



Red Hat Enterprise Linux 8

Creating customized RHEL images using the Image Builder service

Creating customized system images with Image Builder and uploading them to cloud environments

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Abstract

Red Hat Image Builder bundled with Insights enables you to create customized images and upload the image to the target cloud environments, such as Amazon Web Services, Microsoft Azure and Google Cloud Platform, download customized images and upload them to the VMware vSphere client, or to create customized Bare Metal and Guest images. Learn how to create images and upload them to the target cloud platforms.

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MAKING OPEN SOURCE MORE INCLUSIVE

Red Hat is committed to replacing problematic language in our code, documentation, and web properties. We are beginning with these four terms: master, slave, blacklist, and whitelist. Because of the enormity of this endeavor, these changes will be implemented gradually over several upcoming releases. For more details, see [our CTO Chris Wright's message](#).

PROVIDING FEEDBACK ON RED HAT DOCUMENTATION

We appreciate your feedback on our documentation. Let us know how we can improve it.

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1. View the documentation in the **Multi-page HTML** format and ensure that you see the **Feedback** button in the upper right corner after the page fully loads.
2. Use your cursor to highlight the part of the text that you want to comment on.
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1. Log in to the [Bugzilla](#) website.
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3. Enter a descriptive title in the **Summary** field.
4. Enter your suggestion for improvement in the **Description** field. Include links to the relevant parts of the documentation.
5. Click **Submit Bug**.

CHAPTER 1. INTRODUCING RED HAT IMAGE BUILDER ON CONSOLE.REDHAT.COM

1.1. RED HAT IMAGE BUILDER ON CONSOLE.REDHAT.COM

Red Hat Image Builder is a tool bundled with Red Hat Insights, within console.redhat.com. The console experience is also known as the Red Hat Hybrid Cloud Console.

With Red Hat Image Builder, RHEL customers can:

- Create customized system images, that can have a subscription activation key already embedded
- Add additional packages to the image during image creation
- Upload the customized images to the targeted clouds such as **Amazon Web Services**, **Microsoft Azure**, and **Google Cloud Platform**
- Download your customized images and upload it to the private **VMware vSphere client**
- Create customized **Bare Metal** and **Guest images**

RHEL customers can create images for a variety of deployment types, built according to the standards that are recommended for each deployment type.

CHAPTER 2. ACCESSING RED HAT IMAGE BUILDER ON CONSOLE.REDHAT.COM

2.1. GETTING ACCESS TO RED HAT IMAGE BUILDER ON CONSOLE.REDHAT.COM

Follow the steps to access Red Hat Image Builder on console.redhat.com.

Prerequisites

- An account at [Red Hat Customer Portal](#).
- A [Red Hat Insights](#) subscription for your account. Red Hat Insights is included with your Red Hat Enterprise Linux subscription.

Procedure

1. Access [Red Hat Image Builder](#).
2. Login with your Red Hat credentials.

You are now able to create and monitor your composes.

Additional resources

- [Create a Red Hat account](#)
- [Product Documentation for Red Hat Insights](#)
- [Registration Assistant](#)

CHAPTER 3. CREATING A CUSTOMIZED SYSTEM IMAGE WITH AN EMBED SUBSCRIPTION USING RED HAT IMAGE BUILDER

You can create customized system images using Red Hat Image Builder that have a subscription activation key already embedded and upload those images to the cloud target environment.

3.1. EMBEDDING AN AUTOMATIC SUBSCRIPTION DURING THE IMAGE CREATION BY USING RED HAT IMAGE BUILDER

You can create images that have a subscription activation key already embedded in the image. Then, you can perform the registration during image creation time.

Prerequisites

- An account at [Red Hat Customer Portal](#) with an Insights subscription.
- An Activation key. For more information on how to locate your key, see [Understanding activation keys](#).

Procedure

1. Access [Red Hat Image Builder](#) on the browser.
The Red Hat Image Builder dashboard appears.
2. Click **Create image**.
The **Create image** dialog wizard opens.
3. On the **Image output** page, complete the following steps:
 - a. From the **Release** list, select the Release that you want to use: for example, choose Red Hat Enterprise Linux (RHEL).
 - b. From the **Select target environments** option, select the desired target(s) cloud environment.
Click **Next**.
4. On the **Registration** page, select the type of registration that you want to use. You can select from these options:
 - **Register images with Red Hat** - Register and connect image instances, subscriptions and insights with Red Hat. For details on how to embed an activation key and register systems on first boot, see [Chapter 3, Creating a customized system image with an embed subscription using Red Hat Image Builder](#).
 - **Register image instances only** - Register and connect only image instances and subscriptions with Red Hat.
 - **Register later** - Register the system after the image creation.
Click **Next**.
5. Optional: On the **Packages** page, add packages to your image. See [Chapter 4, Adding packages during image creation by Using Red Hat Image Builder](#).
6. On the **Name image** page, enter a name for your image and click **Next**. If you do not enter a name, you can find the image you created by its UUID.

7. On the **Review** page, review the information and click **Create image**.
After you complete the steps in the **Create image** wizard, the **Image Builder** dashboard is displayed. Red Hat Image Builder starts the compose of a RHEL image for the **x86_64** architecture.

The Red Hat Image Builder Images dashboard opens. You can see details such as the Image UUID, the cloud target environment, the image OS release and the status of the image creation.



NOTE

The image build, upload and cloud registration processes can take up to ten minutes to complete.

Additional resources

- [Using Red Hat Subscription Management](#)

CHAPTER 4. ADDING PACKAGES DURING IMAGE CREATION BY USING RED HAT IMAGE BUILDER

You can customize your images during the creation process by adding additional packages from the BaseOS and AppStream RHEL repositories, through the UI. With that, you do not need to install the desired packages on first boot, which can be error-prone.

4.1. ADDING ADDITIONAL PACKAGES DURING THE IMAGE CREATION

When creating a customized image using Image Builder, you can add additional packages from the **BaseOS** and **AppStream** repositories. For that, follow the steps:

Prerequisites

- You have an account on [Red Hat Customer Portal](#) with an Insights subscription.
- Access to the [Red Hat Image Builder](#) dashboard.
- You have already completed the following steps:
 - Image output
 - Target cloud environment
 - Optionally, Registration

Procedure

1. On the **Packages** page:
 - a. Type the name of the package you want to add to your image in the **Available options** search bar.
Optionally, you can enter the first two letters of the package name to see the available package options. The packages are listed on the **Available options** dual list box.
 - b. Click the package or packages you want to add.
 - i. Click the **>>** button to add all packages shown in the package search results to the **Chosen options** dual list box.
Optionally, you can click the **>** button to add all selected packages.
 - c. After you have finished adding the additional packages, click **Next**.
2. On the **Name image** page, enter a name for your image and click **Next**. If you do not enter a name, you can find the image you created by its UUID.
3. On the **Review** page, review the details about the image creation and click **Create image**. After you complete the steps in the **Create image** wizard, the **Image Builder** dashboard is displayed. Red Hat Image Builder starts the compose of a RHEL image for the **x86_64** architecture.

