RED HAT VIRTUALIZATION for SAP HANA

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AGENDA

- Solution Overview
- RHEL for SAP Solutions
- Contents/Solutions
- Advanced Possibilities with RedHat
- Resources

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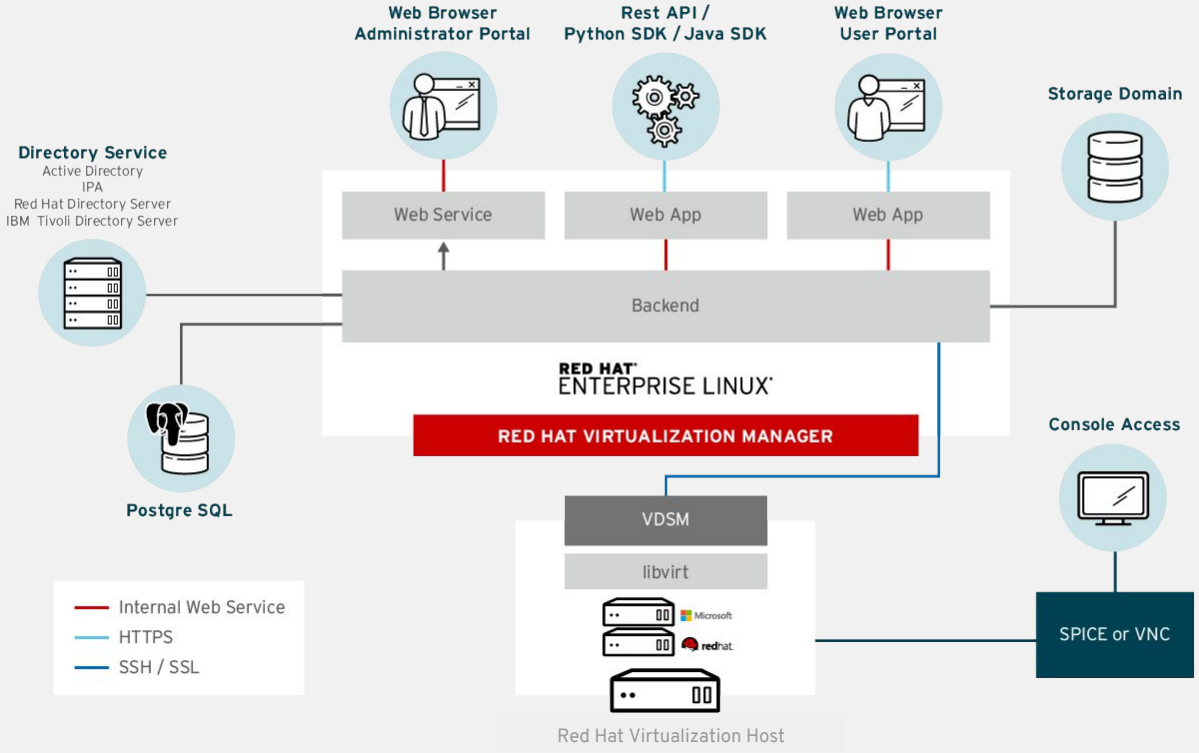
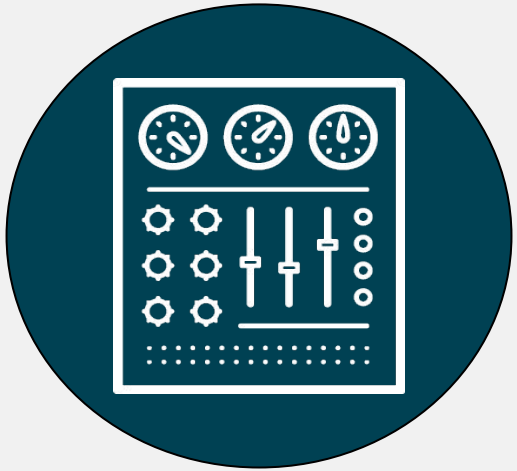
RHV OVERVIEW

