



# RED HAT VIRTUALIZATION for SAP HANA

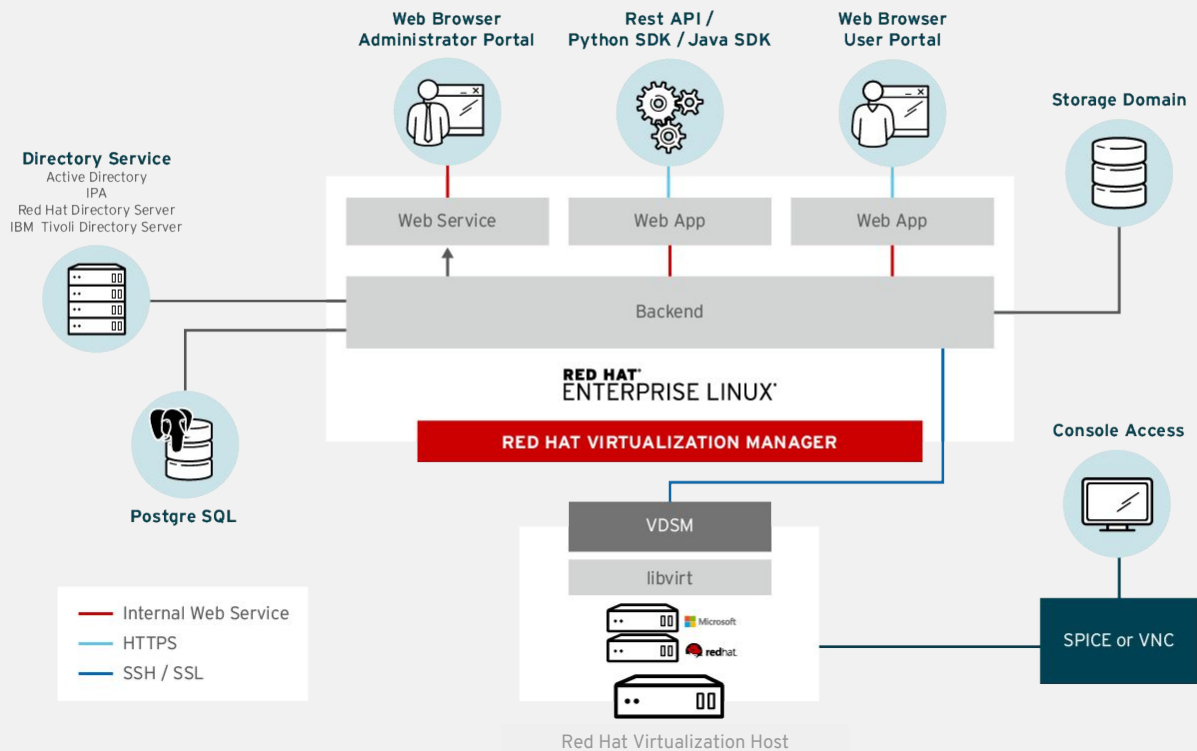
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# AGENDA

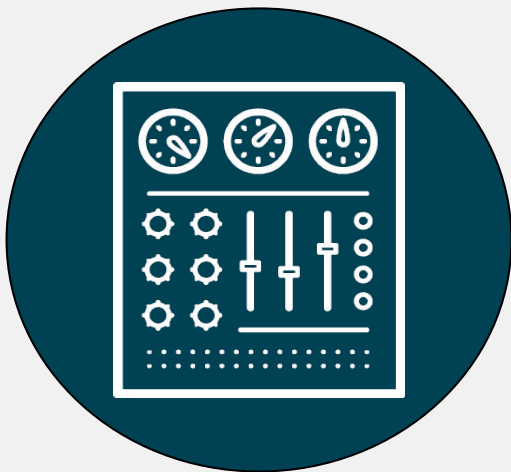
- Solution Overview
- RHEL for SAP Solutions
- Contents/Solutions
- Advanced Possibilities with RedHat
- Resources