The Red Hat Image Builder Images dashboard opens. You can see details such as the Image UUID, the cloud target environment, the image OS release and the status of the image creation.

**NOTE**

The image build, upload and cloud registration processes can take up to ten minutes to complete.

CHAPTER 5. CUSTOMIZING FILE SYSTEMS DURING THE IMAGE CREATION

By using Red Hat Image Builder you can customize your filesystem layouts to set up the desired partitions and sizes during the image creation process.

5.1. MANUALLY CONFIGURING PARTITIONS DURING IMAGE CREATION

When creating a customized image using Image Builder, you can customize the system configuration to use manual or automatic partitioning. Red Hat recommends using automatic partitioning, which is the default. Note that partitions can still be extended or reordered when using manual partitioning. To manually configure the partitioning of the image you are creating, complete the following steps:

Prerequisites

- You have an account on [Red Hat Customer Portal](#) with an Insights subscription.
- You have access to the [Red Hat Image Builder](#) dashboard.
- You have already completed the following steps:
 - Image output
 - Target cloud environment
 - Optionally, Registration

Procedure

1. On the **System Configuration - File system configuration** page:
You can select **Use automatic partitioning** or **Manually configure partitions** for your image file system.
 - a. Click the **Manually configure partitions** button.
The **Configure partitions** section opens, showing the configuration based on Red Hat standards and security guides.
2. From the dropdown menu, provide details to configure the partitions:
 - a. For the **Mount point** field, select one of the following mount point type options:
 - /app
 - /data
 - /home
 - /opt
 - /srv
 - /tmp
 - /usr

- /usr/local
- /var
- /

You can also add an additional path to the **Mount point**, such as **/tmp**. For example: **/var** as a prefix and **/tmp** as an additional path results in **/var/tmp**.



NOTE

Depending on the **Mount point** type you choose, the file system type changes to **xfs**, and so on.

- For the **Minimum size** partition field of the file system, enter the desired minimum partition size. In the **Minimum size** dropdown menu, you can use common size units such as **GiB**, **MiB**, or **KiB**. The default unit is **GiB**.



NOTE

Minimum size means that Image builder can still increase the partition sizes, in case they are too small to create a working image.

- To add more partitions, click the **Add partition** button. Repeat step 2 for each partition. If you see the following error message: "Duplicate partitions: Only one partition at each mount point can be created.", you can:

- Click the **remove** button to remove the duplicated partition.
- Choose a new mount point for the partition you want to create. After you finish the partitioning configuration, click **Next**.

- Optional: On the **Packages** page, add packages to your image. Click **Next**.

- On the **Name image** page, enter a name for your image and click **Next**. If you do not enter a name, you can find the image you created by its UUID.

- On the **Review** page, review the information.

- Click the **System Configuration** tab to review the file system configuration partitioning.

- Click **Create image**.

After you complete the steps in the **Create image** wizard, the **Image Builder** dashboard is displayed. Red Hat Image Builder starts the compose of a RHEL image for the **x86_64** architecture.

The Red Hat Image Builder Images dashboard opens. You can see details such as the Image UUID, the cloud target environment, the image OS release and the status of the image creation.



NOTE

The image build, upload and cloud registration processes can take up to ten minutes to complete.

Additional resources

- [Partition Naming Schemes and Mount Points](#)
- [Recommended partitioning scheme](#)
- [Customizing a mount point file system](#)

CHAPTER 6. CREATING AND UPLOADING A CUSTOMIZED RHEL SYSTEM IMAGE TO AMAZON WEB SERVICE USING RED HAT IMAGE BUILDER

You can create customized RHEL system images using Red Hat Image Builder, and upload those images to the Amazon Web Services (AWS) target environment.

6.1. CREATING AND UPLOADING A CUSTOMIZED RHEL SYSTEM IMAGE TO AWS USING IMAGE BUILDER

Follow the steps to create customized system images using Red Hat Image Builder and upload those images to Amazon Web Services (AWS).

Prerequisites

- You have an [AWS account](#) created.
- You have a Red Hat account. Access [Portal](#).

Procedure

1. Access [Red Hat Image Builder](#) on the browser.
The Red Hat Image Builder dashboard appears.
2. Click **Create image**.
The **Create image** dialog wizard opens.
3. On the **Image output** page, complete the following steps:
 - a. From the **Release** list, select the Release that you want to use: for example, choose Red Hat Enterprise Linux (RHEL).
 - b. From the **Select target environments** option, select **Amazon Web Services** as the **target environment**.
Click **Next**.
4. On the **Target Environment - Amazon Web Service** page, enter your **AWS account ID** and click **Next**.
You can find your AWS account ID by accessing the option [Account](#) on the AWS console.
5. On the **Registration** page, select the type of registration that you want to use. You can select from these options:
 - **Register images with Red Hat** - Register and connect image instances, subscriptions and insights with Red Hat. For details on how to embed an activation key and register systems on first boot, see [Chapter 3, Creating a customized system image with an embed subscription using Red Hat Image Builder](#).
 - **Register image instances only** - Register and connect only image instances and subscriptions with Red Hat.
 - **Register later** - Register the system after the image creation.
Click **Next**.

6. Optional: On the **Packages** page, add packages to your image. See [Chapter 4, Adding packages during image creation by Using Red Hat Image Builder](#).
7. On the **Name image** page, enter a name for your image and click **Next**. If you do not enter a name, you can find the image you created by its UUID.
8. On the **Review** page, review the details about the image creation and click **Create image**. After you complete the steps in the **Create image** wizard, the **Image Builder** dashboard is displayed.

Red Hat Image Builder starts the compose of a RHEL Amazon Machine Image (AMI) for the **x86_64** architecture and uploads it to AWS EC2. Then, it will share the **AMI** image with the account you specified.

On the dashboard, you can see details such as the **Image UUID**, the **cloud target environment**, the **image OS release** and the **status** of the image creation.

