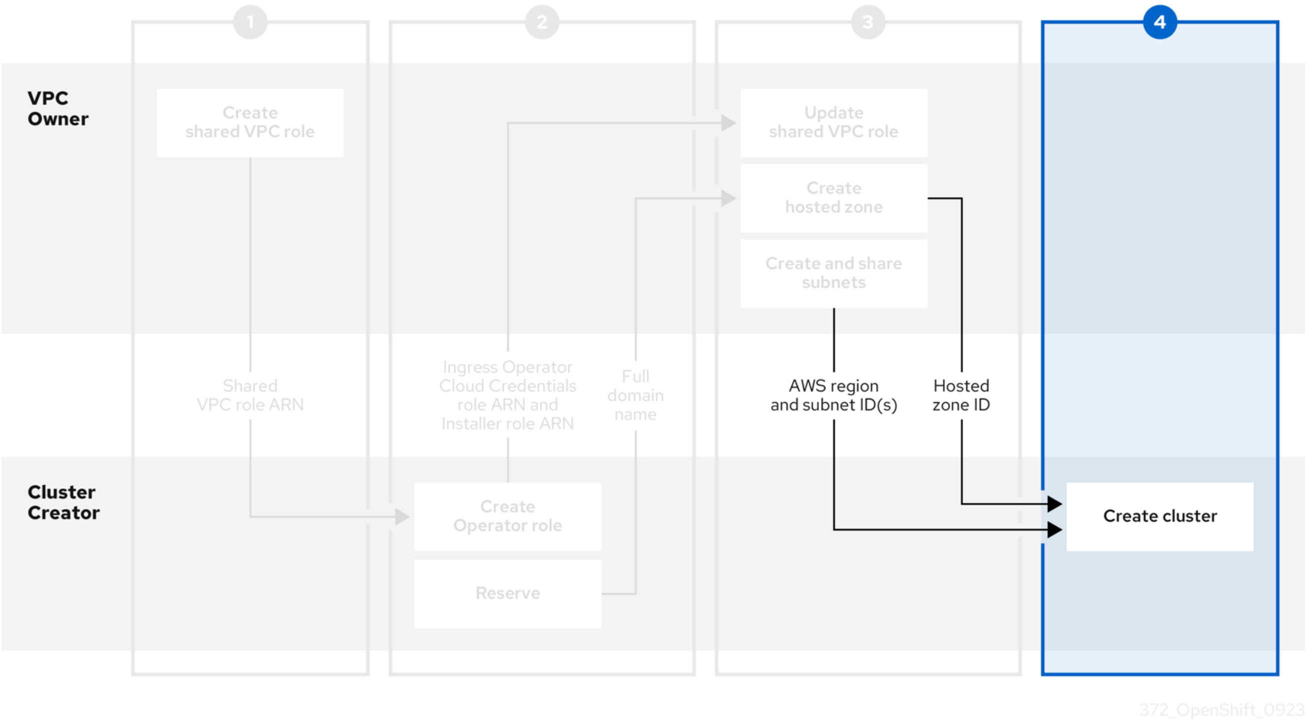
   - Hosted zone ID
   - AWS region
   - Subnet IDs

6.4. STEP FOUR - CLUSTER CREATOR: CREATING YOUR CLUSTER IN A SHARED VPC

To create a cluster in a shared VPC, complete the following steps.

NOTE

Installing a cluster in a shared VPC is supported only for OpenShift 4.12.34 and later, 4.13.10 and later, and all future 4.y-streams.



Prerequisites

- You have the hosted zone ID from the **VPC Owner**.
- You have the AWS region from the **VPC Owner**.
- You have the subnet IDs from the **VPC Owner**.
- You have the **SharedVPCRole** ARN from the **VPC Owner**.

Procedure

- In a terminal, enter the following command to create the shared VPC:

```
rosa create cluster --cluster-name <cluster_name> --sts --operator-roles-prefix <prefix> --oidc-config-id <oidc_config_id> --region us-east-1 --subnet-ids <subnet_ids> --private-hosted-zone-id <hosted_zone_ID> --shared-vpc-role-arn <vpc-role-arn> --base-domain <dns-domain>
```

> **NOTE**
>
> If your cluster name is longer than 15 characters, it will contain an autogenerated domain prefix as a sub-domain for your provisioned cluster on ***.openshiftapps.com**.
>
> To customize the subdomain, use the **--domain-prefix** flag. The domain prefix cannot be longer than 15 characters, must be unique, and cannot be changed after cluster creation.

CHAPTER 7. ACCESSING A ROSA CLUSTER

It is recommended that you access your Red Hat OpenShift Service on AWS (ROSA) cluster using an identity provider (IDP) account. However, the cluster administrator who created the cluster can access it using the quick access procedure.

This document describes how to access a cluster and set up an IDP using the ROSA CLI (**rosa**). Alternatively, you can create an IDP account using OpenShift Cluster Manager console.

7.1. ACCESSING YOUR CLUSTER QUICKLY

You can use this quick access procedure to log in to your cluster.

> **NOTE**
>
> As a best practice, access your cluster with an IDP account instead.

Procedure

1. Enter the following command:

```
$ rosa create admin --cluster=<cluster_name>
```

Example output

```
W: It is recommended to add an identity provider to login to this cluster. See 'rosa create idp -
-help' for more information.
I: Admin account has been added to cluster 'cluster_name'. It may take up to a minute for the
account to become active.
I: To login, run the following command:
oc login https://api.cluster-name.t6k4.i1.oragnization.org:6443 \ 1
--username cluster-admin \
--password FWGYL-2mkJI-3ZTTZ-rINns
```

1 For a Red Hat OpenShift Service on AWS (ROSA) with hosted control planes (HCP) cluster, the port number should be **443**.

2. Enter the **oc login** command, username, and password from the output of the previous command:

Example output

```
$ oc login https://api.cluster_name.t6k4.i1.oragnization.org:6443 \ 1
>  --username cluster-admin \
>  --password FWGYL-2mkJI-3ZTTZ-rINns
Login successful.
You have access to 77 projects, the list has been suppressed. You can list all projects with '
projects'
```

1 For a ROSA with HCP cluster, the port number should be **443**.

3. Using the default project, enter this **oc** command to verify that the cluster administrator access is created:

   ```
   $ oc whoami
   ```

   Example output

   ```
   cluster-admin
   ```

7.2. ACCESSING YOUR CLUSTER WITH AN IDP ACCOUNT

To log in to your cluster, you can configure an identity provider (IDP). This procedure uses GitHub as an example IDP. To view other supported IDPs, run the **rosa create idp --help** command.

> **NOTE**
>
> Alternatively, as the user who created the cluster, you can use the quick access procedure.

Procedure

To access your cluster using an IDP account:

1. Add an IDP.

   a. The following command creates an IDP backed by GitHub. After running the command, follow the interactive prompts from the output to access your GitHub developer settings and configure a new OAuth application.

   ```
   $ rosa create idp --cluster=<cluster_name> --interactive
   ```

   b. Enter the following values:

   - Type of identity provider: **github**
   - Restrict to members of: **organizations** (if you do not have a GitHub Organization, you can create one now)
   - GitHub organizations: **rh-test-org** (enter the name of your organization)

   Example output

   ```
   I: Interactive mode enabled.
   Any optional fields can be left empty and a default will be selected.
   ? Type of identity provider: github
   ? Restrict to members of: organizations
   ? GitHub organizations: rh-test-org
   ? To use GitHub as an identity provider, you must first register the application:
     - Open the following URL:
       https://github.com/organizations/rh-rosa-test-cluster/settings/applications/new?
   oauth_application%5Bcallback_url%5D=https%3A%2F%2Foauth-openshift.apps.rh-
   rosa-test-cluster.z7v0.s1.devshift.org%2Foauth2callback%2Fgithub-
   1&oauth_application%5Bname%5D=rh-rosa-test-cluster-
   stage&oauth_application%5Burl%5D=https%3A%2F%2Fconsole-openshift-
   ```

```
console.apps.rh-rosa-test-cluster.z7v0.s1.devshift.org
  - Click on 'Register application'
...
```

c. Follow the URL in the output and select **Register application** to register a new OAuth application in your GitHub organization. By registering the application, you enable the OAuth server that is built into ROSA to authenticate members of your GitHub organization into your cluster.

NOTE

The fields in the **Register a new OAuth application** GitHub form are automatically filled with the required values through the URL that is defined by the Red Hat OpenShift Service on AWS (ROSA) CLI, **rosa**.

d. Use the information from the GitHub application you created and continue the prompts. Enter the following values:

- Client ID: **<my_github_client_id>**
- Client Secret: [? for help] **<my_github_client_secret>**
- Hostname: (optional, you can leave it blank for now)
- Mapping method: **claim**

Continued example output

```
...
? Client ID: <my_github_client_id>
? Client Secret: [? for help] <my_github_client_secret>
? Hostname:
? Mapping method: claim
I: Configuring IDP for cluster 'rh_rosa_test_cluster'
I: Identity Provider 'github-1' has been created. You need to ensure that there is a list of
cluster administrators defined. See 'rosa create user --help' for more information. To
login into the console, open https://console-openshift-console.apps.rh-test-
org.z7v0.s1.devshift.org and click on github-1
```

The IDP can take 1-2 minutes to be configured within your cluster.

e. Enter the following command to verify that your IDP has been configured correctly:

```
$ rosa list idps --cluster=<cluster_name>
```

Example output

```
NAME       TYPE      AUTH URL
github-1    GitHub    https://oauth-openshift.apps.rh-rosa-test-
cluster1.j9n4.s1.devshift.org/oauth2callback/github-1
```

2. Log in to your cluster.

a. Enter the following command to get the **Console URL** of your cluster:

```
$ rosa describe cluster --cluster=<cluster_name>
```

Example output

```
Name:        rh-rosa-test-cluster1
ID:          1de87g7c30g75qechgh7l5b2bha6r04e
External ID: 34322be7-b2a7-45c2-af39-2c684ce624e1
API URL:     https://api.rh-rosa-test-cluster1.j9n4.s1.devshift.org:6443 1
Console URL: https://console-openshift-console.apps.rh-rosa-test-
cluster1.j9n4.s1.devshift.org
Nodes:       Master: 3, Infra: 3, Compute: 4
Region:      us-east-2
State:       ready
Created:     May 27, 2020
```

1 For a Red Hat OpenShift Service on AWS (ROSA) with hosted control planes (HCP) cluster, the port number should be **443**.

b. Navigate to the **Console URL**, and log in using your Github credentials.

c. In the top right of the OpenShift console, click your name and click **Copy Login Command**.

d. Select the name of the IDP you added (in our case **github-1**), and click **Display Token**.

e. Copy and paste the **oc** login command into your terminal.

```
$ oc login --token=z3sgOGVDk0k4vbqo_wFqBQQTnT-nA-nQLb8XEmWnw4X --
server=https://api.rh-rosa-test-cluster1.j9n4.s1.devshift.org:6443 1
```

1 For a ROSA with HCP cluster, use the port number **443**.

Example output

```
Logged into "https://api.rh-rosa-cluster1.j9n4.s1.devshift.org:6443" as "rh-rosa-test-user"
using the token provided. 1

You have access to 67 projects, the list has been suppressed. You can list all projects
with 'oc projects'

Using project "default".
```

1 For a ROSA with HCP cluster, the port number should be **443**.

f. Enter a simple **oc** command to verify everything is setup properly and that you are logged in.

```
$ oc version
```

Example output

```
Client Version: 4.4.0-202005231254-4a4cd75
Server Version: 4.3.18
Kubernetes Version: v1.16.2
```

7.3. GRANTING CLUSTER-ADMIN ACCESS

As the user who created the cluster, add the **cluster-admin** user role to your account to have the maximum administrator privileges. These privileges are not automatically assigned to your user account when you create the cluster.

Additionally, only the user who created the cluster can grant cluster access to other **cluster-admin** or **dedicated-admin** users. Users with **dedicated-admin** access have fewer privileges. As a best practice, limit the number of **cluster-admin** users to as few as possible.

Prerequisites

- You have added an identity provider (IDP) to your cluster.
- You have the IDP user name for the user you are creating.
- You are logged in to the cluster.

Procedure

1. Give your user **cluster-admin** privileges:

   ```
   $ rosa grant user cluster-admin --user=<idp_user_name> --cluster=<cluster_name>
   ```

2. Verify your user is listed as a cluster administrator:

   ```
   $ rosa list users --cluster=<cluster_name>
   ```

   #### Example output

   ```
   GROUP            NAME
   cluster-admins    rh-rosa-test-user
   dedicated-admins  rh-rosa-test-user
   ```

3. Enter the following command to verify that your user now has **cluster-admin** access. A cluster administrator can run this command without errors, but a dedicated administrator cannot.

