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Red Hat Virtualization

AGENDA

- Architecture overview
- Management
- Compute
- High Availability
- What's New
- Resources


ARCHITECTURE OVERVIEW
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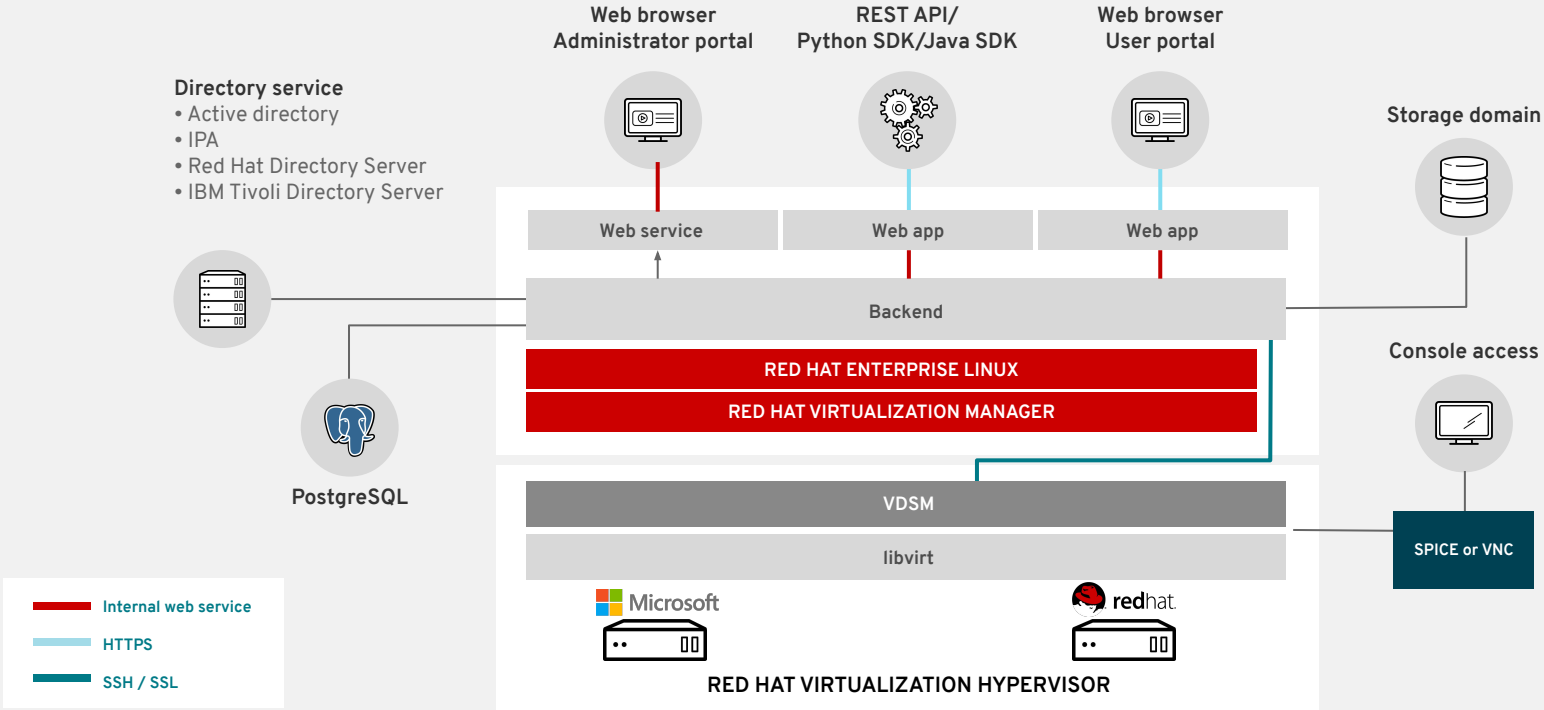
RED HAT VIRTUALIZATION OVERVIEW