Possible statuses:

- Pending: the image upload and cloud registration is being processed.
- In Progress: the image upload and cloud registration is ongoing.
- Ready: the image upload and cloud registration is completed
- Failed: the image upload and cloud registration failed.



NOTE

The image build, upload and cloud registration processes can take up to ten minutes to complete.

Verification

- Check if the image status is **Ready**. It means that the image upload and cloud registration is completed successfully.



NOTE

The image artifacts are saved for 14 days and expire after that. Ensure to transfer the image to your account to avoid losing it.

6.2. ACCESSING YOUR CUSTOMIZED RHEL SYSTEM IMAGE FOR AWS FROM YOUR ACCOUNT

After the image is built, uploaded, and the cloud registration process status is marked as **Ready**, you can access the Amazon Web Services (AWS) image you created and shared with your **AWS EC2** account.

Prerequisites

- You have access to your [AWS Management Console](#).

Procedure

1. Access your [AWS account](#) and navigate to Service→EC2.
2. In the upper right menu, verify if you are under the correct region: **us-east-1**.
3. In the left side menu, under **Images**, click **AMIs**.
The dashboard with the **Owned by me** images opens.
4. From the dropdown menu, choose **Private images**.
You can see the image successfully shared with the **AWS** account you specified.

6.3. LAUNCHING YOUR CUSTOMIZED RHEL SYSTEM IMAGE FOR AWS FROM YOUR AWS EC2

You can launch the image you successfully shared with the **AWS EC2** account you have specified. To do so, follow the steps:

Prerequisites

- You have access to your customized image on AWS. See [Accessing your customized RHEL system image for AWS from your account](#).

Procedure

1. From the list of images, select the image you want to launch.
2. On the top of the panel, **click Launch**. You are redirected to the **Choose an Instance Type** window.
3. Choose the instance type according to the resources you need to launch your image. **Click Review and Launch**.
4. Review your instance launch details. You can edit each section, such as **Security**, **Storage**, for example, if you need to make any changes. After you finish the review, click **Launch**.
5. To launch the instance, you must select a public key to access it.
Create a new key pair in EC2 and attach it to the new instance.
 - a. From the drop-down menu list, select **Create a new key pair**.
 - b. Enter the name to the new key pair. It generates a new key pair.
 - c. Click **Download Key Pair** to save the new key pair on your local system.
6. Then, you can click **Launch Instance** to launch your instance.
You can check the status of the instance, it shows as **Initializing**.
7. After the instance status is **running**, the **Connect** button turns available.
8. Click **Connect**. A popup window appears with instructions on how to connect using SSH.
 - a. Select the preferred connection method to **A standalone SSH client** and open a terminal.
 - b. In the location you store your private key, make sure that your key is publicly viewable for SSH to work. To do so, run the command:

```
$ chmod 400 <your-instance-name.pem>
```

-
- c. Connect to your instance using its Public DNS:

```
$ ssh -i "<_your-instance-name.pem_" ec2-user@<_your-instance-IP-address_"
```

- d. Type **yes** to confirm that you want to continue connecting.

As a result, you are connected to your instance using SSH.

Verification

- From a terminal, check if you are able to perform any action while connected to your instance using SSH.

6.4. COPYING YOUR CUSTOMIZED RHEL SYSTEM IMAGE FOR AWS TO A DIFFERENT REGION ON YOUR AWS EC2

You can copy the image you successfully shared with the **Amazon Web Services EC2** to your own account. Doing so, you grant that the image you shared and copied is available until you delete it, instead of expiring after some time. To copy your image to your own account, follow the steps:

Prerequisites

- You have access to your customized image on AWS. See [Accessing your customized RHEL system image for AWS from your account](#)

Procedure

1. From the list of **Public images**, select the image you want to copy.
2. On the top of the panel, click **Actions**.
3. From the dropdown menu, choose **Copy AMI**. A popup window appears.
4. Choose the **Destination region** and click **Copy AMI**.
After the copying process is complete, you are provided with the new **AMI ID**. You can launch a new instance in the new region. See [Launching your customized RHEL system image for AWS from your AWS EC2](#)



NOTE

When you copy an image to a different region, it results in a separate and new **AMI** in the destination region, with a unique **AMI ID**.

CHAPTER 7. CREATING RHEL SYSTEM IMAGE AND UPLOADING TO MICROSOFT AZURE USING RED HAT IMAGE BUILDER

You can create customized RHEL system images using Red Hat Image Builder, and upload those images to the **Microsoft Azure** cloud target environment. Then, you can create a Virtual Machine (VM) from the image you shared with the Microsoft Azure Cloud account.

7.1. AUTHORIZING RED HAT IMAGE BUILDER TO PUSH IMAGES TO MICROSOFT AZURE CLOUD

Authorize Red Hat Image Builder to push images to the Microsoft Azure cloud. For that, you must:

- Configure Red Hat Image Builder as an authorized application for your **tenant GUID**
- Give it the role of **Contributor** to at least one resource group.
To authorize Red Hat Image Builder as an authorized application, follow the steps:

Prerequisites

- You have a [Subscription account](#) created in Microsoft Azure.
- You have an existing **Resource Group** in Azure portal.
- You have the **User Access Administrator** role rights.
- Your Microsoft Azure subscription has **Microsoft.Storage** and **Microsoft.Compute** as a resource provider.

Procedure

1. Access [Red Hat Image Builder](#) on a browser.
The Red Hat Image Builder dashboard appears.
2. Click **Create image**.
The **Create image** dialog wizard opens.
3. On the **Image output** page, complete the following steps:
 - a. From the **Release** list, select the Release that you want to use: for example, choose Red Hat Enterprise Linux (RHEL).
 - b. From the **Select target environments** option, select **Microsoft Azure**.
Click **Next**.
4. On the **Target Environment - Microsoft Azure** window, to add Red Hat Image Builder as an authorized application, complete the following steps:
 - a. Insert your **Tenant GUID**.
Image Builder checks if your **Tenant GUID** is correctly formatted and the **Authorize Image Builder** button becomes available.
 - b. Click **Authorize Image Builder** to authorize Red Hat Image Builder to push images to the Microsoft Azure cloud.

This redirects you to the Microsoft Azure portal.

