RHHI-V: Red Hat Hyperconverged Infrastructure for Virtualization

“La alternativa Open Source hiperconvergente”

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Tech Lab Madrid - 19 Diciembre 2018

AGENDA

RED HAT®
HYPERCONVERGED
INFRASTRUCTURE

- Why Hyperconverged solutions are on the rise?
- Intro to components of RHHI-V:
  - Red Hat Gluster Storage
  - Red Hat Virtualization
- Red Hat Hyperconverged Infrastructure for Virtualization (RHHI-V):
  - Architecture
  - Deployment
- Live Demo

Why Hyperconverged solutions are on the rise?

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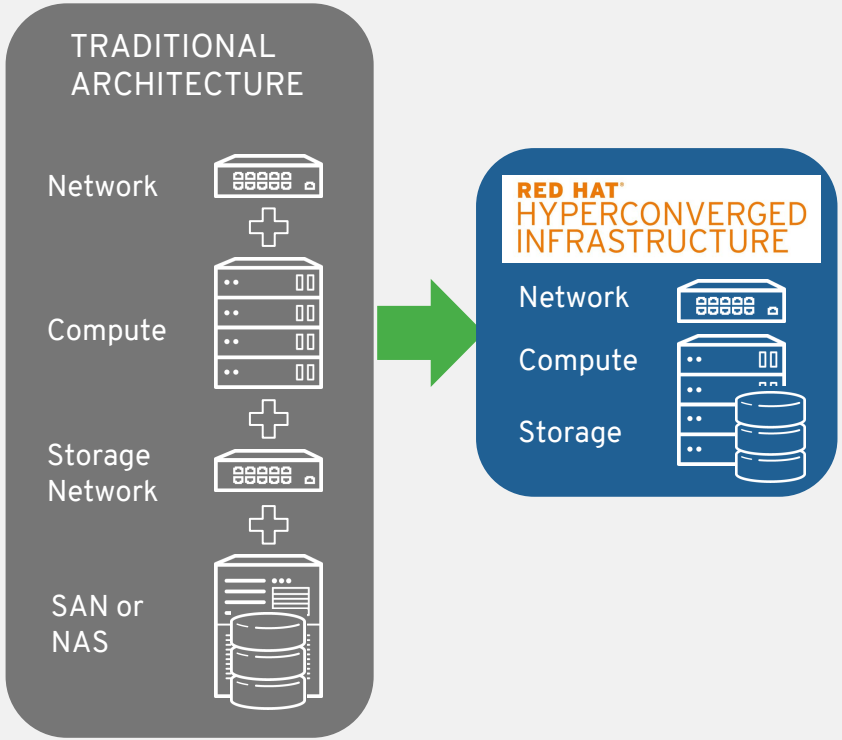
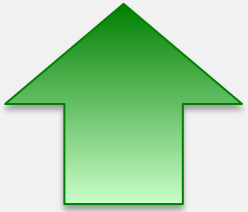
THE BENEFITS OF HCI:
INFRASTRUCTURE CONSOLIDATION & OPERATIONAL EFFICIENCY



- **Single budget** for compute, storage, & networking
- **Single** team managing infrastructure
- **Simplified** planning & procurement
- **Streamlined** deployment & management
- **Single support** stack

TECTONIC SHIFT IN INFRASTRUCTURE

- Declining siloed infrastructure
  - Declined 16.7% in 2017
  - Expected to half 2020-2021



- Growing hyperconverged infrastructure
  - 69% YoY, $10B to $28B by 2022

BENEFITS OF HCI VS. ROLL YOUR OWN

80%

Time to value savings

Time to production decreases from 1 year to ~10 Weeks

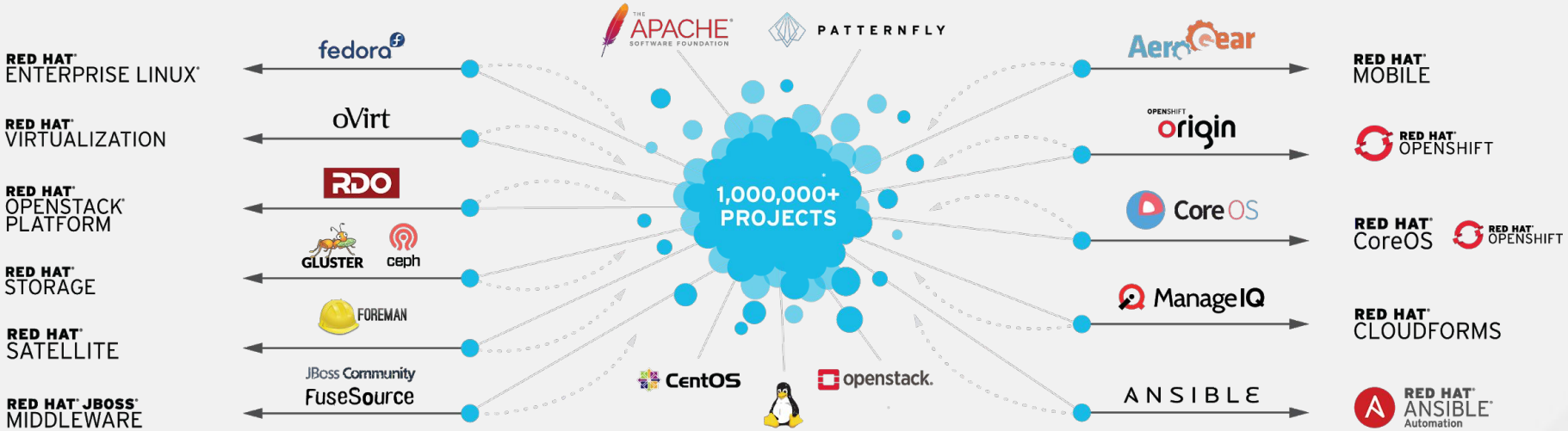
57%

OpEx Savings

Each admin can manage 2.33x the infrastructure

Source: Wikibon 2018

OPEN SOURCE: WHERE INNOVATION LIVES



RHHI-V: WHAT IS IT AND WHAT DELIVERS ?

- A combination of Red Hat Virtualization and Red Hat Gluster Storage
- Consolidation of compute and storage on the same physical hardware
- Software Defined Networking
- Major savings are realized by removal of dedicated SAN infrastructures and its associated maintenance cost
- Single staff looking after both compute and storage - no silo’s

RED HAT GLUSTER STORAGE

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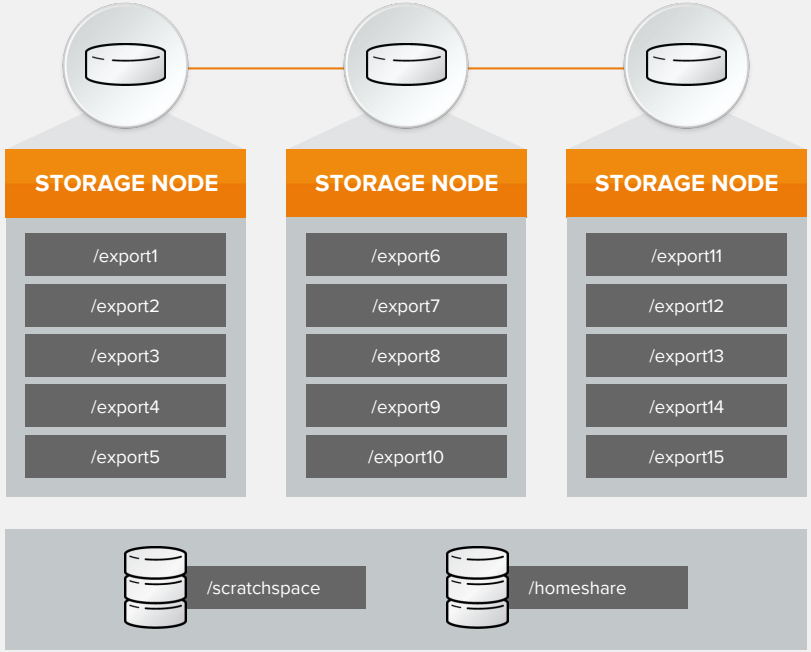
GlusterFS in one sentence

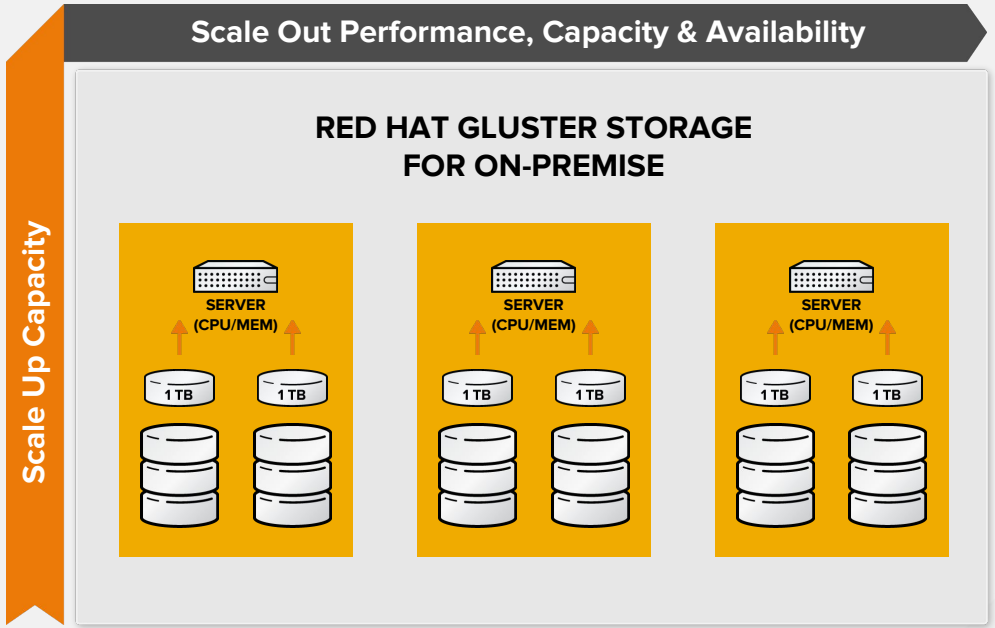


GlusterFS is a user-space software running on Linux that takes local filesystem directories of standard servers and federates them in a pool across the network, to make them accessible to clients a single mountpoint.

GLUSTERFS - DISTRIBUTED FILE STORAGE

Single, Global namespace

- Deploys on Red Hat-supported servers and underlying storage: DAS, JBOD
- Scale-out linearly
- Replicate synchronously and asynchronous



RED HAT VIRTUALIZATION

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HISTORY OF RED HAT VIRTUALIZATION

2009
QUMRANET ACQUISITION

2010
RED HAT ENTERPRISE VIRTUALIZATION BEATS VMWARE
on the SPECvirt_sc2010 benchmark on both speed and scale

2012
RED HAT ENTERPRISE VIRTUALIZATION 3.0
More solution partners
RESTful API
Memory overcommit

2013
RED HAT ENTERPRISE VIRTUALIZATION 3.1, 3.2
Windows guests NUMA
collaboration with HP

2014
RED HAT ENTERPRISE VIRTUALIZATION 3.3, 3.4
OpenStack Neutron integration
Hot Plug CPU Affinity management
IBM Power support

2015
RED HAT ENTERPRISE VIRTUALIZATION 3.6
V-2-V migration tool

2016
RED HAT VIRTUALIZATION 4.0
10th product release

2017
RED HAT VIRTUALIZATION 4.1
Ansible integration
Native SDN

2018
RED HAT VIRTUALIZATION 4.2
Native DR
New metrics
Store new UI
Cisco ACI

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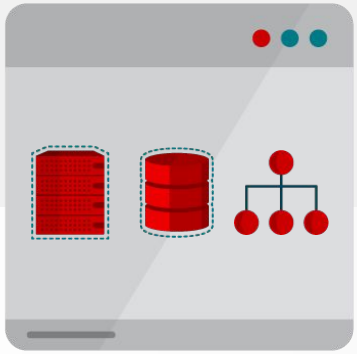
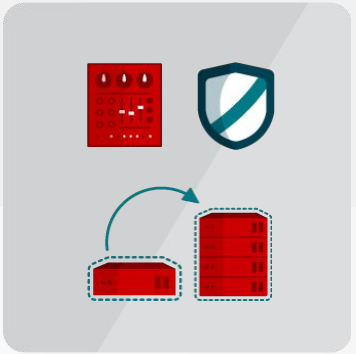
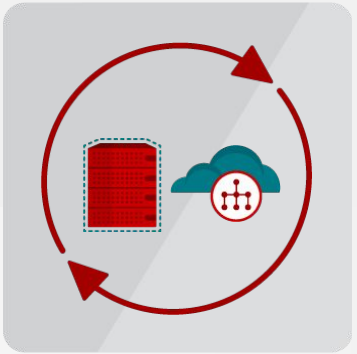
RED HAT VIRTUALIZATION



CENTRALIZED MANAGEMENT
Virtualized compute, network, and storage resources



AUTOMATED WORKLOAD
Management, scalability, and security features



OPTIMIZES CURRENT I.T.
Integrates with future technologies using RESTful API

EASY TO OPERATIONALIZE, EASY TO AUTOMATE, EASY ON THE BUDGET, NO VENDOR LOCK-IN

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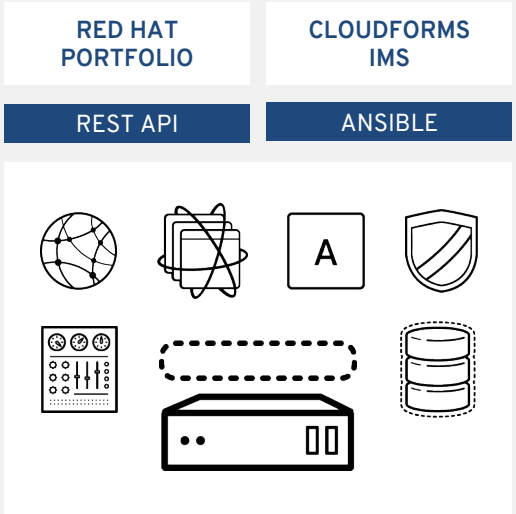
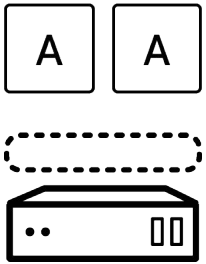
RHV and KVM HYPERVISOR



RED HAT VIRTUALIZATION

Centralized management for the KVM hypervisor, as well as compute, network, and storage resources