RED HAT VIRTUALIZATION OVERVIEW

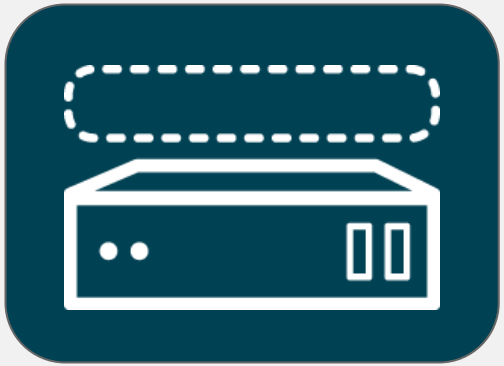


RED HAT VIRTUALIZATION MANAGER OVERVIEW



- Centralized management for virtual infrastructure and resources
- Designed for large scale (500+ hosts and 5,000+ VMs)
- REST API to integrate with Red Hat portfolio, third party applications, backup/recovery software
- Python, Ruby, and Java SDK's
- Intuitive dashboard with detailed information
- Can be integrated with existing infrastructure - Active Directory, CloudForms, OpenStack, etc

RED HAT VIRTUALIZATION HOST OVERVIEW

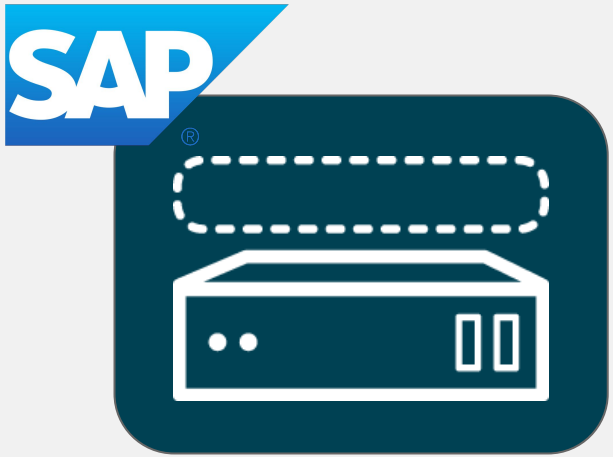


- **RHEL Co-Engineering** - inherits performance, scalability, security, and supportability of Red Hat Enterprise Linux
- **Ecosystem:** Shares Red Hat Enterprise Linux hardware and software ecosystem
- **Host:** 480 logical CPU (4,096 theoretical max), 6TB RAM (64TB theoretical max)
- **Guest:** 240 vCPU, 4TB RAM
- **Technology**: Supports latest silicon virtualization technology
- **Cross-Platform:** Microsoft certified for Windows guests

COCKPIT HOST ADMINISTRATION CONSOLE

- Included as part of Red Hat Virtualization Host image, can be added to RHEL host.
- Used to configure networking, storage, tuning, subscriptions, and other aspects of the host.
- Can be used to view metrics, ease troubleshooting, and provide command line access to the host.
- Can be used to deploy RHV in high availability
- Access via secure HTTP (HTTPS)

HANA ON RED HAT VIRTUALIZATION OVERVIEW



- non-prod support since SAP HANA 1.0 SPS 11
- production support since SAP HANA 1.0 SPS 12
- currently: single VM, 1.5TB
- SAP HANA certified 2 and 4 socket Intel E7 v3 Haswell EX or 2 socket Intel E5 v3 Haswell EP
- No LiveMigration
- CPU & NUMA pinning required
- Roadmap
  - Multi-VM
  - Skylake & Broadwell
- See also SAP Note #1788665 and SAP Note #2599726

WHERE RHV COMPETES BEST (USE CASES)

1. **Proprietary Virtualization Pain:** High-cost burdens of proprietary solutions. Looking for alternatives.
   a. Customers may like the tech they are using but not the company servicing them
2. **Not Fully Virtualized:** Relatively new to virtualization. Long-time users of RHEL on bare metal, looking for means to consolidate.
   a. Some geos are not highly virtualized
3. **Dev/Test:** Looking for low-cost, self-service solutions for developers to test both Windows and Linux applications.
4. **Performance Sensitive Workloads:**
   a. Customers looking to confidently virtualize their high-performing workloads without losing near bare-metal performance. (SPECvirt results)
   b. Looking to virtualize certain high-performance RHEL workstations using GPU Passthrough technology

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RHV KEY COMPETITIVE ADVANTAGES

RHV delivers easier integration and interoperability with existing infrastructure, higher density and performance, and improved economics.

