Red Hat OpenShift

OpenShift Container Platform 4.14 Documentation

-

Welcome to the official OpenShift Container Platform 4.14 documentation, where you can learn about OpenShift Container Platform and start exploring its features.

To navigate the OpenShift Container Platform 4.14 documentation, you can use one of the following methods:

- Use the left navigation bar to browse the documentation.

- Select the task that interests you from the contents of this Welcome page.

Start with Architecture and Security and compliance. Next, view the release notes.

Cluster installer activities

Explore the following OpenShift Container Platform installation tasks:

- **OpenShift Container Platform installation overview** : Depending on the platform, you can install OpenShift Container Platform on installer-provisioned or user-provisioned infrastructure. The OpenShift Container Platform installation program provides the flexibility to deploy OpenShift Container Platform on a range of different platforms.

- **Install a cluster on Alibaba** : On Alibaba Cloud, you can install OpenShift Container Platform on installer-provisioned infrastructure. This is currently a Technology Preview feature only.

- **Install a cluster on AWS** : On AWS, you can install OpenShift Container Platform on installer-provisioned infrastructure or user-provisioned infrastructure.

- **Install a cluster on Azure** : On Microsoft Azure, you can install OpenShift Container Platform on installer-provisioned infrastructure or user-provisioned infrastructure.

- **Install a cluster on Azure Stack Hub** : On Microsoft Azure Stack Hub, you can install OpenShift Container Platform on installer-provisioned infrastructure or user-provisioned infrastructure.

- **Install a cluster on GCP** : On Google Cloud Platform (GCP) you can install OpenShift Container Platform on installer-provisioned infrastructure or user-provisioned infrastructure.

- **Install a cluster on IBM Cloud**® : You can install OpenShift Container Platform on IBM Cloud® on installer-provisioned infrastructure.

- **Install a cluster on IBM Power**® **Virtual Server** : You can install OpenShift Container Platform on IBM Power® Virtual Server on installer-provisioned infrastructure.

- **Install a cluster on IBM Power**® : You can install OpenShift Container Platform on IBM Power® on user-provisioned infrastructure.

- **Install a cluster on VMware vSphere** : On supported versions of VMware vSphere, you can install OpenShift Container Platform on installer-provisioned infrastructure or user-provisioned infrastructure.

- **Install a cluster with z/VM on IBM Z**® **and IBM**® **LinuxONE** : You can install OpenShift Container Platform with z/VM on IBM Z® and IBM® LinuxONE on user-provisioned infrastructure.

-

Install a cluster with RHEL KVM on IBM Z® and IBM® LinuxONE : You can install OpenShift Container Platform with RHEL KVM on IBM Z® and IBM® LinuxONE on user-provisioned infrastructure.

- **Install a cluster on Nutanix** : On Nutanix, you can install a cluster on your OpenShift Container Platform on installer-provisioned infrastructure.

Other cluster installer activities

- **Install a cluster in a restricted network** : If your cluster uses user-provisioned infrastructure on AWS, GCP, vSphere, IBM Z® and IBM® LinuxONE with z/VM, IBM Z® and IBM® LinuxONE with RHEL KVM, IBM Power®, or bare metal and the cluster does not have full access to the internet, you must mirror the OpenShift Container Platform installation images. To do this action, use one of the following methods, so that you can install a cluster in a restricted network.

    - Mirroring images for a disconnected installation

    - Mirroring images for a disconnected installation by using the oc-mirror plug-in

- **Install a cluster in an existing network** : If you use an existing Virtual Private Cloud (VPC) in AWS or GCP or an existing VNet on Microsoft Azure, you can install a cluster. Also consider Installing a cluster on GCP into a shared VPC

- **Install a private cluster** : If your cluster does not require external internet access, you can install a private cluster on AWS, Azure, GCP, or IBM Cloud®. Internet access is still required to access the cloud APIs and installation media.

- **Check installation logs** : Access installation logs to evaluate issues that occur during OpenShift Container Platform installation.

- **Access OpenShift Container Platform** : Use credentials output at the end of the installation process to log in to the OpenShift Container Platform cluster from the command line or web console.

