Get Docker EE for Red Hat Enterprise Linux

Estimated reading time: 13 minutes

There are two ways to install and upgrade Docker Enterprise Edition (Docker EE) (https://www.docker.com/enterprise-edition/) on Red Hat Enterprise Linux:

- YUM repository (/install/linux/docker-ee/rhel/#repo-install-and-upgrade): Set up a Docker repository and install Docker EE from it. This is the recommended approach because installation and upgrades are managed with YUM and easier to do.
- RPM package (/install/linux/docker-ee/rhel/#package-install-and-upgrade): Download the RPM package, install it manually, and manage upgrades manually. This is useful when installing Docker EE on air-gapped systems with no access to the internet.

Docker Community Edition (Docker CE) is *not* supported on Red Hat Enterprise Linux.

Prerequisites

This section lists what you need to consider before installing Docker EE. Items that require action are explained below.

- Use RHEL 64-bit 7.4 and higher on `x86_64` , or `s390x` .
- Use storage driver `overlay2` or `devicemapper` (`direct-lvm` mode in production).
- Find the URL for your Docker EE repo at Docker Hub (https://hub.docker.com/my-content).
- Uninstall old versions of Docker.
- Remove old Docker repos from `/etc/yum.repos.d/` .
- Disable SELinux on `s390x` (IBM Z) systems before install/upgrade.

Architectures and storage drivers

Docker EE supports Red Hat Enterprise Linux 64-bit, versions 7.4 and higher running on one of the following architectures: `x86_64` , or `s390x` (IBM Z). See Compatability Matrix (https://success.docker.com/article/compatibility-matrix)) for specific details.

> **Little-endian format only**
>
> On IBM Power systems, Docker EE only supports little-endian format, `ppc64le`, even though RHEL 7 ships both big and little-endian versions.

On Red Hat Enterprise Linux, Docker EE supports storage drivers, `overlay2` and `devicemapper`. In Docker EE 17.06.2-ee-5 and higher, `overlay2` is the recommended storage driver. The following limitations apply:

- OverlayFS (https://docs.docker.com/storage/storagedriver/overlayfs-driver): If `selinux` is enabled, the `overlay2` storage driver is supported on RHEL 7.4 or higher. If `selinux` is disabled, `overlay2` is supported on RHEL 7.2 or higher with kernel version 3.10.0-693 and higher.
- Device Mapper (https://docs.docker.com/storage/storagedriver/device-mapper-driver/): On production systems using `devicemapper`, you must use `direct-lvm` mode, which requires one or more dedicated block devices. Fast storage such as solid-state media (SSD) is recommended. Do not start Docker until properly configured per the storage guide (https://docs.docker.com/storage/storagedriver/device-mapper-driver/).

FIPS 140-2 cryptographic module support

Federal Information Processing Standards (FIPS) Publication 140-2 (https://csrc.nist.gov/csrc/media/publications/fips/140/2/final/documents/fips1402.pdf) is a United States Federal security requirement for cryptographic modules.

With Docker EE Basic license for versions 18.03 and later, Docker provides FIPS 140-2 support in RHEL 7.3, 7.4 and 7.5. This includes a FIPS supported cryptographic module. If the RHEL implementation already has FIPS support enabled, FIPS is automatically enabled in the Docker engine.

To verify the FIPS-140-2 module is enabled in the Linux kernel, confirm the file `/proc/sys/crypto/fips_enabled` contains `1`.

```
$ cat /proc/sys/crypto/fips_enabled
1
```

> **Note**: FIPS is only supported in the Docker Engine EE. UCP and DTR currently do not have support for FIPS-140-2.

To enable FIPS 140-2 compliance on a system that is not in FIPS 140-2 mode, do the following:

Create a file called `/etc/systemd/system/docker.service.d/fips-module.conf`. It needs to contain the following:

```
[Service]
Environment="DOCKER_FIPS=1"
```

Reload the Docker configuration to systemd.

```
$ sudo systemctl daemon-reload
```

Restart the Docker service as root.

```
$ sudo systemctl restart docker
```

To confirm Docker is running with FIPS-140-2 enabled, run the `docker info` command:

```
docker info --format {{.SecurityOptions}}
[name=selinux name=fips]
```

Disabling FIPS-140-2

If the system has the FIPS 140-2 cryptographic module installed on the operating system, it is possible to disable FIPS-140-2 compliance.

To disable FIPS 140-2 in Docker but not the operating system, set the value `DOCKER_FIPS=0` in the `/etc/systemd/system/docker.service.d/fips-module.conf`.

Reload the Docker configuration to systemd.

```
$ sudo systemctl daemon-reload
```

Restart the Docker service as root.

```
$ sudo systemctl restart docker
```

Find your Docker EE repo URL

To install Docker EE, you will need the URL of the Docker EE repository associated with your trial or subscription:

1. Go to https://hub.docker.com/my-content (https://hub.docker.com/my-content). All of your subscriptions and trials are listed.
2. Click the **Setup** button for **Docker Enterprise Edition for Red Hat Enterprise Linux**.
3. Copy the URL from **Copy and paste this URL to download your Edition** and save it for later use.