Red Hat Virtualization is built on Red Hat Enterprise Linux + KVM



RED HAT ENTERPRISE LINUX + KVM

Basic virtualization

Limited number of VMs allowed

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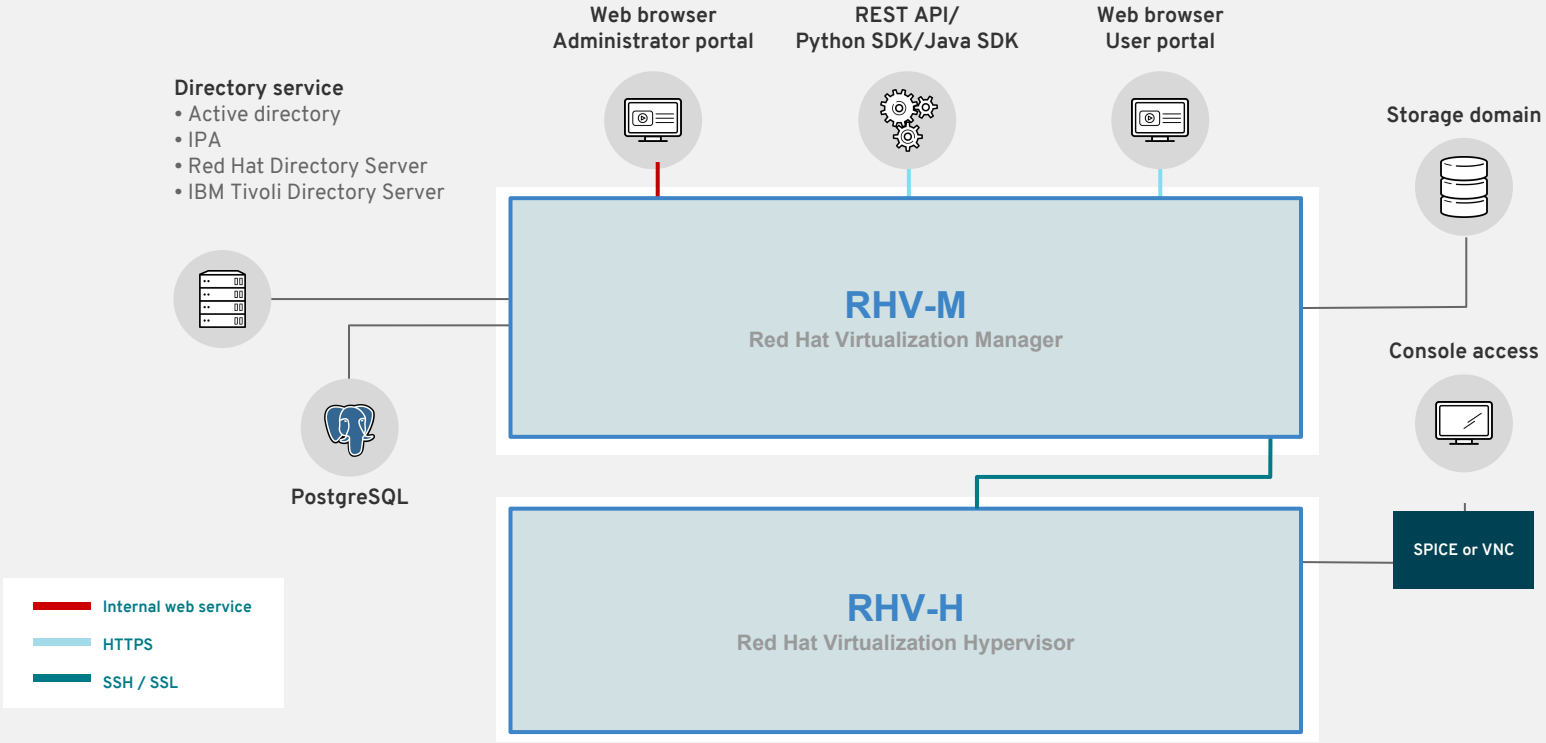
RED HAT VIRTUALIZATION OVERVIEW



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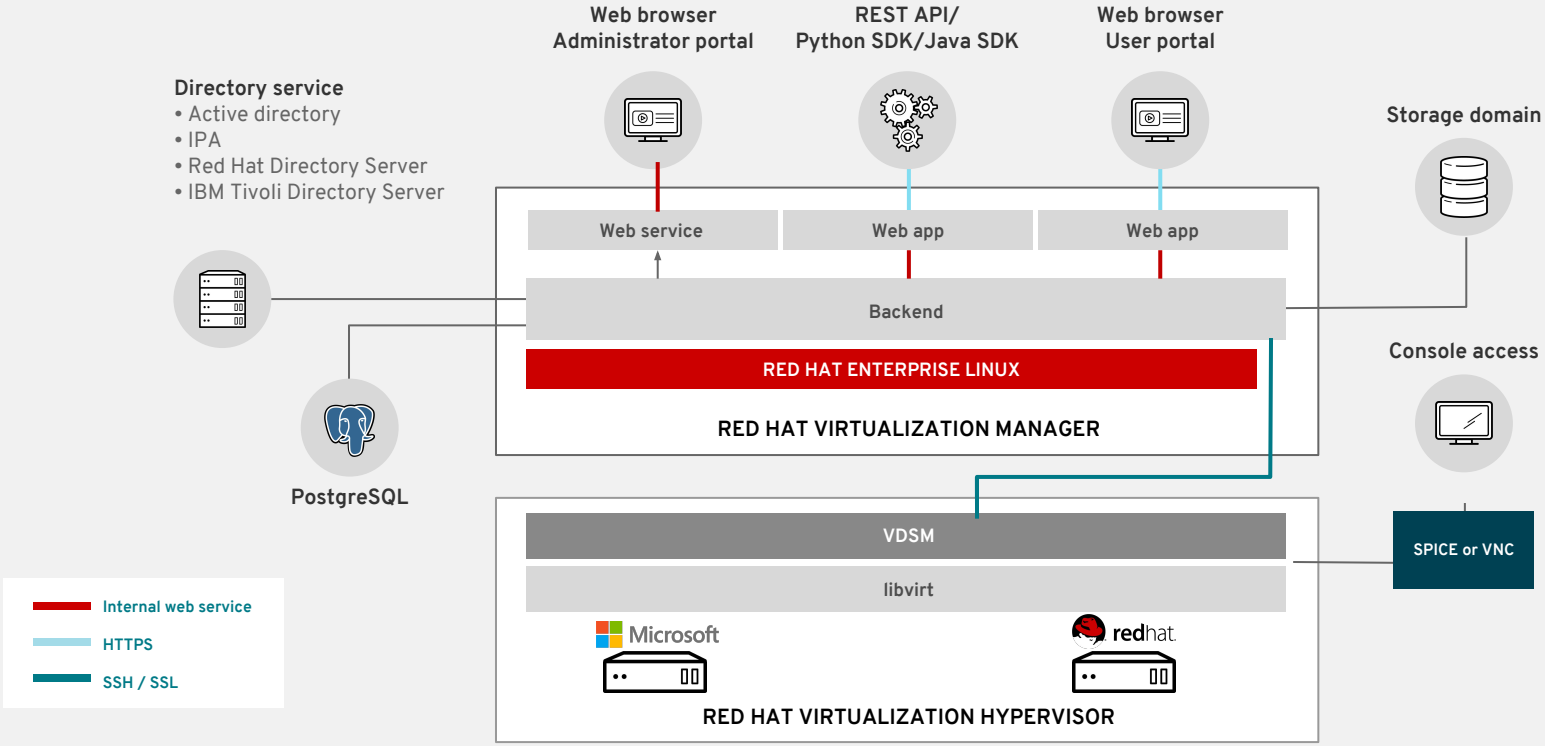

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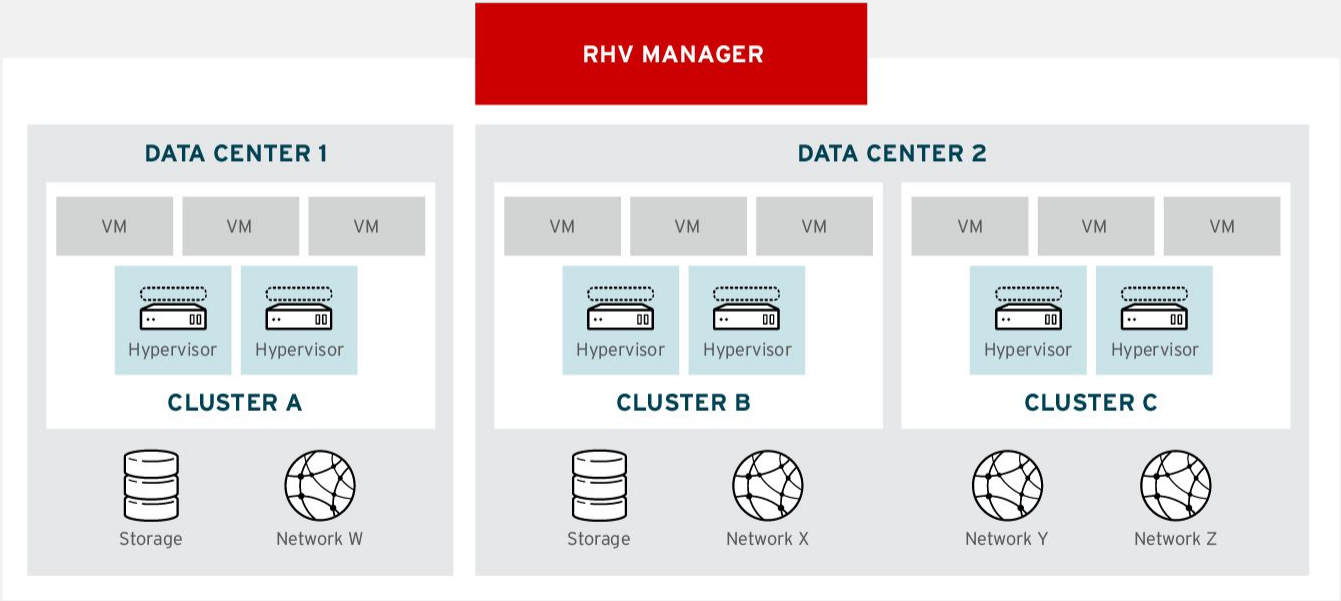
RHV CONCEPTS



RHV Integration with ANSIBLE

RED HAT®
VIRTUALIZATION

Module	Version
ovirt_auth	2.2
ovirt_vms	2.2
ovirt_disks	2.2
ovirt_datacenters	2.3
ovirt_clusters	2.3
ovirt_networks	2.3
ovirt_storage_domains	2.3
ovirt_hosts	2.3
ovirt_host_pm	2.3
ovirt_host_networks	2.3
ovirt_external_providers	2.3
ovirt_nics	2.3
ovirt_templates	2.3
ovirt_vmpools	2.3
ovirt_users	2.3
ovirt_groups	2.3
ovirt_permissions	2.3

https://access.redhat.com/documentation/en-us/red_hat_virtualization/4.2/html/administration_guide/chap-automating_rhv_configuration_using_ansible

Details of RHV & Ansible Integration

```
---
- name: Create a template from qcow
  hosts: localhost

  vars:
    engine_url: https://rhvm-engine.example.com/ovirt-engine/api
    engine_user: admin@internal
    engine_password: 123456
    engine_cafile: /etc/pki/ovirt-engine/ca.pem

    qcow_url: https://images-repo.example.com/images/myvm.qcow2
    template_cluster: production
    template_name: rhel7_template
    template_memory: 4GiB
    template_cpu: 2
    template_disk_size: 10GiB
    template_disk_storage: mydata
```

1. Credentials (or manage with Ansible Tower)
2. Template definition (and URL to download from)

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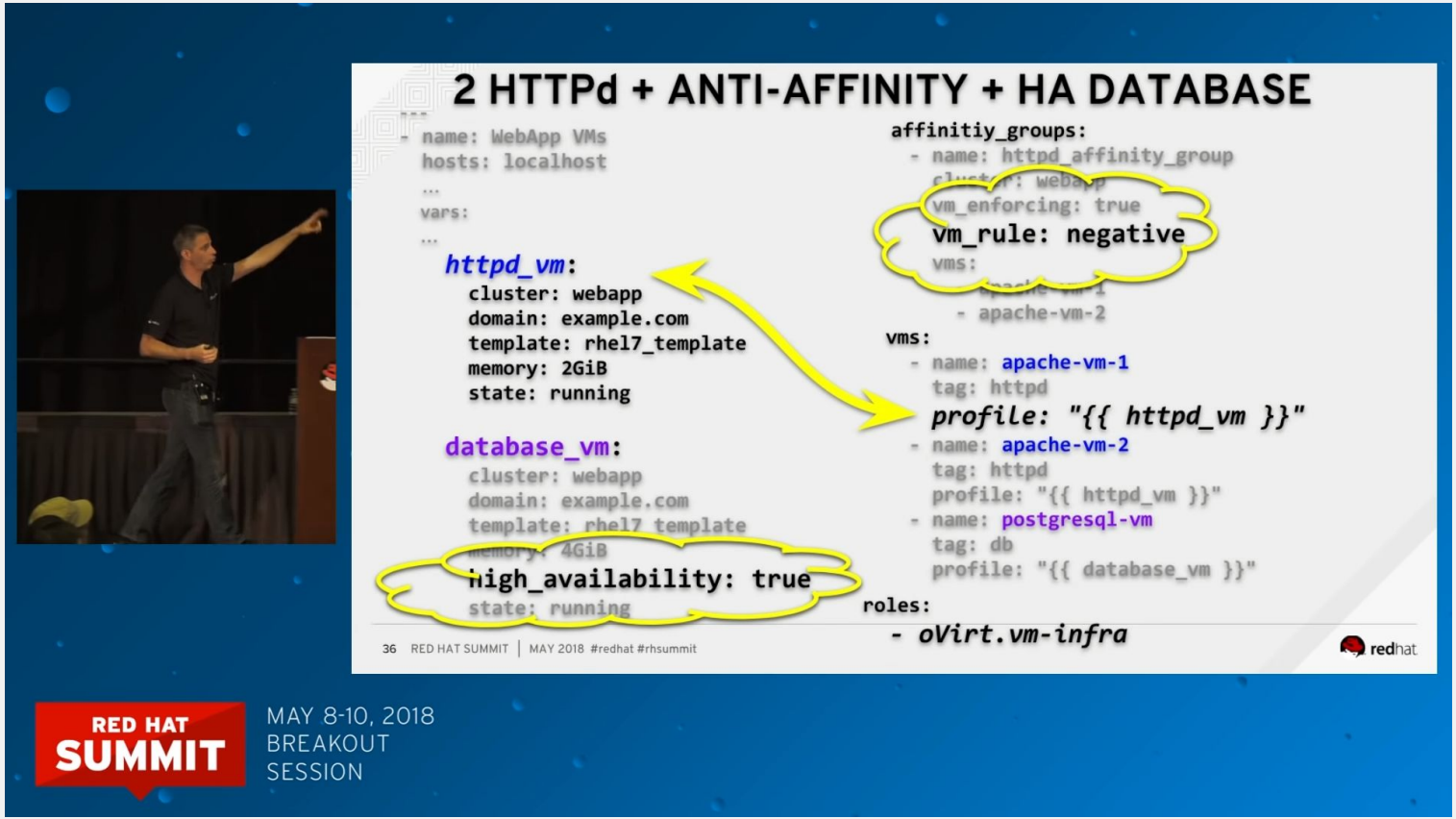
Details of RHV & Ansible Integration