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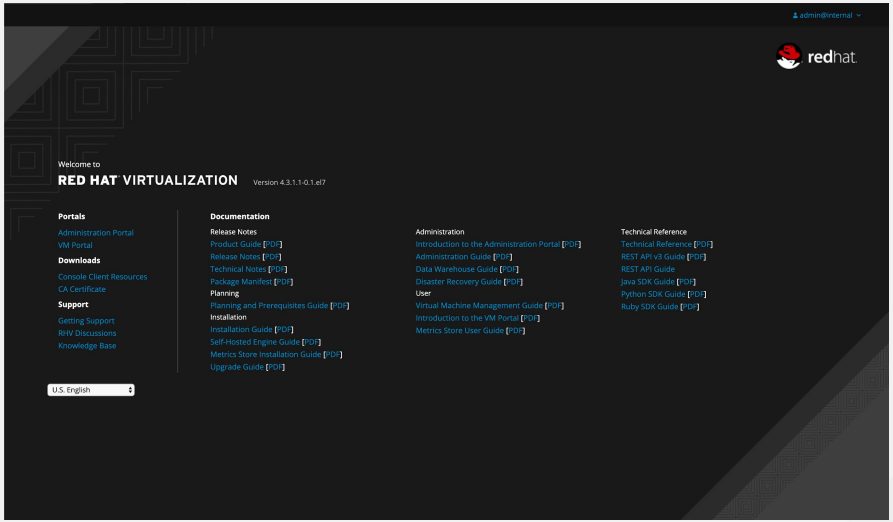
MANAGEMENT

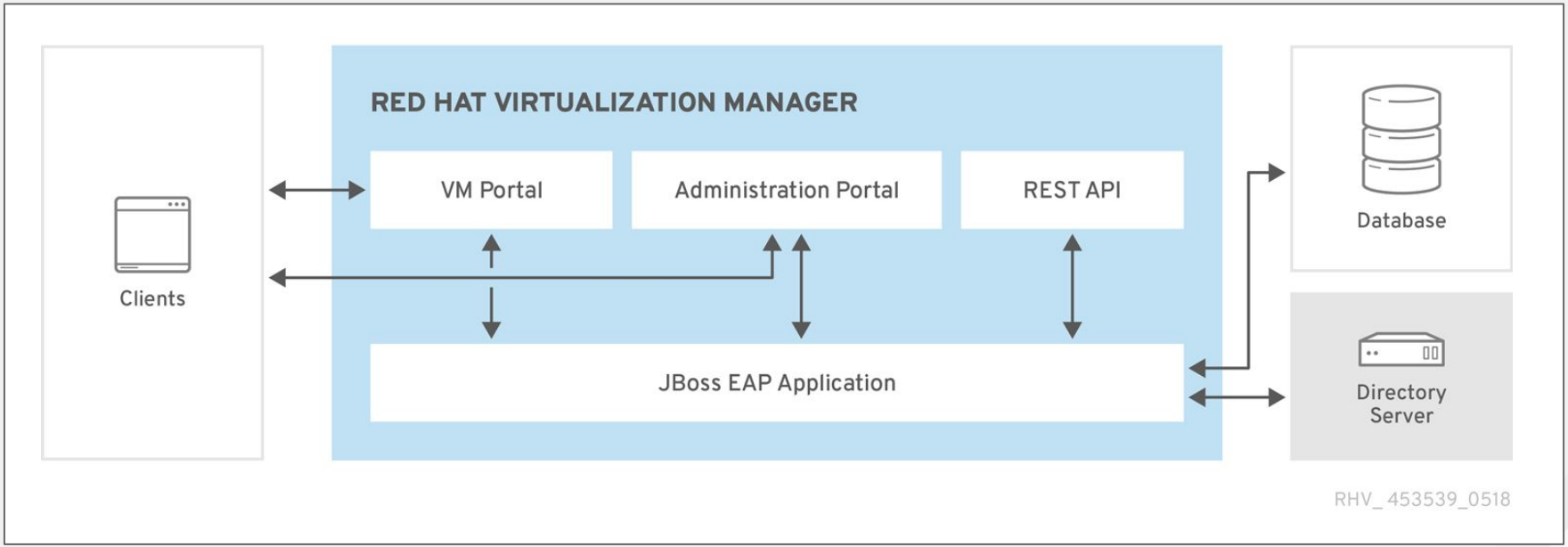
RED HAT VIRTUALIZATION MANAGER

- Primary management interface for RHV
  - Ability to create, manage, and control configuration of physical (hosts, storage), logical (datacenter, cluster, etc.), and virtual machine resources
  - Administrator interface for managing RHV resources
  - Virtual machine portal for non-administrators
- REST API for automation and integration
  - Multiple SDKs available (Python, Java, Ruby)