You will use this URL in a later step to create a variable called, `DOCKERURL`.

Uninstall old Docker versions

The Docker EE package is called `docker-ee`. Older versions were called `docker` or `docker-engine`. Uninstall all older versions and associated dependencies. The contents of `/var/lib/docker/` are preserved, including images, containers, volumes, and networks.

```
$ sudo yum remove docker \
                  docker-client \
                  docker-client-latest \
                  docker-common \
                  docker-latest \
                  docker-latest-logrotate \
                  docker-logrotate \
                  docker-selinux \
                  docker-engine-selinux \
                  docker-engine
```

Repo install and upgrade

The advantage of using a repository from which to install Docker EE (or any software) is that it provides a certain level of automation. RPM-based distributions such as Red Hat Enterprise Linux, use a tool called YUM that work with your repositories to manage dependencies and provide automatic updates.

> **Disable SELinux before installing Docker EE on IBM Z systems**
>
> There is currently no support for `selinux` on IBM Z systems. If you attempt to install or upgrade Docker EE on an IBM Z system with `selinux` enabled, an error is thrown that the `container-selinux` package is not found. Disable `selinux` before installing or upgrading Docker on IBM Z.

Set up the repository

You only need to set up the repository once, after which you can install Docker EE *from* the repo and repeatedly upgrade as necessary.

1. Remove existing Docker repositories from `/etc/yum.repos.d/`:

   ```
   $ sudo rm /etc/yum.repos.d/docker*.repo
   ```

2. Temporarily store the URL (that you copied above (/install/linux/docker-ee/rhel/#find-your-docker-ee-repo-url)) in an environment variable. Replace `<DOCKER-EE-URL>` with your URL in the following command. This variable assignment does not persist when the session ends:

```
$ export DOCKERURL="<DOCKER-EE-URL>"
```

3. Store the value of the variable, `DOCKERURL` (from the previous step), in a `yum` variable in `/etc/yum/vars/`:

   ```
   $ sudo -E sh -c 'echo "$DOCKERURL/rhel" > /etc/yum/vars/dockerurl'
   ```

   Also, store your OS version string in `/etc/yum/vars/dockerosversion`. Most users should use `7`, but you can also use the more specific minor version, starting from `7.2`.

   ```
   $ sudo sh -c 'echo "7" > /etc/yum/vars/dockerosversion'
   ```

4. Install required packages: `yum-utils` provides the *yum-config-manager* utility, and `device-mapper-persistent-data` and `lvm2` are required by the *devicemapper* storage driver:

   ```
   $ sudo yum install -y yum-utils \
     device-mapper-persistent-data \
     lvm2
   ```

5. Enable the `extras` RHEL repository. This ensures access to the `container-selinux` package required by `docker-ee`.

   The repository can differ per your architecture and cloud provider, so review the options in this step before running:

   For all architectures *except* IBM Power:

   ```
   $ sudo yum-config-manager --enable rhel-7-server-extras-rpms
   ```

   For IBM Power only (little endian):

   ```
   $ sudo yum-config-manager --enable extras
   $ sudo subscription-manager repos --enable=rhel-7-for-power-le-extr
   as-rpms
   $ sudo yum makecache fast
   $ sudo yum -y install container-selinux
   ```

   Depending on cloud provider, you may also need to enable another repository:

For AWS (where `REGION` is a literal, and does *not* represent the region your machine is running in):

```
$ sudo yum-config-manager --enable rhui-REGION-rhel-server-extras
```

For Azure:

```
$ sudo yum-config-manager --enable rhui-rhel-7-server-rhui-extras-r
pms
```

6. Add the Docker EE **stable** repository:

```
$ sudo -E yum-config-manager \
    --add-repo \
    "$DOCKERURL/rhel/docker-ee.repo"
```

Install from the repository

> **Note: If you need to run Docker EE 2.0, please see the following instructions:**
>
> - 18.03 (https://docs.docker.com/v18.03/ee/supported-platforms/) - Older Docker EE Engine only release
> - 17.06 (https://docs.docker.com/v17.06/engine/installation/) - Docker Enterprise Edition 2.0 (Docker Engine, UCP, and DTR).

1. Install the latest patch release, or go to the next step to install a specific version:

```
$ sudo yum -y install docker-ee docker-ee-cli containerd.io
```

If prompted to accept the GPG key, verify that the fingerprint matches `77FE DA13 1A83 1D29 A418 D3E8 99E5 FF2E 7668 2BC9`, and if so, accept it.