- i. Login with your credentials.
- ii. Click **Accept** the **Permission requested**.
- c. Confirm that Red Hat Image Builder is authorized for your tenant.
 - i. Search for **Azure Active Directory** and choose **Enterprise applications**, from the left menu.
 - ii. Search for Red Hat Image Builder and confirm it is authorized.
- d. Add the **Enterprise application** as a contributor to your **Resource Group**.
 - i. In the search bar, type **Resource Groups** and select the first entry under **Services**. This redirects you to the **Resource Groups** dashboard.
 - ii. Select your **Resource Group**.
 - iii. On the left menu, click **Access control (IAM)** to add a permission so the **Red Hat Image Builder** application can access your resource group.
 - iv. From the menu, click the tab **Role assignments**.
 - v. Click **+Add**.
 - vi. From the dropdown menu, choose **Add role assignment**. A menu appears on the left side.
 - vii. Insert the following details:
 - A. Role: Assign the **Contributor** role
 - B. Assign access to: User, group, service principal. Add members: Click **+Select members** and type **Red Hat** in the search bar. Press enter.
 - C. Select: **Red Hat Image Builder** application

The Red Hat Image Builder application is now authorized to push images to Microsoft Azure cloud.



NOTE

Even though any user can add an application to the resources group, the application is not able to locate any resource unless the account administrator adds the shared application to the **IAM** image.

Verification

- From the menu, click the tab **Role assignments**.
You can see Red Hat Image Builder set as a **Contributor** of the **Resource Group** you selected.

Additional resources

- [Manage Azure Resource Manager resources group by using the Azure portal](#)

7.2. CREATING A CUSTOMIZED RHEL SYSTEM IMAGE FOR MICROSOFT AZURE USING IMAGE BUILDER

After you authorize Image Builder to push images to Microsoft Azure, create customized system images using Image Builder and upload those images to Microsoft Azure. For that, follow the steps:

Prerequisites

- You have created an [Azure Storage Account](#).
- You have a **Storage account** created.
- You authorized Image Builder to push images to Microsoft Azure. See [Authorizing Red Hat Image Builder to push images to Microsoft Azure Cloud](#).

Procedure

1. On the **Target Environment - Microsoft Azure** window, complete the following steps:
 - a. Enter your **Tenant GUID**: you can find your Tenant ID in the Azure Active Directory application in Microsoft Azure Portal.
 - b. Enter your **Subscription ID**: you can find your Subscription ID account by accessing the Microsoft Azure console.
 - c. Enter your **Resource group**: is the name of your Resource Group in Microsoft Azure Portal. Click **Next**.
2. On the **Registration** page, select the type of registration that you want to use. You can select from these options:
 - **Register images with Red Hat** - Register and connect image instances, subscriptions and insights with Red Hat. For details on how to embed an activation key and register systems on first boot, see [Chapter 3, Creating a customized system image with an embed subscription using Red Hat Image Builder](#).
 - **Register image instances only** - Register and connect only image instances and subscriptions with Red Hat.
 - **Register later** - Register the system after the image creation. Click **Next**.
3. Optional: On the **Packages** page, add packages to your image. See [Chapter 4, Adding packages during image creation by Using Red Hat Image Builder](#).
4. On the **Name image** page, enter a name for your image and click **Next**. If you do not enter a name, you can find the image you created by its UUID.
5. On the **Review** page, review the details about the image creation and click **Create image**. After you complete the steps in the **Create image** wizard, the **Image Builder** dashboard is displayed.

Red Hat Image Builder starts the compose of a RHEL Azure Disk Image image for the **x86_64** architecture, uploads it to the resource group account you specified, and creates an **Azure Image**.

The Red Hat Image Builder Images dashboard opens. You can see details such as the **Image UUID**, the **cloud target environment**, the **image OS release** and the **status** of the image creation. After the status is **Ready**, the Azure Disk Image is shared with the specified account.

On the dashboard, you can see details such as the **Image UUID**, the **cloud target environment**, the **image OS release** and the **status** of the image creation.

Possible statuses:

- Pending: the image upload and cloud registration is being processed.
- In Progress: the image upload and cloud registration is ongoing.
- Ready: the image upload and cloud registration is completed
- Failed: the image upload and cloud registration failed.



NOTE

The image build, upload and cloud registration processes can take up to ten minutes to complete.

Verification

- Check if the image status is **Ready**. It means that the image upload and cloud registration completed successfully.

Additional resources

- [How to find your Azure Active Directory tenant ID](#)

7.3. ACCESSING YOUR CUSTOMIZED RHEL SYSTEM IMAGE FROM YOUR MICROSOFT AZURE ACCOUNT

After you have build and uploaded the image, and the cloud registration process status is marked as **Ready**, you can access the Azure Disk Image from your **Microsoft Azure** account.

Prerequisites

- You have access to your [Microsoft Azure dashboard](#).

Procedure

- Access your [Microsoft Azure](#) dashboard and navigate to the **Resource group** page.

Verification

1. After you access your Microsoft Azure Account, you can see that the image successfully shared with the resource group account you specified.



NOTE

If the image is not visible there, you may have issues with the upload process. Return to the Red Hat Image Builder dashboard and check if the image is marked as **Ready**.

7.4. CREATING A VM FROM THE RHEL SYSTEM IMAGE SHARED WITH THE AZURE ACCOUNT

You can create a Virtual Machine (VM) from the image you shared with the Microsoft Azure Cloud account by using Red Hat Image Builder.

Prerequisites

- You must have a [Microsoft AzureStorage Account](#) created.
- You must have uploaded the required image to the Microsoft Azure Cloud account.

Procedure

1. Click **+ Create VM**. You are redirected to the **Create a virtual machine** dashboard.
2. In the **Basic** tab under **Project Details**, your **Subscription** and the **Resource Group** are pre-set.
Optional: If you want to create a new resource Group:
 - a. Click **Create new**.
A pop-up prompts you to create the **Resource Group Name** container.
 - b. Insert a name and click **OK**.
If you want to keep the **Resource Group** that is already pre-set.
3. Under **Instance Details**, insert:
 - a. **Virtual machine name**
 - b. **Region**
 - c. **Image**
 - d. **Size**: Choose a VM size that better suits your needs.
Keep the remaining fields as in the default choice.
4. Under **Administrator account**, enter the following details:
 - a. **Username**: the name of the account administrator.
 - b. **SSH public key source**: from the drop-down menu, select **Generate new key pair**.
 - c. **Key pair name**: insert a name for the key pair.
5. Under **Inbound port rules**:
 - a. **Public inbound ports**: select **Allow selected ports**.
 - b. **Select inbound ports**: Use the default set **SSH (22)**.

6. Click **Review + Create**. You are redirected to the **Review + create** tab. You receive a confirmation that the validation passed.
7. Review the details and click **Create**.
To change options, click **Previous**.
8. A **Generates New Key Pair** pop-up opens. Click **Download private key and create resources**.
Save the key file in the **yourKey.pem** file format.
9. After the deployment is complete, click **Go to resource**.
You are redirected to a new window with your VM details.
10. Select the public IP address on the top right side of the page and copy it to your clipboard.

