



Red Hat OpenStack Platform 16.1

Product Guide

Overview of Red Hat OpenStack Platform

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Abstract

This guide provides a high level overview of the Red Hat OpenStack Platform environment.

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PREFACE

Red Hat OpenStack Platform (RHOSP) provides the foundation to build a private or public Infrastructure-as-a-Service (IaaS) cloud on top of Red Hat Enterprise Linux. It offers a scalable, fault-tolerant platform for the development of cloud-enabled workloads.

CHAPTER 1. UNDERSTANDING RED HAT OPENSTACK PLATFORM

Red Hat OpenStack Platform (RHOSP) delivers an integrated foundation to create, deploy, and scale a secure and reliable public or private OpenStack cloud.

RHOSP is packaged so that you can create private, public, or hybrid cloud platforms from your available physical hardware. RHOSP clouds include the following components:

- Fully distributed object storage
- Persistent block-level storage
- Virtual machine provisioning engine and image storage
- Authentication and authorization mechanisms
- Integrated networking
- Web browser-based interface accessible to users and administrators

The RHOSP IaaS cloud is implemented by a collection of interacting services that control its computing, storage, and networking resources. You can manage the cloud with a web-based interface to control, provision, and automate RHOSP resources. Additionally, an extensive API controls the RHOSP infrastructure and this API is also available to end users of the cloud.

1.1. ADVANTAGES OF USING RED HAT OPENSTACK PLATFORM

You can use Red Hat OpenStack Platform to combine virtualization, networking, and storage based on your requirements. The following capabilities are some of the advantages of the Red Hat OpenStack Platform:

- You can create public, private, or hybrid clouds that you can scale up or down based on your requirements.
- You can deploy cloud-enabled workloads based on your needs.
- You can address customer demands in hours or minutes instead of weeks or days, without sacrificing security, performance, or budget.
- You can implement stability and agility for your cloud environments, using hybrid cloud management, monitoring, and reporting with Red Hat CloudForms.

1.2. RELATIONSHIP BETWEEN RDO AND OPENSTACK FOUNDATION

OpenStack Foundation promotes the global development, distribution, and adoption of the OpenStack cloud operating system. The goal of the OpenStack Foundation is to serve developers, users, and the entire ecosystem globally by providing a set of shared resources to grow the footprint of public and private OpenStack clouds, enable technology vendors targeting the platform and assist developers to produce the best cloud software in the industry.