Performance & Scalability:

- Higher VM density (specvirt) yields improved economics.
- Red Hat is a top contributor to KVM development - we can help guide RFE's upstream
- RHV performance meets or beats competing solutions - same workload on same hardware

Automation & Seamless Deployments:

- Customer can re-use many RHEL7 security practices for their RHV infrastructure
- RHEL runs better on RHV - no additional guest agents required... better compatibility story with hosting new major/minor RHEL releases

Interoperability:

- RHV supports both Windows (full SVVP) and Linux workloads.
- RHV integrates and supports multiple directory services, including Microsoft Active Directory, Red Hat IdM, and Red Hat Directory Server

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SAP SERVER MANAGEMENT … WITH AUTOMATION

Provision & Update Nodes & VMs

- Enforce compliance, including OpenSCAP
- RHV-M can query errata for hosts and guests
- Receive & apply software updates from Satellite
- Host update manager provides interoperability with Satellite to simplify updates for hosts and virtual machines

Red Hat Virtualization and Ansible 2.3 are integrated in order to provide streamlined configuration for:

- Virtual machines
- Virtual networks
- Virtual storage
- Configuration
- Updates
- Ready2run playbooks for SAP HANA

Red Hat Virtualization is a first class infrastructure provider for CloudForms. The integration delivers features such as:

- Automation
- Orchestration
- Chargeback
- Compliance and security policies
- Self-service portal
- resource planning

Red Hat Insights delivers

- In-depth analysis of the SAP infrastructure enables proactive management
- Mitigate risk / ensure compliance (e.g. configuration drifts)
- Increase stability and performance
- Continuous identification of new risks driven by unique industry data

https://access.redhat.com/blogs/2184921/posts/2849871

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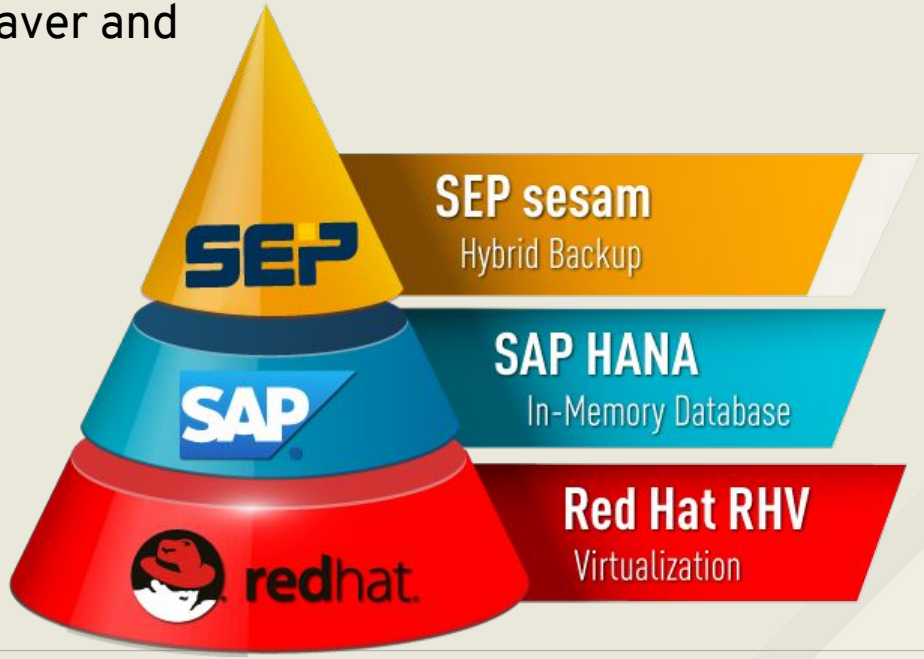
… AND COMPLETE BACKUP

- Support of RHV and RHEL
- Disaster Recovery supported
- SAP certified SEP agents for NetWeaver and HANA (Linux Intel and ppc)
- Ready for S/4HANA



CUSTOMER SUCCESS

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VIRTUALIZATION FOR SAP HANA

finanz **informatik**
technologie service

Christoph Theis, Head of SAP Services, Finanz Informatik Technologie Services:
"To deliver the absolute reliability and fast performance that our financial services and insurance custom expect for their critical enterprise transactions, we needed a robust virtualization platform. Choosing Red Hat Virtualization means that we can deliver a high-performing, cloud-based SAP HANA solution that meets our customers' requirements, and can do so in a cost-effective manner."