Verification

Create an SSH connection to connect to the Virtual Machine you created. For that, follow the steps:

1. Open a terminal.
2. At your prompt, open an SSH connection to your virtual machine. Replace the IP address with the one from your VM, and replace the path to the **.pem** file with the path to where the key file was downloaded.

```
# ssh -i <yourKey.pem file location> <username>@<IP_address>
```

- Add the user name and replace the IP address with the one from your VM.
- Replace the path to the **.pem** file with the path to where the key file was downloaded.
For example:

```
# ssh -i ./Downloads/yourKey.pem azureuser@10.111.12.123
```

3. You are required to confirm if you want to continue to connect. Type **yes** to continue.
As a result, the output image you shared with the Azure Storage account is started and ready to be provisioned.



NOTE

The default user is **azureuser** and the password is **azureuser**.

CHAPTER 8. CREATING AND UPLOADING A CUSTOMIZED RHEL SYSTEM IMAGE TO GCP USING RED HAT IMAGE BUILDER

You can create customized RHEL system images by using Red Hat Image Builder and upload those images to the Google Cloud Platform target environment.

8.1. CREATING A CUSTOMIZED RHEL SYSTEM IMAGE FOR GOOGLE CLOUD PLATFORM USING RED HAT IMAGE BUILDER

You can create customized system images by using Red Hat Image Builder and upload those images to Google Cloud Platform. Then, you can start an instance from the image you uploaded.

Prerequisites

- You have a valid Google account to share your image.
- You have a Red Hat account. Access [Portal](#).
- You have access to the [Red Hat Image Builder](#).

Procedure

1. Access [Red Hat Image Builder](#) on the browser.
The Red Hat Image Builder dashboard appears.
2. Click **Create image**.
The **Create image** dialog wizard opens.
3. On the **Image output** page, complete the following steps:
 - a. From the dropdown menu, select the Release: Red Hat Enterprise Linux (RHEL).
 - b. From the **Select target environments** option, select **Google Cloud Platform**.
Click **Next**.
4. On the **Target environment- Google Cloud Platform** window, select a valid account type to share your image with: a Google account, a Service account or a domain name.
 - Google account: A Google account which interacts with Google Cloud, for example: **alice@gmail.com**.
 - Service account: An application account, for example: **myapp@appspot.gserviceaccount.com**.
 - Google group: A named collection of Google accounts and service accounts, for example: **admins@example.com**.
 - Google workspace domain/Cloud identity domain: A virtual group of all the Google accounts in a named organization. For example, the domain name **mycompany.com**.
5. Enter the account email address or domain name, depending on the type of target environment you chose.
Click **Next**.

6. On the **Registration** page, select the type of registration that you want to use. You can select from these options:
 - **Register images with Red Hat** - Register and connect image instances, subscriptions and insights with Red Hat. For details on how to embed an activation key and register systems on first boot, see [Chapter 3, Creating a customized system image with an embed subscription using Red Hat Image Builder](#).
 - **Register image instances only** - Register and connect only image instances and subscriptions with Red Hat.
 - **Register later** - Register the system after the image creation. Click **Next**.
7. Optional: On the **Packages** page, add packages to your image. See [Chapter 4, Adding packages during image creation by Using Red Hat Image Builder](#).
8. On the **Name image** page, enter a name for your image and click **Next**. If you do not enter a name, you can find the image you created by its UUID
9. On the **Review** page, review the details about the image creation and click **Create image**. After you complete the steps in the **Create image** wizard, the **Image Builder** dashboard is displayed.

Red Hat Image Builder starts to compose the RHEL image for the **x86_64** architecture and upload it to Google Cloud Platform. Then, it shares the image with the account you specified.

On the dashboard you can see details such as, the Image UUID, the cloud target environment, the image OS release and the status of the image creation. After the new image displays a **Ready** status in the **Status** column, Red Hat Image Builder shares the image with the account you specified.

Possible statuses:

- Pending: the image upload and cloud registration is being processed.
- In Progress: the image upload and cloud registration is ongoing.
- Ready: the image upload and cloud registration is completed
- Failed: the image upload and cloud registration failed.



NOTE

The image build, upload and cloud registration processes can take up to ten minutes to complete.

Verification

- Check the status in the **Images** Dashboard. Click the image name to expand and show details.
 - The **Ready** status indicates that the image has been successfully created and shared with the Google account.
 - In addition, the window shows the number of days until image expiration.
 - You can check which account the image is shared with.

**NOTE**

The image artifacts are saved for 14 days and expire after that. Ensure to transfer the image to your account to avoid losing it.

8.2. CREATING A VM INSTANCE USING YOUR GCE IMAGE

After the image is built, uploaded and the cloud registration process status is marked as **Ready**, you can create a Virtual Machine (VM) instance using the GCE image.

Prerequisites

- You have the universally unique identifier (UUID) of the image you created.
- You have access to the Image-builder service API endpoint.
- You have access to your project details at [Google Cloud Platform](#).
- You can access [Google Cloud Shell](#) from your browser.

Procedure

1. From the Red Hat Image Builder dashboard, copy the image **UUID** of the image you created.
2. Access [/composes/{composeId}](#) API endpoint.
3. Click the **Try it Out** button to activate the **composeId** string path.
4. Enter the **UUID** into the **composes/{composeId}** field in the API endpoint.
5. Click **Execute**. The API endpoint generates a response in the **Response body**, for example:

```
{
  "image_status": {
    "status": "success",
    "upload_status": {
      "options": {
        "image_name": "composer-api-03f0e19c-0050-4c8a-a69e-88790219b086",
        "project_id": "red-hat-image-builder"
      },
      "status": "success",
      "type": "gcp"
    }
  }
}
```

6. From the **Response body** field, copy the **image_name** and **project_id** to access the image from the Google Cloud Platform environment.
7. From your browser, access [Google Cloud Shell](#).
8. Set your Google Cloud Platform **Project ID** as the default GCP project. You can find the Product ID of your project by accessing the [Google Cloud Platform dashboard](#).

```
$ gcloud config set project PROJECT_ID
```

9. In the **Authorize Cloud Shell** window prompt, click **Authorize** to allow this and future calls that require your credentials.
10. Create a VM instance with the image by using the `gcloud` command in the Google Cloud Shell:

```
$ gcloud compute instances create INSTANCE_NAME \  
  --image-project PROJECT_ID_FROM_RESPONSE \  
  --image IMAGE_NAME \  
  --zone GCP_ZONE
```

Where:

- *INSTANCE_NAME* is the name you give to your instance;
- *PROJECT_ID_FROM_RESPONSE* is the *project_id* generated by **Response body**;
- *IMAGE_NAME* is the *image_name* generated by **Response body**;
- *GCP_ZONE* is the GCP zone in which the instance will be created.

