Red Hat Enterprise Linux OpenStack Platform:

Life-cycle, roadmap, & partner ecosystem

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Agenda

- OpenStack Refresher
- Life-cycle
- Roadmap
- Partner Ecosystem
OpenStack Refresher
OpenStack is made up of individual autonomous components

All of which are designed to scale-out to accommodate throughput and availability

OpenStack is considered more of a **framework**, that relies on **drivers** and **plugins**

Largely written in Python and is heavily dependent on Linux
The OpenStack Community

- OpenStack community releases a new major version every **six months**
- Previous **upstream** version codenamed **Juno** (released **October 2014**)
- Current **upstream** version codenamed **Kilo** (released **April 2015**)
- Contributions to the project come from both corporate and non-corporate entities
- Ships source-code (**trunk code**) - no certifications, support, or packages
- In terms of scale, the **Kilo** release had:
  - **21,000+** code commits
  - **1,500+** individual contributors
  - **150+** organisations contributing
Red Hat’s OpenStack Contributions

- Red Hat is a **Platinum Founding** member of the **OpenStack Foundation**
- Red Hat has been a leading corporate contributor to **Grizzly**, **Havana**, **Icehouse**, **Juno**, and **Kilo**
  - Commitment is **broad** across **all components**
  - Consistent leadership across individual **commits**, **code reviews**, **lines of code**, and **bugs fixed**
- Red Hat is also leading development in underlying **dependencies**
  - **Linux** kernel
  - **KVM** and **QEMU** hypervisor components
  - **Libvirt** - virtualization library
  - **Open vSwitch** - multilayer virtual switch
  - **Ceph** - since acquisition of Inktank
Why does this matter?

- Proves that Red Hat has the skills and resources to-
  - Support customers through the entire OpenStack platform and its dependencies
  - Engineer hot-fixes for customers, back-port security/stability fixes
  - Drive new customer features and requests
  - Influence the strategy and direction of the OpenStack project
- Red Hat is heavily focused on “upstream first”
  - All patches are contributed to the community for adoption, integration, and testing, first
  - Red Hat will not fragment their OpenStack distribution and support forks
RHEL OpenStack Platform Life-cycle
RHEL OpenStack Platform Life-Cycle

- Icehouse: Jun ‘14
- RHEL 6 & 7: Jun ‘14
- Juno: Jan ‘15
- RHEL 7: Jan ‘16
- Kilo: Jun ‘16
- RHEL 7: Jan ‘17
- Liberty: Jun ‘17

3-year Life Cycle
- Production 1
- Production 2
- To be defined

# Life-Cycle Definitions

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<th>Description</th>
<th>1-year Production 1</th>
<th>2-year Production 2</th>
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<td>yes</td>
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<tr>
<td>Minor bug fixes</td>
<td>yes</td>
<td>yes*</td>
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<tr>
<td>Security errata</td>
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<td>Bug fix errata</td>
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<tr>
<td>New features (backport potential)</td>
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<tr>
<td>Updated install image</td>
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<tr>
<td>Partner enablements additions</td>
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</table>

* need full product + engineering review prior to commitment
RHEL OpenStack Platform 6

Note: Roadmap content and delivery plans subject to change
RHEL OpenStack Platform 7

RHEL OpenStack Platform Director:

- **Deployment** ("TripleO") - Fully supported
- **Baremetal** ("Ironic") - Fully Supported

Technology Previews:

- **Database-as-a-Service** ("Trove") - Technology Preview
- **DNS-as-a-Service** ("Designate") - Technology Preview
- **File Share Service** ("Manila") - Technology Preview
- **Operational tools** (logging, monitoring, etc) - Technology Preview
  - Centralized Logging: fluentd + ElasticSearch + Kibana
  - Availability Monitoring: sensu + rabbitmq + redis + uchiwa

Note: Roadmap content and delivery plans subject to change
Roadmap Focal Areas

● Deployment Management
● Containerization
● High Availability
● Core Infrastructure Updates

Note: Roadmap content and delivery plans subject to change
Deployment Management
RHEL OpenStack Platform director

- Deployment management tool for RHEL OpenStack Platform
- Based on TripleO
  - Upstream friendly, upstream first
- 3 focus areas:
  - Deployment Consistency
  - Lifecycle Management
  - Operational Visibility

Note: Roadmap content and delivery plans subject to change
Deployment Consistency

- Best practices & reference architectures
  - Automation and repeatability
  - RHEL OpenStack platform director was created based on expertise from the field
  - Lessons learned from previous deployment tools
  - Reference architectures with certified hardware make deployment easier