RED HAT VIRTUALIZATION SUITE

RED HAT®
VIRTUALIZATION

Enterprise virtualization

RED HAT®
CLOUDFORMS

Orchestration and automation

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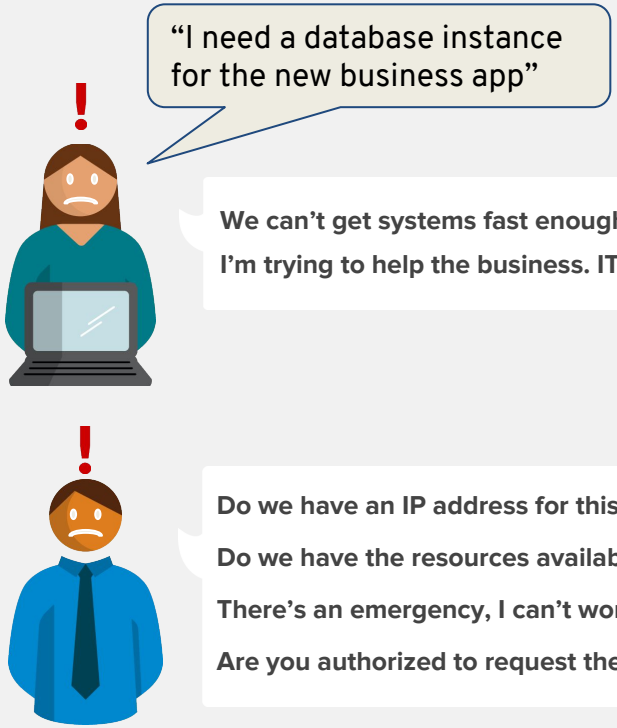
WITHOUT AUTOMATION



ACTIVITIES REQUIRED

+ **Process requests** for IT resource
+ **Clarify request** and collect needed information
+ **VM creation** from template
+ **Configuration** to desired state
+ **Security** and compliance process
+ **Non-work time** for weekends, emergencies, etc.

= WEEKS OR MONTHS

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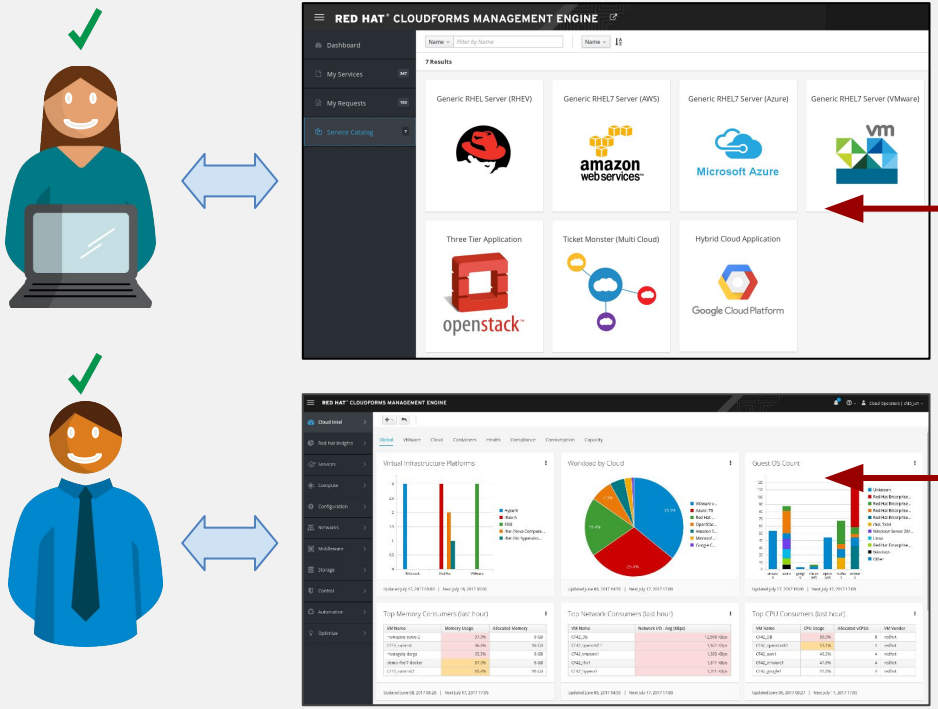
SERVICE AUTOMATION



ACTIVITIES REQUIRED

+ **Self-service** catalog
+ **Automated** approval workflow
  + provisioning
  + configuration
  + policy enforcement
+ **No down time** for weekends, emergencies, etc

= **MINUTES**

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RHHI-V: Architecture

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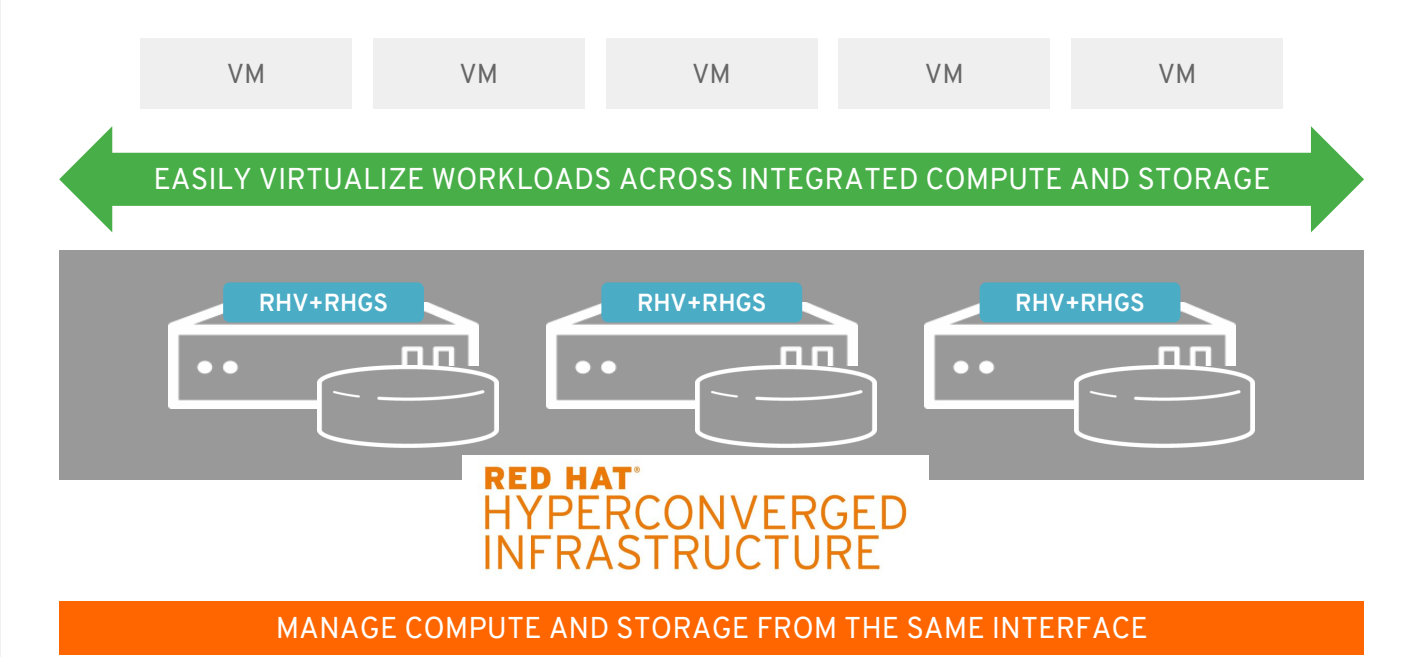
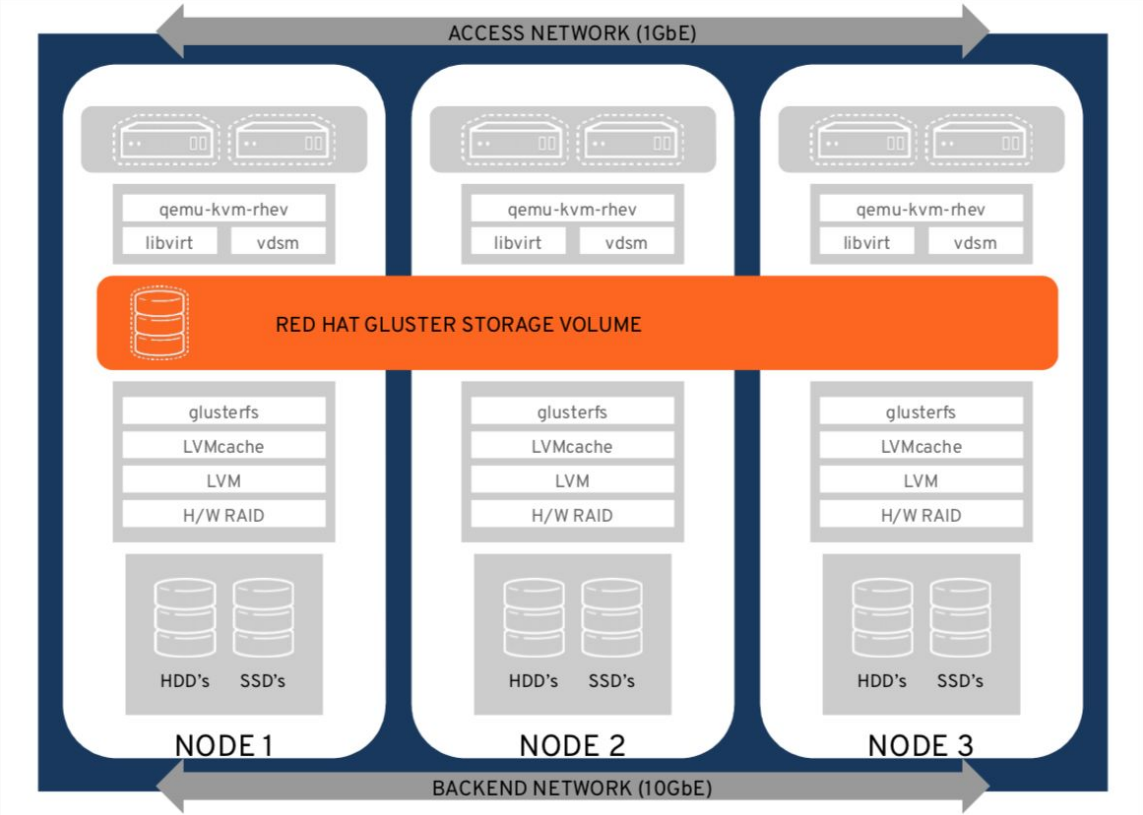
RED HAT HYPERCONVERGED INFRASTRUCTURE

OPTIMIZE, INTEGRATE, MANAGE



Red Hat Virtualization and Red Hat Gluster storage as complete offering for Compute and Storage.

ARCHITECTURAL POD VIEW
STARTING WITH 3 NODES UP TO 12 NODES



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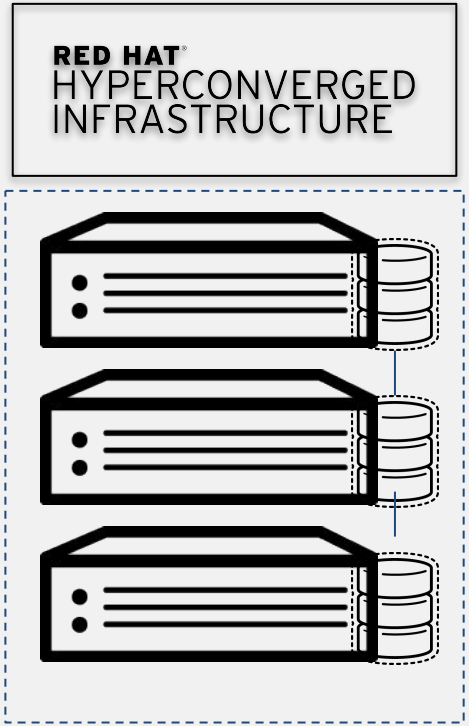
RHHI-V PRODUCT



Simple, Self Healing & Highly Available

- **3-node base** POD configuration
- RHGS with **3-way replica** & Arbiter configs
- SSD **cache** fronting spinning media
- HW & SW **monitoring**, fault correlation
- **Automated** metal-to-VM deployment

ANSIBLE
by Red Hat

ADVANTAGES OF SUBSCRIPTION MODEL

	RHHI	HCI appliance	Proprietary SW HCI
SW portability (across HW or cloud)	✔	✖	✔
No feature degradation at expiration	✔	✔	✖
All-inclusive license/subscription	✔	✖	✖
No HW or SW lock-In	✔	✖	✖

✔ Ability/Common ✖ No Ability/Uncommon

SIGNIFICANT COST SAVINGS

Medium-sized environment

9 nodes, production support

3 years, 25% discount

Must support encryption

VMware/VSAN (Source/Source/Source)