ARCHITECTURE

Red Hat Virtualization Manager



RHV-M DEPLOYMENT OPTIONS

Standard vs. hosted engine comparison

Standard deployment

Installed to an existing RHEL bare-metal or virtual machine deployment

Pros

- Simple and fast to instantiate
- Bare-metal or virtual machine
- Easy-to-customize deployment options

Cons

- No intrinsic high availability

Hosted engine

Deployed as virtual machine appliance in high availability (HA) configuration

Pros

- Native HA for RHV-M (engine)
- Reduced hardware footprint
- Less to manage

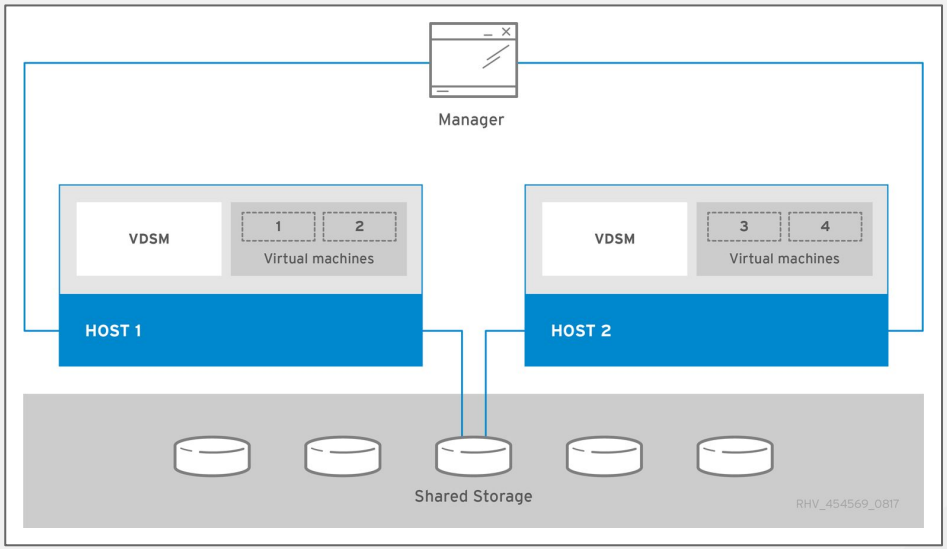
Cons

- Initial setup is slightly more complicated

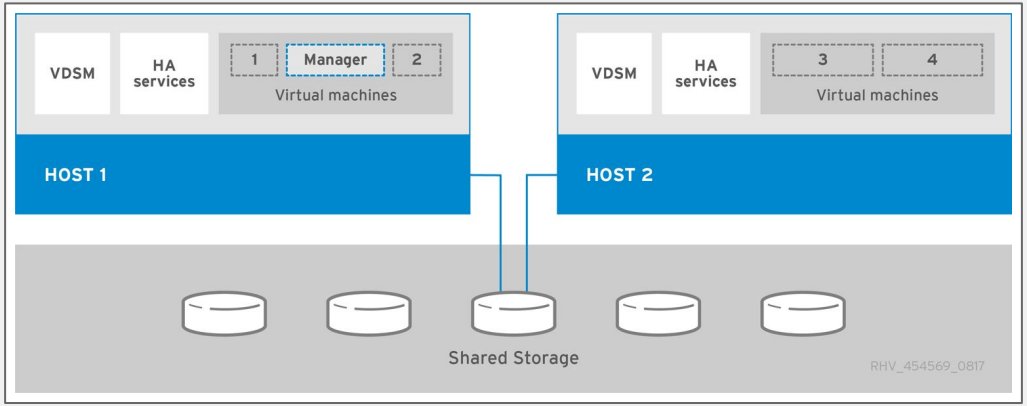
USE CASE DETERMINES WHICH ONE IS BEST FOR YOUR ENVIRONMENT

STANDARD RHV-M DEPLOYMENT

- RHV-M deployed to separate host
  - Physical or virtual
  - **Not** hosted on and managing the same infrastructure
- High availability handled externally
- Deployed using standard `yum` practice



SELF-HOSTED RHV-M DEPLOYMENT



- Deployed to same hypervisor hosts which are managed by the RHV-M instance
  - May use Cockpit interface, Ansible, or CLI for deployment
  - Hosted by either RHEL or Red Hat Virtualization Host (RHV-H) hypervisors
- Intrinsic high availability using technology separate from the hypervisor clusters/datacenter