- Hardware performance and validation testing
  - AHC (Automated Health Checks)
  - Hardware detection
  - Performance information
  - Black sheep detection

- Automated tests during and after deployment
  - Find and troubleshoot problems faster

Note: Roadmap content and delivery plans subject to change
Lifecycle Management

● Deployment is just the first step, most of the action happens afterwards
  ○ Add and remove capacity
  ○ Deploy critical updates
  ○ Upgrade to new OpenStack versions

● Automation is a must
  ○ API first, used by both the CLI and GUI and allow for better integration with external tools
  ○ Automated hardware detection and performance tests
  ○ Automated functional tests to validate the deployment as early as possible
  ○ Orchestrated upgrades, easier to keep closer to the newest features

Note: Roadmap content and delivery plans subject to change
Operational Visibility

- Important for troubleshooting and system status
  - Are my nodes behaving correctly?
  - Do I have enough resources?
  - What caused an operational failure?

- Operational tools
  - Log aggregation and search
  - Core service and infrastructure availability monitoring
  - Performance monitoring

Note: Roadmap content and delivery plans subject to change
**RHEL OpenStack Platform director demo**

Soon on https://www.youtube.com/redhat or right now at our booth

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Note: Roadmap content and delivery plans subject to change

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```

#redhat #rhsummit
### Nodes

#### Hardware Inventory

- **5** Nodes
  - 5 CPU cores
  - 20 GB of memory
  - 200 GB of storage

#### Provisioned nodes

- **5** Provisioned Nodes

#### Nodes Status

- **Provisioned 100%**
- **Free 1%**
- **Maintenance 0%**

#### Power Status

- **Running 100%**
- **Stopped 0%**

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**Note:** Roadmap content and delivery plans subject to change.
RHEL OpenStack Platform director 7.0

- APIs for deployment and management
  - Ironic, Nova, Glance, Heat, Tuskar
- CLI and GUI operation
- Per node Automatic Health Check (AHC)
  - aka black sheep detection
- Automated sanity checks for the deployment
  - Tempest run at the end to validate cloud as whole
  - Full and custom test suite
- Ready state configuration for selected hardware
  - RAID
  - Network
  - BIOS
- Automatic HA configuration using Pacemaker

Note: Roadmap content and delivery plans subject to change
RHEL OpenStack Platform director 7.x

- Accelerated release cadence
  - Released more often than core components
  - Reduced cycle time between field feedback and improvements
- Certified partner integration
- Automated orchestrated upgrades from 7.0 onwards
  - Upgrades should be a non-event, making it easier to use the newest features
- Automated HA fencing setup
- Distributed Automatic Health Check (DAHC)
  - Troubleshoot networking issues before deployment
- Automated tests in between deployment steps
  - Detect deployment issues earlier and make troubleshooting easier
- Images and templates customization
  - Increased deployment flexibility, adapting the director to customers' needs

Note: Roadmap content and delivery plans subject to change
RHEL OpenStack Platform director 8

● Ready state configuration for any hardware supporting IPMI
  ○ Increased options of deployment
  ○ Easier to repurpose hardware

● Alternative automatic HA configuration using Keepalived
  ○ More HA options, not everybody uses Pacemaker

● Container based deployment
  ○ Lots of innovation on the container front
  ○ Introducing the technology early in incremental steps

Note: Roadmap content and delivery plans subject to change
Containers
In the works

Supporting two use cases:

- Deploying OpenStack itself
- Deploying workloads on top of OpenStack

Focused on:

- **Kolla** for OpenStack deployment
- **heat-kubernetes** for deploying Atomic on OpenStack and configuring a Kubernetes cluster for user workloads
- **Kubernetes integration** with OpenStack infrastructure services (e.g. Networking and Storage).
- Kubernetes **cloud provider plug-in** for OpenStack

Note: Roadmap content and delivery plans subject to change
Architectural tenets

1) **Technical independence**: Ensure that containers are defined such that they remain independent of the underlying infrastructure. Containers must continue to be portable across host environments.

2) **Avoid redundancy**: Limit redundancies where possible to minimize performance and other resource hits. This includes limiting the number of layers between the container and the hardware.

3) **Contextual awareness**: Allow containers to easily take advantage of OpenStack shared services beyond compute (i.e. networking and storage). To do this, Red Hat Atomic Enterprise (and other Red Hat container offerings) must be context aware.

4) **Simplified management**: Simplify management by delivering a holistic, integrated view across platforms.