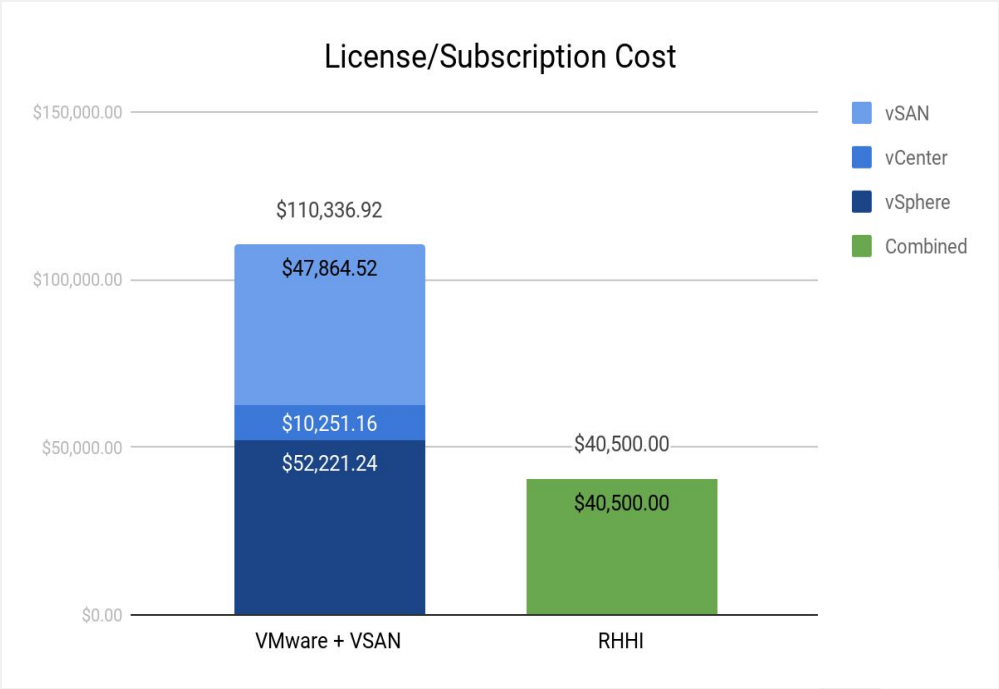
- Cost - $110,337

RHHI4V - $40,500

- VMware 172% more expensive

Open HCI = Lower dev costs

→ Customer savings



RHHI-V 1.5 HIGHLIGHTS

DATA REDUCTION

Dedup & compression with the Permabit technologies

VIRTUAL GPU

NVIDIA based vGPU support available!
Documented steps to support Nvidia vGPUs

AUTOMATED DR

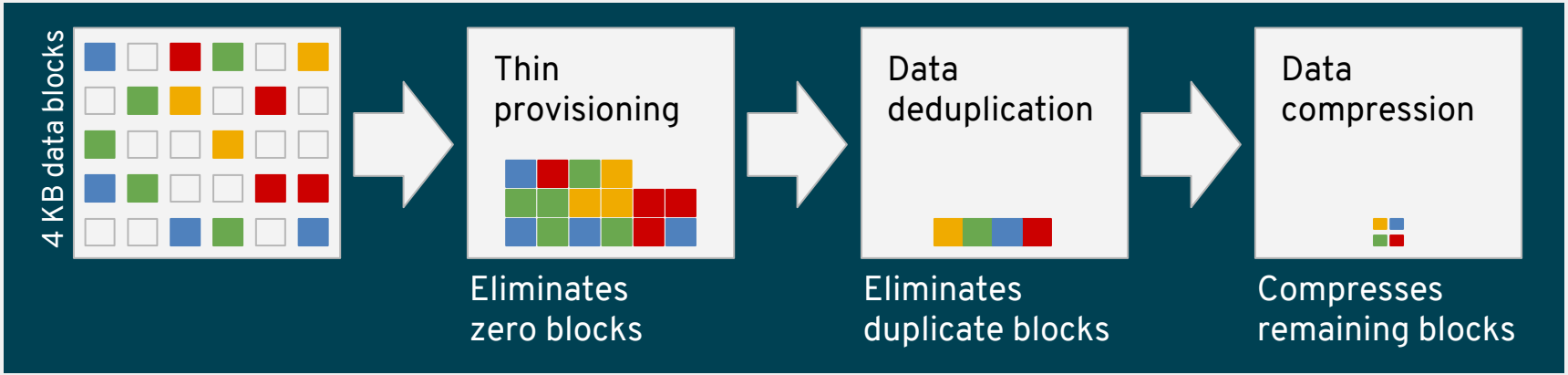
Site to site failover capability driven
by Ansible

SINGLE NODE RHHI-V

There are use cases that require an all-in-one hyperconverged appliance

RHHI-V STORAGE EFFICIENCIES

DATA REDUCTION
WITH PERMABIT VDO AND INTEGRATED MANAGEMENT



VIRTUAL GRAPHICS PROCESSING UNIT

vGPU powered RHHI-V for AI, big data, rich graphics

Target markets include

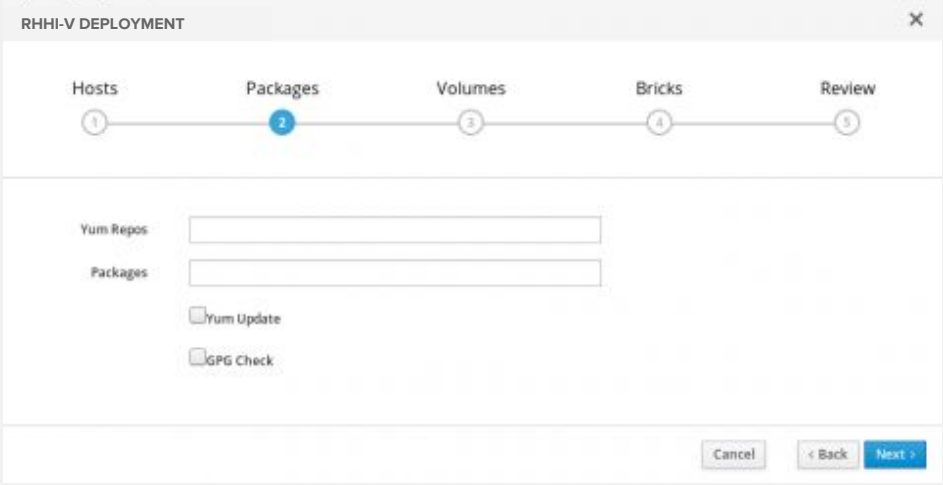
- Energy / Oil & Gas
- Sciences & Education
- Manufacturing & Engineering

➔ *Support for Linux and Windows*

Easier Deployments Using Ansible

Deployment wizard via Ansible

- RHN credentials and channels
- LVM config (including lvmcache)
- Systemd service configuration
- Firewall ports
- Pool, volume configuration, tuning
- **Metal to running VM**



ANSIBLE
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VALIDATED HARDWARE CONFIGS

- RHHI-V Validated Configurations take the guesswork out of sizing for many workload profiles
- Built from systems in the trusted Red Hat HCL
- Program launches with a set of HPE DL Validated Configs

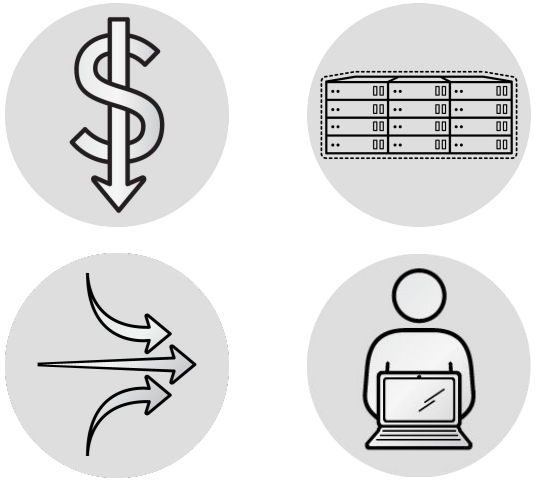
- Sizer Tool

SERVER CONSOLIDATION

SIZING RESULTS	BASIC NODE (CLUSTER)	CAPACITY NODE (CLUSTER)
NUMBER OF NODES	6	3
RACK UNITS	1 U (6 U)	2 U (6 U)
CPUs (2 SOCKETS)	Intel Xeon Silver 4116 48 threads (288 threads)	Intel Xeon Platinum 8160 96 threads (288 threads)
MEMORY	128 GB (768 GB)	512 GB (1536 GB)
CLUSTER USABLE STORAGE	24.99 TB	40.86 TB
CPU COMMITMENT	69 %	69 %
MEMORY COMMITMENT	104%	52 %
STORAGE CAPACITY COMMITMENT	39 %	24 %

Hewlett Packard Enterprise

INFRASTRUCTURE MIGRATION SOLUTION



http://red.ht/possibilities

Combines technologies, consulting services, and leading subscriptions to deliver significant infrastructure savings

Alternative platforms including Red Hat Virtualization and Red Hat OpenStack Platform

Provides a modern, flexible infrastructure supporting hybrid cloud and cloud-native architectures

Safely migrate from proprietary virtualization to flexible open source alternatives

INFRASTRUCTURE MIGRATION STRATEGY

Three aspects to successful migration

Planning and platform setup

- Define approach and architecture
- Operationalize alternative platform
- Identify and characterize VMs for migration

Migration tooling and approach

- Included comprehensive tooling for VM migration.
- Analyze workloads and develop an approach for migration with key stakeholders to ensure success

Migration execution

- Validate and refine migration approach
- Pilot migration of a representative set of workloads
- Set the stage to migrate thousands of workloads with a strategic approach and proven tools

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RHHI 1.5 HARDWARE REQUIREMENTS

- **SMALL SETUP**

at least: **12** CORES

at least: **64** GB RAM

at most: **48** TB STORAGE

- **MEDIUM SETUP**

at least: **12** CORES

at least: **128** GB RAM

at most: **64** TB STORAGE

- **LARGE SETUP**

at least: **12** CORES

at least: **256** GB RAM

at most: **80** TB STORAGE

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RHHI 1.5 MINIMAL SETUP REQUIREMENTS

- **3-NODE DEPLOYMENT**
  RHHI requires at least **3** physical machines

- **NETWORKING REQUIREMENTS**

  2 NICS per node, split across 2 network switches
  FQDN resolvable in both forward and reverse lookups

  FRONT-end network: for client connectivity
  BACK-end network: for internal storage and migration traffic

RHHI-V: Deployment

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RHHI 1.5 SETUP OPTIONS

- **RHEL BASED INSTALLATION (LAYERED INSTALL)**
  RHV being installed on top of RHEL

- **RHV HYPERVISOR BASED INSTALLATION**
  ISO Appliciance way of setup

- **CONVERSION OF EXISTING RHV HYPERVISOR**
  Migration towards hyperconverged setup

RHHI 1.5 STORAGE SETUP REQUIREMENTS

- **SOLID STATE DISKS (SSD) RECOMMENDED**
  4k native devices are not supported as RHV requires 512k blocks emulation

- **RAID**
  Recommended setup for Spinning Disks: RAID6 (10+2) for most disk technology types. Raid cards must have protected write cache (flash or battery backup)

- **JBOD**
  Only for SSD, NVMe flash disks

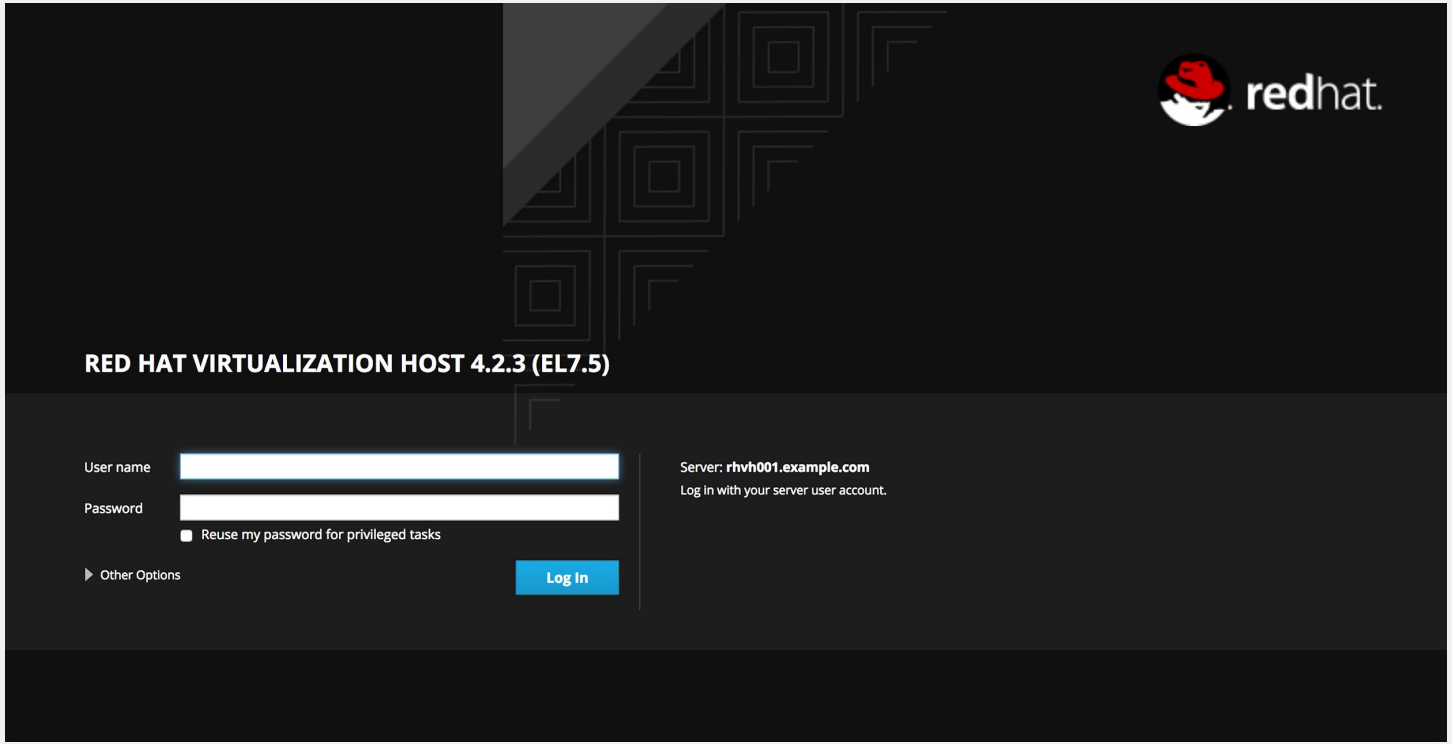
RHV HYPERVISOR INSTALLATION

- **RHV - RED HAT VIRTUALIZATION HOST**
  Minimal operating system based on Red Hat Enterprise Linux
  Designed to provide a simple set-up method