-

Install Red Hat OpenShift Data Foundation : You can install Red Hat OpenShift Data Foundation as an Operator to provide highly integrated and simplified persistent storage management for containers.

- **Red Hat Enterprise Linux CoreOS (RHCOS) image layering** : As a post-installation task, you can add new images on top of the base RHCOS image. This layering does not modify the base RHCOS image. Instead, the layering creates a custom layered image that includes all RHCOS functions and adds additional functions to specific nodes in the cluster.

Developer activities

Develop and deploy containerized applications with OpenShift Container Platform. OpenShift Container Platform is a platform for developing and deploying containerized applications. Read the following OpenShift Container Platform documentation, so that you can better understand OpenShift Container Platform functions:

- **Understand OpenShift Container Platform development** : Learn the different types of containerized applications, from simple containers to advanced Kubernetes deployments and Operators.

- **Work with projects** : Create projects from the OpenShift Container Platform web console or OpenShift CLI (oc) to organize and share the software you develop.

- **Creating applications using the Developer perspective** : Use the **Developer** perspective in the OpenShift Container Platform web console to easily create and deploy applications.

- **Viewing application composition using the Topology view** : Use the **Topology** view to visually interact with your applications, monitor status, connect and group components, and modify your code base.

-

Understanding Service Binding Operator : With the Service Binding Operator, an application developer can bind workloads with Operator-managed backing services by automatically collecting and sharing binding data with the workloads. The Service Binding Operator improves the development lifecycle with a consistent and declarative service binding method that prevents discrepancies in cluster environments.

- **Create CI/CD Pipelines** : Pipelines are serverless, cloud-native, continuous integration and continuous deployment systems that run in isolated containers. Pipelines use standard Tekton custom resources to automate deployments and are designed for decentralized teams that work on microservice-based architecture.

- **Manage your infrastructure and application configurations** : GitOps is a declarative way to implement continuous deployment for cloud native applications. GitOps defines infrastructure and application definitions as code. GitOps uses this code to manage multiple workspaces and clusters to simplify the creation of infrastructure and application configurations. GitOps also handles and automates complex deployments at a fast pace, which saves time during deployment and release cycles.

- **Deploy Helm charts** : Helm is a software package manager that simplifies deployment of applications and services to OpenShift Container Platform clusters. Helm uses a packaging format called *charts*. A Helm chart is a collection of files that describes the OpenShift Container Platform resources.

- **Understand image builds** : Choose from different build strategies (Docker, S2I, custom, and pipeline) that can include different kinds of source materials, such as Git repositories, local binary inputs, and external artifacts. You can follow examples of build types from basic builds to advanced builds.

-

Create container images: A container image is the most basic building block in OpenShift Container Platform and Kubernetes applications. By defining image streams, you can gather multiple versions of an image in one place as you continue to develop the image stream. With S2I containers, you can insert your source code into a base container. The base container is configured to run code of a particular type, such as Ruby, Node.js, or Python.

- **Create deployments**: Use `Deployment` and `DeploymentConfig` objects to exert fine-grained management over applications. Manage deployments by using the **Workloads** page or OpenShift CLI (`oc`). Learn rolling, recreate, and custom deployment strategies.

- **Create templates**: Use existing templates or create your own templates that describe how an application is built or deployed. A template can combine images with descriptions, parameters, replicas, exposed ports and other content that defines how an application can be run or built.

- **Understand Operators**: Operators are the preferred method for creating on-cluster applications for OpenShift Container Platform 4.14. Learn about the Operator Framework and how to deploy applications by using installed Operators into your projects.

- **Develop Operators**: Operators are the preferred method for creating on-cluster applications for OpenShift Container Platform 4.14. Learn the workflow for building, testing, and deploying Operators. You can then create your own Operators based on Ansible or Helm, or configure built-in Prometheus monitoring by using the Operator SDK.

- **Reference the REST API index**: Learn about OpenShift Container Platform application programming interface endpoints.

Cluster administrator activities

Manage machines, provide services to users, and follow monitoring and logging reports. Read the following OpenShift Container Platform documentation, so that you can better understand OpenShift Container Platform functions:

- **Understand OpenShift Container Platform management** : Learn about components of the OpenShift Container Platform 4.14 control plane. See how OpenShift Container Platform control plane and compute nodes are managed and updated through the Machine API and Operators.