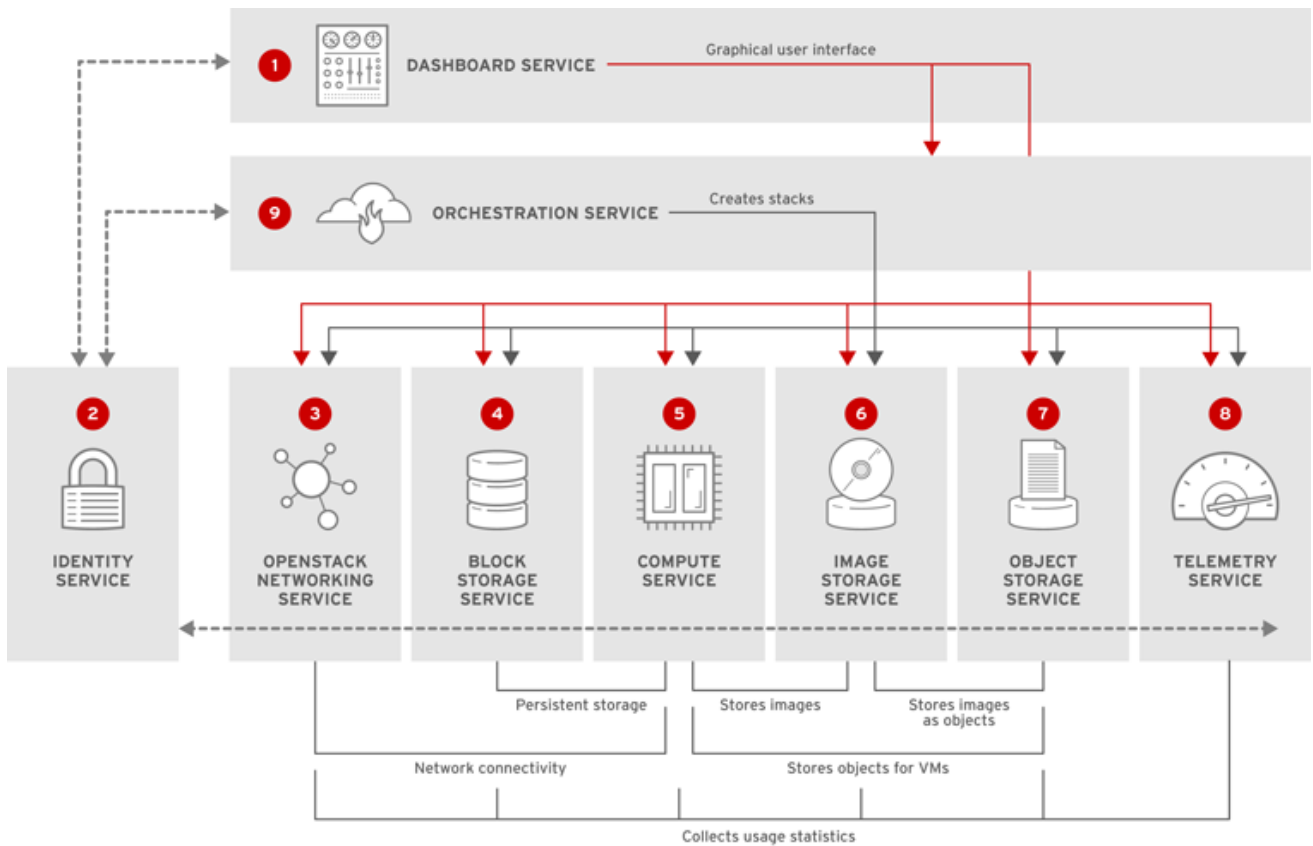
RPM Distribution of OpenStack (RDO) is a free, community-supported distribution of the Red Hat version of OpenStack that runs on Red Hat Enterprise Linux (RHEL) and its derivatives, such as CentOS. RDO also makes the latest OpenStack development release available for Fedora. In addition to providing a set of software packages, RDO is a community of users of cloud computing platforms on

Red Hat-based operating systems to get help and compare notes on running OpenStack. For enterprise-level support or information on partner certification, Red Hat offers Red Hat OpenStack Platform. For more information, see [Red Hat OpenStack Platform](#).

CHAPTER 2. SOFTWARE

The Red Hat OpenStack Platform IaaS cloud is implemented as a collection of interacting services that control compute, storage, and networking resources. The cloud can be managed with a web-based dashboard or command-line clients that allow administrators to control, provision, and automate OpenStack resources. OpenStack also has an extensive API that is also available to all cloud users.

The following diagram provides a high-level overview of the OpenStack core services and their relationship with each other.



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The following table describes each component shown in the diagram and provides links for the component documentation section.

Table 2.1. Core services

Service	Code	Description
1 Dashboard	horizon	Web browser-based dashboard that you use to manage OpenStack services.
2 Identity	keystone	Centralized service for authentication and authorization of OpenStack services and for managing users, projects, and roles.
3 OpenStack Networking	neutron	Provides connectivity between the interfaces of OpenStack services.

	Service	Code	Description
3	Load balancing service	octavia	Provides load-balancing services for the cloud.
4	Block Storage	cinder	Manages persistent block storage volumes for virtual machines.
5	Compute	nova	Manages and provisions virtual machines running on hypervisor nodes.
6	Image	glance	Registry service that you use to store resources such as virtual machine images and volume snapshots.
7	Object Storage	swift	Allows users to store and retrieve files and arbitrary data.
8	Telemetry	ceilometer	Provides measurements of cloud resources.
9	Orchestration	heat	Template-based orchestration engine that supports automatic creation of resource stacks.

Each OpenStack service contains a functional group of Linux services and other components. For example, the **glance-api** and **glance-registry** Linux services, together with a MariaDB database, implement the Image service.

2.1. COMPONENTS

This section describes each of the OpenStack components in some detail:

- **OpenStack Dashboard (horizon)**

OpenStack Dashboard provides a graphical user interface for users and administrators to perform operations such as creating and launching instances, managing networking, and setting access control.

The Dashboard service provides the Project, Admin, and Settings default dashboards. The modular design enables the dashboard to interface with other products such as billing, monitoring, and additional management tools.

- **OpenStack Identity (keystone)**

OpenStack Identity provides user authentication and authorization to all OpenStack components. Identity supports multiple authentication mechanisms, including username and password credentials, token-based systems, and AWS-style log-ins.