HIGH AVAILABILITY AND DISASTER RECOVERY
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RHV-M HIGH AVAILABILITY

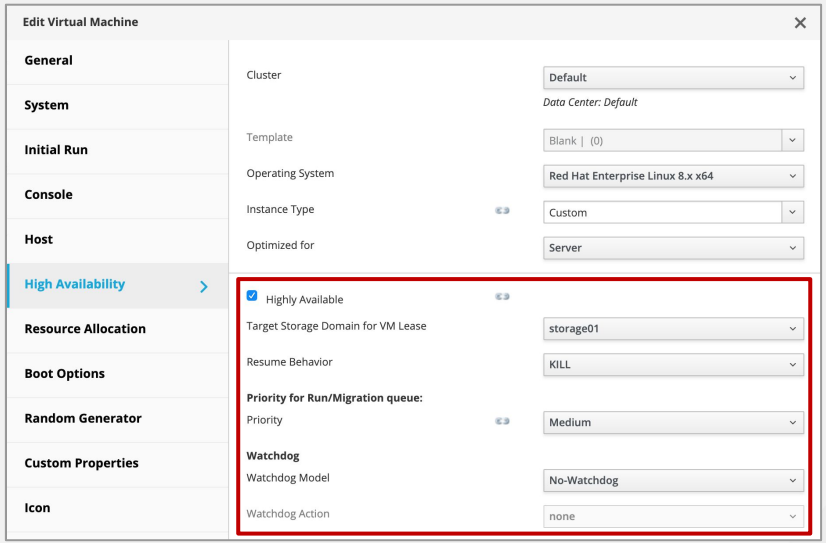
- Standard or traditional deployment
  - Administrator provides HA, no intrinsic capability
- Self-hosted deployment
  - Hosts are added to a RHV-M resource cluster
    - Cluster is managed via Cockpit
  - Resource cluster exists outside of standard RHV-M managed datacenter and cluster paradigm
  - Intrinsic HA mechanism will ensure RHV-M is running
  - Host is chosen by score, score determined by multiple factors
    - Gateway response, up-to-date VM config, management network bridge status, available memory, CPU load, previous failed attempts

```
--== Host 1 status ==--

Status up-to-date                  : True
Hostname                           : hypervisor.example.com
Host ID                            : 1
Engine status                      : {"health": "good", "vm": "up", "detail":
"up"}
Score                              : 3400
stopped                            : False
Local maintenance                  : False
crc32                              : 99e57eba
Host timestamp                     : 248542
```

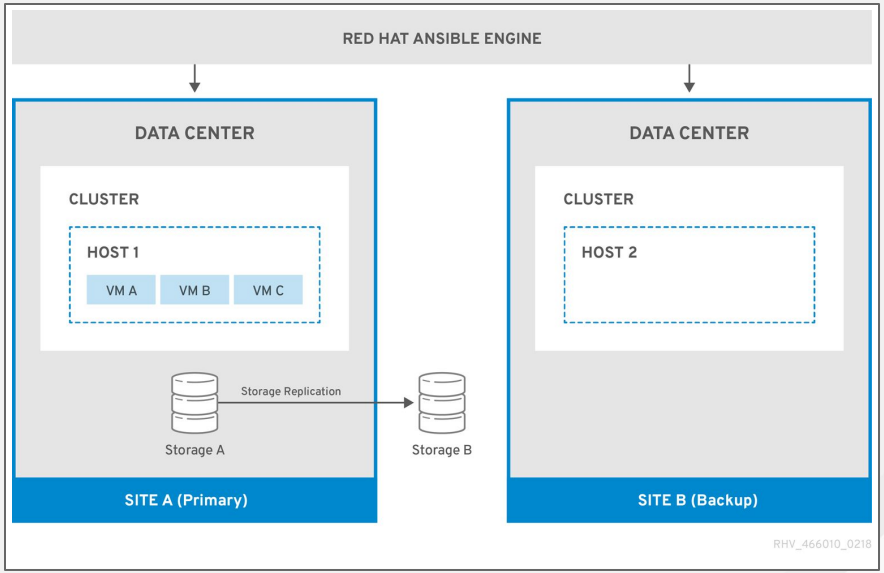
VIRTUAL MACHINE HIGH AVAILABILITY

- HA is configured on a per-VM basis
- Configure a watchdog to monitor guest operating system
- Host failure detected using multiple methods:
  - Fencing - relies on out-of-band connectivity via a fence agent; host failure is validated using agent
  - Leases - host creates a per-VM lease on shared storage; when lease is lost, VM is assumed dead
- **RHV-M must be running for VM HA**