Verification

1. Verify that Compute Engine created the VM:

```
$ gcloud compute instances describe INSTANCE_NAME
```

2. Connect to the VM instance via SSH:

```
$ gcloud compute ssh --project=PROJECT_ID --zone=ZONE INSTANCE_NAME
```

Additional resources

- [Google Cloud Shell documentation](#)
- [Default region and zone](#)

8.3. COPYING THE GCE IMAGE TO YOUR PROJECT GROUP

After the image is built, uploaded and the cloud registration process status is marked as Ready, you can create a Virtual Machine (VM) instance using the GCE image.

Prerequisites

- The universally unique identifier (UUID) of the image you created.
- Access to the Image-builder service API endpoint.
- Access to the [Google Cloud Shell](#) from your browser.

Procedure

1. From the Image Builder dashboard, copy the **UUID** image of the image you created.
2. Access [/composes/{composeId} API endpoint](#).

3. Click the **Try it Out** button to activate the **composeId** string path.
4. Enter the **UUID** into the **composes/{composeId}** field in the API endpoint.
5. Click **Execute**. The API endpoint generates a response in the **Response body**, for example:

```
{
  "image_status": {
    "status": "success",
    "upload_status": {
      "options": {
        "image_name": "composer-api-03f0e19c-0050-4c8a-a69e-88790219b086",
        "project_id": "red-hat-image-builder"
      },
      "status": "success",
      "type": "gcp"
    }
  }
}
```

6. From the **Response body** field, copy the **image_name** and **project_id** to access the image from the Google Cloud Platform environment. From the **Response body**:

```
"image_name": "composer-api-03f0e19c-0050-4c8a-a69e-88790219b086",
"project_id": "red-hat-image-builder"
```

7. From your browser, access [Google Cloud Shell](#).
8. Set your Google Cloud Platform **Project ID** as the default GCP project. You can find the Product ID of your project by accessing the [Google Cloud Platform dashboard](#).

```
$ gcloud config set project PROJECT_ID
```

9. In the **Authorize Cloud Shell** window prompt, click **Authorize** to allow this and future calls that require your credentials.
10. Copy the image to your project by using the gcloud command:

```
$ gcloud compute images create MY_IMAGE_NAME \
  --source-image-project red-hat-image-builder \
  --source-image IMAGE_NAME
```

Where:

- *MY_IMAGE_NAME* is the name you give to your instance;
- red-hat-image-builder is the *project_id* generated by **Response body**;
- *IMAGE_NAME* is the *image_name* generated by **Response body**;

Verification

Confirm that the image has been successfully copied to your project:

- Using the Google Cloud Platform UI, by accessing the [Compute Engine / Images](#) section.

- Using the **gcloud** tool, by running the command in [Google Cloud Shell](#):

```
$ gcloud compute images list --no-standard-images
```

Additional resources

- [Google Cloud Shell documentation](#)

CHAPTER 9. CREATING AND UPLOADING A CUSTOMIZED RHEL VMDK SYSTEM IMAGE TO VSPHERE

You can create customized RHEL system images by using Red Hat Image Builder and upload those images to the **VMware vSphere** client.

9.1. CREATING A CUSTOMIZED RHEL VMDK SYSTEM IMAGE USING IMAGE BUILDER

You can create customized system images using Red Hat Image Builder and upload those images to VMware vSphere client.

Procedure

1. Access [Red Hat Image Builder](#) on the browser.
The Red Hat Image Builder dashboard appears.
2. Click **Create image**.
The **Create image** dialog wizard opens.
3. On the **Image output** page, complete the following steps:
 - a. From the **Release** list, select the Release that you want to use: for example, choose Red Hat Enterprise Linux (RHEL).
 - b. From the **Select target environments** option, select **VMWare**.
Click **Next**.
4. On the **Registration** page, select the type of registration that you want to use. You can select from these options:
 - **Register images with Red Hat** - Register and connect image instances, subscriptions and insights with Red Hat. For details on how to embed an activation key and register systems on first boot, see [Chapter 3, Creating a customized system image with an embed subscription using Red Hat Image Builder](#).
 - **Register image instances only** - Register and connect only image instances and subscriptions with Red Hat.
 - **Register later** - Register the system after the image creation.
Click **Next**.
5. Optional: On the **Packages** page, add packages to your image. See [Chapter 4, Adding packages during image creation by Using Red Hat Image Builder](#).
6. On the **Name image** page, enter a name for your image and click **Next**. If you do not enter a name, you can find the image you created by its UUID.
7. On the **Review** page, review the details about the image creation and click **Create image**. After you complete the steps in the **Create image** wizard, the **Image Builder** dashboard is displayed.
8. When the new image displays a **Ready** status in the **Status** column, click **Download .vmdk** in the **Instance** column.
The **.vmdk** image is saved to your system and is ready for deployment.

**NOTE**

The **.vmdk** images are available for 6 hours and expire after that. Ensure to download the image to avoid losing it.

9.2. UPLOADING AND DEPLOYING A VMDK IMAGE TO VMWARE VSPHERE

Upload a **.vmdk** image to VMware vSphere via HTTP.

Prerequisites

- You created an **.vmdk** image by using Image Builder.
- You have access to VMware vSphere.

Procedure

1. In the vCenter, click **Upload Files** .
After you upload the image to vCenter, you can deploy it into a virtual machine (VM).
2. Use your preferred method for VM creation in VMWare to create a virtual machine.
3. In the **New Virtual Machine** wizard, complete the steps to create a new VM. The following is required for your **.vmdk** image to function correctly:
 - For the **Customize hardware** step: When you create a VM, on the Device Configuration button on the upper right, delete the default New Hard Disk and use the drop-down to select an Existing Hard Disk disk image.

**NOTE**

You must use an IDE device as the Virtual Device Node for the disk you create. The default **SCSI** value results in an unbootable virtual machine.

- For the **Ready to complete** step: Review the details and click **Finish** to create the image. The new VM is created and available in vSphere Client.

9.3. CREATING A USER FOR THE VMDK IMAGE WITH CLOUD-INIT

To be able to login into your VM, you must create a user account. For that, follow the steps on the CLI.