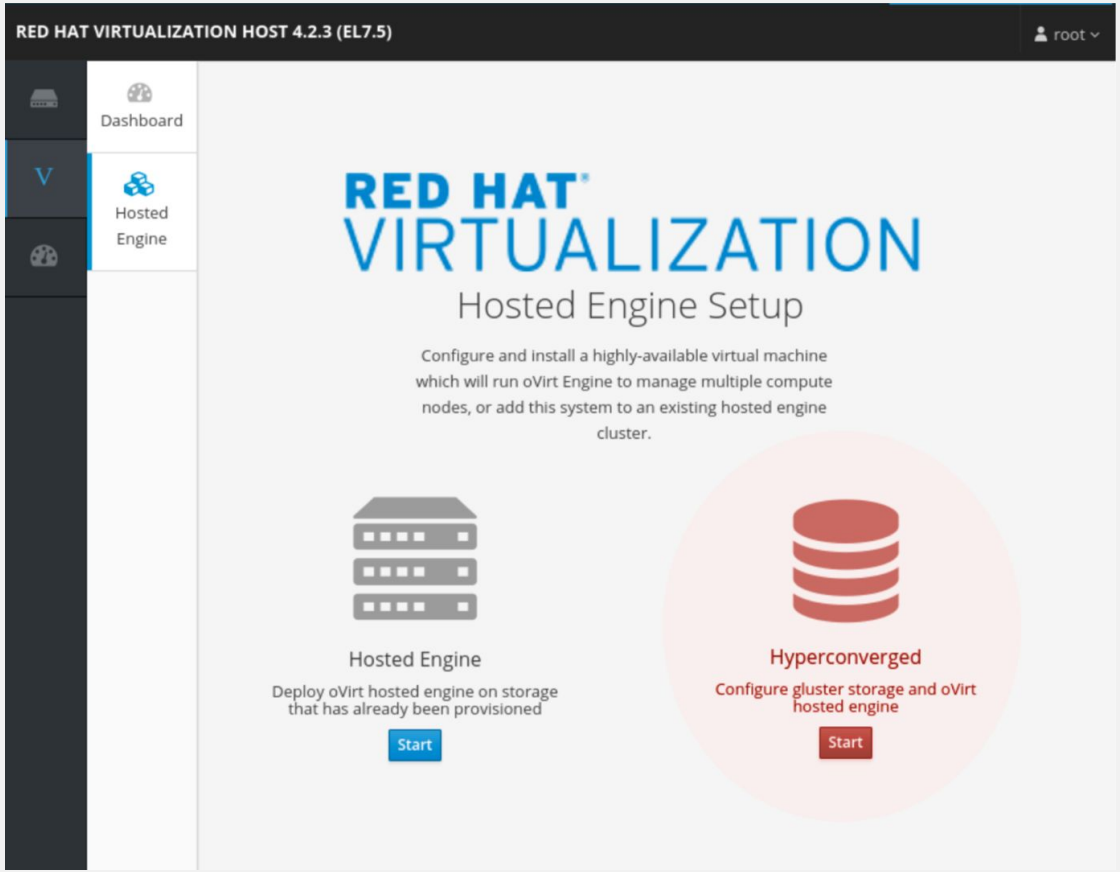
  Contains packages required for the machine to act as a hypervisor

- **COCKPIT**
  User interface for monitoring the host and performing administrative tasks

HTTPS://RHVHOST:9090



CONFIGURE RED HAT GLUSTER STORAGE



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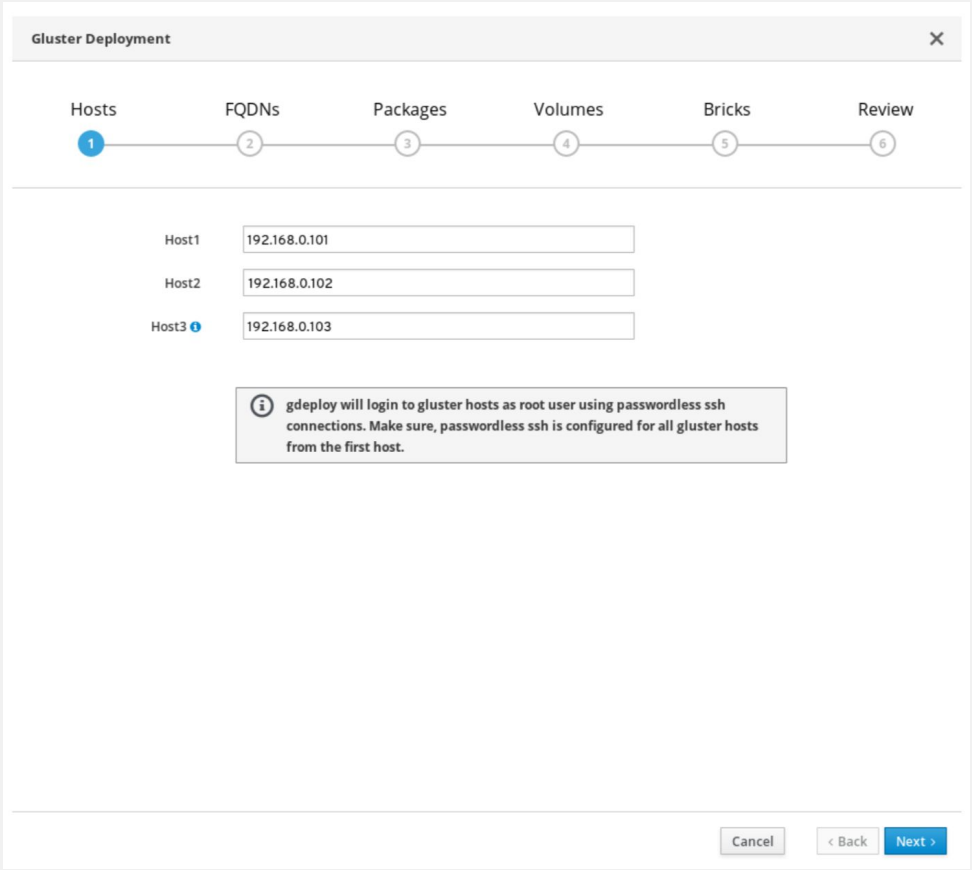

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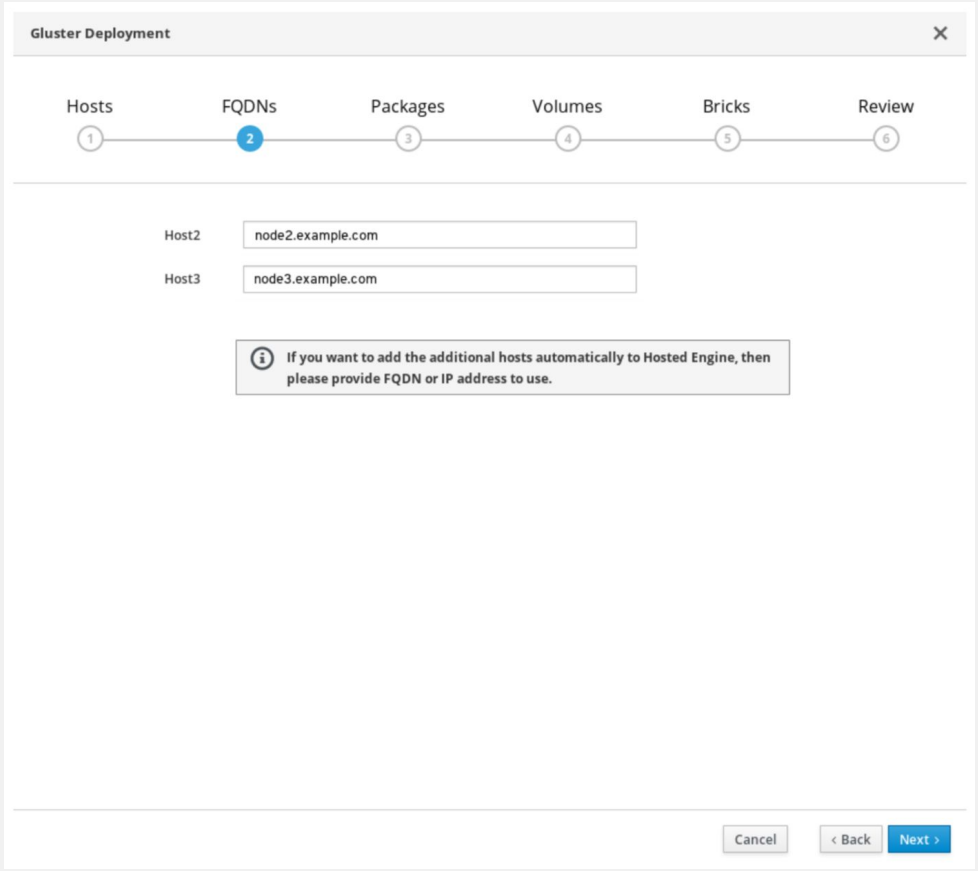

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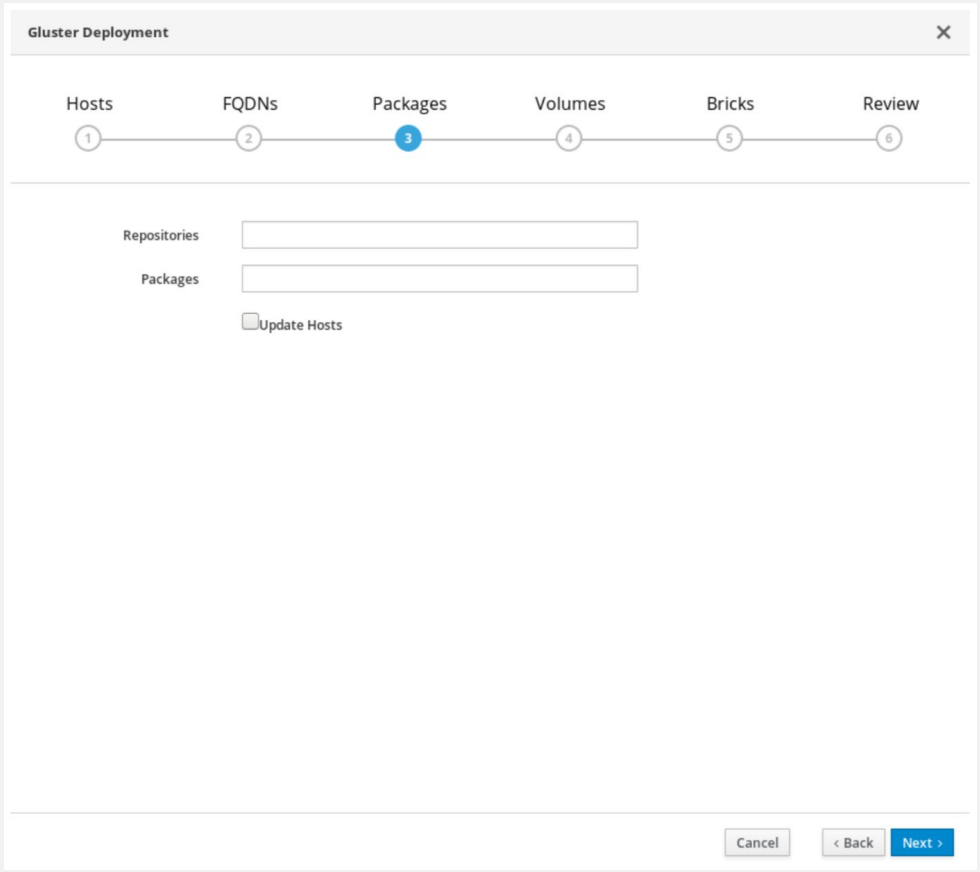

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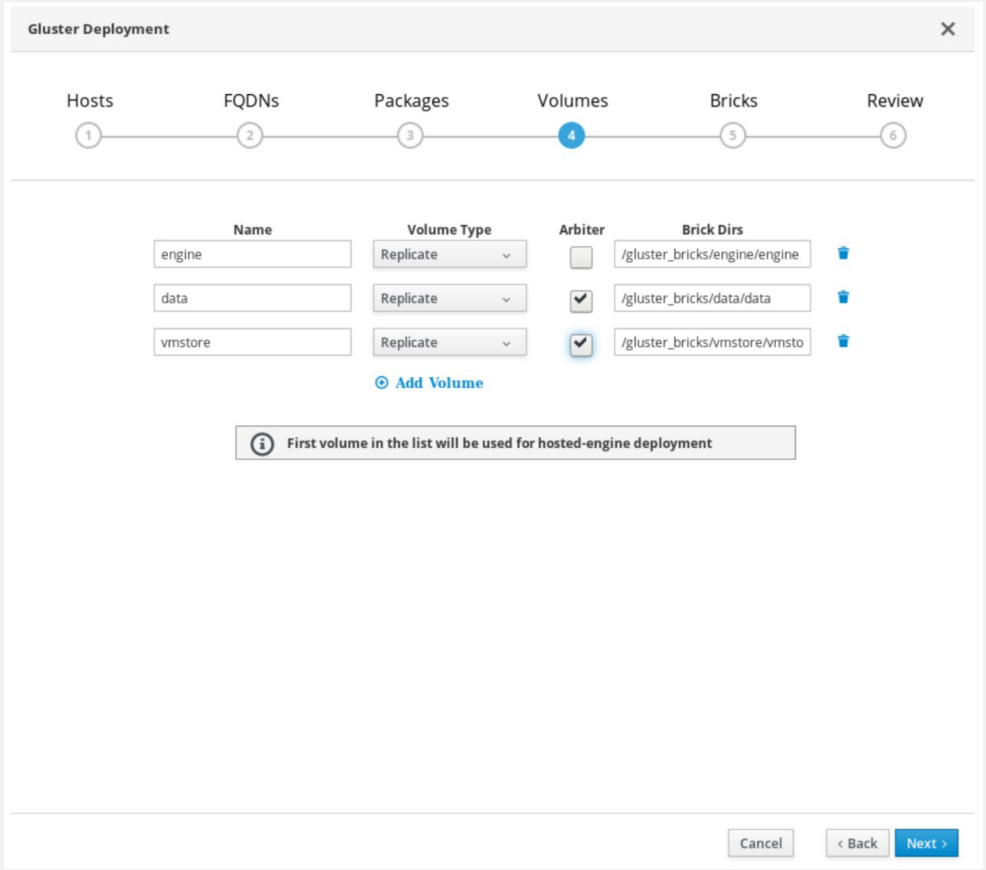