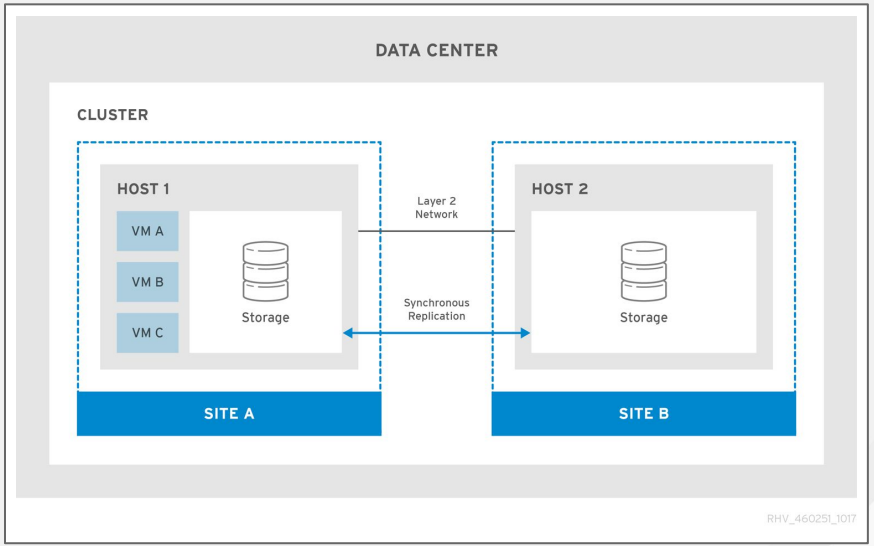
ACTIVE-PASSIVE DISASTER RECOVERY

- Ansible-based, manual failover between primary and backup sites
- Asynchronous storage replication: Replicate based on your RTO
- Networks do not have to be the same
- Failover process will:
  - Mount storage domains
  - Discover VMs
  - Remap networks, affinity and anti-affinity, and direct mapped LUNs
  - Restart VMs according to HA priority
- Use Ansible to reverse DR if primary site returns to service



ACTIVE-ACTIVE DISASTER RECOVERY

- Cluster is “stretched” across multiple sites
- Automatic failover, no manual process
- VM soft-affinity rules keep VMs at primary site until failure
- Storage must be synchronously replicated and available at both sites
- Layer 2 network (VLAN) must be available at both (no network re-map)
- RHV-M must be recovered first!
  - Use self-hosted RHV-M with nodes at both sites




COMPUTE

RHV - HYPERVISORS

- 2 different hypervisor “models”
  - Appliance: Red Hat Virtualization - Host (RHV-H)
  - Traditional OS: Red Hat Enterprise Linux (RHEL) w/RHV packages
- Both result in the same capabilities!
  - RHV-H has a smaller footprint, having only what’s needed to be a hypervisor
- Configuration and management are both handled the same by RHV-M
  - Updates/upgrades, power management, etc. all equivalent
  - Logical entities (e.g., networks and storage) are created and managed the same
- Do you want/need to customize the hypervisor OS layout and/or package set **extensively**?
  - Yes - RHEL
  - No - RHV-H

HYPERVISOR OPTIONS

RHV-H vs. RHEL comparison

Red Hat Enterprise Linux

- Manage using traditional tools and practices
  - Monitoring and alerting
  - Automation
- Customize to your organization's needs
  - Storage layout
  - Packages
- Cockpit optional (but recommended)

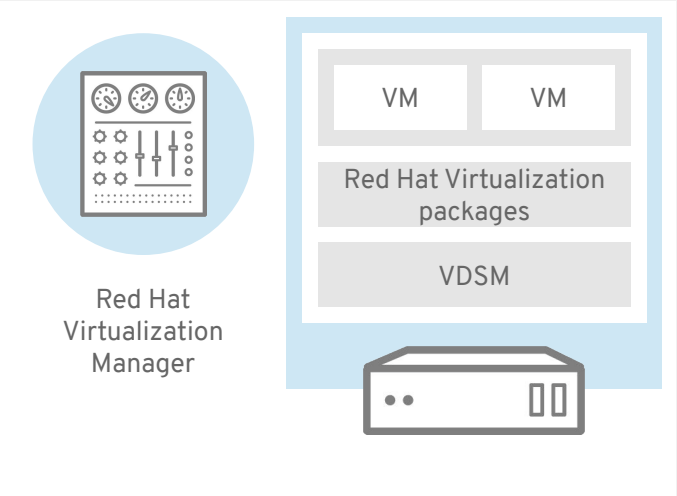
Red Hat Virtualization Host

- Fewer packages, smaller footprint
- Hands-off, appliance management model
  - Cockpit required
  - Automatically tuned for virtualization workloads
- Limited customization
  - Add packages only if needed
  - Storage layout is semi rigid