   ```
   $ oc get all -n openshift-apiserver
   ```

   #### Example output

   ```
   NAME                  READY   STATUS    RESTARTS   AGE
   pod/apiserver-6ndg2   1/1     Running   0          17h
   pod/apiserver-lrmxs   1/1     Running   0          17h
   pod/apiserver-tsqhz   1/1     Running   0          17h
   NAME          TYPE        CLUSTER-IP      EXTERNAL-IP   PORT(S)   AGE
   service/api   ClusterIP   172.30.23.241   <none>        443/TCP   18h
   NAME                       DESIRED   CURRENT   READY   UP-TO-DATE   AVAILABLE   NODE
   ```

```
SELECTOR                    AGE
daemonset.apps/apiserver  3        3       3      3          3          node-
role.kubernetes.io/master=   18h
```

Additional resources

- Cluster administration role

7.4. GRANTING DEDICATED-ADMIN ACCESS

Only the user who created the cluster can grant cluster access to other **cluster-admin** or **dedicated-admin** users. Users with **dedicated-admin** access have fewer privileges. As a best practice, grant **dedicated-admin** access to most of your administrators.

Prerequisites

- You have added an identity provider (IDP) to your cluster.
- You have the IDP user name for the user you are creating.
- You are logged in to the cluster.

Procedure

1. Enter the following command to promote your user to a **dedicated-admin**:

```
$ rosa grant user dedicated-admin --user=<idp_user_name> --cluster=<cluster_name>
```

2. Enter the following command to verify that your user now has **dedicated-admin** access:

```
$ oc get groups dedicated-admins
```

Example output

```
NAME              USERS
dedicated-admins   rh-rosa-test-user
```

NOTE

A **Forbidden** error displays if user without **dedicated-admin** privileges runs this command.

Additional resources

- Customer administrator user

7.5. ADDITIONAL RESOURCES

- Configuring identity providers using Red Hat OpenShift Cluster Manager console
- Understanding the ROSA with STS deployment workflow

CHAPTER 8. CONFIGURING IDENTITY PROVIDERS FOR STS

After your Red Hat OpenShift Service on AWS (ROSA) cluster is created, you must configure identity providers to determine how users log in to access the cluster.

The following topics describe how to configure an identity provider using OpenShift Cluster Manager console. Alternatively, you can use the ROSA CLI (**rosa**) to configure an identity provider and access the cluster.

8.1. UNDERSTANDING IDENTITY PROVIDERS

Red Hat OpenShift Service on AWS includes a built-in OAuth server. Developers and administrators obtain OAuth access tokens to authenticate themselves to the API. As an administrator, you can configure OAuth to specify an identity provider after you install your cluster. Configuring identity providers allows users to log in and access the cluster.

8.1.1. Supported identity providers

You can configure the following types of identity providers:

Identity provider	Description
GitHub or GitHub Enterprise	Configure a GitHub identity provider to validate usernames and passwords against GitHub or GitHub Enterprise’s OAuth authentication server.
GitLab	Configure a GitLab identity provider to use GitLab.com or any other GitLab instance as an identity provider.
Google	Configure a Google identity provider using Google’s OpenID Connect integration.
LDAP	Configure an LDAP identity provider to validate usernames and passwords against an LDAPv3 server, using simple bind authentication.
OpenID Connect	Configure an OpenID Connect (OIDC) identity provider to integrate with an OIDC identity provider using an Authorization Code Flow.
htpasswd	Configure an htpasswd identity provider for a single, static administration user. You can log in to the cluster as the user to troubleshoot issues. **IMPORTANT** The htpasswd identity provider option is included only to enable the creation of a single, static administration user. htpasswd is not supported as a general-use identity provider for Red Hat OpenShift Service on AWS. For the steps to configure the single user, see *Configuring an htpasswd identity provider.*

8.1.2. Identity provider parameters

The following parameters are common to all identity providers:

Parameter	Description
name	The provider name is prefixed to provider user names to form an identity name.
mappingMethod	Defines how new identities are mapped to users when they log in. Enter one of the following values: claim The default value. Provisions a user with the identity's preferred user name. Fails if a user with that user name is already mapped to another identity. lookup Looks up an existing identity, user identity mapping, and user, but does not automatically provision users or identities. This allows cluster administrators to set up identities and users manually, or using an external process. Using this method requires you to manually provision users. add Provisions a user with the identity's preferred user name. If a user with that user name already exists, the identity is mapped to the existing user, adding to any existing identity mappings for the user. Required when multiple identity providers are configured that identify the same set of users and map to the same user names.

NOTE

When adding or changing identity providers, you can map identities from the new provider to existing users by setting the **mappingMethod** parameter to **add**.

8.2. CONFIGURING A GITHUB IDENTITY PROVIDER

Configure a GitHub identity provider to validate user names and passwords against GitHub or GitHub Enterprise's OAuth authentication server and access your Red Hat OpenShift Service on AWS cluster. OAuth facilitates a token exchange flow between Red Hat OpenShift Service on AWS and GitHub or GitHub Enterprise.

WARNING

Configuring GitHub authentication allows users to log in to Red Hat OpenShift Service on AWS with their GitHub credentials. To prevent anyone with any GitHub user ID from logging in to your Red Hat OpenShift Service on AWS cluster, you must restrict access to only those in specific GitHub organizations or teams.

Prerequisites

- The OAuth application must be created directly within the GitHub organization settings by the GitHub organization administrator.
- GitHub organizations or teams are set up in your GitHub account.

Procedure

1. From OpenShift Cluster Manager, navigate to the **Clusters** page and select the cluster that you need to configure identity providers for.

2. Click the **Access control** tab.

3. Click **Add identity provider**.

   NOTE

   You can also click the **Add Oauth configuration** link in the warning message displayed after cluster creation to configure your identity providers.

4. Select **GitHub** from the drop-down menu.

5. Enter a unique name for the identity provider. This name cannot be changed later.

   - An **OAuth callback URL** is automatically generated in the provided field. You will use this to register the GitHub application.

     ```
     https://oauth-openshift.apps.<cluster_name>.
     <cluster_domain>/oauth2callback/<idp_provider_name>
     ```

     For example:

     ```
     https://oauth-openshift.apps.openshift-cluster.example.com/oauth2callback/github
     ```

6. Register an application on GitHub.

7. Return to Red Hat OpenShift Service on AWS and select a mapping method from the drop-down menu. **Claim** is recommended in most cases.

8. Enter the **Client ID** and **Client secret** provided by GitHub.

9. Enter a **hostname**. A hostname must be entered when using a hosted instance of GitHub Enterprise.

10. Optional: You can use a certificate authority (CA) file to validate server certificates for the configured GitHub Enterprise URL. Click **Browse** to locate and attach a **CA file** to the identity provider.

11. Select **Use organizations** or **Use teams** to restrict access to a particular GitHub organization or a GitHub team.

12. Enter the name of the organization or team you would like to restrict access to. Click **Add more** to specify multiple organizations or teams that users can be a member of.

13. Click **Confirm**.

Verification

- The configured identity provider is now visible on the **Access control** tab of the **Clusters** page.

8.3. CONFIGURING A GITLAB IDENTITY PROVIDER

Configure a GitLab identity provider to use GitLab.com or any other GitLab instance as an identity provider.

Prerequisites

- If you use GitLab version 7.7.0 to 11.0, you connect using the OAuth integration. If you use GitLab version 11.1 or later, you can use OpenID Connect (OIDC) to connect instead of OAuth.

Procedure

1. From OpenShift Cluster Manager, navigate to the **Clusters** page and select the cluster that you need to configure identity providers for.

2. Click the **Access control** tab.

3. Click **Add identity provider**.

   NOTE

   You can also click the **Add Oauth configuration** link in the warning message displayed after cluster creation to configure your identity providers.

4. Select **GitLab** from the drop-down menu.

5. Enter a unique name for the identity provider. This name cannot be changed later.

   - An **OAuth callback URL** is automatically generated in the provided field. You will provide this URL to GitLab.

     ```
     https://oauth-openshift.apps.<cluster_name>.
     <cluster_domain>/oauth2callback/<idp_provider_name>
     ```

     For example:

     ```
     https://oauth-openshift.apps.openshift-cluster.example.com/oauth2callback/gitlab
     ```

6. Add a new application in GitLab .

7. Return to Red Hat OpenShift Service on AWS and select a mapping method from the drop-down menu. **Claim** is recommended in most cases.

8. Enter the **Client ID** and **Client secret** provided by GitLab.

9. Enter the **URL** of your GitLab provider.

10. Optional: You can use a certificate authority (CA) file to validate server certificates for the configured GitLab URL. Click **Browse** to locate and attach a **CA file** to the identity provider.

11. Click **Confirm**.

Verification

- The configured identity provider is now visible on the **Access control** tab of the **Clusters** page.

8.4. CONFIGURING A GOOGLE IDENTITY PROVIDER

Configure a Google identity provider to allow users to authenticate with their Google credentials.

> **WARNING**
>
> Using Google as an identity provider allows any Google user to authenticate to your server. You can limit authentication to members of a specific hosted domain with the **hostedDomain** configuration attribute.

Procedure

1. From OpenShift Cluster Manager, navigate to the **Clusters** page and select the cluster that you need to configure identity providers for.
2. Click the **Access control** tab.
3. Click **Add identity provider**.

   > **NOTE**
   >
   > You can also click the **Add Oauth configuration** link in the warning message displayed after cluster creation to configure your identity providers.

4. Select **Google** from the drop-down menu.
5. Enter a unique name for the identity provider. This name cannot be changed later.
   - An **OAuth callback URL** is automatically generated in the provided field. You will provide this URL to Google.

     ```
     https://oauth-openshift.apps.<cluster_name>.
     <cluster_domain>/oauth2callback/<idp_provider_name>
     ```

     For example:

     ```
     https://oauth-openshift.apps.openshift-cluster.example.com/oauth2callback/google
     ```

6. Configure a Google identity provider using Google's OpenID Connect integration.
7. Return to Red Hat OpenShift Service on AWS and select a mapping method from the drop-down menu. **Claim** is recommended in most cases.
8. Enter the **Client ID** of a registered Google project and the **Client secret** issued by Google.
9. Enter a hosted domain to restrict users to a Google Apps domain.
10. Click **Confirm**.

Verification

- The configured identity provider is now visible on the **Access control** tab of the **Clusters** page.

8.5. CONFIGURING A LDAP IDENTITY PROVIDER

Configure the LDAP identity provider to validate user names and passwords against an LDAPv3 server, using simple bind authentication.

Prerequisites

- When configuring a LDAP identity provider, you will need to enter a configured **LDAP URL**. The configured URL is an RFC 2255 URL, which specifies the LDAP host and search parameters to use. The syntax of the URL is:

```
ldap://host:port/basedn?attribute?scope?filter
```

URL component	Description
ldap	For regular LDAP, use the string **ldap**. For secure LDAP (LDAPS), use**ldaps** instead.
host:port	The name and port of the LDAP server. Defaults to **localhost:389** for ldap and **localhost:636** for LDAPS.
basedn	The DN of the branch of the directory where all searches should start from. At the very least, this must be the top of your directory tree, but it could also specify a subtree in the directory.
attribute	The attribute to search for. Although RFC 2255 allows a comma-separated list of attributes, only the first attribute will be used, no matter how many are provided. If no attributes are provided, the default is to use **uid**. It is recommended to choose an attribute that will be unique across all entries in the subtree you will be using.
scope	The scope of the search. Can be either **one** or **sub**. If the scope is not provided, the default is to use a scope of **sub**.
filter	A valid LDAP search filter. If not provided, defaults to **(objectClass=*)**

When doing searches, the attribute, filter, and provided user name are combined to create a search filter that looks like:

```
(&(<filter>)(<attribute>=<username>))
```

IMPORTANT

If the LDAP directory requires authentication to search, specify a **bindDN** and **bindPassword** to use to perform the entry search.

Procedure

1. From OpenShift Cluster Manager, navigate to the **Clusters** page and select the cluster that you need to configure identity providers for.

2. Click the **Access control** tab.

3. Click **Add identity provider**.

   NOTE

   You can also click the **Add Oauth configuration** link in the warning message displayed after cluster creation to configure your identity providers.

4. Select **LDAP** from the drop-down menu.

5. Enter a unique name for the identity provider. This name cannot be changed later.

6. Select a mapping method from the drop-down menu. **Claim** is recommended in most cases.

7. Enter a **LDAP URL** to specify the LDAP search parameters to use.

8. Optional: Enter a **Bind DN** and **Bind password**.

9. Enter the attributes that will map LDAP attributes to identities.

   - Enter an **ID** attribute whose value should be used as the user ID. Click **Add more** to add multiple ID attributes.

   - Optional: Enter a **Preferred username** attribute whose value should be used as the display name. Click **Add more** to add multiple preferred username attributes.

   - Optional: Enter an **Email** attribute whose value should be used as the email address. Click **Add more** to add multiple email attributes.