Requirements for SAP HANA

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Virtualization Host Requirements

OS

- RHEL 7.3 with the following packages
  - qemu-img-rhev 2.6.0-28.el7_3.8 or later
  - qemu-kvm-common-rhev 2.6.0-28.el7_3.8 or later
  - qemu-kvm-rhev 2.6.0-28.el7_3.8 or later
  - qemu-kvm-tools-rhev 2.6.0-28.el7_3.8 or later

NOTE: The virtual machine guest operating system is independent of the operating system on the RHEL-based host running the RHV hypervisor. For example, a RHV 4.1 host running on RHEL 7.1 supports and is compatible with RHEL 7.1 and higher based guests.

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Virtualization Host Requirements

Kernel Boot Option for Optimal Memory Overhead (Hugepages)

- default: 4kb pages => 1GB hugepages
- parameters need to be added to the kernel command line:

```
default_hugepagesz=1GB
hugepagesz=1GB
hugepages=[# hugepages]
intel_idle.max_cstate=1
```


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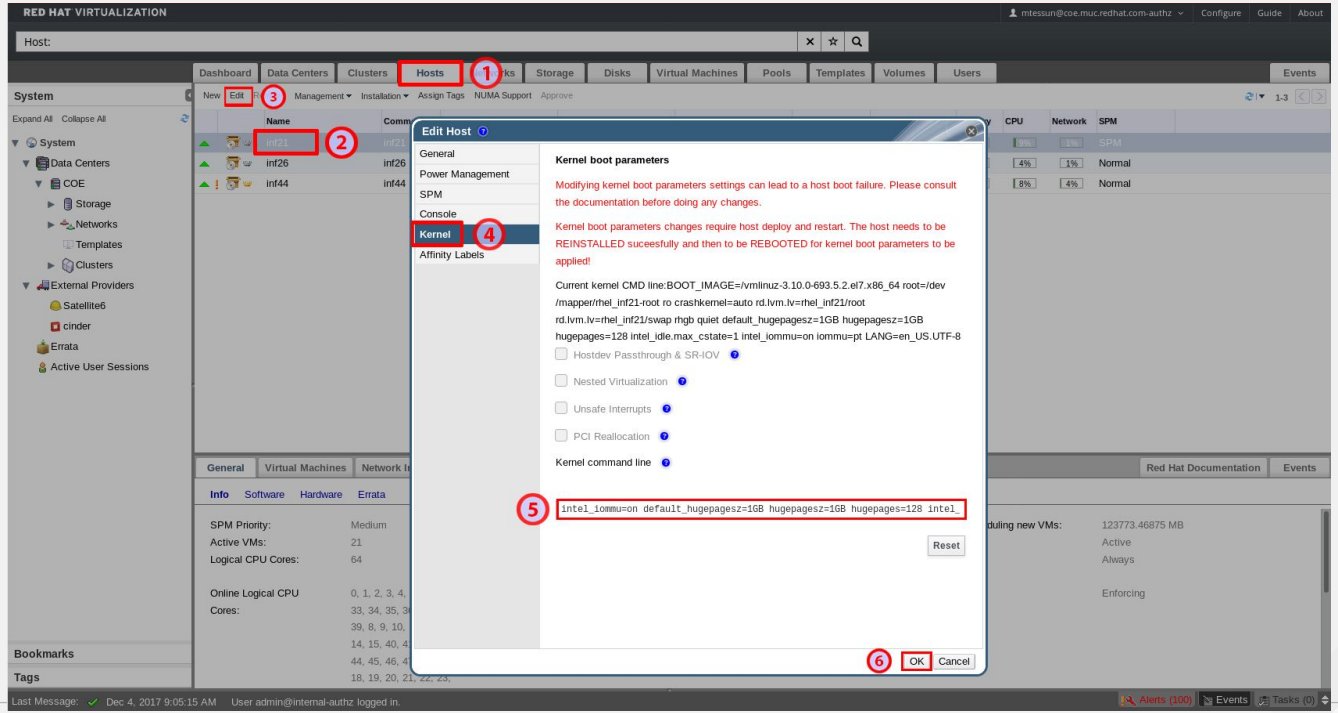
Virtualization Host Requirements