# RHV OVERVIEW

# RED HAT VIRTUALIZATION OVERVIEW

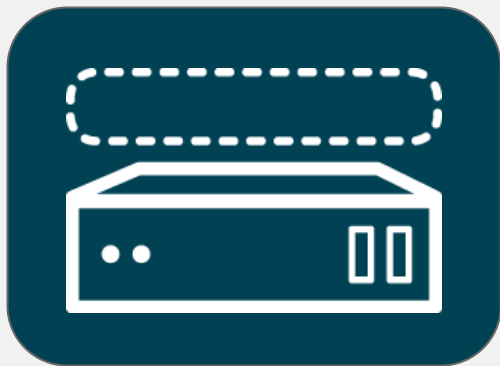


# RED HAT VIRTUALIZATION MANAGER OVERVIEW



- **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

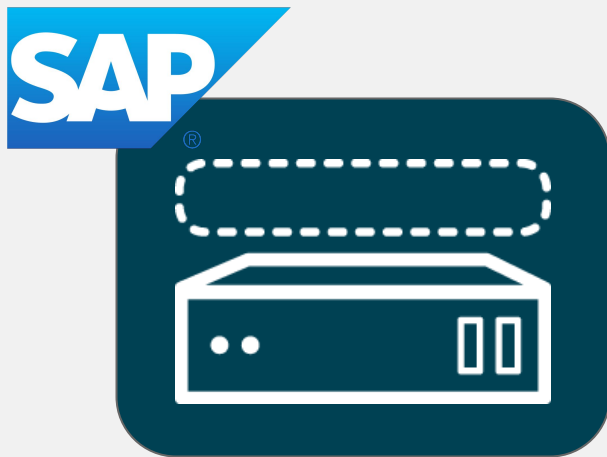
# COCKPIT HOST ADMINISTRATION CONSOLE



- 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

# 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

# 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

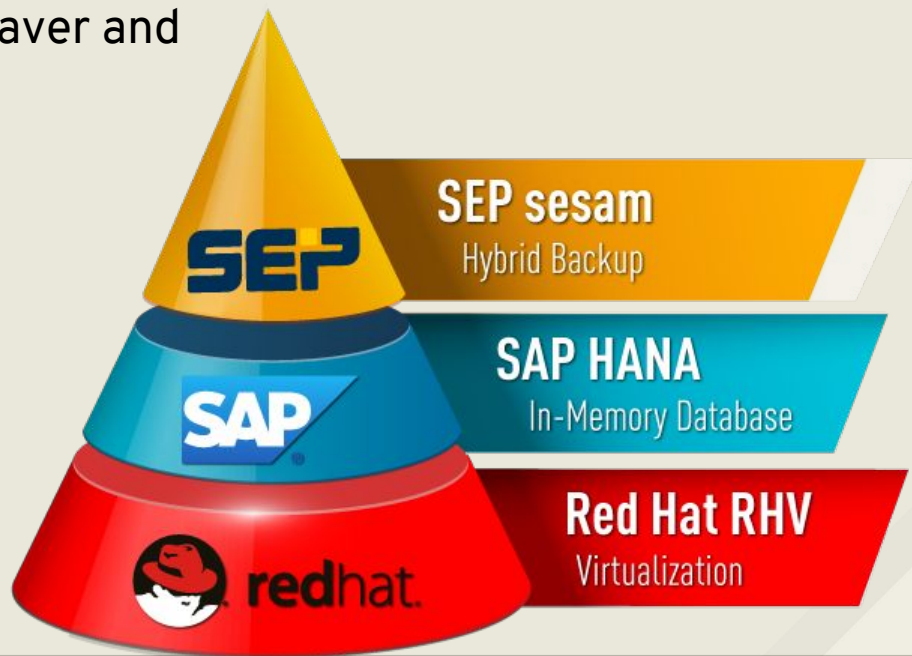
Red Hat Insights delivers

- 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>

## ... 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

# VIRTUALIZATION FOR SAP HANA



*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



# 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.

# 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
```

# Virtualization Host Requirements

## Kernel Boot Option for Optimal Memory Overhead (Hugepages)

The screenshot displays the Red Hat Virtualization (RHV) web console interface. The top navigation bar includes tabs for Dashboard, Data Centers, Clusters, Hosts, Disks, Virtual Machines, Pools, Templates, Volumes, and Users. The 'Hosts' tab is selected, and a host named 'inf21' is highlighted. The 'Edit Host' dialog is open, showing the 'Kernel' tab. The 'Kernel boot parameters' section contains a text area with the following command line: `BOOT_IMAGE=lvmlinuz-3.10.0-693.5.2.el7.x86_64 root=/dev/mapper/rhel_inf21-root ro crashkernel=auto rd.lvm.lv=rhel_inf21/root rd.lvm.lv=rhel_inf21/swap rhgb quiet default_hugepagesz=1GB hugepagesz=1GB hugepages=128 intel_iommu=on lsm=pt LANG=en_US.UTF-8`. The 'Kernel command line' field is highlighted with a red box and the number 5, showing the updated command line: `intel_iommu=on default_hugepagesz=1GB hugepagesz=1GB hugepages=128 intel_iommu=on`. The 'OK' button is highlighted with a red box and the number 6.

# Virtualization Host Requirements

## Required Hooks

- Install highperf-hook on 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

# 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**.

# 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

# 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



# BRIEF SUMMARY & NEXT STEPS

# 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

# SUBSCRIPTIONS 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
<b>RED HAT®</b> ENTERPRISE LINUX® for SAP Solutions	<b>RED HAT®</b> ENTERPRISE LINUX® for Virtual Datacenters for SAP Solutions

# Outlook

caution: Subject to change

planned validations

	single-VM	multi-VM	scale-out
Haswell	1,5TB	tbd	tbd
Broadwell	tbd	tbd	tbd
Skylake	work in progress	tbd	tbd

# 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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