**NOTE**

The GUI wizard does not support **cloud-init**.

Prerequisites

- You configured the **govc** VMware CLI tool client.
 - To use the **govc** VMware CLI tool client, you must set the following values in the environment:

```
GOVC_URL
GOVC_DATACENTER
GOVC_FOLDER
GOVC_DATASTORE
GOVC_RESOURCE_POOL
GOVC_NETWORK
```

Procedure

1. Access the directory where you downloaded your **.vmdk** image.
2. Create a file named **metadata.yaml**. Add the following information to this file:

```
instance-id: cloud-vm
local-hostname: vmname
```

3. Create a file named **userdata.yaml**. Add the following information to the file:

```
#cloud-config
users
- name: admin
  sudo: "ALL=(ALL) NOPASSWD:ALL"
  ssh_authorized_keys:
    - ssh-rsa AAA...fhHQ== your.email@example.com
```

- **ssh_authorized_keys** is your SSH public key. You can find your SSH public key in **~/.ssh/id_rsa.pub**.
4. Export the **metadata.yaml** and **userdata.yaml** files to the environment, compressed with **gzip**, encoded in **base64** as follows. They will be used in further steps.

```
export METADATA=$(gzip -c9 <metadata.yaml | { base64 -w0 2>/dev/null || base64; }) \
USERDATA=$(gzip -c9 <userdata.yaml | { base64 -w0 2>/dev/null || base64; })
```

5. Launch the image on vSphere with the **metadata.yaml** and **userdata.yaml** files:
 - a. Import the **.vmdk** image in to vSphere:

```
$ govc import.vmdk ./composer-api.vmdk foldername
```

- b. Create the VM in VSphere without powering it on:

```
govc vm.create \
-net.adapter=vmxnet3 \
-m=4096 -c=2 -g=rhel8_64Guest \
-firmware=bios -disk="foldername/composer-api.vmdk" \
-disk.controller=ide -on=false \
vmname
```

- c. Change the VM to add **ExtraConfig** variables, the **cloud-init** config:

```
govc vm.change -vm vmname \
-e guestinfo.metadata="${METADATA}" \
```

```
-e guestinfo.metadata.encoding="gzip+base64" \  
-e guestinfo.userdata="{USERDATA}" \  
-e guestinfo.userdata.encoding="gzip+base64"
```

d. Power-on the VM:

```
govc vm.power -on vmname
```

e. Retrieve the VM IP address:

```
HOST=$(govc vm.ip vmname)
```

f. Use SSH to log in to the VM, using the user-data specified in **cloud-init** file configuration:

```
$ ssh admin@HOST
```

Additional resources

- The [govc](#) documentation
- The [VMware - cloud init 22.2](#) documentation

CHAPTER 10. CREATING A CUSTOMIZED RHEL GUEST IMAGE USING RED HAT IMAGE BUILDER

You can create customized RHEL guest system images using Red Hat Image Builder. You can then download these images to create virtual machines from these guest images as per your requirements.

10.1. CREATING A CUSTOMIZED RHEL GUEST SYSTEM IMAGE USING IMAGE BUILDER

Follow the steps to create customized RHEL guest **.qcow2** images using Red Hat Image Builder.

Procedure

1. Access [Red Hat Image Builder](#) on the browser.
You are redirected to the Red Hat Image Builder dashboard.
2. Click **Create image**.
The **Create image** wizard opens.
3. On the Image output page, complete the following steps:
 - a. From the **Releases** list, select the release of Red Hat Enterprise Linux (RHEL) that you want to use to create the image.
 - b. From the **Select target environments** options, select **Virtualization - Guest image**
Click **Next**.
4. On the **Registration** page, select the type of registration that you want to use. You can select from these options:
 - a. **Register images with Red Hat** - Register and connect image instances, subscriptions and insights with Red Hat. For details on how to embed an activation key and register systems on first boot, see [Chapter 3, Creating a customized system image with an embed subscription using Red Hat Image Builder](#).
 - b. **Register image instances only** - Register and connect only image instances and subscriptions with Red Hat.
 - c. **Register later** - Register the system after the image creation.
Click **Next**.
5. Optional: On the **Packages** page, add packages to your image. See [Chapter 4, Adding packages during image creation by Using Red Hat Image Builder](#).
6. On the **Name image** page, enter a name for your image and click **Next**. If you do not enter a name, you can find the image you created by its UUID.
7. On the **Review** page, review the details about the image creation and click **Create image**.
After you complete the steps in the **Create image** wizard, the **Image Builder** dashboard is displayed.
8. When the new image displays a **Ready** status in the **Status** column, click **Download .qcow2** image in the **Instance** column.
The **.qcow2** image is saved to your system and is ready for deployment.

**NOTE**

The **.qcow2** images are available for 6 hours and expire after that. Ensure to download the image to avoid losing it.

10.2. CREATING A VIRTUAL MACHINE FROM THE CUSTOMIZED RHEL GUEST SYSTEM IMAGE

You can create a Virtual Machine (VM) from the **qcow2** image that you created using Red Hat Image Builder.

Prerequisites

- You created and downloaded a **.qcow2** image using Image Builder.

Procedure

- Access the directory where you downloaded your **.qcow2** image.
- Create a file named **meta-data**. Add the following information to this file:

```
instance-id: nocloud
local-hostname: vmname
```

- Create a file named **user-data**. Add the following information to the file:

```
#cloud-config
user: admin
password: password
chpasswd: {expire: False}
ssh_pwauth: True
ssh_authorized_keys:
  - ssh-rsa AAA...fhHQ== your.email@example.com
```

- ssh_authorized_keys** is your SSH public key. You can find your SSH public key in `~/.ssh/id_rsa.pub`.
- Use the **genisoimage** command to create an ISO image that includes the **user-data** and **meta-data** files.

```
# genisoimage -output cloud-init.iso -volid cidata -joliet -rock user-data meta-data
```

```
l: -input-charset not specified, using utf-8 (detected in locale settings)
Total translation table size: 0
Total rockridge attributes bytes: 331
Total directory bytes: 0
Path table size(bytes): 10
Max brk space used 0
183 extents written (0 MB)
```

- Create a new VM from the KVM Guest Image using the **virt-install** command. Include the ISO image you created on step 4 as an attachment to the VM image.

```
# virt-install \
```



```
--memory 4096 \  
--vcpus 4 \  
--name myvm \  
--disk composer-api.qcow2,device=disk,bus=virtio,format=qcow2 \  
--disk cloud-init.iso,device=cdrom \  
--os-variant rhel8.5 \  
--virt-type kvm \  
--graphics none \  
--import
```

Where,

- `--graphics none` - indicates that it is a headless RHEL Virtual Machine.
- `--vcpus 4` - indicates that it uses 4 virtual CPUs.
- `--memory 4096` - indicates that it uses 4096 MB RAM.