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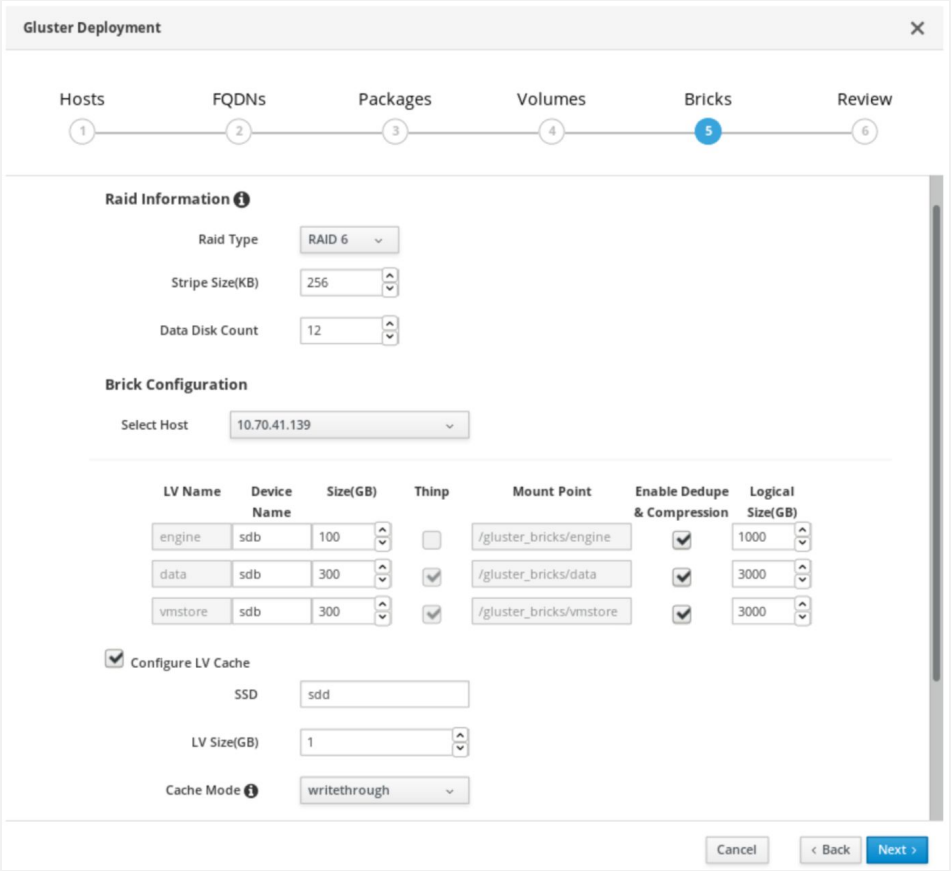
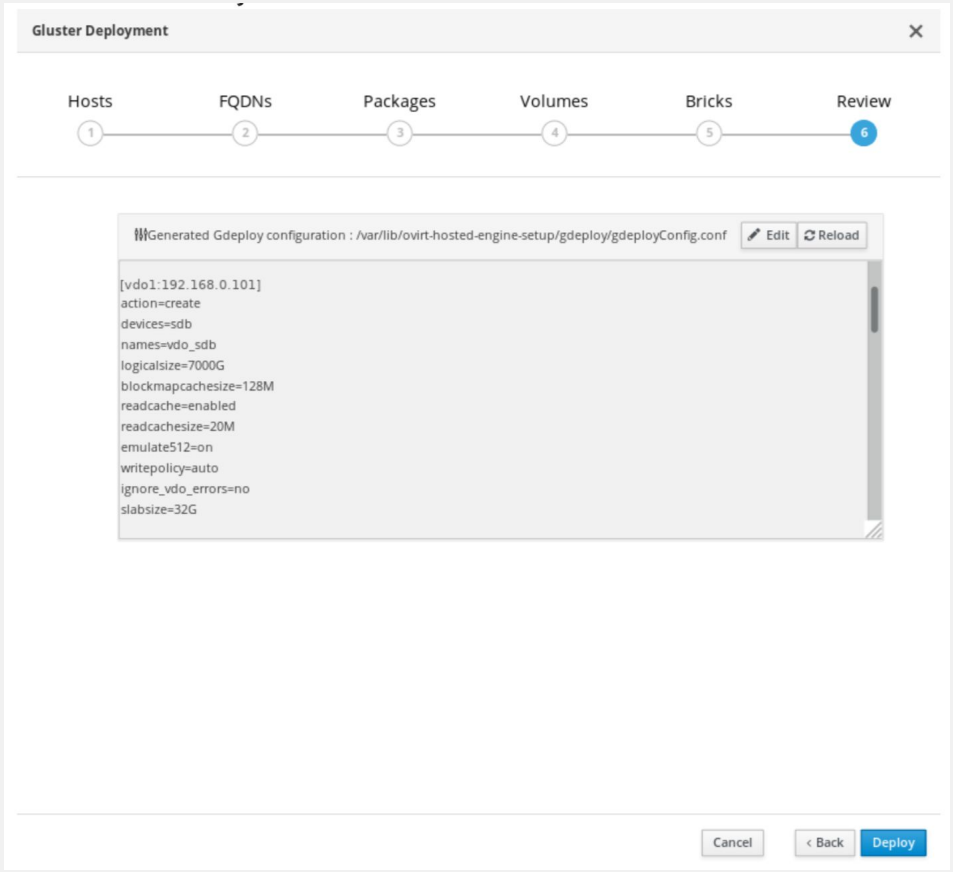
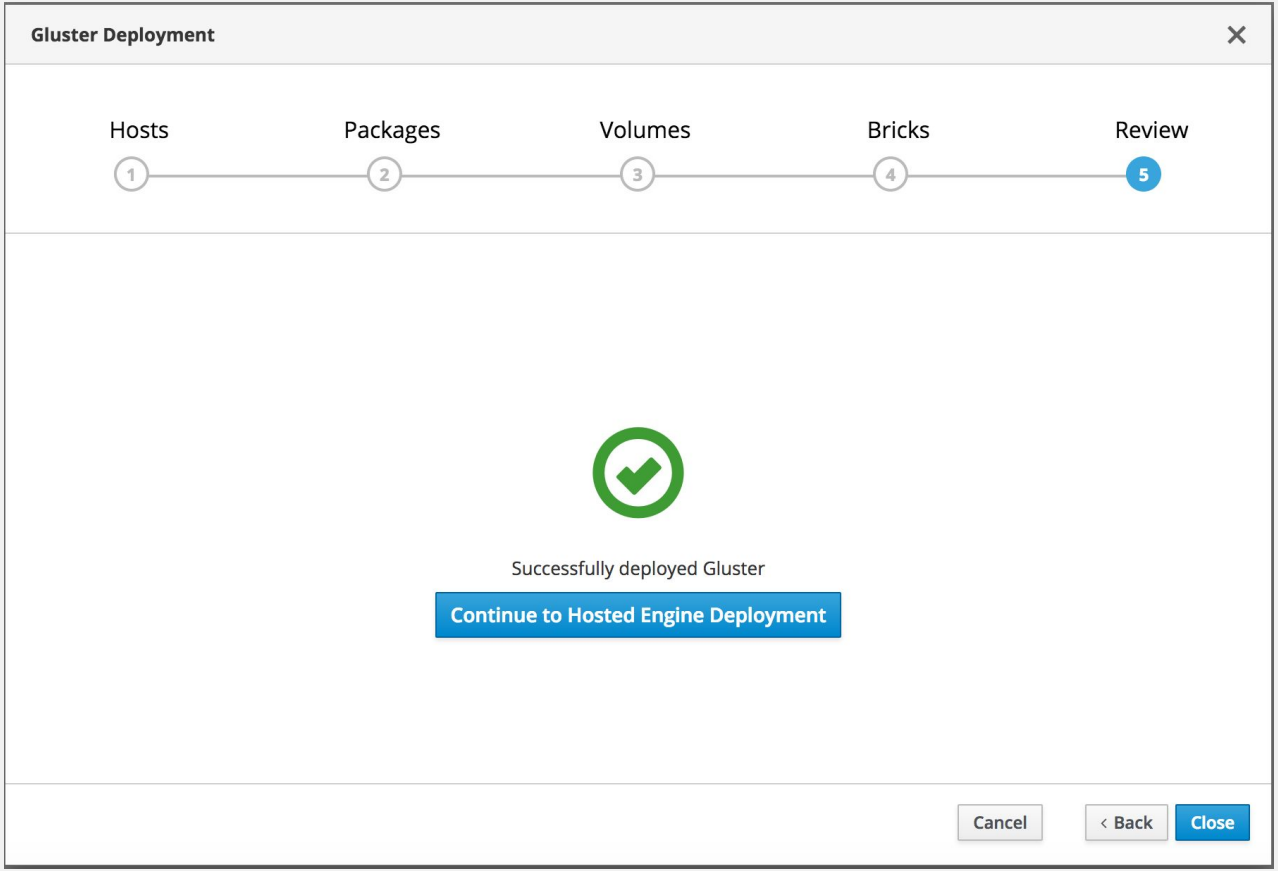


CONFIGURE RED HAT GLUSTER STORAGE



DEPLOYED RED HAT GLUSTER STORAGE



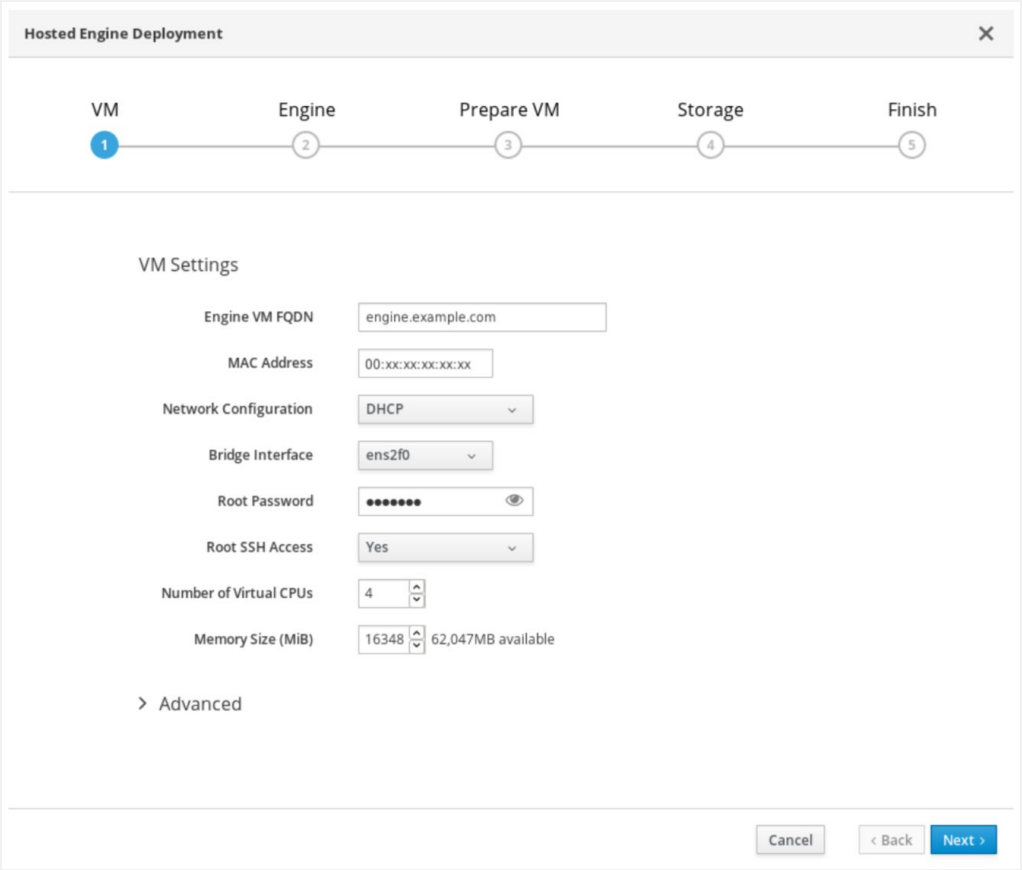
DEPLOYMENT SELF-HOSTED ENGINE AKA RHV-M

PREREQUISITES

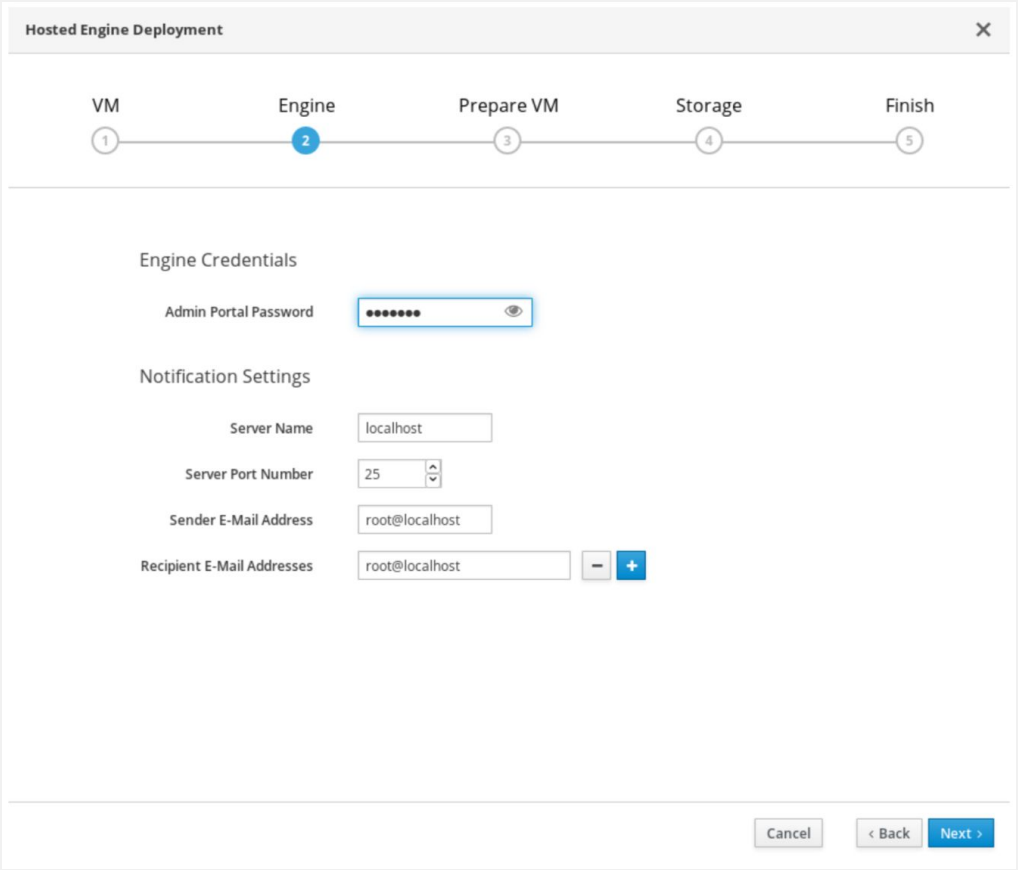
1. Configure Red Hat Gluster Storage for Hosted Engine
2. Gather information needed for Hosted Engine deployment:

   IP address for a pingable gateway to the virtualization host
   IP address of the front-end management network
   Fully-qualified domain name (FQDN) for the Hosted Engine appliance
   MAC address that resolves to the static FQDN and IP address

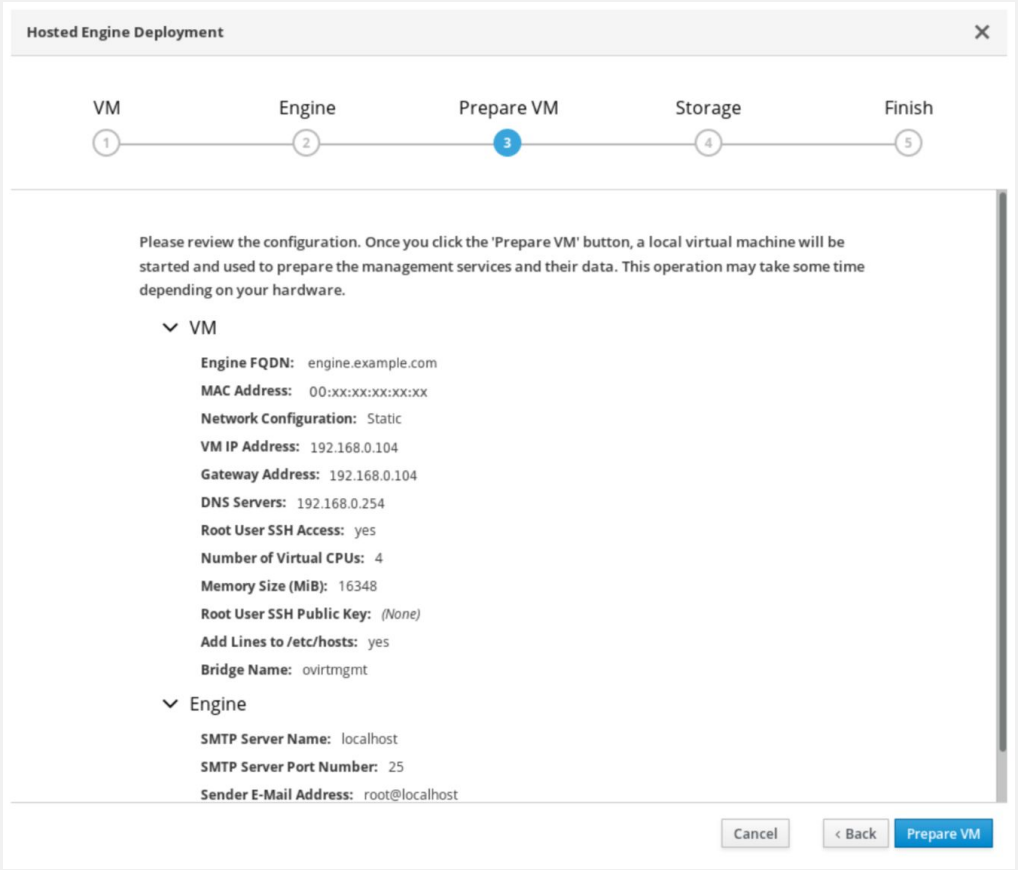
DEPLOYMENT SELF-HOSTED ENGINE



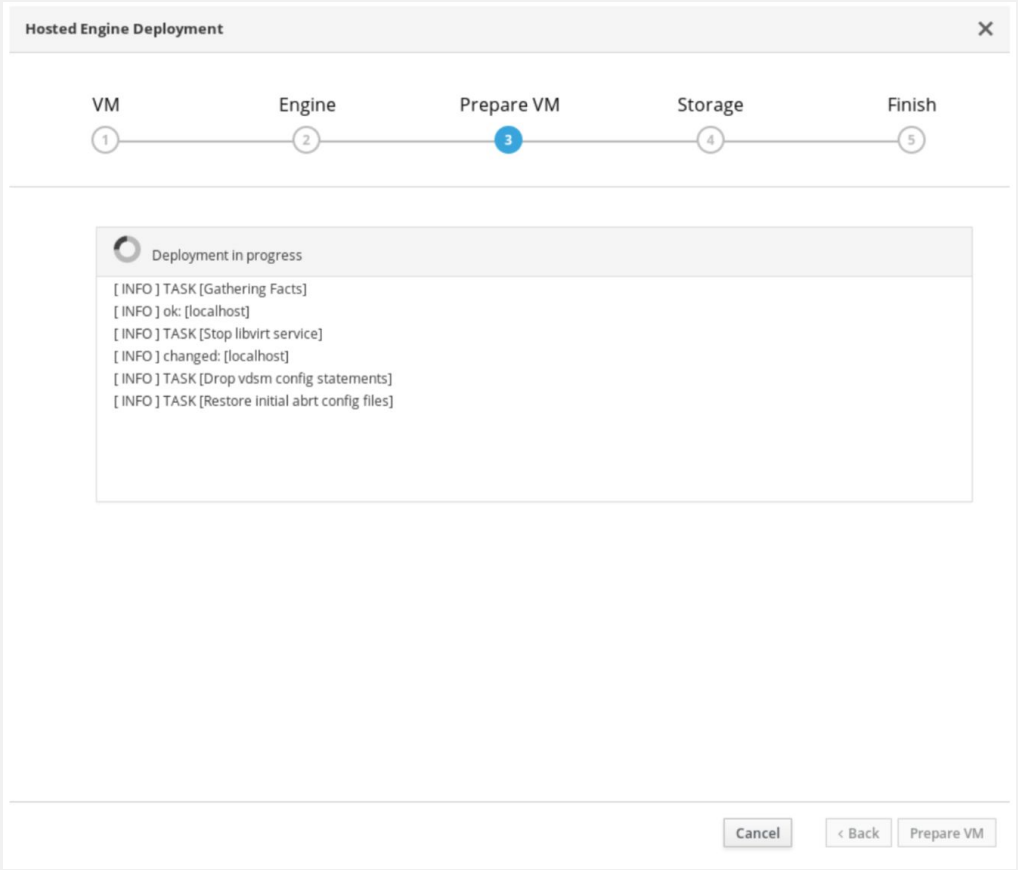
DEPLOYMENT SELF-HOSTED ENGINE



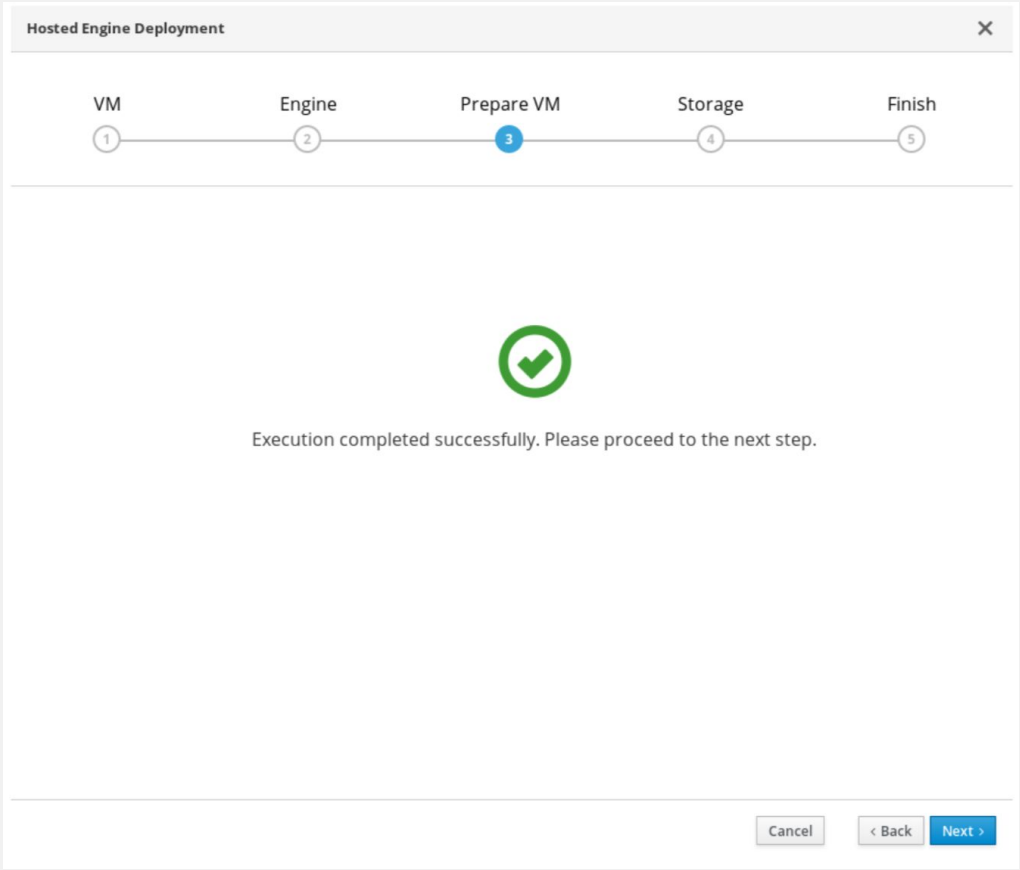
DEPLOYMENT SELF-HOSTED ENGINE



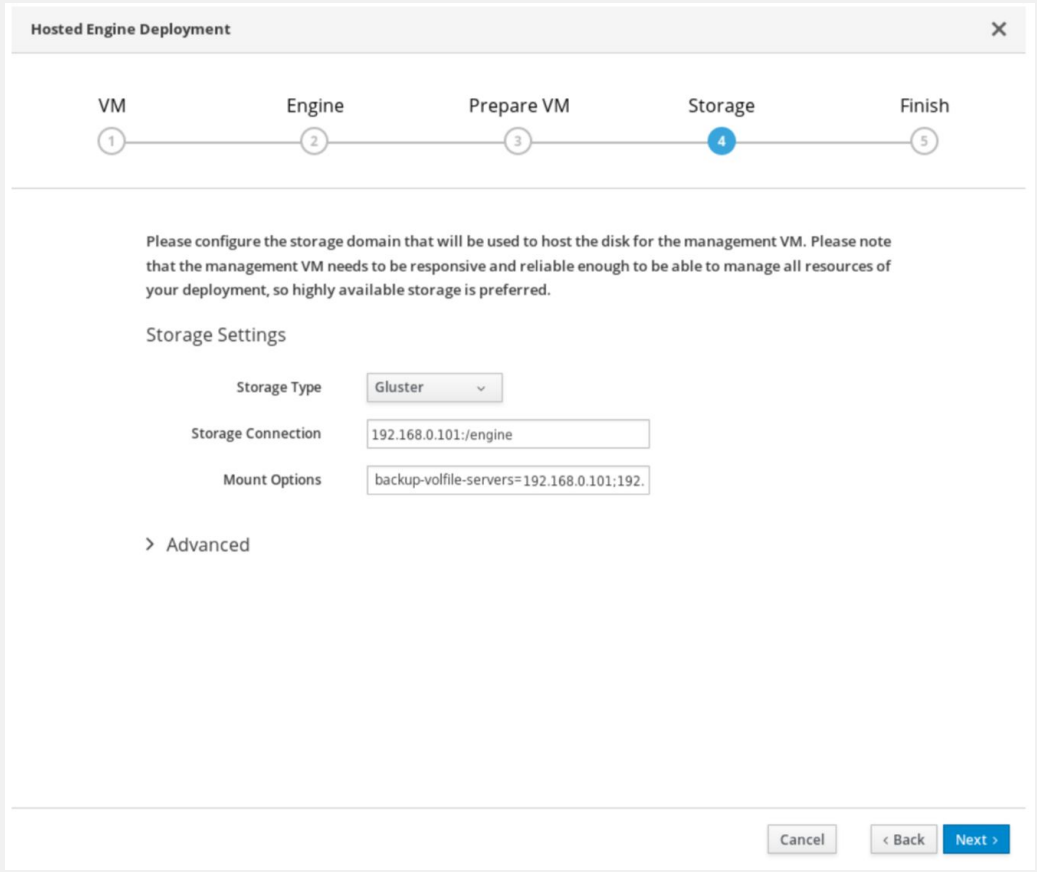
DEPLOYMENT SELF-HOSTED ENGINE



DEPLOYMENT SELF-HOSTED ENGINE



DEPLOYMENT SELF-HOSTED ENGINE