10. Optional: Click **Show advanced Options** to add a certificate authority (CA) file to your LDAP identity provider to validate server certificates for the configured URL. Click **Browse** to locate and attach a **CA file** to the identity provider.

11. Optional: Under the advanced options, you can choose to make the LDAP provider **Insecure**. If you select this option, a CA file cannot be used.

    IMPORTANT

    If you are using an insecure LDAP connection (ldap:// or port 389), then you must check the **Insecure** option in the configuration wizard.

12. Click **Confirm**.

Verification

- The configured identity provider is now visible on the **Access control** tab of the **Clusters** page.

8.6. CONFIGURING AN OPENID IDENTITY PROVIDER

Configure an OpenID identity provider to integrate with an OpenID Connect identity provider using an Authorization Code Flow.

IMPORTANT

The Authentication Operator in Red Hat OpenShift Service on AWS requires that the configured OpenID Connect identity provider implements the OpenID Connect Discovery specification.

Claims are read from the JWT **id_token** returned from the OpenID identity provider and, if specified, from the JSON returned by the Issuer URL.

At least one claim must be configured to use as the user's identity.

You can also indicate which claims to use as the user's preferred user name, display name, and email address. If multiple claims are specified, the first one with a non-empty value is used. The standard claims are:

Claim	Description
preferred_username	The preferred user name when provisioning a user. A shorthand name that the user wants to be referred to as, such as **janedoe**. Typically a value that corresponding to the user's login or username in the authentication system, such as username or email.
email	Email address.
name	Display name.

See the OpenID claims documentation for more information.

Prerequisites

- Before you configure OpenID Connect, check the installation prerequisites for any Red Hat product or service you want to use with your Red Hat OpenShift Service on AWS cluster.

Procedure

1. From OpenShift Cluster Manager, navigate to the **Clusters** page and select the cluster that you need to configure identity providers for.

2. Click the **Access control** tab.

3. Click **Add identity provider**.

   NOTE

   You can also click the **Add Oauth configuration** link in the warning message displayed after cluster creation to configure your identity providers.

4. Select **OpenID** from the drop-down menu.

5. Enter a unique name for the identity provider. This name cannot be changed later.

   - An **OAuth callback URL** is automatically generated in the provided field.

```
https://oauth-openshift.apps.<cluster_name>.
<cluster_domain>/oauth2callback/<idp_provider_name>
```

For example:

```
https://oauth-openshift.apps.openshift-cluster.example.com/oauth2callback/openid
```

6. Register a new OpenID Connect client in the OpenID identity provider by following the steps to create an authorization request .

7. Return to Red Hat OpenShift Service on AWS and select a mapping method from the drop-down menu. **Claim** is recommended in most cases.

8. Enter a **Client ID** and **Client secret** provided from OpenID.

9. Enter an **Issuer URL**. This is the URL that the OpenID provider asserts as the Issuer Identifier. It must use the https scheme with no URL query parameters or fragments.

10. Enter an **Email** attribute whose value should be used as the email address. Click **Add more** to add multiple email attributes.

11. Enter a **Name** attribute whose value should be used as the preferred username. Click **Add more** to add multiple preferred usernames.

12. Enter a **Preferred username** attribute whose value should be used as the display name. Click **Add more** to add multiple display names.

13. Optional: Click **Show advanced Options** to add a certificate authority (CA) file to your OpenID identity provider.

14. Optional: Under the advanced options, you can add **Additional scopes**. By default, the **OpenID** scope is requested.

15. Click **Confirm**.

Verification

- The configured identity provider is now visible on the **Access control** tab of the **Clusters** page.

8.7. CONFIGURING AN HTPASSWD IDENTITY PROVIDER

Configure an htpasswd identity provider to create a single, static user with cluster administration privileges. You can log in to your cluster as the user to troubleshoot issues.

IMPORTANT

The htpasswd identity provider option is included only to enable the creation of a single, static administration user. htpasswd is not supported as a general-use identity provider for Red Hat OpenShift Service on AWS.

Procedure

1. From OpenShift Cluster Manager, navigate to the **Clusters** page and select your cluster.

2. Select **Access control → Identity providers**.

3. Click **Add identity provider**.

4. Select **HTPasswd** from the **Identity Provider** drop-down menu.

5. Add a unique name in the **Name** field for the identity provider.

6. Use the suggested username and password for the static user, or create your own.

   NOTE

   The credentials defined in this step are not visible after you select **Add** in the following step. If you lose the credentials, you must recreate the identity provider and define the credentials again.

7. Select **Add** to create the htpasswd identity provider and the single, static user.

8. Grant the static user permission to manage the cluster:

   a. Under **Access control → Cluster Roles and Access**, select **Add user**.

   b. Enter the **User ID** of the static user that you created in the preceding step.

   c. Select a **Group**. Users in the **dedicated-admins** group have standard administrative privileges for Red Hat OpenShift Service on AWS. Users in the **cluster-admins** group have full administrative access to the cluster.

   d. Select **Add user** to grant the administration privileges to the user.

Verification

- The configured htpasswd identity provider is visible on the **Access control → Identity providers** page.

  NOTE

  After creating the identity provider, synchronization usually completes within two minutes. You can log in to the cluster as the user after the htpasswd identity provider becomes available.

- The single, administrative user is visible on the **Access control → Cluster Roles and Access** page. The administration group membership of the user is also displayed.

8.8. ADDITIONAL RESOURCES

- Accessing a cluster

- Understanding the ROSA with STS deployment workflow

CHAPTER 9. REVOKING ACCESS TO A ROSA CLUSTER

An identity provider (IDP) controls access to a Red Hat OpenShift Service on AWS (ROSA) cluster. To revoke access of a user to a cluster, you must configure that within the IDP that was set up for authentication.

9.1. REVOKING ADMINISTRATOR ACCESS USING THE ROSA CLI

You can revoke the administrator access of users so that they can access the cluster without administrator privileges. To remove the administrator access for a user, you must revoke the **dedicated-admin** or **cluster-admin** privileges. You can revoke the administrator privileges using the Red Hat OpenShift Service on AWS (ROSA) CLI, **rosa**, or using OpenShift Cluster Manager console.

9.1.1. Revoking dedicated-admin access using the ROSA CLI

You can revoke access for a **dedicated-admin** user if you are the user who created the cluster, the organization administrator user, or the super administrator user.

Prerequisites

- You have added an Identity Provider (IDP) to your cluster.
- You have the IDP user name for the user whose privileges you are revoking.
- You are logged in to the cluster.

Procedure

1. Enter the following command to revoke the **dedicated-admin** access of a user:

```
$ rosa revoke user dedicated-admin --user=<idp_user_name> --cluster=<cluster_name>
```

2. Enter the following command to verify that your user no longer has **dedicated-admin** access. The output does not list the revoked user.

```
$ oc get groups dedicated-admins
```

9.1.2. Revoking cluster-admin access using the ROSA CLI

Only the user who created the cluster can revoke access for **cluster-admin** users.

Prerequisites

- You have added an Identity Provider (IDP) to your cluster.
- You have the IDP user name for the user whose privileges you are revoking.
- You are logged in to the cluster.

Procedure

1. Enter the following command to revoke the **cluster-admin** access of a user:

```
$ rosa revoke user cluster-admins --user=myusername --cluster=mycluster
```

2. Enter the following command to verify that the user no longer has **cluster-admin** access. The output does not list the revoked user.

```
$ oc get groups cluster-admins
```

9.2. REVOKING ADMINISTRATOR ACCESS USING OPENSHIFT CLUSTER MANAGER CONSOLE

You can revoke the **dedicated-admin** or **cluster-admin** access of users through OpenShift Cluster Manager console. Users will be able to access the cluster without administrator privileges.

Prerequisites

- You have added an Identity Provider (IDP) to your cluster.
- You have the IDP user name for the user whose privileges you are revoking.
- You are logged in to OpenShift Cluster Manager console using an OpenShift Cluster Manager account that you used to create the cluster, the organization administrator user, or the super administrator user.

Procedure

1. On the **Clusters** tab of OpenShift Cluster Manager, select the name of your cluster to view the cluster details.
2. Select **Access control** > **Cluster Roles and Access**.
3. For the user that you want to remove, click the **Options** menu ⋮ to the right of the user and group combination and click **Delete**.

CHAPTER 10. DELETING A ROSA CLUSTER

This document provides steps to delete a Red Hat OpenShift Service on AWS (ROSA) cluster that uses the AWS Security Token Service (STS). After deleting your cluster, you can also delete the AWS Identity and Access Management (IAM) resources that are used by the cluster.

10.1. PREREQUISITES

- If Red Hat OpenShift Service on AWS created a VPC, you must remove the following items from your cluster before you can successfully delete your cluster:
  - Network configurations, such as VPN configurations and VPC peering connections
  - Any additional services that were added to the VPC

If these configurations and services remain, the cluster does not delete properly.

10.2. DELETING A ROSA CLUSTER AND THE CLUSTER-SPECIFIC IAM RESOURCES

You can delete a Red Hat OpenShift Service on AWS (ROSA) with AWS Security Token Service (STS) cluster by using the ROSA CLI (**rosa**) or Red Hat OpenShift Cluster Manager.

After deleting the cluster, you can clean up the cluster-specific Identity and Access Management (IAM) resources in your AWS account by using the ROSA CLI (**rosa**). The cluster-specific resources include the Operator roles and the OpenID Connect (OIDC) provider.

NOTE

The cluster deletion must complete before you remove the IAM resources, because the resources are used in the cluster deletion and clean-up processes.

If add-ons are installed, the cluster deletion takes longer because add-ons are uninstalled before the cluster is deleted. The amount of time depends on the number and size of the add-ons.

IMPORTANT

If the cluster that created the VPC during the installation is deleted, the associated installation program-created VPC will also be deleted, resulting in the failure of all the clusters that are using the same VPC. Additionally, any resources created with the same **tagSet** key-value pair of the resources created by the installation program and labeled with a value of **owned** will also be deleted.

Prerequisites

- You have installed a ROSA cluster.
- You have installed and configured the latest ROSA CLI (**rosa**) on your installation host.

Procedure

1. Obtain the cluster ID, the Amazon Resource Names (ARNs) for the cluster-specific Operator roles and the endpoint URL for the OIDC provider:

```
$ rosa describe cluster --cluster=<cluster_name> ①
```

① Replace **<cluster_name>** with the name of your cluster.

Example output

```
Name:                    mycluster
ID:                   1s3v4x39lhs8sm49m90mi0822o34544a ①
...
Operator IAM Roles: ②
 - arn:aws:iam::<aws_account_id>:role/mycluster-x4q9-openshift-machine-api-aws-cloud-credentials
 - arn:aws:iam::<aws_account_id>:role/mycluster-x4q9-openshift-cloud-credential-operator-cloud-crede
 - arn:aws:iam::<aws_account_id>:role/mycluster-x4q9-openshift-image-registry-installer-cloud-creden
 - arn:aws:iam::<aws_account_id>:role/mycluster-x4q9-openshift-ingress-operator-cloud-credentials
 - arn:aws:iam::<aws_account_id>:role/mycluster-x4q9-openshift-cluster-csi-drivers-ebs-cloud-credent
 - arn:aws:iam::<aws_account_id>:role/mycluster-x4q9-openshift-cloud-network-config-controller-cloud
State:                   ready
Private:                 No
Created:                 May 13 2022 11:26:15 UTC
Details Page:
https://console.redhat.com/openshift/details/s/296kyEFwzoy1CREQicFRdZybrc0
OIDC Endpoint URL:         https://oidc.op1.openshiftapps.com/<oidc_config_id> ③
```

① Lists the cluster ID.

② Specifies the ARNs for the cluster-specific Operator roles. For example, in the sample output the ARN for the role required by the Machine Config Operator is **arn:aws:iam::<aws_account_id>:role/mycluster-x4q9-openshift-machine-api-aws-cloud-credentials**.

③ Displays the endpoint URL for the cluster-specific OIDC provider.

> **IMPORTANT**
>
> You require the cluster ID to delete the cluster-specific STS resources using the ROSA CLI (**rosa**) after the cluster is deleted.

2. Delete the cluster:

- To delete the cluster by using Red Hat OpenShift Cluster Manager:

    a. Navigate to OpenShift Cluster Manager.

    b. Click the Options menu ⋮ next to your cluster and select **Delete cluster**.

c. Type the name of your cluster at the prompt and click **Delete**.

- To delete the cluster using the ROSA CLI (**rosa**):

  a. Enter the following command to delete the cluster and watch the logs, replacing **<cluster_name>** with the name or ID of your cluster:

  ```
  $ rosa delete cluster --cluster=<cluster_name> --watch
  ```

  IMPORTANT

  You must wait for the cluster deletion to complete before you remove the Operator roles and the OIDC provider. The cluster-specific Operator roles are required to clean-up the resources created by the OpenShift Operators. The Operators use the OIDC provider to authenticate.