- **OpenStack Networking (neutron)**

OpenStack Networking handles creation and management of a virtual networking infrastructure in the OpenStack cloud. Infrastructure elements include networks, subnets, and routers.

- **Load-balancing service (octavia)**

The OpenStack Load-balancing service (octavia) provides a Load Balancing-as-a-Service (LBaaS) implementation for Red Hat OpenStack Platform director installations. To achieve load balancing, octavia supports enabling multiple provider drivers. The reference provider driver

(Amphora provider driver) is an open-source, scalable, and highly available load balancing provider. It accomplishes its delivery of load balancing services by managing a fleet of virtual machines—collectively known as amphorae—which it spins up on demand.

- **OpenStack Block Storage (cinder)**
OpenStack Block Storage provides persistent block storage management for virtual hard drives. Block Storage enables the user to create and delete block devices, and to manage attachment of block devices to servers.
- **OpenStack Compute (nova)**
OpenStack Compute serves as the core of the OpenStack cloud by providing virtual machines on demand. Compute schedules virtual machines to run on a set of nodes by defining drivers that interact with underlying virtualization mechanisms, and by exposing the functionality to the other OpenStack components.
- **OpenStack Image Service (glance)**
OpenStack Image acts as a registry for virtual disk images. Users can add new images or take a snapshot of an existing server for immediate storage. You can use the snapshots for backup or as templates for new servers.
- **OpenStack Object Storage (swift)**
Object Storage provides an HTTP-accessible storage system for large amounts of data, including static entities such as videos, images, email messages, files, or VM images. Objects are stored as binaries on the underlying file system along with metadata stored in the extended attributes of each file.
- **OpenStack Telemetry (ceilometer)**
OpenStack Telemetry provides user-level usage data for OpenStack-based clouds. The data can be used for customer billing, system monitoring, or alerts. Telemetry can collect data from notifications sent by existing OpenStack components such as Compute usage events, or by polling OpenStack infrastructure resources such as libvirt.
- **OpenStack Orchestration (heat)**
OpenStack Orchestration provides templates to create and manage cloud resources such as storage, networking, instances, or applications. Templates are used to create stacks, which are collections of resources.
- **OpenStack Bare Metal Provisioning (ironic)**
OpenStack Bare Metal Provisioning enables the user to provision physical, or bare metal machines, for a variety of hardware vendors with hardware-specific drivers. Bare Metal Provisioning integrates with the Compute service to provision the bare metal machines in the same way that virtual machines are provisioned, and provides a solution for the bare-metal-to-trusted-tenant use case.
- **OpenStack Shared-Filesystems-as-a-Service (manila)**
OpenStack Shared-Filesystems-as-a-Service provides shared file systems that Compute instances can use. The basic resources offered by the Shared File Systems are shares, snapshots and share networks.
- **OpenStack DNS-as-a-Service (designate)**

**NOTE**

This feature is available in this release as a Technology Preview, and therefore is not fully supported by Red Hat. It should only be used for testing, and should not be deployed in a production environment. For more information about Technology Preview features, see the [Scope of Coverage Details](#).

DNSaaS includes a REST API for domain and record management. It is multi-tenanted and integrates with OpenStack Identity Service (keystone) for authentication. DNSaaS includes a framework for integration with Compute (nova) and OpenStack Networking (neutron) notifications, allowing auto-generated DNS records. DNSaaS includes integration support for PowerDNS and Bind9.

- **OpenStack Key Manager Service (barbican)**

OpenStack Key Manager Service is a REST API designed for the secure storage, provisioning and management of secrets such as passwords, encryption keys, and X.509 Certificates. This includes keying material such as Symmetric Keys, Asymmetric Keys, Certificates, and raw binary data.

- **Red Hat OpenStack Platform director**

The Red Hat OpenStack Platform director is a toolset for installing and managing a complete OpenStack environment. It is based primarily on the OpenStack project TripleO, which is an abbreviation for "OpenStack-On-OpenStack". This project takes advantage of OpenStack components to install a fully operational OpenStack environment. It includes new OpenStack components that provision and control bare metal systems to use as OpenStack nodes. It provides a simple method for installing a complete Red Hat OpenStack Platform environment. The Red Hat OpenStack Platform director uses two main concepts: an Undercloud and an Overcloud. The Undercloud installs and configures the Overcloud.