Note: Roadmap content and delivery plans subject to change
Convergence - Physical and application abstraction

Red Hat Atomic Enterprise Platform

OpenShift
Kubernetes

VM

Container

KVM
Ironic

OpenStack shared services
compute
networking
storage

Note: Roadmap content and delivery plans subject to change
Convergence - Physical and application abstraction

Containers and VMs can be attached to the same Neutron network

OpenStack shared services

compute  networking  storage

Service  Container  Container

VM  VM

KVM  Ironic

OpenShift  Kubernetes

Note: Roadmap content and delivery plans subject to change
Convergence - Physical and application abstraction

Cinder virtual block devices can be attached to VM or containers indifferently

OpenStack shared services
- compute
- networking
- storage

standard hardware

OpenShift
Kubernetes
Ironic

Service
Container
Container
VM
VM
KVM

Note: Roadmap content and delivery plans subject to change
Kubernetes should be able to recognize local resources for storage and networking, and request scaling of container hosts on demand, VM or bare metal.

OpenStack shared services

- OpenShift
- Kubernetes
- Container
- Container
- Ironic
- OpenStack shared services
- compute
- networking
- storage
- standard hardware

Note: Roadmap content and delivery plans subject to change.
High Availability
High Availability - Current State

- Have supported integration with RHEL High Availability Add-On since RHEL OpenStack Platform 5
  - **Pacemaker** - resource mgr for active/active & active/passive services
  - **HAProxy** - Load balancing active/active services
  - **Keepalived** - Load balancer availability
- Two architectures: Pacemaker/HAProxy & Keepalived/HAProxy
- All core OpenStack services **active/active** except **cinder-volume**
  - Red Hat developers working upstream on enhancing cinder-volume to support active/active safely

Note: Roadmap content and delivery plans subject to change
High Availability - Roadmap

Compute Node & Instance High Availability:

- Uses Pacemaker to monitor all Compute Nodes, detect faults, and recovers instances to other running Nodes
- Uses vanilla Nova functionality for node disable and evacuation
- Can detect failures from kernel panics, loss of connectivity or other failure
- Works with most baseboard management controllers

Note: Roadmap content and delivery plans subject to change
Core Infrastructure Updates:

Networking
RHEL OpenStack Platform 7 - IPv6 enhancements

- Multiple IPv6 prefixes on a network
  - It is now possible to attach several IPv6 subnets to a network
  - When the subnet type is either SLAAC or DHCPv6 stateless, one IPv6 address from each subnet will be assigned to the Neutron port

- Extra DHCP options
  - It is now possible to specify extra DHCP options (e.g., DNS) for both DHCPv4 and DHCPv6
  - Important for dual-stack designs, where a VM is assigned with both IPv4 and IPv6 addresses on the same port

- IPv6 external router support
  - The virtual router can automatically learn its default gateway information via SLAAC; or
  - The default route can be manually set by the operator using a new `ipv6-gateway` option

**Note:** there is no NAT or floating IP support with IPv6. Tenants are expected (and trusted) to configure globally routable prefixes

**Note:** Roadmap content and delivery plans subject to change
Deployment with DVR

**Controller Nodes**

**Compute Nodes**

agent_mode = dvr

- L3 Agent
- Metadata Agent

**Network Nodes**

agent_mode = dvr_snat

- L3 Agent
- Metadata Agent

Management

Tenant Data (GRE/VXLAN/VLAN)

External

Note: Roadmap content and delivery plans subject to change
RHEL OpenStack Platform 7

- VLAN networks with DVR (Technology Preview)
  - Distributed Virtual Router can now be configured to serve VLAN networks, in addition to GRE or VXLAN
  - DVR allows to distribute east/west routing and floating IPs to the Compute nodes

- LBaaS v2 API - RHEL OpenStack Platform 7
  - A new version of the API, including support for TLS/SSL termination
  - Customers can deploy with the HAPerxy service plugin/agent (default in RHEL OpenStack Platform) or with certified plugins for some of our partners

Note: Roadmap content and delivery plans subject to change
RHEL OpenStack Platform 8 and beyond

- Role-based Access Control (RBAC) for networks
- Neutron quality of service (QoS)
- Pluggable IPAM
- IPv6 Prefix Delegation
- L3 HA + L2 Population support
- L3 HA support for IPv6
- Stateful OVS firewall
- VLAN trunking into a VM

Note: Roadmap content and delivery plans subject to change
Core Infrastructure Updates:

Storage
RHEL OpenStack Platform 7

- Volume Backup API was extended to support snapshot based ("incremental") backups, where the volume can remain online and in-use for the duration of the operation.
- Image conversion during image import process
  - Useful to unify stored image types and use a type that works better with the hypervisor and the storage backend. (supported formats are: raw <-> qcow2)
- Introspection of images
  - A new task has been added to Glance’s v2, which makes it possible for introspecting image’s metadata and populate it.
- Ability to deactivate or “hold” images
  - The admin is now able to put the image “on hold” preventing instances from being built with it until it has be properly examined.
- Object Storage Composite Tokens & Service Accounts
  - Allow other OpenStack services to store data in Swift on behalf of a client so that neither the client nor the service can update the data without both parties consent.

