Red Hat OpenStack Platform 17.1

Introduction to Red Hat OpenStack Platform

Product overview

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Abstract

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

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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.

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CHAPTER 1. UNDERSTANDING RED HAT OPENSTACK PLATFORM

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 is a scalable, fault-tolerant platform for the development of cloud-enabled workloads.

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.

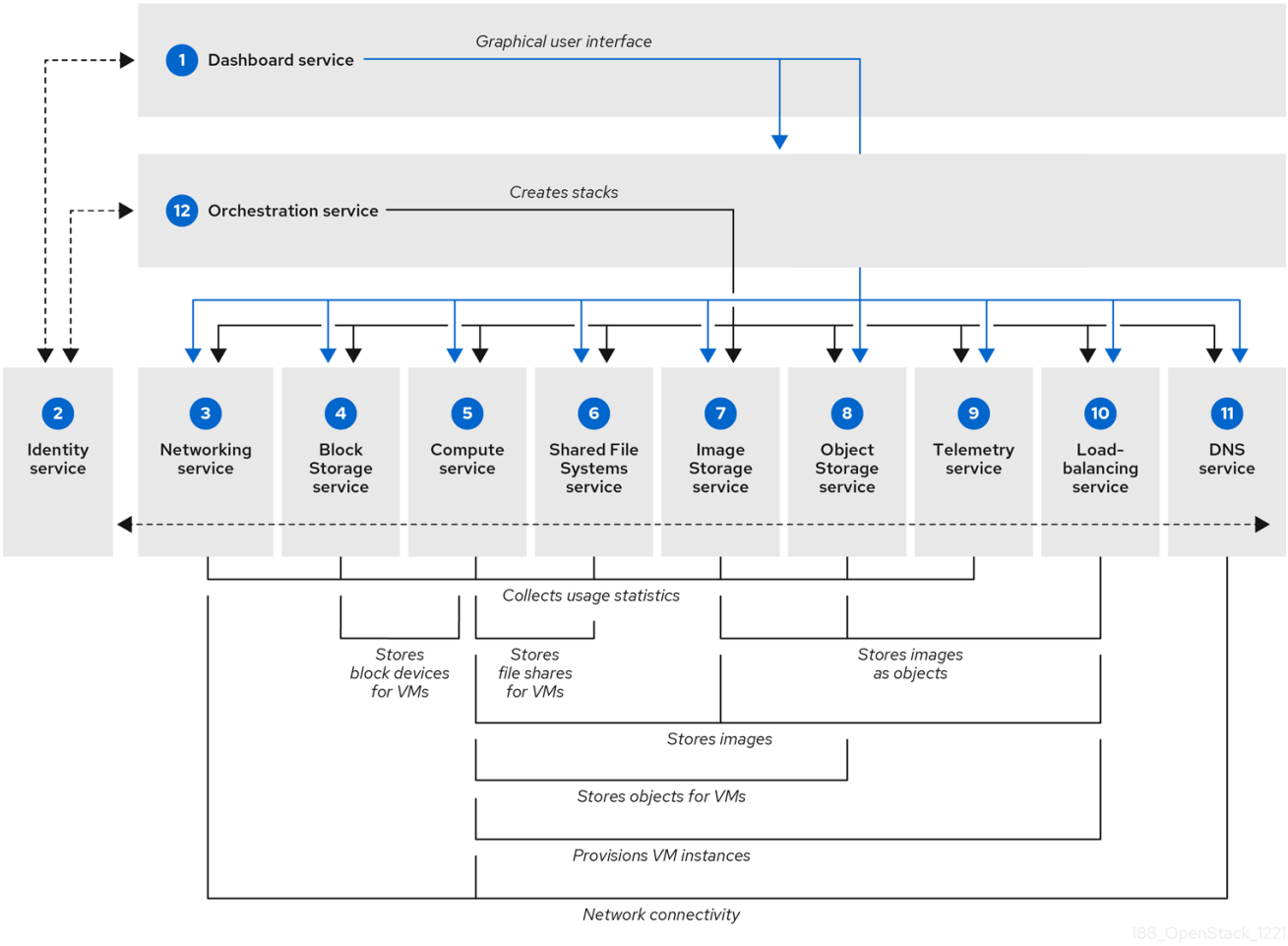
RPM Distribution of OpenStack (RDO) is a free, community-supported distribution of the Red Hat version of OpenStack that runs on Red Hat Enterprise Linux (RHEL) and its derivatives, such as CentOS. RDO also makes the latest OpenStack development release available for Fedora. In addition to providing 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 (RHOSP) IaaS cloud is implemented as a collection of interacting services that control compute, storage, and networking resources. To manage the cloud, administrators can use a web-based dashboard or command-line clients to control, provision, and automate OpenStack resources. RHOSP also has an extensive API that is available to all cloud users.

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

RHOSP component relationships



The following table describes each component 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.

	Service	Code	Description
3	Networking	neutron	Provides connectivity between the interfaces of OpenStack services.
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	Shared File Systems	manila	Provisions shared file systems that multiple compute instances, bare metal nodes, or containers can consume.
7	Image	glance	Registry service that you use to store resources such as virtual machine images and volume snapshots.
8	Object Storage	swift	Allows users to store and retrieve files and arbitrary data.
9	Telemetry	ceilometer	Provides measurements of cloud resources.
10	Load-balancing	octavia	Provides load balancing services for the cloud.
11	DNS	designate	Manages Domain Name System (DNS) records and zones for the cloud.
12	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.