Kernel Boot Option for Optimal Memory Overhead (Hugepages)



Virtualization Host Requirements

Required Hooks

- Install highperf-hook an all virtualizations hosts that may run HANA
  - enables memory backing with hugepages
  - iothreads binding and pinning
  - enabling invtsc and rdtscp cpuflags (use hardware timer)
  - enable level-3 cache for VMs

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Virtualization Host Requirements

SAP HANA guest storage pool configuration

- follow the recommendations in
  - SAP HANA Server Installation and Update Guide
  - SAP HANA – Storage Requirements Guide
  - SAP HANA TDI-Storage Requirements.

- Select direct LUNS for **/hana/data** from an iSCSI or FC storage pool so that they are mapped as *type=raw, cache=none ,io=native*.
- Select direct LUNS for **/hana/log** from an iSCSI or FC storage pool so that they are mapped as *type=raw, cache=none ,io=native*
- Select direct LUNS for **/hana/shared** from an iSCSI or FC storage pool so that they are mapped as *type=raw, cache=none ,io=native*
- Use NFS-shares for **/hana/data, /hana/log** and **/hana/shared**.

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RHV Manager Cluster Configuration

Configuration Optimizations

- Disable memory overcommit
- Disable Memory Balloon Optimization
- Disable Memory Checking for newly launched VMs
  - RHV Manager 4.1 does not recognize that the VM will use hugepages to run
- Enable highperf-hook in RHV-Manager

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RHV Guest configuration

make sure the following options are created in each guest

The overall goal is that there is “no” difference between hypervisor and guest

- Enable CPU pinning
- Set the correct NUMA topology
- Enable memory backing with hugepages
- Enable CPU passthrough
- Enable iothread pinning

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BRIEF SUMMARY & NEXT STEPS

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RED HAT VIRTUALIZATION SUMMARY

FOUNDATIONAL TO THE RED HAT OPEN HYBRID CLOUD

- Co-engineered with Red Hat Enterprise Linux
- Record holding performance and scalability
- Enterprise hardened security with sVirt and SELinux
- Global support, training, certification, and professional services
- Predictable cost model, lower cost of IT optimization, higher ROI
- Complete portfolio - build a foundation for future technologies including cloud and containers

- Cross-platform: Optimized for Microsoft Windows and Linux guests
- Integrated with a trusted and proven solution stack including
  - Red Hat Enterprise Linux
  - Red Hat CloudForms
  - Ansible by Red Hat
  - Red Hat Gluster
  - Red Hat OpenStack Platform
  - Red Hat Atomic

SUBCRIPTIONS FOR SAP HANA CUSTOMERS

RED HAT®
VIRTUALIZATION

Red Hat Virtualization Manager
Red Hat Virtualization Host
Standard (business hours) or Premium (7x24) support
2 sockets

2 sockets / 2 VMs	2 sockets / unlimited VMs
RED HAT® ENTERPRISE LINUX® for SAP Solutions	**RED HAT®** ENTERPRISE LINUX® for Virtual Datacenters for SAP Solutions

Outlook

caution: Subject to change

planned validations

	single-VM	multi-VM	scale-out
Haswell	1,5TB	planned	tbd
Broadwell	planned	planned	tbd
Skylake	tbd	tbd	tbd

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ADDITIONAL RESOURCES

SAP on RHV Best Practices Deployment Guide

- https://access.redhat.com/articles/2176051

Red Hat Virtualization evaluation:

- https://access.redhat.com/products/red-hat-virtualization/evaluation

Blogs:

- RHEL Blog
  - http://rhelblog.redhat.com
- Captain KVM
  - http://CaptainKVM.com

Product page:

- http://www.redhat.com/rhv

Documents:

- https://access.redhat.com/documentation/en/red-hat-virtualization

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