6. The VM installation starts:

```
Starting install...  
Connected to domain myvm  
...  
[ OK ] Started Execute cloud user/final scripts.  
[ OK ] Reached target Cloud-init target.  
  
Red Hat Enterprise Linux 8.5 (Ootpa)  
Kernel 4.18.0-221.el8.x86_64 on an x86_64
```

Additional resources

- [Creating virtual machines using the command-line interface](#)

CHAPTER 11. CREATING A CUSTOMIZED RHEL BARE METAL IMAGE USING RED HAT IMAGE BUILDER

You can create customized RHEL ISO system images using the Red Hat Image Builder. You can then download these images and install them on a bare metal system as per your requirements.

11.1. CREATING A CUSTOMIZED RHEL ISO SYSTEM IMAGE USING IMAGE BUILDER

Follow the steps to create custom RHEL **.iso** images using the Red Hat Image Builder.

Procedure

1. Access [Red Hat Image Builder](#) on the browser.
The Red Hat Image Builder dashboard opens.
2. Click **Create image**.
The **Create image** dialog wizard opens.
3. On the **Image output** page, complete the following steps:
 - a. From the **Release** list, select the Release that you want to use: for example, choose Red Hat Enterprise Linux (RHEL).
 - b. From the **Select target environments** option, select Bare metal - Installer.
Click **Next**.
4. On the **Registration** page, select the type of registration that you want to use. You can select from these options:
 - **Register images with Red Hat** - Register and connect image instances, subscriptions and insights with Red Hat. For details on how to embed an activation key and register systems on first boot, see [Chapter 3, Creating a customized system image with an embed subscription using Red Hat Image Builder](#).
 - **Register image instances only** - Register and connect only image instances and subscriptions with Red Hat.
 - **Register later** - Register the system after the image creation.
Click **Next**.
5. Optional: On the **Packages** page, add packages to your image. See [Chapter 4, Adding packages during image creation by Using Red Hat Image Builder](#).
6. On the **Name image** page, enter a name for your image and click **Next**. If you do not enter a name, you can find the image you created by its UUID.
7. On the **Review** page, review the details about the image creation and click **Create image**. Your image is created as a **.iso** image.
8. When the new image displays a **Ready** status in the **Status** column, click **Download .iso** image. The **.iso** image is saved to your system and is ready for deployment.

**NOTE**

The **.iso** images are available for 6 hours and expire after that. Ensure to download the image to avoid losing it.

11.2. INSTALLING THE CUSTOMIZED RHEL ISO SYSTEM IMAGE TO A BARE METAL SYSTEM

You can create a virtual machine (VM) from the **.iso** image that you created using the Red Hat Image Builder.

Prerequisites

- You created and downloaded a **.iso** image using the Image Builder.
- A 8 GB USB flash drive.

Procedure

1. Access the directory where you downloaded your **.iso** image.
2. Place the bootable ISO image file on a USB flash drive.
3. Connect the USB flash drive to the port of the computer you want to boot.
4. Boot the ISO image from the USB flash drive.
5. Perform the steps to install the customized bootable ISO image.
The boot screen shows you the following options:
 - Install Red Hat Enterprise Linux 8
 - Test this media & install Red Hat Enterprise Linux 8

Additional resources

- [Booting the installation](#)

CHAPTER 12. LOCATING THE IMAGES YOU CREATED USING RED HAT IMAGE BUILDER

By accessing the Red Hat Image Builder dashboard, you are able to locate the images built for you.

12.1. LOCATING YOUR CUSTOMIZED IMAGES IN THE IMAGE BUILDER DASHBOARD

After your customized images are uploaded to the cloud or clouds, you can still locate these images and, if they are still valid, you have the option to copy them and also launch them directly from the dashboard.

To locate your images in Image Builder, complete the following steps:

Prerequisites

- You have an account on [Red Hat Customer Portal](#) with an Insights subscription.
- You have access to the [Red Hat Image Builder dashboard](#).
- You created images using Image Builder.

Procedure

1. Access the [Red Hat Image Builder](#) dashboard.
You are redirected to the Red Hat Image Builder dashboard and can see all the images that were built for you.
2. Locate your image by name.
 - a. Type your image name in the search bar on the top left menu.
 - b. If your image exists, image details appear, showing: the **Image** name, **Creation** date, **Release** version, cloud **Target**, and image **Status**.
You can also see information about any customizations applied to the image, such as packages and file system configuration.
3. Under **Uploads**, you can find the uploaded images.
 - For **Amazon Web Services** images:
 - After the image status is marked as **Ready**, click the **Launch instance** link. You are redirected to the image on AWS from where you can launch the instance. See [Launching your customized RHEL system image for AWS from your AWS EC2](#).
 - For **Google Cloud Platform** images:
 - After the image status is marked as **Ready**, click the **copy** symbol. You can create a Virtual Machine (VM) instance using the GCE image. See [Creating a VM instance using your GCE image](#).
 - For **Microsoft Azure** images:
 - After the image status is marked as **Ready**, click the **View uploaded image** link. You are redirected to the image on Microsoft Azure from where you can view the uploaded image from your Microsoft Azure account. See [Creating a Virtual Machine from the](#)

customized RHEL system image you shared with the Microsoft Azure account.

- For **VMWare** images:
 - After the image status is marked as **Ready**, click the **Download .vmdk** link. The image is saved to your system and is ready for deployment. See [Uploading and deploying a VMDK image to VMware vSphere](#).
- For **Guest images** images:
 - After the image status is marked as **Ready**, click the **Download .qcow2** image. The image is saved to your system and is ready for deployment. See [Creating a Virtual Machine from the customized RHEL Guest system image](#).
- For **Bare metal images** images:
 - After the image status is marked as **Ready**, click the **Download .iso** image. The image is saved to your system and is ready for deployment. See [Installing the customized RHEL ISO system image to a bare metal system](#).



NOTE

1. The image artifacts for public clouds, such as GCP, and AWS are saved for 14 days and expire after that. Ensure to transfer the image to your account to avoid losing it.
2. The private clouds images, such as VMWare, Guest-image, and Installer images are available for 6 hours and expire after that. Ensure to download the image to avoid losing it.