2. To install a *specific version* of Docker EE (recommended in production), list versions and install:

a. List and sort the versions available in your repo. This example sorts results by version number, highest to lowest, and is truncated:

```
$ sudo yum list docker-ee  --showduplicates | sort -r

docker-ee.x86_64      18.09.ee.2-1.el7.rhel      docker-ee-stable-1
8.09
```

The list returned depends on which repositories you enabled, and is specific to your version of Red Hat Enterprise Linux (indicated by `.el7` in this example).

b. Install a specific version by its fully qualified package name, which is the package name (`docker-ee`) plus the version string (2nd column) starting at the first colon (`:`), up to the first hyphen, separated by a hyphen (`-`). For example, `docker-ee-18.09.1` .

```
$ sudo yum -y install docker-ee-<VERSION_STRING> docker-ee-cli-<VER
SION_STRING> containerd.io
```

For example, if you want to install the 18.09 version run the following:

```
sudo yum-config-manager --enable docker-ee-stable-18.09
```

Docker is installed but not started. The `docker` group is created, but no users are added to the group.

3. Start Docker:

> If using `devicemapper` , ensure it is properly configured before starting Docker, per the storage guide (https://docs.docker.com/storage/storagedriver/device-mapper-driver/).

```
$ sudo systemctl start docker
```

4. Verify that Docker EE is installed correctly by running the `hello-world` image. This command downloads a test image, runs it in a container, prints an informational message, and exits:

```
$ sudo docker run hello-world
```

Docker EE is installed and running. Use `sudo` to run Docker commands. See Linux postinstall (https://docs.docker.com/install/linux/linux-postinstall/) to allow non-privileged users to run Docker commands.

Upgrade from the repository

1. Add the new repository (/install/linux/docker-ee/rhel/#set-up-the-repository).
2. Follow the installation instructions (/install/linux/docker-ee/rhel/#install-from-the-repository) and install a new version.

Package install and upgrade

To manually install Docker EE, download the `.rpm` file for your release. You need to download a new file each time you want to upgrade Docker EE.

> **Disable SELinux before installing Docker EE on IBM Z systems**
>
> There is currently no support for `selinux` on IBM Z systems. If you attempt to install or upgrade Docker EE on an IBM Z system with `selinux` enabled, an error is thrown that the `container-selinux` package is not found. Disable `selinux` before installing or upgrading Docker on IBM Z.

Install with a package

1. Enable the `extras` RHEL repository. This ensures access to the `container-selinux` package which is required by `docker-ee` :

   ```
   $ sudo yum-config-manager --enable rhel-7-server-extras-rpms
   ```

   Alternately, obtain that package manually from Red Hat. There is no way to publicly browse this repository.

2. Go to the Docker EE repository URL associated with your trial or subscription in your browser. Go to `rhel/` . Choose your Red Hat Enterprise Linux version, architecture, and Docker version. Download the `.rpm` file from the `Packages` directory.

   > If you have trouble with `selinux` using the packages under the `7` directory, try choosing the version-specific directory instead, such as `7.3` .

3. Install Docker EE, changing the path below to the path where you downloaded the Docker package.

   ```
   $ sudo yum install /path/to/package.rpm
   ```

Docker is installed but not started. The `docker` group is created, but no users are added to the group.

4. Start Docker:

   > If using `devicemapper`, ensure it is properly configured before starting Docker, per the storage guide (https://docs.docker.com/storage/storagedriver/device-mapper-driver/).

   ```
   $ sudo systemctl start docker
   ```

5. Verify that Docker EE is installed correctly by running the `hello-world` image. This command downloads a test image, runs it in a container, prints an informational message, and exits:

   ```
   $ sudo docker run hello-world
   ```

   Docker EE is installed and running. Use `sudo` to run Docker commands. See Linux postinstall (https://docs.docker.com/install/linux/linux-postinstall/) to allow non-privileged users to run Docker commands.

Upgrade with a package

1. Download the newer package file.
2. Repeat the installation procedure (/install/linux/docker-ee/rhel/#install-with-a-package), using `yum -y upgrade` instead of `yum -y install`, and point to the new file.

Uninstall Docker EE

1. Uninstall the Docker EE package:

   ```
   $ sudo yum -y remove docker-ee
   ```

2. Delete all images, containers, and volumes (because these are not automatically removed from your host):

   ```
   $ sudo rm -rf /var/lib/docker
   ```

3. Delete other Docker related resources:

```
$ sudo rm -rf /run/docker
$ sudo rm -rf /var/run/docker
$ sudo rm -rf /etc/docker
```

4. If desired, remove the `devicemapper` thin pool and reformat the block devices that were part of it.

You must delete any edited configuration files manually.

Next steps

- Continue to Post-installation steps for Linux (https://docs.docker.com/install/linux/linux-postinstall/)
- Continue with user guides on Universal Control Plane (UCP) (https://docs.docker.com/ee/ucp/) and Docker Trusted Registry (DTR) (https://docs.docker.com/ee/dtr/)

requirements (https://docs.docker.com/glossary/?term=requirements), installation (https://docs.docker.com/glossary/?term=installation), rhel (https://docs.docker.com/glossary/?term=rhel), rpm (https://docs.docker.com/glossary/?term=rpm), install (https://docs.docker.com/glossary/?term=install), uninstall (https://docs.docker.com/glossary/?term=uninstall), upgrade (https://docs.docker.com/glossary/?term=upgrade), update (https://docs.docker.com/glossary/?term=update)