- **Enable cluster capabilities** : As a cluster administrator, you can enable cluster capabilities that were disabled prior to installation.

Manage cluster components

- **Manage machines** : Manage compute and control plane machines in your cluster with machine sets, by deploying health checks, and applying autoscaling.

- **Manage container registries** : Each OpenShift Container Platform cluster includes a built-in container registry for storing its images. You can also configure a separate Red Hat Quay registry to use with OpenShift Container Platform. The Quay.io website provides a public container registry that stores OpenShift Container Platform containers and Operators.

- **Manage users and groups** : Add users and groups with different levels of permissions to use or modify clusters.

- **Manage authentication** : Learn how user, group, and API authentication works in OpenShift Container Platform. OpenShift Container Platform supports multiple identity providers.

- **Manage ingress, API server, and service certificates** : OpenShift Container Platform creates certificates by default for the Ingress Operator, the API server, and for services needed by complex middleware applications that require encryption. You might need to change, add, or rotate these certificates.

-

Manage networking : The cluster network in OpenShift Container Platform is managed by the Cluster Network Operator (CNO). The CNO uses `iptables` rules in kube-proxy to direct traffic between nodes and pods running on those nodes. The Multus Container Network Interface adds the capability to attach multiple network interfaces to a pod. By using network policy features, you can isolate your pods or permit selected traffic.

- **Manage storage** : With OpenShift Container Platform, a cluster administrator can configure persistent storage by using Red Hat OpenShift Data Foundation, AWS Elastic Block Store, NFS, iSCSI, Container Storage Interface (CSI), and more. You can expand persistent volumes, configure dynamic provisioning, and use CSI to configure, clone, and use snapshots of persistent storage.

- **Manage Operators** : Lists of Red Hat, ISV, and community Operators can be reviewed by cluster administrators and installed on their clusters. After you install them, you can run, upgrade, back up, or otherwise manage the Operator on your cluster.

- **Understanding Windows container workloads** . You can use the Red Hat OpenShift support for Windows Containers feature to run Windows compute nodes in an OpenShift Container Platform cluster. This is possible by using the Red Hat Windows Machine Config Operator (WMCO) to install and manage Windows nodes.

Change cluster components

- **Use custom resource definitions (CRDs) to modify the cluster** : Cluster features implemented with Operators can be modified with CRDs. Learn to create a CRD and manage resources from CRDs.

- **Set resource quotas** : Choose from CPU, memory, and other system resources to set quotas.

- **Prune and reclaim resources** : Reclaim space by pruning unneeded Operators, groups, deployments, builds, images, registries, and cron jobs.

- **Scale and tune clusters**: Set cluster limits, tune nodes, scale cluster monitoring, and optimize networking, storage, and routes for your environment.

- **Update a cluster**: Use the Cluster Version Operator (CVO) to upgrade your OpenShift Container Platform cluster. If an update is available from the OpenShift Update Service (OSUS), you apply that cluster update from the OpenShift Container Platform web console or the OpenShift CLI (oc).

- **Using the OpenShift Update Service in a disconnected environment**: Learn about installing and managing a local OpenShift Update Service for recommending OpenShift Container Platform updates in disconnected environments.

- **Improving cluster stability in high latency environments by using worker latency profiles**: If your network has latency issues, you can use one of three worker latency profiles to help ensure that your control plane does not accidentally evict pods in case it cannot reach a worker node. You can configure or modify the profile at any time during the life of the cluster.

Monitor the cluster

- **Work with OpenShift Logging**: Learn about OpenShift Logging and configure different OpenShift Logging types, such as Elasticsearch, Fluentd, and Kibana.

- **Monitor**: Learn to configure the monitoring stack. After configuring monitoring, use the web console to access monitoring dashboards. In addition to infrastructure metrics, you can also scrape and view metrics for your own services.

- **Remote health monitoring**: OpenShift Container Platform collects anonymized aggregated information about your cluster. By using Telemetry and the Insights Operator, this data is received by Red Hat and used to improve OpenShift Container Platform. You can view the data collected by remote health monitoring.