Note: Roadmap content and delivery plans subject to change
RHEL OpenStack Platform 8

- Generic Volume Migration
  - Add the ability to migrate volumes of drivers that don’t support iSCSI such as Ceph RBD.

- Import/Export Volume snapshots
  - Allows to import volumes snapshot from one Cinder to another.
  - Allows to import "non" openstack snapshots already on a backend-device. Where, export snapshots should work the same way as export volumes.

- Image Artifact Repository (ongoing)
  - Extend Glance functionality to store not only the VM images
  - Glance to become a catalog of such artifacts, providing capabilities to store, search and retrieve their artifacts, their metadata and associated objects.

- Support snapshotting ephemeral disks stored in Ceph RBD
  - By clean up unused parents of clones on deletion.

- Object Storage
  - Erasure Coding (tech-preview in RHEL OpenStack Platform 7)

Note: Roadmap content and delivery plans subject to change
Core Infrastructure Updates:
Compute
Compute - RHEL OpenStack Platform 7

- Iteration on Enhanced Platform Awareness (EPA) features developed in “Kilo” and backported to RHEL OpenStack Platform 6 release:
  - vCPU pinning
  - Large pages (2M and 1G)
  - vCPU, RAM, and I/O device NUMA awareness
- Baremetal (“Ironic”) driver supported, with caveats!
- Support for quiescing file-systems during image snapshot using QEMU guest agent

Note: Roadmap content and delivery plans subject to change
Compute - RHEL OpenStack Platform 8

- RHEL for Real-time integration (incl. real-time KVM)
- `virtio` and `vhost-user` performance enhancements
- Hardening of instance live-migration
  - migration monitoring capabilities
  - support evacuate/migrate on instances with enhanced platform awareness
- Enhancements to Nova API to better support virtual machine HA
  - Allow external tools (e.g. Pacemaker) to tell Nova that a node is being fenced.

Note: Roadmap content and delivery plans subject to change
Partner Ecosystem
Red Hat Connect for Technology Partners

- RHC4TP is an open, collaborative ecosystem connecting technology companies with the tools and resources to build certified solutions for the Red Hat family of products

- The program provides:
  - Early access to pre-release products
  - Best practices, architectural guidance, SMEs
  - Certification
Comprehensive Partner Ecosystem

Red Hat Connect for Technology Partners

- OEMs and IHVs
- ISVs
- System Integrators
- Cloud Service Providers
- Managed Service Providers
- Channel Partners

- Over 350+ members
- Over 900 certified solutions
- Over 4,000 Red Hat Enterprise Linus certified compute servers
- Over 13,000 applications available on Red Hat Enterprise Linux
- Large catalog of Windows certified applications
Red Hat Enterprise Linux OpenStack Platform Certification

● Certification Value Proposition
  ○ Partner testing and validation on Red Hat products
  ○ Collaborative technical support issue resolution
  ○ Certifications for:
    ■ Nova compute
    ■ Cinder storage
    ■ Neutron networking
OpenStack Key Strategic Alliances

- Cisco
- Dell
- NetApp
- Intel
Cisco and Red Hat

- Cisco Unified Computing System Integrated Infrastructure for Red Hat Enterprise Linux OpenStack Platform (USCO)
- Cisco Validated Designs
- Application Centric Infrastructure and Group Based Policy
- Cisco Intercloud
Dell and Red Hat

- Jointly developed OpenStack cloud solutions with tested and proven reference architectures
- Co-engineered to be quality engineered, secure and validated
- Accelerated private cloud deployment shortens time to business value
NetApp and Red Hat

● Pre-integrated / validated OpenStack solutions
● Start small and expand over time
● Streamlined support more quickly resolves technical support issues
  ○ Experience
  ○ Collaboration
  ○ Cross-training
Intel and Red Hat

- Extending the OpenStack On-Ramp to the Enterprise program
- Focused on ease of deployment
- Rolling upgrades with zero downtime
- High availability of services / tenants
  - Evacuate hosts impacted by failure
  - Move workloads to consolidate host usage
  - Enables traditional and cloud workloads to co-exist
LEARN. NETWORK.
EXPERIENCE OPEN SOURCE.
Questions?

Don’t forget to submit feedback using the Red Hat Summit App!

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Coming up!
● OpenStack Engineering Roadmap - Ballroom A @ 3:40 PM.