3. Delete the OIDC provider that the cluster Operators use to authenticate:

```
$ rosa delete oidc-provider -c <cluster_id> --mode auto 1
```

1 Replace **<cluster_id>** with the ID of the cluster.

NOTE

You can use the **-y** option to automatically answer yes to the prompts.

4. Optional. Delete the cluster-specific Operator IAM roles:

IMPORTANT

The account-wide IAM roles can be used by other ROSA clusters in the same AWS account. Only remove the roles if they are not required by other clusters.

```
$ rosa delete operator-roles -c <cluster_id> --mode auto 1
```

1 Replace **<cluster_id>** with the ID of the cluster.

Troubleshooting

- If the cluster cannot be deleted because of missing IAM roles, see Additional Repairing a cluster that cannot be deleted.
- If the cluster cannot be deleted for other reasons:
  - Check that there are no Add-ons for your cluster pending in the Hybrid Cloud Console.
  - Check that all AWS resources and dependencies have been deleted in the Amazon Web Console.

Additional resources

- For steps to delete the account-wide IAM roles and policies, see Deleting the account-wide IAM roles and policies.
- For steps to delete the OpenShift Cluster Manager and user IAM roles, see Unlinking and deleting the OpenShift Cluster Manager and user IAM roles.

10.3. DELETING THE ACCOUNT-WIDE IAM RESOURCES

After you have deleted all Red Hat OpenShift Service on AWS (ROSA) with AWS Security Token Services (STS) clusters that depend on the account-wide AWS Identity and Access Management (IAM) resources, you can delete the account-wide resources.

If you no longer need to install a ROSA with STS cluster by using Red Hat OpenShift Cluster Manager, you can also delete the OpenShift Cluster Manager and user IAM roles.

IMPORTANT

The account-wide IAM roles and policies might be used by other ROSA clusters in the same AWS account. You must only remove the resources if they are not required by other clusters.

The OpenShift Cluster Manager and user IAM roles are required if you want to install, manage, and delete other ROSA clusters in the same AWS account by using OpenShift Cluster Manager. You must only remove the roles if you no longer need to install ROSA clusters in your account by using OpenShift Cluster Manager. See the "Additional resources" section for information on repairing your cluster if these roles are removed prior to deletion.

10.3.1. Deleting the account-wide IAM roles and policies

This section provides steps to delete the account-wide IAM roles and policies that you created for ROSA with STS deployments, along with the account-wide Operator policies. You can delete the account-wide AWS Identity and Access Management (IAM) roles and policies only after deleting all of the Red Hat OpenShift Service on AWS (ROSA) with AWS Security Token Services (STS) clusters that depend on them.

IMPORTANT

The account-wide IAM roles and policies might be used by other ROSA clusters in the same AWS account. You must only remove the roles if they are not required by other clusters.

Prerequisites

- You have installed a ROSA cluster.
- You have installed and configured the latest ROSA CLI (**rosa**) on your installation host.

Procedure

1. Delete the account-wide roles:

   a. List the account-wide roles in your AWS account by using the ROSA CLI (**rosa**):

```
$ rosa list account-roles
```

Example output

```
I: Fetching account roles
ROLE NAME                          ROLE TYPE      ROLE ARN
OPENSHIFT VERSION
ManagedOpenShift-ControlPlane-Role  Control plane  arn:aws:iam::
<aws_account_id>:role/ManagedOpenShift-ControlPlane-Role  4.10
ManagedOpenShift-Installer-Role     Installer      arn:aws:iam::
<aws_account_id>:role/ManagedOpenShift-Installer-Role     4.10
ManagedOpenShift-Support-Role       Support        arn:aws:iam::
<aws_account_id>:role/ManagedOpenShift-Support-Role       4.10
ManagedOpenShift-Worker-Role        Worker         arn:aws:iam::
<aws_account_id>:role/ManagedOpenShift-Worker-Role        4.10
```

b. Delete the account-wide roles:

```
$ rosa delete account-roles --prefix <prefix> --mode auto 1
```

1 You must include the **--<prefix>** argument. Replace **<prefix>** with the prefix of the account-wide roles to delete. If you did not specify a custom prefix when you created the account-wide roles, specify the default prefix, **ManagedOpenShift**.

IMPORTANT

The account-wide IAM roles might be used by other ROSA clusters in the same AWS account. You must only remove the roles if they are not required by other clusters.

2. Delete the account-wide in-line and Operator policies:

   a. Under the **Policies** page in the AWS IAM Console, filter the list of policies by the prefix that you specified when you created the account-wide roles and policies.

   NOTE

   If you did not specify a custom prefix when you created the account-wide roles, search for the default prefix, **ManagedOpenShift**.

   b. Delete the account-wide in-line policies and Operator policies by using the AWS IAM Console. For more information about deleting IAM policies by using the AWS IAM Console, see Deleting IAM policies in the AWS documentation.

   IMPORTANT

   The account-wide in-line and Operator IAM policies might be used by other ROSA clusters in the same AWS account. You must only remove the roles if they are not required by other clusters.

10.3.2. Unlinking and deleting the OpenShift Cluster Manager and user IAM roles

If you installed a Red Hat OpenShift Service on AWS (ROSA) cluster by using Red Hat OpenShift Cluster Manager, you created OpenShift Cluster Manager and user Identity and Access Management (IAM) roles and linked them to your Red Hat organization. After deleting your cluster, you can unlink and delete the roles by using the ROSA CLI (**rosa**).

IMPORTANT

The OpenShift Cluster Manager and user IAM roles are required if you want to use OpenShift Cluster Manager to install and manage other ROSA clusters in the same AWS account. You must only remove the roles if you no longer need to use OpenShift Cluster Manager to install ROSA clusters.

Prerequisites

- You created OpenShift Cluster Manager and user IAM roles and linked them to your Red Hat organization.
- You have installed and configured the latest ROSA CLI (**rosa**) on your installation host.
- You have organization administrator privileges in your Red Hat organization.

Procedure

1. Unlink the OpenShift Cluster Manager IAM role from your Red Hat organization and delete the role:

   a. List the OpenShift Cluster Manager IAM roles in your AWS account:

   ```
   $ rosa list ocm-roles
   ```

   #### Example output

   ```
   I: Fetching ocm roles
   ROLE NAME                              ROLE ARN
   LINKED  ADMIN
   ManagedOpenShift-OCM-Role-<red_hat_organization_external_id>  arn:aws:iam::
   <aws_account_id>:role/ManagedOpenShift-OCM-Role-
   <red_hat_organization_external_id>  Yes      Yes
   ```

   b. If your OpenShift Cluster Manager IAM role is listed as linked in the output of the preceding command, unlink the role from your Red Hat organization:

   ```
   $ rosa unlink ocm-role --role-arn <arn> 1
   ```

   1 Replace **<arn>** with the Amazon Resource Name (ARN) for your OpenShift Cluster Manager IAM role. The ARN is specified in the output of the preceding command. In the preceding example, the ARN is in the format **arn:aws:iam::<aws_account_external_id>:role/ManagedOpenShift-OCM-Role-<red_hat_organization_external_id>**.

   #### Example output

   ```
   I: Unlinking OCM role
   ```

```
? Unlink the 'arn:aws:iam::<aws_account_id>:role/ManagedOpenShift-OCM-Role-
<red_hat_organization_external_id>' role from organization '<red_hat_organization_id>'?
Yes
I: Successfully unlinked role-arn 'arn:aws:iam::
<aws_account_id>:role/ManagedOpenShift-OCM-Role-
<red_hat_organization_external_id>' from organization account
'<red_hat_organization_id>'
```

c. Delete the OpenShift Cluster Manager IAM role and policies:

```
$ rosa delete ocm-role --role-arn <arn>
```

Example output

```
I: Deleting OCM role
? OCM Role ARN: arn:aws:iam::<aws_account_id>:role/ManagedOpenShift-OCM-Role-
<red_hat_organization_external_id>
? Delete 'arn:aws:iam::<aws_account_id>:role/ManagedOpenShift-OCM-Role-
<red_hat_organization_external_id>' ocm role? Yes
? OCM role deletion mode: auto 1
I: Successfully deleted the OCM role
```

1 Specifies the deletion mode. You can use **auto** mode to automatically delete the OpenShift Cluster Manager IAM role and policies. In **manual** mode, the ROSA CLI generates the **aws** commands needed to delete the role and policies. **manual** mode enables you to review the details before running the **aws** commands manually.

2. Unlink the user IAM role from your Red Hat organization and delete the role:

a. List the user IAM roles in your AWS account:

```
$ rosa list user-roles
```

Example output

```
I: Fetching user roles
ROLE NAME                              ROLE ARN
LINKED
ManagedOpenShift-User-<ocm_user_name>-Role  arn:aws:iam::
<aws_account_id>:role/ManagedOpenShift-User-<ocm_user_name>-Role  Yes
```

b. If your user IAM role is listed as linked in the output of the preceding command, unlink the role from your Red Hat organization:

```
$ rosa unlink user-role --role-arn <arn> 1
```

1 Replace **<arn>** with the Amazon Resource Name (ARN) for your user IAM role. The ARN is specified in the output of the preceding command. In the preceding example, the ARN is in the format **arn:aws:iam::<aws_account_id>:role/ManagedOpenShift-User-<ocm_user_name>-Role**.

Example output

```
I: Unlinking user role
? Unlink the 'arn:aws:iam::<aws_account_id>:role/ManagedOpenShift-User-
<ocm_user_name>-Role' role from the current account '<ocm_user_account_id>'? Yes
I: Successfully unlinked role ARN 'arn:aws:iam::
<aws_account_id>:role/ManagedOpenShift-User-<ocm_user_name>-Role' from account
'<ocm_user_account_id>'
```

c. Delete the user IAM role:

```
$ rosa delete user-role --role-arn <arn>
```

Example output

```
I: Deleting user role
? User Role ARN: arn:aws:iam::<aws_account_id>:role/ManagedOpenShift-User-
<ocm_user_name>-Role
? Delete the 'arn:aws:iam::<aws_account_id>:role/ManagedOpenShift-User-
<ocm_user_name>-Role' role from the AWS account? Yes
? User role deletion mode: auto ①
I: Successfully deleted the user role
```

① Specifies the deletion mode. You can use **auto** mode to automatically delete the user IAM role. In **manual** mode, the ROSA CLI generates the **aws** command needed to delete the role. **manual** mode enables you to review the details before running the **aws** command manually.

10.4. ADDITIONAL RESOURCES

- For information about the AWS IAM resources for ROSA clusters that use STS, see About IAM resources for ROSA clusters that use STS.
- For information on cluster errors that are due to missing IAM roles, see Repairing a cluster that cannot be deleted.

CHAPTER 11. DEPLOYING ROSA WITHOUT AWS STS

11.1. AWS PREREQUISITES FOR ROSA

Red Hat OpenShift Service on AWS (ROSA) provides a model that allows Red Hat to deploy clusters into a customer's existing Amazon Web Service (AWS) account.

You must ensure that the prerequisites are met before installing ROSA. This requirements document does not apply to AWS Security Token Service (STS). If you are using STS, see the STS-specific requirements.

TIP

AWS Security Token Service (STS) is the recommended credential mode for installing and interacting with clusters on Red Hat OpenShift Service on AWS (ROSA) because it provides enhanced security.

11.1.1. Customer Requirements

Red Hat OpenShift Service on AWS (ROSA) clusters must meet several prerequisites before they can be deployed.

NOTE

In order to create the cluster, the user must be logged in as an IAM user and not an assumed role or STS user.

11.1.1.1. Account

- The customer ensures that the AWS limits are sufficient to support Red Hat OpenShift Service on AWS provisioned within the customer's AWS account.
- The customer's AWS account should be in the customer's AWS Organizations with the applicable service control policy (SCP) applied.

  NOTE

  It is not a requirement that the customer's account be within the AWS Organizations or for the SCP to be applied, however Red Hat must be able to perform all the actions listed in the SCP without restriction.

- The customer's AWS account should not be transferable to Red Hat.
- The customer may not impose AWS usage restrictions on Red Hat activities. Imposing restrictions will severely hinder Red Hat's ability to respond to incidents.
- The customer may deploy native AWS services within the same AWS account.

  NOTE

  Customers are encouraged, but not mandated, to deploy resources in a Virtual Private Cloud (VPC) separate from the VPC hosting Red Hat OpenShift Service on AWS and other Red Hat supported services.

11.1.1.2. Access requirements

- To appropriately manage the Red Hat OpenShift Service on AWS service, Red Hat must have the **AdministratorAccess** policy applied to the administrator role at all times. This requirement does **not** apply if you are using AWS Security Token Service (STS).

  NOTE

  This policy only provides Red Hat with permissions and capabilities to change resources in the customer-provided AWS account.