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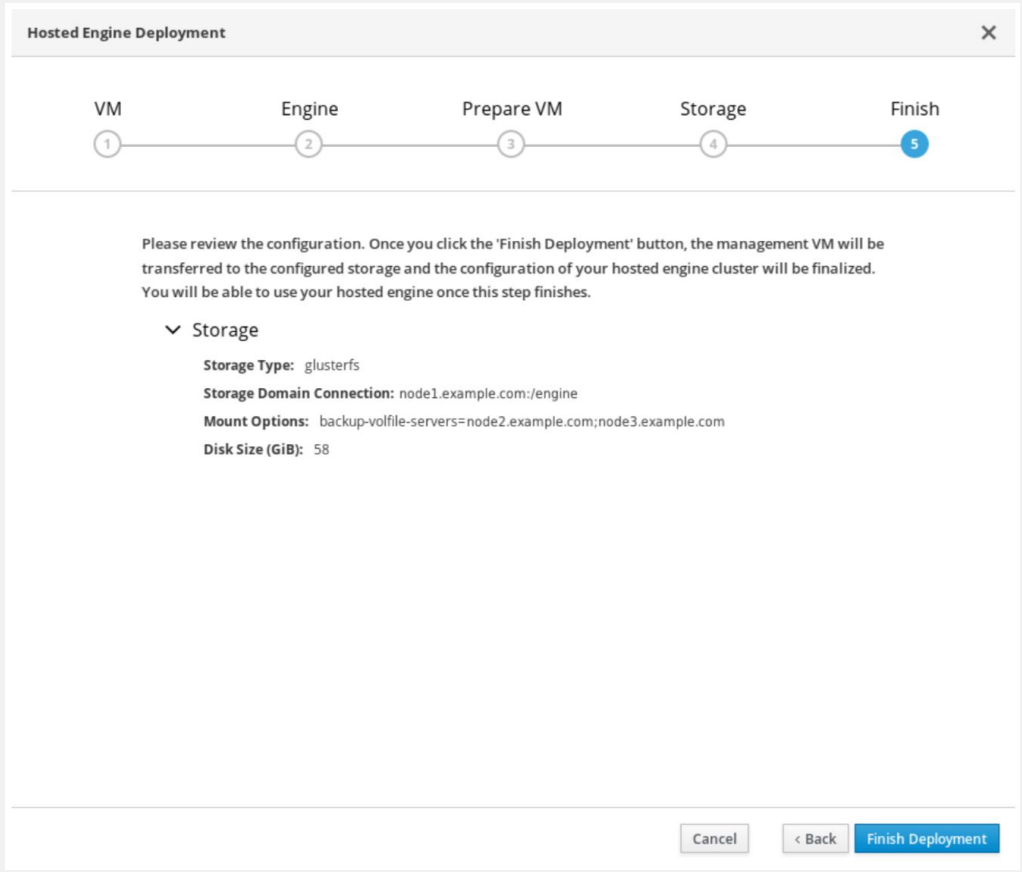
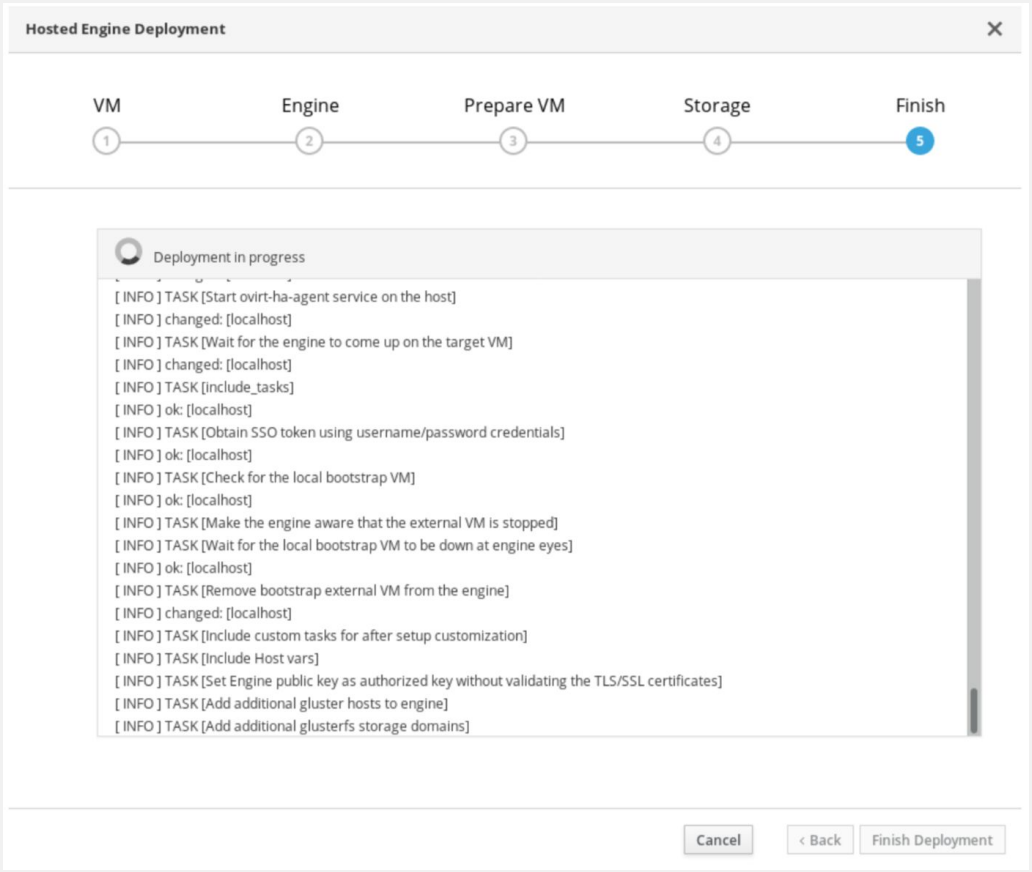
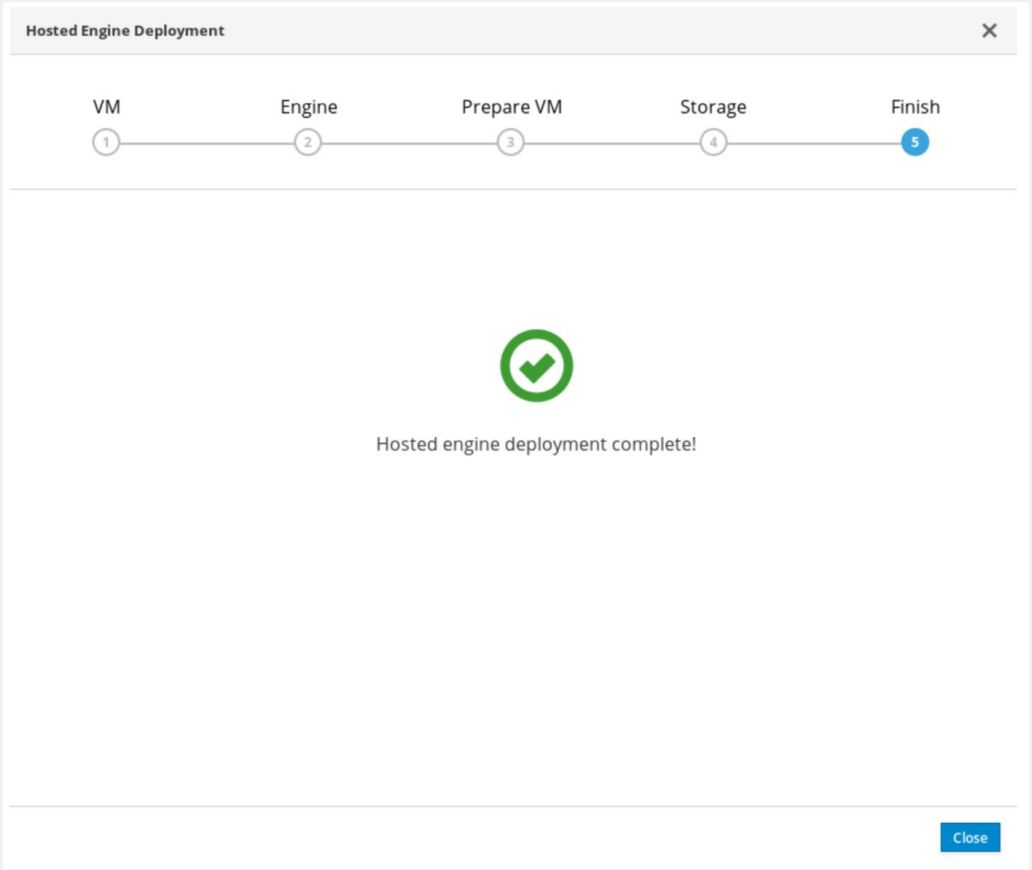


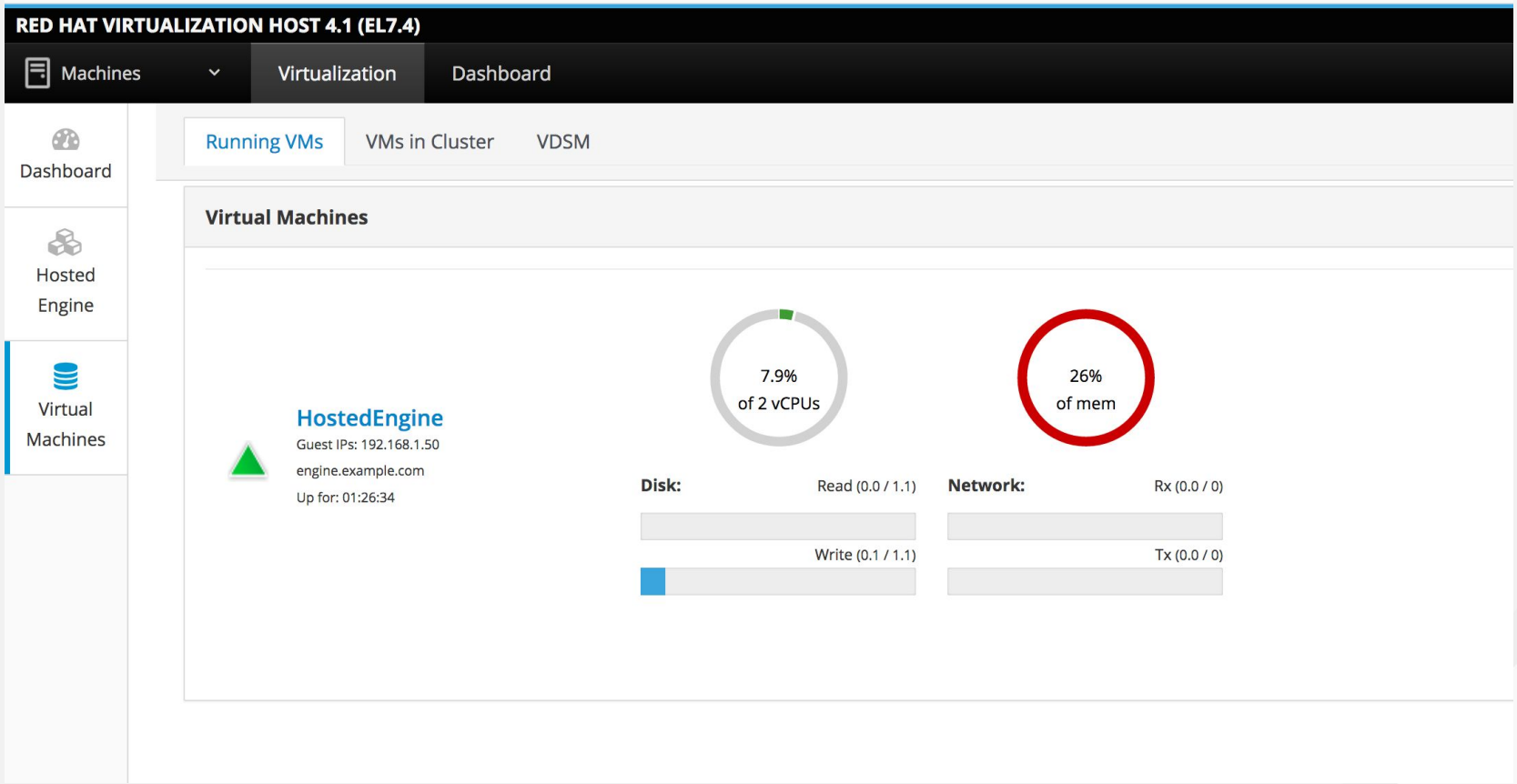
DEPLOYMENT SELF-HOSTED ENGINE



DEPLOYMENT SELF-HOSTED ENGINE

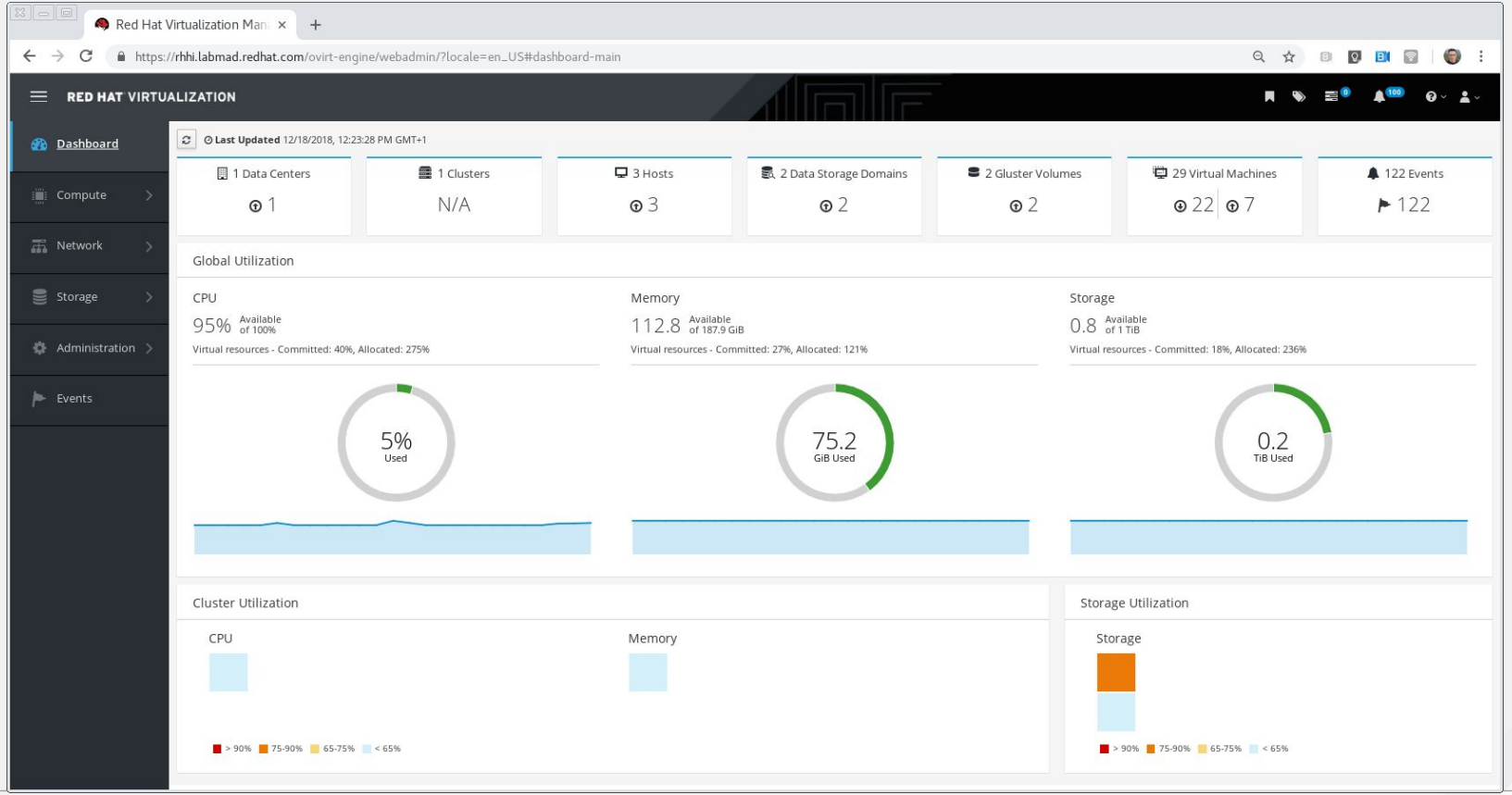


SELF-HOSTED ENGINE RUNNING



RHHI HOSTED ENGINE

https://rhhi.labmad.redhat.com



LIVE DEMO

redhat.

THANK YOU!

OPEN HYBRID CLOUD

HYBRID CLOUD INFRASTRUCTURE

RED HAT HYPERCONVERGED INFRASTRUCTURE

CLOUD-NATIVE APP PLATFORMS

CLOUD MANAGEMENT AND AUTOMATION

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