2.1. COMPONENTS

This section describes each of the OpenStack components:

- **OpenStack Dashboard service (horizon)**
  OpenStack Dashboard service provides a graphical user interface for users and administrators to create and launch instances, manage networking, and set 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 service (keystone)**
  OpenStack Identity service provides user authentication and authorization to all OpenStack components. Identity service supports multiple authentication mechanisms, including user name and password credentials, token-based systems, and AWS-style log-ins.

- **OpenStack Networking service (neutron)**

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

- **OpenStack Block Storage service (cinder)**
  OpenStack Block Storage service provides persistent block storage management for virtual hard drives. With Block Storage, users can create and delete block devices, and manage attachment of block devices to servers.

- **OpenStack Compute service (nova)**
  OpenStack Compute service serves as the core of the RHOSP cloud by providing and managing virtual machine instances on demand. The Compute service abstracts the underlying hardware and interacts with other RHOSP services to create and provision instances in a RHOSP cloud.

- **OpenStack Shared File Systems service (manila)**
  OpenStack Shared File Systems 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 Image service (glance)**
  OpenStack Image service is 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 service (swift)**
  Object Storage service 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 with metadata stored in the extended attributes of each file.

- **OpenStack Telemetry service (ceilometer)**
  OpenStack Telemetry service provides user-level usage data for RHOSP-based clouds. You can use the data 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 RHOSP infrastructure resources such as libvirt.

- **OpenStack Load-balancing service (octavia)**
  OpenStack Load-balancing service provides a Load Balancing-as-a-Service (LBaaS) implementation that supports 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 creates on demand.

- **OpenStack DNS service (designate)**
  OpenStack DNS service provides a DNS-as-a-Service (DNSaaS) implementation that enables you to manage DNS records and zones in the cloud. The RHOSP DNS service provides a REST API, and is integrated with the RHOSP Identity service (keystone) for user management. Using RHOSP director you can deploy BIND instances to contain DNS records, or you can integrate the DNS service into an existing BIND infrastructure. In addition, director can configure DNS service integration with the RHOSP Networking service (neutron) to automatically create records for compute instances, network ports, and floating IPs.

- **OpenStack Orchestration service (heat)**
  OpenStack Orchestration service provides templates to create and manage cloud resources such as storage, networking, instances, or applications. Use templates to create stacks, which are collections of resources.

- **OpenStack Bare Metal Provisioning service (ironic)**
  OpenStack Bare Metal Provisioning service supports physical machines for a variety of hardware vendors with hardware-specific drivers. Bare Metal Provisioning integrates with the Compute service to provision physical machines in the same way that virtual machines are provisioned, and provides a solution for the bare-metal-to-trusted-project use case.

- **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**
  Red Hat OpenStack Platform (RHOSP) director is a toolset for installing and managing a complete RHOSP environment. It is based primarily on the OpenStack project TripleO, which is an abbreviation for OpenStack-On-OpenStack. This project uses OpenStack components to install a fully operational RHOSP 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 RHOSP environment. RHOSP director uses two main concepts: an undercloud and an overcloud. The undercloud installs and configures the overcloud.

- **OpenStack High Availability**
  To keep your Red Hat OpenStack Platform (RHOSP) environment up and running efficiently, use RHOSP director to create configurations that offer high availability and load balancing across all major services in RHOSP.

- **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 (RHOSP) with the following third-party software - Tested and Approved Software

2.3. INSTALLATION SUMMARY

Red Hat supports the following methods to install Red Hat OpenStack Platform (RHOSP):

- **Red Hat OpenStack Platform director**: RHOSP director is recommended for enterprise deployments. RHOSP director is a toolset for installing and managing a complete RHOSP 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 RHOSP 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 RHOSP environment. RHOSP 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 Installing and managing Red Hat OpenStack Platform with director.

- **packstack**: Packstack is an OpenStack deployment that 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, 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 (RHOSP), you must register all systems in the OpenStack environment with Red Hat Subscription Manager, and subscribe to the required channels. For more information about the channels and repositories to deploy RHOSP, see the following guides:

- Requirements for installing using director in the *Installing and managing Red Hat OpenStack Platform with director* 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 Red Hat OpenStack Platform (RHOSP) components.

For additional RHOSP documentation, see Product Documentation for Red Hat OpenStack Platform 17.1.

Component	Reference
Red Hat Enterprise Linux	Red Hat OpenStack Platform 17.1 is supported on Red Hat Enterprise Linux 8.4. For information about installing Red Hat Enterprise Linux, see Product Documentation for Red Hat Enterprise Linux 8.
Red Hat OpenStack Platform	To install OpenStack components and their dependencies, use RHOSP director. Director uses a basic OpenStack undercloud to provision and manage the OpenStack nodes in the final overcloud. 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 Installing and managing Red Hat OpenStack Platform with director guide.
High Availability	For the configuration of additional high availability components, for example, HAProxy, see the Managing high availability services guide. For information about configuring live migration, see Migrating virtual machine instances between Compute nodes in the *Configuring the Compute service for instance creation* guide.
Load-balancing	The OpenStack Load-balancing service (octavia) provides a Load Balancing-as-a-Service (LBaaS) version 2 implementation for RHOSP director installations. For more information, see the Configuring load balancing as a service guide.
Pacemaker	Pacemaker is integrated into Red Hat Enterprise Linux as an add-on. To configure Red Hat Enterprise Linux for high availability, see the Configuring and managing high availability clusters guide.