- Red Hat must have AWS console access to the customer-provided AWS account. This access is protected and managed by Red Hat.
- The customer must not utilize the AWS account to elevate their permissions within the Red Hat OpenShift Service on AWS cluster.
- Actions available in the Red Hat OpenShift Service on AWS (ROSA) CLI, **rosa**, or OpenShift Cluster Manager console must not be directly performed in the customer's AWS account.

11.1.1.3. Support requirements

- Red Hat recommends that the customer have at least Business Support from AWS.
- Red Hat has authority from the customer to request AWS support on their behalf.
- Red Hat has authority from the customer to request AWS resource limit increases on the customer's account.
- Red Hat manages the restrictions, limitations, expectations, and defaults for all Red Hat OpenShift Service on AWS clusters in the same manner, unless otherwise specified in this requirements section.

11.1.1.4. Security requirements

- Volume snapshots will remain within the customer's AWS account and customer-specified region.
- Red Hat must have ingress access to EC2 hosts and the API server from allow-listed IP addresses.
- Red Hat must have egress allowed to forward system and audit logs to a Red Hat managed central logging stack.

11.1.2. Required customer procedure

Complete these steps before deploying Red Hat OpenShift Service on AWS (ROSA).

Procedure

1. If you, as the customer, are utilizing AWS Organizations, then you must use an AWS account within your organization or create a new one .
2. To ensure that Red Hat can perform necessary actions, you must either create a service control policy (SCP) or ensure that none is applied to the AWS account.

3. Attach the SCP to the AWS account.

4. Follow the ROSA procedures for setting up the environment.

11.1.2.1. Minimum set of effective permissions for service control policies (SCP)

Service control policies (SCP) are a type of organization policy that manages permissions within your organization. SCPs ensure that accounts within your organization stay within your defined access control guidelines. These polices are maintained in AWS Organizations and control the services that are available within the attached AWS accounts. SCP management is the responsibility of the customer.

NOTE

The minimum SCP requirement does not apply when using AWS Security Token Service (STS). For more information about STS, see AWS prerequisites for ROSA with STS.

Verify that your service control policy (SCP) does not restrict any of these required permissions.

	Service	Actions	Effect
Required	Amazon EC2	All	Allow
	Amazon EC2 Auto Scaling	All	Allow
	Amazon S3	All	Allow
	Identity And Access Management	All	Allow
	Elastic Load Balancing	All	Allow
	Elastic Load Balancing V2	All	Allow
	Amazon CloudWatch	All	Allow
	Amazon CloudWatch Events	All	Allow
	Amazon CloudWatch Logs	All	Allow
	AWS EC2 Instance Connect	SendSerialConsoleSSH PublicKey	Allow
	AWS Support	All	Allow
	AWS Key Management Service	All	Allow

	Service	Actions	Effect
	AWS Security Token Service	All	Allow
	AWS Tiro	CreateQuery GetQueryAnswer GetQueryExplanation	Allow
	AWS Marketplace	Subscribe Unsubscribe View Subscriptions	Allow
	AWS Resource Tagging	All	Allow
	AWS Route53 DNS	All	Allow
	AWS Service Quotas	ListServices GetRequestedServiceQuotaChange GetServiceQuota RequestServiceQuotaIncrease ListServiceQuotas	Allow
Optional	AWS Billing	ViewAccount Viewbilling ViewUsage	Allow
	AWS Cost and Usage Report	All	Allow
	AWS Cost Explorer Services	All	Allow

Additional resources

- Service control policies
- SCP effects on permissions

11.1.3. Red Hat managed IAM references for AWS

Red Hat is responsible for creating and managing the following Amazon Web Services (AWS) resources: IAM policies, IAM users, and IAM roles.

11.1.3.1. IAM Policies

NOTE

IAM policies are subject to modification as the capabilities of Red Hat OpenShift Service on AWS change.

- The **AdministratorAccess** policy is used by the administration role. This policy provides Red Hat the access necessary to administer the Red Hat OpenShift Service on AWS (ROSA) cluster in the customer's AWS account.

```
{
    "Version": "2012-10-17",
    "Statement": [
        {
            "Action": "*",
            "Resource": "*",
            "Effect": "Allow"
        }
    ]
}
```

11.1.3.2. IAM users

The **osdManagedAdmin** user is created immediately after installing ROSA into the customer's AWS account.

11.1.4. Provisioned AWS Infrastructure

This is an overview of the provisioned Amazon Web Services (AWS) components on a deployed Red Hat OpenShift Service on AWS (ROSA) cluster. For a more detailed listing of all provisioned AWS components, see the OpenShift Container Platform documentation.

11.1.4.1. EC2 instances

AWS EC2 instances are required for deploying the control plane and data plane functions of ROSA in the AWS public cloud.

Instance types can vary for control plane and infrastructure nodes, depending on the worker node count. At a minimum, the following EC2 instances will be deployed:

- Three **m5.2xlarge** control plane nodes
- Two **r5.xlarge** infrastructure nodes
- Two **m5.xlarge** customizable worker nodes

For further guidance on worker node counts, see the information about initial planning considerations in the "Limits and scalability" topic listed in the "Additional resources" section of this page.

11.1.4.2. Amazon Elastic Block Store storage

Amazon Elastic Block Store (Amazon EBS) block storage is used for both local node storage and persistent volume storage.

Volume requirements for each EC2 instance:

- Control Plane Volume
  - Size: 350GB
  - Type: gp3
  - Input/Output Operations Per Second: 1000
- Infrastructure Volume
  - Size: 300GB
  - Type: gp3
  - Input/Output Operations Per Second: 900
- Worker Volume
  - Size: 300GB
  - Type: gp3
  - Input/Output Operations Per Second: 900

NOTE

Clusters deployed before the release of OpenShift Container Platform 4.11 use gp2 type storage by default.

11.1.4.3. Elastic Load Balancing

Up to two Network Load Balancers for API and up to two Classic Load Balancers for application router. For more information, see the ELB documentation for AWS .

11.1.4.4. S3 storage

The image registry is backed by AWS S3 storage. Pruning of resources is performed regularly to optimize S3 usage and cluster performance.

NOTE

Two buckets are required with a typical size of 2TB each.

11.1.4.5. VPC

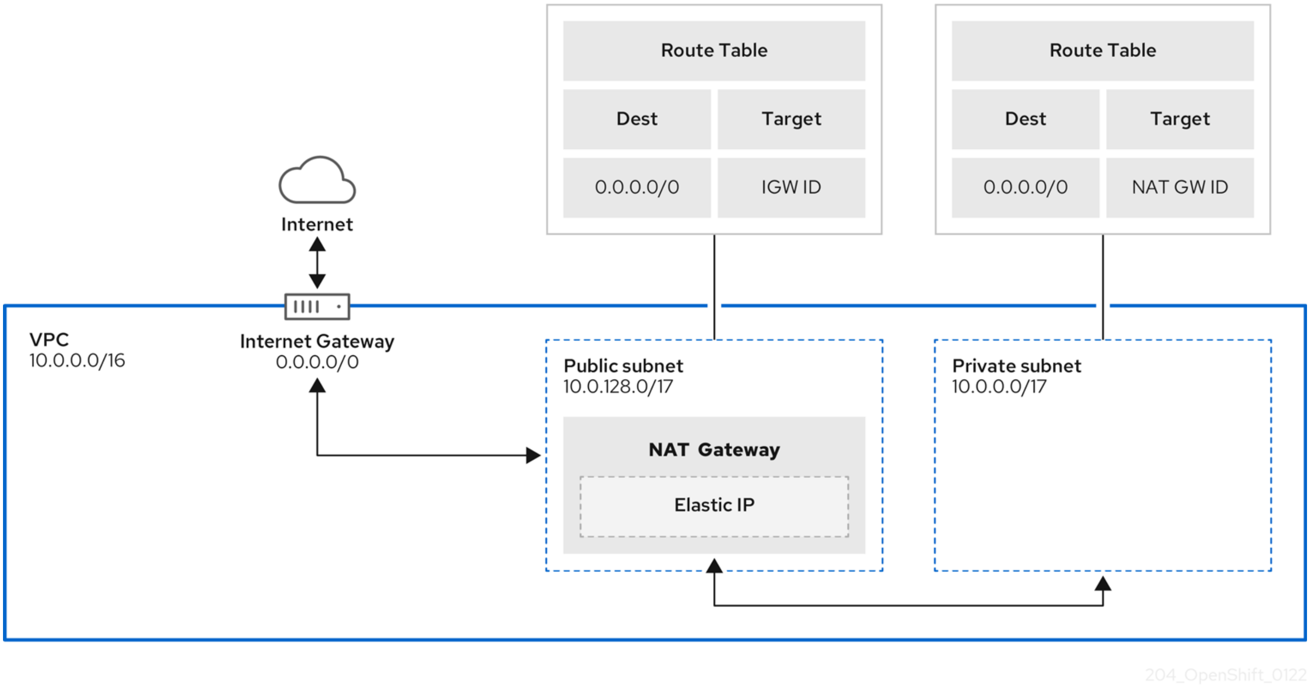
Customers should expect to see one VPC per cluster. Additionally, the VPC will need the following configurations:

- **Subnets**: Two subnets for a cluster with a single availability zone, or six subnets for a cluster with multiple availability zones.

> NOTE
>
> A **public subnet** connects directly to the internet through an internet gateway. A **private subnet** connects to the internet through a network address translation (NAT) gateway.

- **Route tables**: One route table per private subnet, and one additional table per cluster.
- **Internet gateways**: One Internet Gateway per cluster.
- **NAT gateways**: One NAT Gateway per public subnet.

Figure 11.1. Sample VPC Architecture



11.1.4.6. Security groups

AWS security groups provide security at the protocol and port access level; they are associated with EC2 instances and Elastic Load Balancing (ELB) load balancers. Each security group contains a set of rules that filter traffic coming in and out of one or more EC2 instances. You must ensure the ports required for the OpenShift installation are open on your network and configured to allow access between hosts.

Table 11.1. Required ports for default security groups

Group	Type	IP Protocol	Port range
MasterSecurityGroup	**AWS::EC2::Security Group**	**icmp**	**0**
		tcp	**22**

Group	Type	IP Protocol	Port range
		tcp	**6443**
		tcp	**22623**
WorkerSecurityGroup	**AWS::EC2::Security Group**	**icmp**	**0**
		tcp	**22**
BootstrapSecurityGroup	**AWS::EC2::Security Group**	**tcp**	**22**
		tcp	**19531**

11.1.4.6.1. Additional custom security groups

When you create a cluster using an existing non-managed VPC, you can add additional custom security groups during cluster creation. Custom security groups are subject to the following limitations:

- You must create the custom security groups in AWS before you create the cluster. For more information, see Amazon EC2 security groups for Linux instances .
- You must associate the custom security groups with the VPC that the cluster will be installed into. Your custom security groups cannot be associated with another VPC.
- You might need to request additional quota for your VPC if you are adding additional custom security groups. For information on AWS quota requirements for ROSA, see *Required AWS service quotas* in *Prepare your environment*. For information on requesting an AWS quota increase, see Requesting a quota increase .

11.1.5. AWS firewall prerequisites

IMPORTANT

Only ROSA clusters deployed with PrivateLink can use a firewall to control egress traffic.

This section provides the necessary details that enable you to control egress traffic from your Red Hat OpenShift Service on AWS cluster. If you are using a firewall to control egress traffic, you must configure your firewall to grant access to the domain and port combinations below. Red Hat OpenShift Service on AWS requires this access to provide a fully managed OpenShift service.

Procedure

1. Allowlist the following URLs that are used to install and download packages and tools:

Domain	Port	Function
registry.redhat.io	443	Provides core container images.
quay.io	443	Provides core container images.

Domain	Port	Function
.quay.io	443	Provides core container images.
sso.redhat.com	443	Required. The **https://console.redhat.com/openshift** site uses authentication from **sso.redhat.com** to download the pull secret and use Red Hat SaaS solutions to facilitate monitoring of your subscriptions, cluster inventory, chargeback reporting, and so on.
quay-registry.s3.amazonaws.com	443	Provides core container images.
ocm-quay-production-s3.s3.amazonaws.com	443	Provides core container images.
quayio-production-s3.s3.amazonaws.com	443	Provides core container images.
cart-rhcos-ci.s3.amazonaws.com	443	Provides Red Hat Enterprise Linux CoreOS (RHCOS) images.
openshift.org	443	Provides Red Hat Enterprise Linux CoreOS (RHCOS) images.
registry.access.redhat.com [1]	443	Hosts all the container images that are stored on the Red Hat Ecosytem Catalog. Additionally, the registry provides access to the **odo** CLI tool that helps developers build on OpenShift and Kubernetes.
registry.connect.redhat.com	443	Required for all third-party images and certified Operators.
console.redhat.com	443	Required. Allows interactions between the cluster and OpenShift Console Manager to enable functionality, such as scheduling upgrades.
sso.redhat.com	443	The **https://console.redhat.com/openshift** site uses authentication from **sso.redhat.com**.
pull.q1w2.quay.rhcloud.com	443	Provides core container images as a fallback when quay.io is not available.