USE CASE DETERMINES WHICH ONE IS BEST FOR YOUR ENVIRONMENT

ARCHITECTURE

Red Hat Enterprise Linux hypervisor node



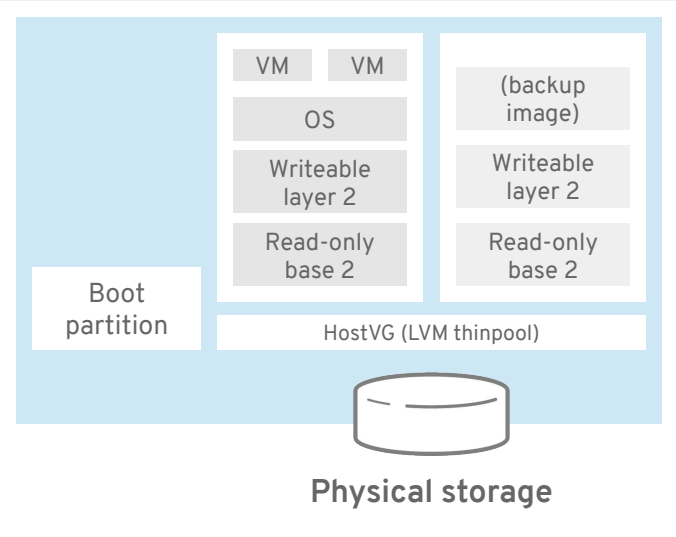
TRADITIONAL HOST

- Red Hat Virtualization 4 supports Red Hat Enterprise Linux 7 as a node
  - Larger OS footprint as compared to RHV-H
- May be deployed using any traditional RHEL methodology
- Enables administrators to use traditional management toolchain and third party integrations

Red Hat Enterprise Linux 7 is fully supported as a host in Red Hat Virtualization. RHV-related packages and policies are deployed by RHV-M.