- **OpenStack High Availability**

To keep your OpenStack environment up and running efficiently, Red Hat OpenStack Platform director lets you create configurations that offer high availability and load balancing across all major services in OpenStack.

- **OpenStack Operational Tools**

Red Hat OpenStack Platform comes with an optional suite of tools, such as Centralized Logging, Availability Monitoring, and Performance Monitoring. These tools help you maintain your OpenStack environment.

2.2. INTEGRATION

You can integrate Red Hat OpenStack Platform with the following third-party software - [Tested and Approved Software](#)

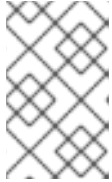
2.3. INSTALLATION SUMMARY

Red Hat supports the installation of Red Hat OpenStack Platform using the following methods:

- **Red Hat OpenStack Platform director.** Recommended for enterprise deployments. The Red Hat OpenStack Platform director is a toolset for installing and managing a complete OpenStack environment. It is based primarily on the OpenStack project TripleO, which is an abbreviation for "OpenStack-On-OpenStack". This project takes advantage of OpenStack components to install a fully operational OpenStack environment. This includes new OpenStack components that provision and control bare metal systems to use as OpenStack nodes. This provides a simple method for installing a complete Red Hat OpenStack Platform environment.

The Red Hat OpenStack Platform director uses two main concepts: an Undercloud and an Overcloud. The Undercloud installs and configures the Overcloud. For more information, see [Red Hat OpenStack Platform Director Installation and Usage](#).

- **packstack:** OpenStack deployment consists of a public network and a private network on one machine, hosting one CirrOS-image instance, with an attached storage volume. Installed OpenStack services include: Block Storage, Compute, Dashboard, Identity, Image, OpenStack Networking, Object Storage, and Telemetry. Packstack is a command-line utility that rapidly deploys OpenStack.



NOTE

Packstack deployments are intended only for POC-type testing environments and are not suitable for production. By default, the public network is only routable from the OpenStack host.

For more information, see [Evaluating OpenStack: Single-Node Deployment](#).

See [Installing and Managing Red Hat OpenStack Platform](#) for a comparison of these installation options.

2.4. SUBSCRIPTIONS

To install Red Hat OpenStack Platform, you must register all systems in the OpenStack environment with Red Hat Subscription Manager, and subscribe to the required channels. The guides listed below detail the channels and repositories you must subscribe to before deploying Red Hat OpenStack Platform.

- [Requirements for installing using director](#) in the *Director Installation and Usage* guide.
- [Requirements for installing a single-node POC deployment](#)

CHAPTER 3. HARDWARE

You can deploy Red Hat OpenStack Platform on trusted cloud providers. For the certified list of products, see [Hardware - Tested and Approved](#).

CHAPTER 4. FINDING MORE INFORMATION

The following table includes deployment references for components mentioned in this guide.

For additional manuals for Red Hat OpenStack Platform, see [Product Documentation for Red Hat OpenStack Platform 16.1](#).

Component	Reference
Red Hat Enterprise Linux	Red Hat OpenStack Platform 16.1 is supported on Red Hat Enterprise Linux 8.2 For information on installing Red Hat Enterprise Linux, see Product Documentation for Red Hat Enterprise Linux 8 .
Red Hat OpenStack Platform	<p>To install OpenStack components and their dependencies, use Red Hat OpenStack Platform director. Director uses a basic OpenStack undercloud, which is used to provision and manage the OpenStack nodes in the final overcloud.</p> <p>Be aware that you need one extra host machine for the installation of the undercloud, in addition to the environment necessary for the deployed overcloud. For more information, see the Director Installation and Usage guide.</p>
High Availability	<p>For the configuration of additional high availability components (for example, HAProxy), see the High Availability Deployment and Usage guide.</p> <p>For information about configuring live migration, see Migrating virtual machine instances between Compute nodes in the <i>Instances and Images Guide</i>.</p>
Octavia	The OpenStack Load-balancing service (Octavia) provides a Load Balancing-as-a-Service (LBaaS) version 2 implementation for Red Hat OpenStack Platform director installations. To use Load Balancing-as-a-Service, see Load Balancing-as-a-Service (LBaaS) with Octavia in the <i>Networking Guide</i> .
Pacemaker	Pacemaker is integrated into Red Hat Enterprise Linux as an add-on. To set up Red Hat Enterprise Linux for high availability, see the Configuring and managing high availability clusters guide.