Domain	Port	Function
.q1w2.quay.rhcloud.com	443	Provides core container images as a fallback when quay.io is not available.
www.okd.io	443	The **openshift.org** site redirects through **www.okd.io**.
www.redhat.com	443	The **sso.redhat.com** site redirects through **www.redhat.com**.
aws.amazon.com	443	The **iam.amazonaws.com** and **sts.amazonaws.com** sites redirect through **aws.amazon.com**.
catalog.redhat.com	443	The **registry.access.redhat.com** and **https://registry.redhat.io** sites redirect through **catalog.redhat.com**.
dvbwgdztaeq9o.cloudfront.net [2]	443	Used by ROSA for STS implementation with managed OIDC configuration.

1. In a firewall environment, ensure that the **access.redhat.com** resource is on the allowlist. This resource hosts a signature store that a container client requires for verifying images when pulling them from **registry.access.redhat.com**.

2. The string of alphanumeric characters before **cloudfront.net** could change if there is a major cloudfront outage that requires redirecting the resource.

When you add a site such as **quay.io** to your allowlist, do not add a wildcard entry such as **.quay.io** to your denylist. In most cases, image registries use a content delivery network (CDN) to serve images. If a firewall blocks access, then image downloads are denied when the initial download request is redirected to a host name such as **cdn01.quay.io**.

CDN host names, such as **cdn01.quay.io**, are covered when you add a wildcard entry, such as **.quay.io**, in your allowlist.

2. Allowlist the following telemetry URLs:

Domain	Port	Function
cert-api.access.redhat.com	443	Required for telemetry.
api.access.redhat.com	443	Required for telemetry.
infogw.api.openshift.com	443	Required for telemetry.
console.redhat.com	443	Required for telemetry and Red Hat Insights.
cloud.redhat.com/api/ingress	443	Required for telemetry and Red Hat Insights.

Domain	Port	Function
observatorium-mst.api.openshift.com	443	Required for managed OpenShift-specific telemetry.
observatorium.api.openshift.com	443	Required for managed OpenShift-specific telemetry.

Managed clusters require enabling telemetry to allow Red Hat to react more quickly to problems, better support the customers, and better understand how product upgrades impact clusters. For more information about how remote health monitoring data is used by Red Hat, see *About remote health monitoring* in the *Additional resources* section.

3. Allowlist the following Amazon Web Services (AWS) API URls:

Domain	Port	Function
.amazonaws.com	443	Required to access AWS services and resources.

Alternatively, if you choose to not use a wildcard for Amazon Web Services (AWS) APIs, you must allowlist the following URLs:

Domain	Port	Function
ec2.amazonaws.com	443	Used to install and manage clusters in an AWS environment.
events.<aws_region>.amazonaws.com	443	Used to install and manage clusters in an AWS environment.
iam.amazonaws.com	443	Used to install and manage clusters in an AWS environment.
route53.amazonaws.com	443	Used to install and manage clusters in an AWS environment.
sts.amazonaws.com	443	Used to install and manage clusters in an AWS environment, for clusters configured to use the global endpoint for AWS STS.
sts.<aws_region>.amazonaws.com	443	Used to install and manage clusters in an AWS environment, for clusters configured to use regionalized endpoints for AWS STS. See AWS STS regionalized endpoints for more information.

Domain	Port	Function
tagging.us-east-1.amazonaws.com	443	Used to install and manage clusters in an AWS environment. This endpoint is always us-east-1, regardless of the region the cluster is deployed in.
ec2.<aws_region>.amazonaws.com	443	Used to install and manage clusters in an AWS environment.
elasticloadbalancing.<aws_region>.amazonaws.com	443	Used to install and manage clusters in an AWS environment.
servicequotas.<aws_region>.amazonaws.com	443	Required. Used to confirm quotas for deploying the service.
tagging.<aws_region>.amazonaws.com	443	Allows the assignment of metadata about AWS resources in the form of tags.

4. Allowlist the following OpenShift URLs:

Domain	Port	Function
mirror.openshift.com	443	Used to access mirrored installation content and images. This site is also a source of release image signatures, although the Cluster Version Operator (CVO) needs only a single functioning source.
storage.googleapis.com/openshift-release (Recommended)	443	Alternative site to mirror.openshift.com/. Used to download platform release signatures that are used by the cluster to know what images to pull from quay.io.
api.openshift.com	443	Used to check if updates are available for the cluster.

5. Allowlist the following site reliability engineering (SRE) and management URLs:

Domain	Port	Function
api.pagerduty.com	443	This alerting service is used by the in-cluster alertmanager to send alerts notifying Red Hat SRE of an event to take action on.

Domain	Port	Function
events.pagerduty.com	443	This alerting service is used by the in-cluster alertmanager to send alerts notifying Red Hat SRE of an event to take action on.
api.deadmanssnitch.com	443	Alerting service used by Red Hat OpenShift Service on AWS to send periodic pings that indicate whether the cluster is available and running.
nosnch.in	443	Alerting service used by Red Hat OpenShift Service on AWS to send periodic pings that indicate whether the cluster is available and running.
.osdsecuritylogs.splunkcloud.com OR **inputs1.osdsecuritylogs.splunkcloud.cominputs2.osdsecuritylogs.splunkcloud.cominputs4.osdsecuritylogs.splunkcloud.cominputs5.osdsecuritylogs.splunkcloud.cominputs6.osdsecuritylogs.splunkcloud.cominputs7.osdsecuritylogs.splunkcloud.cominputs8.osdsecuritylogs.splunkcloud.cominputs9.osdsecuritylogs.splunkcloud.cominputs10.osdsecuritylogs.splunkcloud.cominputs11.osdsecuritylogs.splunkcloud.cominputs12.osdsecuritylogs.splunkcloud.cominputs13.osdsecuritylogs.splunkcloud.cominputs14.osdsecuritylogs.splunkcloud.cominputs15.osdsecuritylogs.splunkcloud.com**	9997	Used by the **splunk-forwarder-operator** as a logging forwarding endpoint to be used by Red Hat SRE for log-based alerting.
http-inputs-osdsecuritylogs.splunkcloud.com	443	Required. Used by the **splunk-forwarder-operator** as a logging forwarding endpoint to be used by Red Hat SRE for log-based alerting.
sftp.access.redhat.com (Recommended)	22	The SFTP server used by **must-gather-operator** to upload diagnostic logs to help troubleshoot issues with the cluster.

6. Allowlist the following URLs for optional third-party content:

Domain	Port	Function
registry.connect.redhat.com	443	Required for all third-party-images and certified operators.

Domain	Port	Function
rhc4tp-prod-z8cxf-image-registry-us-east-1-evenkyleffocxqvofrk.s3.dualstack.us-east-1.amazonaws.com	443	Provides access to container images hosted on **registry.connect.redhat.com**
oso-rhc4tp-docker-registry.s3-us-west-2.amazonaws.com	443	Required for Sonatype Nexus, F5 Big IP operators.

7. If you did not allow a wildcard for Amazon Web Services (AWS) APIs, you must also allow the S3 bucket used for the internal OpenShift registry. To retrieve that endpoint, run the following command after the cluster is successfully provisioned:

   ```
   $ oc -n openshift-image-registry get pod -l docker-registry=default -o json | jq
   '.items[].spec.containers[].env[] | select(.name=="REGISTRY_STORAGE_S3_BUCKET")'
   ```

   The S3 endpoint should be in the following format:

   ```
   '<cluster-name>-<random-string>-image-registry-<cluster-region>-<random-
   string>.s3.dualstack.<cluster-region>.amazonaws.com'.
   ```

8. Allowlist any site that provides resources for a language or framework that your builds require.

9. Allowlist any outbound URLs that depend on the languages and frameworks used in OpenShift. See OpenShift Outbound URLs to Allow for a list of recommended URLs to be allowed on the firewall or proxy.

Additional resources

- About remote health monitoring
- Security groups
- Required AWS service quotas

11.1.6. Next steps

- Review the required AWS service quotas

11.1.7. Additional resources

- Limits and scalability
- SRE access to all Red Hat OpenShift Service on AWS clusters
- Understanding the ROSA deployment workflow

11.2. UNDERSTANDING THE ROSA DEPLOYMENT WORKFLOW

Before you create a Red Hat OpenShift Service on AWS (ROSA) cluster, you must complete the AWS prerequisites, verify that the required AWS service quotas are available, and set up your environment.

This document provides an overview of the ROSA workflow stages and refers to detailed resources for each stage.

TIP

AWS Security Token Service (STS) is the recommended credential mode for installing and interacting with clusters on Red Hat OpenShift Service on AWS (ROSA) because it provides enhanced security.

11.2.1. Overview of the ROSA deployment workflow

You can follow the workflow stages outlined in this section to set up and access a Red Hat OpenShift Service on AWS (ROSA) cluster.

1. Perform the AWS prerequisites. To deploy a ROSA cluster, your AWS account must meet the prerequisite requirements.

2. Review the required AWS service quotas . To prepare for your cluster deployment, review the AWS service quotas that are required to run a ROSA cluster.

3. Configure your AWS account . Before you create a ROSA cluster, you must enable ROSA in your AWS account, install and configure the AWS CLI (**aws**) tool, and verify the AWS CLI tool configuration.

4. Install the ROSA and OpenShift CLI tools and verify the AWS servce quotas . Install and configure the ROSA CLI (**rosa**) and the OpenShift CLI (**oc**). You can verify if the required AWS resource quotas are available by using the ROSA CLI.

5. Create a ROSA cluster or Create a ROSA cluster using AWS PrivateLink . Use the ROSA CLI (**rosa**) to create a cluster. You can optionally create a ROSA cluster with AWS PrivateLink.

6. Access a cluster. You can configure an identity provider and grant cluster administrator privileges to the identity provider users as required. You can also access a newly deployed cluster quickly by configuring a **cluster-admin** user.

7. Revoke access to a ROSA cluster for a user . You can revoke access to a ROSA cluster from a user by using the ROSA CLI or the web console.

8. Delete a ROSA cluster. You can delete a ROSA cluster by using the ROSA CLI (**rosa**).

11.2.2. Additional resources

- For information about using the ROSA deployment workflow to create a cluster that uses the AWS Security Token Service (STS), see Understanding the ROSA with STS deployment workflow.

- Configuring identity providers

- Deleting a cluster

- Deleting access to a cluster

- Command quick reference for creating clusters and users

11.3. REQUIRED AWS SERVICE QUOTAS

Review this list of the required Amazon Web Service (AWS) service quotas that are required to run an Red Hat OpenShift Service on AWS cluster.

TIP

AWS Security Token Service (STS) is the recommended credential mode for installing and interacting with clusters on Red Hat OpenShift Service on AWS (ROSA) because it provides enhanced security.

11.3.1. Required AWS service quotas

The table below describes the AWS service quotas and levels required to create and run one Red Hat OpenShift Service on AWS cluster. Although most default values are suitable for most workloads, you might need to request additional quota for the following cases:

- ROSA clusters require at least 100 vCPUs, but the default maximum value for vCPUs assigned to Running On-Demand Standard Amazon EC2 instances is **5**. Therefore if you have not created a ROSA cluster using the same AWS account previously, you must request additional EC2 quota for **Running On-Demand Standard (A, C, D, H, I, M, R, T, Z) instances**.

- Some optional cluster configuration features, such as custom security groups, might require you to request additional quota. For example, because ROSA associates 1 security group with network interfaces in worker machine pools by default, and the default quota for **Security groups per network interface** is **5**, if you want to add 5 custom security groups, you must request additional quota, because this would bring the total number of security groups on worker network interfaces to 6.

NOTE

The AWS SDK allows ROSA to check quotas, but the AWS SDK calculation does not account for your existing usage. Therefore, it is possible that the quota check can pass in the AWS SDK yet the cluster creation can fail. To fix this issue, increase your quota.

If you need to modify or increase a specific quota, see Amazon’s documentation on requesting a quota increase. Large quota requests are submitted to Amazon Support for review, and take some time to be approved. If your quota request is urgent, contact AWS Support.

Table 11.2. ROSA-required service quota

Quota name	Service code	Quota code	AWS default	Minimum required	Description

Quota name	Service code	Quota code	AWS default	Minimum required	Description
Running On-Demand Standard (A, C, D, H, I, M, R, T, Z) instances	ec2	L-1216C47A	5	100	Maximum number of vCPUs assigned to the Running On-Demand Standard (A, C, D, H, I, M, R, T, Z) instances. The default value of 5 vCPUs is not sufficient to create ROSA clusters. ROSA has a minimum requirement of 100 vCPUs for cluster creation.
Storage for General Purpose SSD (gp2) volume storage in TiB	ebs	L-D18FCD1D	50	300	The maximum aggregated amount of storage, in TiB, that can be provisioned across General Purpose SSD (gp2) volumes in this Region.