ARCHITECTURE

Red Hat Virtualization Host (RHV-H) hypervisor node



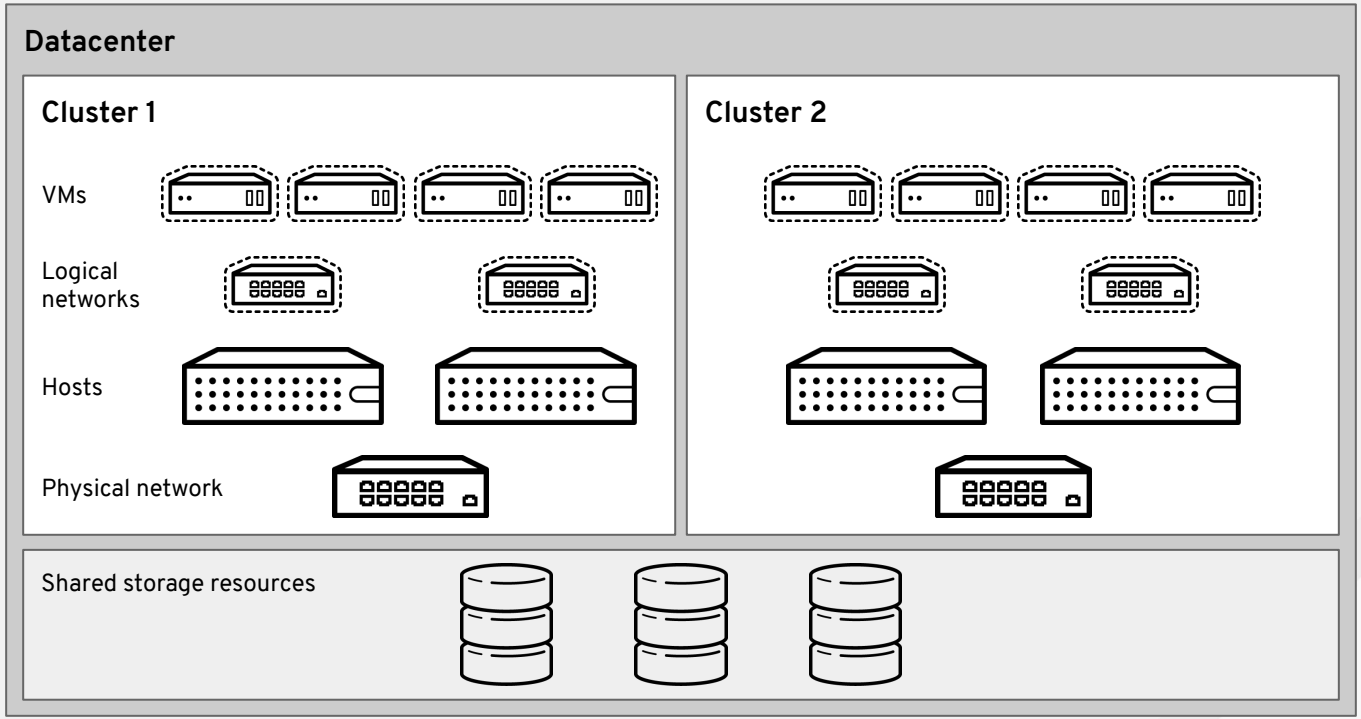
LIGHTWEIGHT HOST

- Red Hat Virtualization Host - Purpose-built node built on Red Hat Enterprise Linux
- Can be deployed via ISO, PXE, USB, cloned, etc.
- Writable root file system
- Uses trimmed down Anaconda installer
- Cockpit administrative console
- Security and services are pretuned to support virtual machines

Red Hat Virtualization Host is designed around LVM Thinpools and “imgbased,” resulting in a lightweight and flexible architecture.

RESOURCE RELATIONSHIPS

- A datacenter has 1 or more clusters
- Clusters are composed of 1 or more hosts
- VMs are hosted by the clusters and can be migrated to any host in the cluster
- All hosts in the ***cluster*** must access the same physical networks
- All hosts in the ***datacenter*** must have access to the same shared storage



RHV LIMITS

	COMPONENT	LIMIT
Maximum per hypervisor	Logical CPUs	768
	RAM	12TB
	VMs	Unlimited
Maximum per cluster	Hosts	400
	VMs	Unlimited
Maximum per VM	CPUs	240
	RAM	4TB

TEMPLATES AND POOLS

- Templates
  - Rapidly create virtual machines using templates
    - Hardware, software, and VM config stored in template
    - Customization using Sysprep or Cloud-Init
  - VMs ***created*** from a template depend on the template
    - Thin provisioned, COW instance of template disk image
  - VMs ***cloned*** from a template have no dependency
    - Full clone of template disk image
- Pools
  - Group(s) of VMs based on a template
  - Non-persistent: Created and changed data is lost at shutdown
  - Users are assigned to a pool, randomly given a VM from the pool each time

CAPABILITIES

Live migration	High-availability virtual machines
CPU pinning	Non-uniform memory access (NUMA) support
Role-based access control (RBAC) and tiered access	Browser-based management
Host power management	PCI passthrough
VM templates	USB passthrough
Firewall/Security-Enhanced Linux (SELinux)	REST API
Full support for Red Hat Enterprise Linux and Windows	Python, Ruby, and Java™ SDKs

ADVANCED CAPABILITIES

Host affinity and anti-affinity	Resource reservation
Migrate and import VMs	Automatic VM reset
Automated resource management and load balancing	Resource overcommit
CPU quality of service (QoS)	Memory page sharing
NVIDIA vGPU support	Large page support
Hot add memory and CPU	`virt-sparsify`
Hot unplug CPU	Import VMs from VMware
Native site-to-site failover (disaster recovery)	Metrics store and visualization


WHAT’s NEW

BY THE NUMBERS

NEW FEATURES

- Hundreds of new features, spanning Red Hat Enterprise Linux, KVM, and oVirt

BUG FIXES AND FEATURE REQUESTS SINCE RED HAT VIRTUALIZATION 4.2 (April 2018)

- 74 requests for enhancement (RFEs) completed
- More than 240 customer bugs fixed
- 1,367 Bugzilla bugs fixed

MAJOR THEMES

A MINOR RELEASE WITH SIGNIFICANT UPDATES, FOCUSING ON:

- Happy customers - User experience, closed Bugzillas, and completed RFEs all play a role in ensuring RHV customers are happy and continue to use RHV
- Maturity - Red Hat Virtualization is a stable, reliable, and trusted platform for enterprise virtualization. The 4.3 release continues that trend, enabling ...
- Infrastructure migration solution(s) - Red Hat Virtualization is positioned for, capable of executing, and ready to host workloads migrated to Red Hat's portfolio

RED HAT ENTERPRISE LINUX 8 SUPPORT

New integration support for
RED HAT ENTERPRISE LINUX 8

- Red Hat Enterprise Linux 8 is a fully supported guest OS
- Update and upgrade virtual machines as needed
- Other guest OS support:

  RHEL 3, 4, 5, 6, 7

  Microsoft Windows Server 2008, 2008 R2, 2012, 2012 R2, 2016

  Microsoft Windows 7, 8, 8.1, 10

RED HAT ANSIBLE AUTOMATION INTEGRATION

New integration support for
RED HAT ANSIBLE® ENGINE 2.7

- Ansible modules and roles are fully supported
- Red Hat Virtualization includes the downstream Ansible Engine
- New roles include:

  `ovirt.shutdown-env` - Performs a clean shutdown of the RHV environment. Useful for RHHI-V deployments.

  `ovirt.engine-setup` - Automates the install and configuration of RHV-M in a standard (non-HE) deployment

  `ovirt.hosted-engine-setup` - Automates the install and configuration of RHV-M in a hosted-engine deployment

  `ovirt.infra` - Allows users to create and manage datacenters, clusters, hosts, networks, storage domains, authentication and authorization, and more

RED HAT OPENSTACK PLATFORM INTEGRATION

New support for

RED HAT OPENSTACK PLATFORM 13 and 14

- Host OpenStack Platform control plane on Red Hat Virtualization
- Virtualized OpenStack Platform director (undercloud) on Red Hat Virtualization (since Red Hat OpenStack Platform 12)
- Neutron (OVN) certified as an external network provider
  - Connect RHV virtual machines to Neutron networks
  - Create and manage per-VM and per-network security groups and rules

IBM POWER9 CPU ARCHITECTURE

- IBM's newest CPU architecture, POWER9, is fully supported
  - POWER8 continues to be a supported platform as well
- High performance for big data and database workloads
  - Oracle, Db2
- Guest OS support:
  - RHEL 6.5 - 6.10
  - RHEL 7.1 - 7.6

RED HAT VIRTUALIZATION MANAGER

- Improvements and updates
  - Metrics store can be configured using more than one node and can be scaled out
  - REST API v4
  - Import VMware VMs with snapshots
  - Monitoring and alerting thresholds can now be percentage or absolute values
- Other changes
  - 3.6 and 4.0 cluster compatibility versions have been removed
    - Must upgrade to >= 4.1 before upgrading to 4.3
  - `ovirt-image-uploader` deprecated, use `ovirt-imageio` / REST API / GUI to upload images to storage domain(s)
  - `ovirt-shell` is now unsupported (not just deprecated)

RED HAT VIRTUALIZATION HOST

- Improvements and updates
  - Private VLANs enabled via network filter (`clean-traffic-gateway`)
  - Enhanced security posture with OpenSCAP included
  - rsyslog replaces fluentd
  - IPv6 for host networking (management, display, storage, migration, etc.)
- Other changes
  - Conroe, Penryn, Opteron G1/G2/G3 CPUs no longer supported
  - IBRS CPU types (first-gen Spectre/Meltdown mitigations) no longer supported
    - Cluster CPU types must be moved to “IBRS SSBD” before upgrading

VIRTUAL MACHINE CHANGES

- Improvements and updates
  - Live migration for “high performance” type VMs and other VMs with “pinning” configs (e.g. NUMA pinning, CPU pinning, CPU pass-through, etc.)
  - Windows clustering supported for direct attached LUNs and shared disks
  - Post-copy migration policy
  - Q35 chipset support
  - Ability to remove memory state from snapshot
  - Memory hot plug for POWER-based VMs
  - VM template import/export as OVA
- Other changes
  - `ovirt-guest-agent` is unsupported, upgrade to `qemu-guest-agent`


RESOURCES

ADDITIONAL INFORMATION

DOCUMENTATION

- RHV landing page
- RHV documentation
- RHEL virtualization documentation

OTHER

- RHEL blog
- RHV Partner Connect Zone

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THANK YOU