Quota name	Service code	Quota code	AWS default	Minimum required	Description
Storage for General Purpose SSD (gp3) volume storage in TiB	ebs	L-7A658B76	50	300	The maximum aggregated amount of storage, in TiB, that can be provisioned across General Purpose SSD (gp3) volumes in this Region. 300 TiB of storage is the required minimum for optimal performance.
Storage for Provisioned IOPS SSD (io1) volumes in TiB	ebs	L-FD252861	50	300	The maximum aggregated amount of storage, in TiB, that can be provisioned across Provisioned IOPS SSD (io1) volumes in this Region. 300 TiB of storage is the required minimum for optimal performance.

Table 11.3. General AWS service quotas

Quota name	Service code	Quota code	AWS default	Minimum required	Description

Quota name	Service code	Quota code	AWS default	Minimum required	Description
EC2-VPC Elastic IPs	ec2	L-0263D0A3	5	5	The maximum number of Elastic IP addresses that you can allocate for EC2-VPC in this Region.
VPCs per Region	vpc	L-F678F1CE	5	5	The maximum number of VPCs per Region. This quota is directly tied to the maximum number of internet gateways per Region.
Internet gateways per Region	vpc	L-A4707A72	5	5	The maximum number of internet gateways per Region. This quota is directly tied to the maximum number of VPCs per Region. To increase this quota, increase the number of VPCs per Region.
Network interfaces per Region	vpc	L-DF5E4CA3	5,000	5,000	The maximum number of network interfaces per Region.

Quota name	Service code	Quota code	AWS default	Minimum required	Description
Security groups per network interface	vpc	L-2AFB9258	5	5	The maximum number of security groups per network interface. This quota, multiplied by the quota for rules per security group, cannot exceed 1000.
Snapshots per Region	ebs	L-309BACF6	10,000	10,000	The maximum number of snapshots per Region
IOPS for Provisioned IOPS SSD (Io1) volumes	ebs	L-B3A130E6	300,000	300,000	The maximum aggregated number of IOPS that can be provisioned across Provisioned IOPS SDD (io1) volumes in this Region.
Application Load Balancers per Region	elasticloadbalancing	L-53DA6B97	50	50	The maximum number of Application Load Balancers that can exist in each region.
Classic Load Balancers per Region	elasticloadbalancing	L-E9E9831D	20	20	The maximum number of Classic Load Balancers that can exist in each region.

11.3.1.1. Additional resources

- How can I request, view, and manage service quota increase requests using AWS CLI commands?

- ROSA service quotas
- Request a quota increase

11.3.2. Next steps

- Configure your AWS account

11.3.3. Additional resources

- Understanding the ROSA deployment workflow

11.4. CONFIGURING YOUR AWS ACCOUNT

After you complete the AWS prerequisites, configure your AWS account and enable the Red Hat OpenShift Service on AWS (ROSA) service.

TIP

AWS Security Token Service (STS) is the recommended credential mode for installing and interacting with clusters on Red Hat OpenShift Service on AWS (ROSA) because it provides enhanced security.

11.4.1. Configuring your AWS account

To configure your AWS account to use the ROSA service, complete the following steps.

Prerequisites

- Review and complete the deployment prerequisites and policies.
- Create a Red Hat account, if you do not already have one. Then, check your email for a verification link. You will need these credentials to install ROSA.

Procedure

1. Log in to the Amazon Web Services (AWS) account that you want to use.
   A dedicated AWS account is recommended to run production clusters. If you are using AWS Organizations, you can use an AWS account within your organization or create a new one .

   If you are using AWS Organizations and you need to have a service control policy (SCP) applied to the AWS account you plan to use, see AWS Prerequisites for details on the minimum required SCP.

   As part of the cluster creation process, **rosa** establishes an **osdCcsAdmin** IAM user. This user uses the IAM credentials you provide when configuring the AWS CLI.

   NOTE

   This user has **Programmatic** access enabled and the **AdministratorAccess** policy attached to it.

2. Enable the ROSA service in the AWS Console.

a. Sign in to your AWS account.

b. To enable ROSA, go to the ROSA service and select **Enable OpenShift**.

3. Install and configure the AWS CLI.

   a. Follow the AWS command-line interface documentation to install and configure the AWS CLI for your operating system.
   Specify the correct **aws_access_key_id** and **aws_secret_access_key** in the **.aws/credentials** file. See AWS Configuration basics in the AWS documentation.

   b. Set a default AWS region.

   NOTE

   It is recommended to set the default AWS region by using the environment variable.

   The ROSA service evaluates regions in the following priority order:

   i. The region specified when running the **rosa** command with the **--region** flag.

   ii. The region set in the **AWS_DEFAULT_REGION** environment variable. See Environment variables to configure the AWS CLI in the AWS documentation.

   iii. The default region set in your AWS configuration file. See Quick configuration with aws configure in the AWS documentation.

   c. Optional: Configure your AWS CLI settings and credentials by using an AWS named profile. **rosa** evaluates AWS named profiles in the following priority order:

   i. The profile specified when running the **rosa** command with the **--profile** flag.

   ii. The profile set in the **AWS_PROFILE** environment variable. See Named profiles in the AWS documentation.

   d. Verify the AWS CLI is installed and configured correctly by running the following command to query the AWS API:

```
$ aws sts get-caller-identity --output text
```

Example output

```
<aws_account_id>    arn:aws:iam::<aws_account_id>:user/<username>  <aws_user_id>
```

After completing these steps, install ROSA.

11.4.2. Next steps

- Installing the ROSA CLI

11.4.3. Additional resources

- AWS prerequisites

- Required AWS service quotas and requesting increases
- Understanding the ROSA deployment workflow

11.5. INSTALLING THE RED HAT OPENSHIFT SERVICE ON AWS (ROSA) CLI, ROSA

After you configure your AWS account, install and configure the Red Hat OpenShift Service on AWS (ROSA) CLI, **rosa**.

TIP

AWS Security Token Service (STS) is the recommended credential mode for installing and interacting with clusters on Red Hat OpenShift Service on AWS (ROSA) because it provides enhanced security.

11.5.1. Installing and configuring the ROSA CLI

Install and configure the Red Hat OpenShift Service on AWS (ROSA) CLI, **rosa**. You can also install the OpenShift CLI (**oc**) and verify if the required AWS resource quotas are available by using the ROSA CLI (**rosa**).

Prerequisites

- Review and complete the AWS prerequisites and ROSA policies.
- Create a Red Hat account, if you do not already have one. Then, check your email for a verification link. You will need these credentials to install ROSA.
- Configure your AWS account and enable the ROSA service in your AWS account.

Procedure

1. Install **rosa**, the Red Hat OpenShift Service on AWS command-line interface (CLI).
   a. Download the latest release of the ROSA CLI for your operating system.
   b. Optional: Rename the executable file you downloaded to **rosa**. This documentation uses **rosa** to refer to the executable file.
   c. Optional: Add **rosa** to your path.

      Example

      ```
      $ mv rosa /usr/local/bin/rosa
      ```

   d. Enter the following command to verify your installation:

      ```
      $ rosa
      ```

      Example output

      ```
      Command line tool for Red Hat OpenShift Service on AWS.
      For further documentation visit https://access.redhat.com/documentation/en-
      ```

```
us/red_hat_openshift_service_on_aws

Usage:
  rosa [command]

Available Commands:
  completion  Generates completion scripts
  create      Create a resource from stdin
  delete      Delete a specific resource
  describe    Show details of a specific resource
  download    Download necessary tools for using your cluster
  edit        Edit a specific resource
  grant       Grant role to a specific resource
  help        Help about any command
  init        Applies templates to support Red Hat OpenShift Service on AWS
  install     Installs a resource into a cluster
  link        Link a ocm/user role from stdin
  list        List all resources of a specific type
  login       Log in to your Red Hat account
  logout      Log out
  logs        Show installation or uninstallation logs for a cluster
  revoke      Revoke role from a specific resource
  uninstall   Uninstalls a resource from a cluster
  unlink      UnLink a ocm/user role from stdin
  upgrade     Upgrade a resource
  verify      Verify resources are configured correctly for cluster install
  version     Prints the version of the tool
  whoami      Displays user account information

Flags:
      --color string   Surround certain characters with escape sequences to display them in
color on the terminal. Allowed options are [auto never always] (default "auto")
      --debug          Enable debug mode.
  -h, --help           help for rosa

Use "rosa [command] --help" for more information about a command.
```

e. Optional: Generate the command completion scripts for the ROSA CLI. The following example generates the Bash completion scripts for a Linux machine:

```
$ rosa completion bash | sudo tee /etc/bash_completion.d/rosa
```

f. Optional: Enable command completion for the ROSA CLI from your existing terminal. The following example enables Bash completion for **rosa** in an existing terminal on a Linux machine:

```
$ source /etc/bash_completion.d/rosa
```

2. Log in to your Red Hat account with **rosa**.

a. Enter the following command.

```
$ rosa login
```

b. Replace **<my_offline_access_token>** with your token.

Example output

```
To login to your Red Hat account, get an offline access token at
https://console.redhat.com/openshift/token/rosa
? Copy the token and paste it here: <my-offline-access-token>
```

Example output continued

```
I: Logged in as 'rh-rosa-user' on 'https://api.openshift.com'
```

3. Enter the following command to verify that your AWS account has the necessary permissions.

```
$ rosa verify permissions
```

Example output

```
I: Validating SCP policies...
I: AWS SCP policies ok
```

> **NOTE**
>
> This command verifies permissions only for ROSA clusters that do not use the AWS Security Token Service (STS).

4. Verify that your AWS account has the necessary quota to deploy an Red Hat OpenShift Service on AWS cluster.

```
$ rosa verify quota --region=us-west-2
```

Example output

```
I: Validating AWS quota...
I: AWS quota ok
```

> **NOTE**
>
> Sometimes your AWS quota varies by region. If you receive any errors, try a different region.

If you need to increase your quota, go to your AWS console, and request a quota increase for the service that failed.

After both the permissions and quota checks pass, proceed to the next step.

5. Prepare your AWS account for cluster deployment:

   a. Run the following command to verify your Red Hat and AWS credentials are setup correctly. Check that your AWS Account ID, Default Region and ARN match what you expect. You can safely ignore the rows beginning with **OCM** for now.

```
$ rosa whoami
```

Example output

```
AWS Account ID:               000000000000
AWS Default Region:           us-east-2
AWS ARN:                      arn:aws:iam::000000000000:user/hello
OCM API:                      https://api.openshift.com
OCM Account ID:               1DzGIdIhqEWyt8UUXQhSoWaaaaa
OCM Account Name:             Your Name
OCM Account Username:         you@domain.com
OCM Account Email:            you@domain.com
OCM Organization ID:          1HopHfA2hcmhup5gCr2uH5aaaaa
OCM Organization Name:        Red Hat
OCM Organization External ID: 0000000
```

b. Initialize your AWS account. This step runs a CloudFormation template that prepares your AWS account for cluster deployment and management. This step typically takes 1-2 minutes to complete.

```
$ rosa init
```

Example output

```
I: Logged in as 'rh-rosa-user' on 'https://api.openshift.com'
I: Validating AWS credentials...
I: AWS credentials are valid!
I: Validating SCP policies...
I: AWS SCP policies ok
I: Validating AWS quota...
I: AWS quota ok
I: Ensuring cluster administrator user 'osdCcsAdmin'...
I: Admin user 'osdCcsAdmin' created successfully!
I: Verifying whether OpenShift command-line tool is available...
E: OpenShift command-line tool is not installed.
Run 'rosa download oc' to download the latest version, then add it to your PATH.
```

6. Install the OpenShift CLI (**oc**) from the ROSA CLI.

   a. Enter this command to download the latest version of the **oc** CLI:

   ```
   $ rosa download oc
   ```

   b. After downloading the **oc** CLI, unzip it and add it to your path.

   c. Enter this command to verify that the **oc** CLI is installed correctly:

   ```
   $ rosa verify oc
   ```

After installing ROSA, you are ready to create a cluster.

11.5.2. Next steps

- Create a ROSA cluster or Create an AWS PrivateLink cluster on ROSA .

11.5.3. Additional resources

- AWS prerequisites
- Required AWS service quotas and requesting increases
- Understanding the ROSA deployment workflow

11.6. CREATING A ROSA CLUSTER WITHOUT AWS STS

After you set up your environment and install Red Hat OpenShift Service on AWS (ROSA), create a cluster.

This document describes how to set up a ROSA cluster. Alternatively, you can create a ROSA cluster with AWS PrivateLink.

TIP

AWS Security Token Service (STS) is the recommended credential mode for installing and interacting with clusters on Red Hat OpenShift Service on AWS (ROSA) because it provides enhanced security.

11.6.1. Creating your cluster

You can create a Red Hat OpenShift Service on AWS (ROSA) cluster using the ROSA CLI (**rosa**).

Prerequisites

You have installed Red Hat OpenShift Service on AWS.

NOTE

AWS Shared VPCs are not currently supported for ROSA installs.

Procedure

1. You can create a cluster using the default settings or by specifying custom settings using the interactive mode. To view other options when creating a cluster, enter the **rosa create cluster --help** command.
   Creating a cluster can take up to 40 minutes.

   NOTE

   Multiple availability zones (AZ) are recommended for production workloads. The default is a single availability zone. Use **--help** for an example of how to set this option manually or use interactive mode to be prompted for this setting.

   - To create your cluster with the default cluster settings:

     ```
     $ rosa create cluster --cluster-name=<cluster_name>
     ```

     Example output

     ```
     I: Creating cluster with identifier '1de87g7c30g75qechgh7l5b2bha6r04e' and name 'rh-
     ```

```
rosa-test-cluster1'
I: To view list of clusters and their status, run `rosa list clusters`
I: Cluster 'rh-rosa-test-cluster1' has been created.
I: Once the cluster is 'Ready' you will need to add an Identity Provider and define the list
of cluster administrators. See `rosa create idp --help` and `rosa create user --help` for
more information.
I: To determine when your cluster is Ready, run `rosa describe cluster rh-rosa-test-
cluster1`.
```

- To create a cluster using interactive prompts:

```
$ rosa create cluster --interactive
```

- To configure your networking IP ranges, you can use the following default ranges. For more information when using manual mode, use the **rosa create cluster --help | grep cidr** command. In interactive mode, you are prompted for the settings.
  - Node CIDR: 10.0.0.0/16
  - Service CIDR: 172.30.0.0/16
  - Pod CIDR: 10.128.0.0/14

2. Enter the following command to check the status of your cluster. During cluster creation, the **State** field from the output will transition from **pending** to **installing**, and finally to **ready**.

```
$ rosa describe cluster --cluster=<cluster_name>
```

Example output

```
Name: rh-rosa-test-cluster1
OpenShift Version: 4.6.8
DNS: *.example.com
ID: uniqueidnumber
External ID: uniqueexternalidnumber
AWS Account: 123456789101
API URL: https://api.rh-rosa-test-cluster1.example.org:6443
Console URL: https://console-openshift-console.apps.rh-rosa-test-cluster1.example.or
Nodes: Master: 3, Infra: 2, Compute: 2
Region: us-west-2
Multi-AZ: false
State: ready
Channel Group: stable
Private: No
Created: Jan 15 2021 16:30:55 UTC
Details Page: https://console.redhat.com/examplename/details/idnumber
```

NOTE

If installation fails or the **State** field does not change to **ready** after 40 minutes, check the installation troubleshooting documentation for more details.

3. Track the progress of the cluster creation by watching the OpenShift installer logs:

```
$ rosa logs install --cluster=<cluster_name> --watch
```

11.6.2. Next steps

Configure identity providers

11.6.3. Additional resources

- Understanding the ROSA deployment workflow
- Deleting a ROSA cluster
- ROSA architecture models

11.7. CONFIGURING A PRIVATE CLUSTER

A Red Hat OpenShift Service on AWS cluster can be made private so that internal applications can be hosted inside a corporate network. In addition, private clusters can be configured to have only internal API endpoints for increased security.

Privacy settings can be configured during cluster creation or after a cluster is established.

11.7.1. Enabling private cluster on a new cluster

You can enable the private cluster setting when creating a new Red Hat OpenShift Service on AWS cluster.

IMPORTANT

Private clusters cannot be used with AWS security token service (STS). However, STS supports AWS PrivateLink clusters.

Prerequisites

AWS VPC Peering, VPN, DirectConnect, or TransitGateway has been configured to allow private access.

Procedure

Enter the following command to create a new private cluster.

```
$ rosa create cluster --cluster-name=<cluster_name> --private
```

NOTE

Alternatively, use **--interactive** to be prompted for each cluster option.

11.7.2. Enabling private cluster on an existing cluster

After a cluster has been created, you can later enable the cluster to be private.

IMPORTANT

Private clusters cannot be used with AWS security token service (STS). However, STS supports AWS PrivateLink clusters.

Prerequisites

AWS VPC Peering, VPN, DirectConnect, or TransitGateway has been configured to allow private access.

Procedure

Enter the following command to enable the **--private** option on an existing cluster.

```
$ rosa edit cluster --cluster=<cluster_name> --private
```

NOTE

Transitioning your cluster between private and public can take several minutes to complete.

11.7.3. Additional resources

- Creating an AWS PrivateLink cluster on ROSA

11.8. DELETING ACCESS TO A ROSA CLUSTER

Delete access to a Red Hat OpenShift Service on AWS (ROSA) cluster using the **rosa** command-line.

TIP

AWS Security Token Service (STS) is the recommended credential mode for installing and interacting with clusters on Red Hat OpenShift Service on AWS (ROSA) because it provides enhanced security.

11.8.1. Revoking dedicated-admin access using the ROSA CLI

You can revoke access for a **dedicated-admin** user if you are the user who created the cluster, the organization administrator user, or the super administrator user.

Prerequisites

- You have added an Identity Provider (IDP) to your cluster.
- You have the IDP user name for the user whose privileges you are revoking.
- You are logged in to the cluster.

Procedure

1. Enter the following command to revoke the **dedicated-admin** access of a user:

```
$ rosa revoke user dedicated-admin --user=<idp_user_name> --cluster=<cluster_name>
```

2. Enter the following command to verify that your user no longer has **dedicated-admin** access. The output does not list the revoked user.

```
$ oc get groups dedicated-admins
```

11.8.2. Revoking cluster-admin access using the ROSA CLI

Only the user who created the cluster can revoke access for **cluster-admin** users.

Prerequisites

- You have added an Identity Provider (IDP) to your cluster.
- You have the IDP user name for the user whose privileges you are revoking.
- You are logged in to the cluster.

Procedure

1. Enter the following command to revoke the **cluster-admin** access of a user:

```
$ rosa revoke user cluster-admins --user=myusername --cluster=mycluster
```

2. Enter the following command to verify that the user no longer has **cluster-admin** access. The output does not list the revoked user.

```
$ oc get groups cluster-admins
```

11.9. DELETING A ROSA CLUSTER

Delete a Red Hat OpenShift Service on AWS (ROSA) cluster using the **rosa** command-line.

TIP

AWS Security Token Service (STS) is the recommended credential mode for installing and interacting with clusters on Red Hat OpenShift Service on AWS (ROSA) because it provides enhanced security.

11.9.1. Prerequisites

- If Red Hat OpenShift Service on AWS created a VPC, you must remove the following items from your cluster before you can successfully delete your cluster:
  - Network configurations, such as VPN configurations and VPC peering connections
  - Any additional services that were added to the VPC

If these configurations and services remain, the cluster does not delete properly.

11.9.2. Deleting a ROSA cluster and the cluster-specific IAM resources

You can delete a Red Hat OpenShift Service on AWS (ROSA) with AWS Security Token Service (STS) cluster by using the ROSA CLI (**rosa**) or Red Hat OpenShift Cluster Manager.

After deleting the cluster, you can clean up the cluster-specific Identity and Access Management (IAM) resources in your AWS account by using the ROSA CLI (**rosa**). The cluster-specific resources include the Operator roles and the OpenID Connect (OIDC) provider.

NOTE

The cluster deletion must complete before you remove the IAM resources, because the resources are used in the cluster deletion and clean-up processes.

If add-ons are installed, the cluster deletion takes longer because add-ons are uninstalled before the cluster is deleted. The amount of time depends on the number and size of the add-ons.

IMPORTANT

If the cluster that created the VPC during the installation is deleted, the associated installation program-created VPC will also be deleted, resulting in the failure of all the clusters that are using the same VPC. Additionally, any resources created with the same **tagSet** key-value pair of the resources created by the installation program and labeled with a value of **owned** will also be deleted.

Prerequisites

- You have installed a ROSA cluster.
- You have installed and configured the latest ROSA CLI (**rosa**) on your installation host.

Procedure

1. Obtain the cluster ID, the Amazon Resource Names (ARNs) for the cluster-specific Operator roles and the endpoint URL for the OIDC provider:

```
$ rosa describe cluster --cluster=<cluster_name> 1
```

1 Replace **<cluster_name>** with the name of your cluster.

Example output

```
Name:                    mycluster
ID:                     1s3v4x39lhs8sm49m90mi0822o34544a 1
...
Operator IAM Roles: 2
 - arn:aws:iam::<aws_account_id>:role/mycluster-x4q9-openshift-machine-api-aws-cloud-
credentials
 - arn:aws:iam::<aws_account_id>:role/mycluster-x4q9-openshift-cloud-credential-operator-
cloud-crede
 - arn:aws:iam::<aws_account_id>:role/mycluster-x4q9-openshift-image-registry-installer-
cloud-creden
 - arn:aws:iam::<aws_account_id>:role/mycluster-x4q9-openshift-ingress-operator-cloud-
credentials
 - arn:aws:iam::<aws_account_id>:role/mycluster-x4q9-openshift-cluster-csi-drivers-ebs-
cloud-credent
 - arn:aws:iam::<aws_account_id>:role/mycluster-x4q9-openshift-cloud-network-config-
controller-cloud
```

```
State:                    ready
Private:                  No
Created:                  May 13 2022 11:26:15 UTC
Details Page:
https://console.redhat.com/openshift/details/s/296kyEFwzoy1CREQicFRdZybrc0
OIDC Endpoint URL:        https://oidc.op1.openshiftapps.com/<oidc_config_id> 3
```

1 Lists the cluster ID.

2 Specifies the ARNs for the cluster-specific Operator roles. For example, in the sample output the ARN for the role required by the Machine Config Operator is **arn:aws:iam::<aws_account_id>:role/mycluster-x4q9-openshift-machine-api-aws-cloud-credentials**.

3 Displays the endpoint URL for the cluster-specific OIDC provider.

IMPORTANT

You require the cluster ID to delete the cluster-specific STS resources using the ROSA CLI (**rosa**) after the cluster is deleted.

2. Delete the cluster:

   - To delete the cluster by using Red Hat OpenShift Cluster Manager:

     a. Navigate to OpenShift Cluster Manager.

     b. Click the Options menu ⋮ next to your cluster and select **Delete cluster**.

     c. Type the name of your cluster at the prompt and click **Delete**.

   - To delete the cluster using the ROSA CLI (**rosa**):

     a. Enter the following command to delete the cluster and watch the logs, replacing **<cluster_name>** with the name or ID of your cluster:

     ```
     $ rosa delete cluster --cluster=<cluster_name> --watch
     ```

     IMPORTANT

     You must wait for the cluster deletion to complete before you remove the Operator roles and the OIDC provider. The cluster-specific Operator roles are required to clean-up the resources created by the OpenShift Operators. The Operators use the OIDC provider to authenticate.

3. Delete the OIDC provider that the cluster Operators use to authenticate:

   ```
   $ rosa delete oidc-provider -c <cluster_id> --mode auto 1
   ```

   1 Replace **<cluster_id>** with the ID of the cluster.

NOTE

You can use the **-y** option to automatically answer yes to the prompts.

4. Optional. Delete the cluster-specific Operator IAM roles:

IMPORTANT

The account-wide IAM roles can be used by other ROSA clusters in the same AWS account. Only remove the roles if they are not required by other clusters.

```
$ rosa delete operator-roles -c <cluster_id> --mode auto 1
```

1 Replace **<cluster_id>** with the ID of the cluster.

Troubleshooting

- If the cluster cannot be deleted because of missing IAM roles, see Additional Repairing a cluster that cannot be deleted.
- If the cluster cannot be deleted for other reasons:
  - Check that there are no Add-ons for your cluster pending in the Hybrid Cloud Console.
  - Check that all AWS resources and dependencies have been deleted in the Amazon Web Console.

11.10. COMMAND QUICK REFERENCE FOR CREATING CLUSTERS AND USERS

TIP

AWS Security Token Service (STS) is the recommended credential mode for installing and interacting with clusters on Red Hat OpenShift Service on AWS (ROSA) because it provides enhanced security.

11.10.1. Command quick reference list

If you have already created your first cluster and users, this list can serve as a command quick reference list when creating additional clusters and users.

```
## Configures your AWS account and ensures everything is setup correctly
$ rosa init

## Starts the cluster creation process (~30-40minutes)
$ rosa create cluster --cluster-name=<cluster_name>

## Connect your IDP to your cluster
$ rosa create idp --cluster=<cluster_name> --interactive

## Promotes a user from your IDP to dedicated-admin level
$ rosa grant user dedicated-admin --user=<idp_user_name> --cluster=<cluster_name>
```

```
## Checks if your install is ready (look for State: Ready),
## and provides your Console URL to login to the web console.
$ rosa describe cluster --cluster=<cluster_name>
```

11.10.2. Additional resources

- Understanding the ROSA deployment workflow