



SAP HANA AND RED HAT - TECHNICAL REVIEW

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Agenda

- RHEL for SAP Portfolio
 - SKUs
 - Automated SAP HANA System Replication
- Performance
- Support Process
- JBoss Middleware for SAP HANA
- Resources

Red Hat: Key to SAP HANA success



"The #1 requested thing that we got was not a feature for the product, it was support for Red Hat" (in regards to SAP HANA)

"Our largest financial customers came to us and said that we are not going to buy anything from you unless you support Red Hat."

"The Red Hat platform is the fastest growing platform for our SAP core product SAP HANA on the market today."

Steve Lucas

President, Platform Solutions SAP

2015 Red Hat Summit Keynote

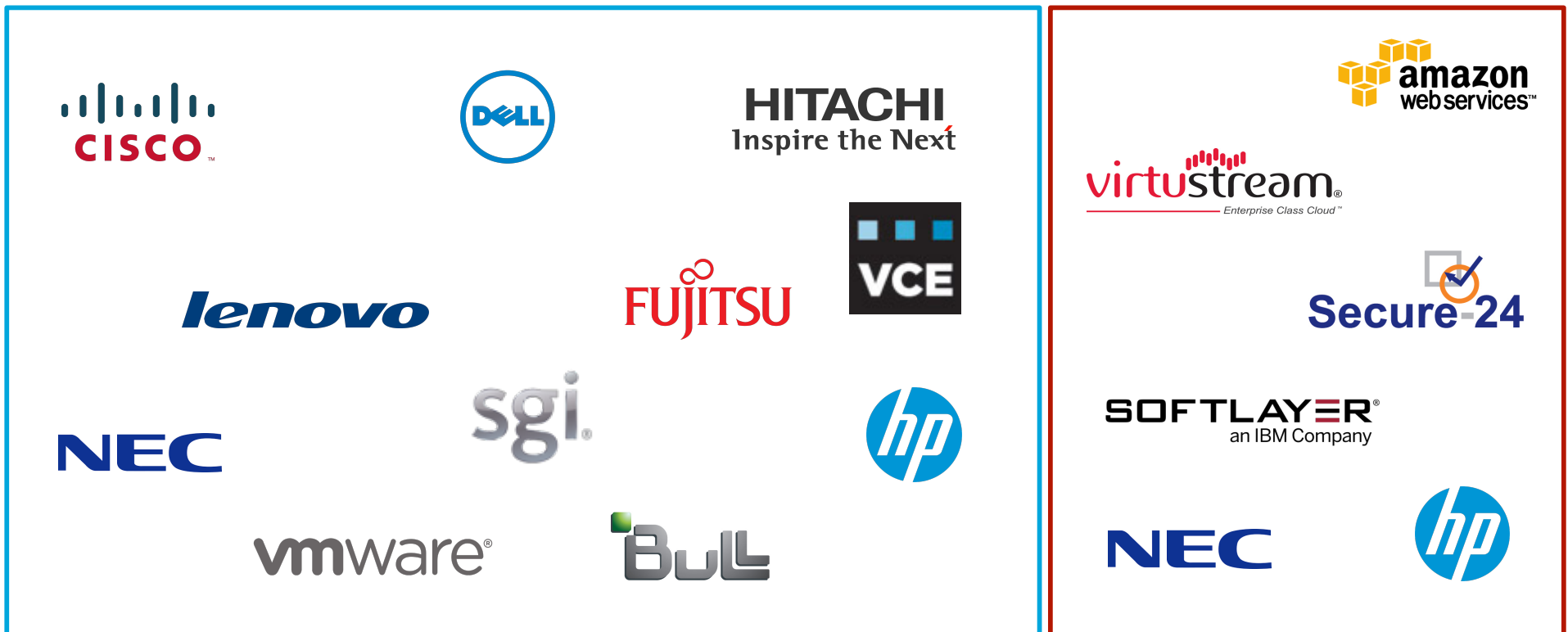
https://www.youtube.com/watch?v=_UiKdgasgQ0

RHEL for SAP Portfolio

SAP HANA Deployment Options

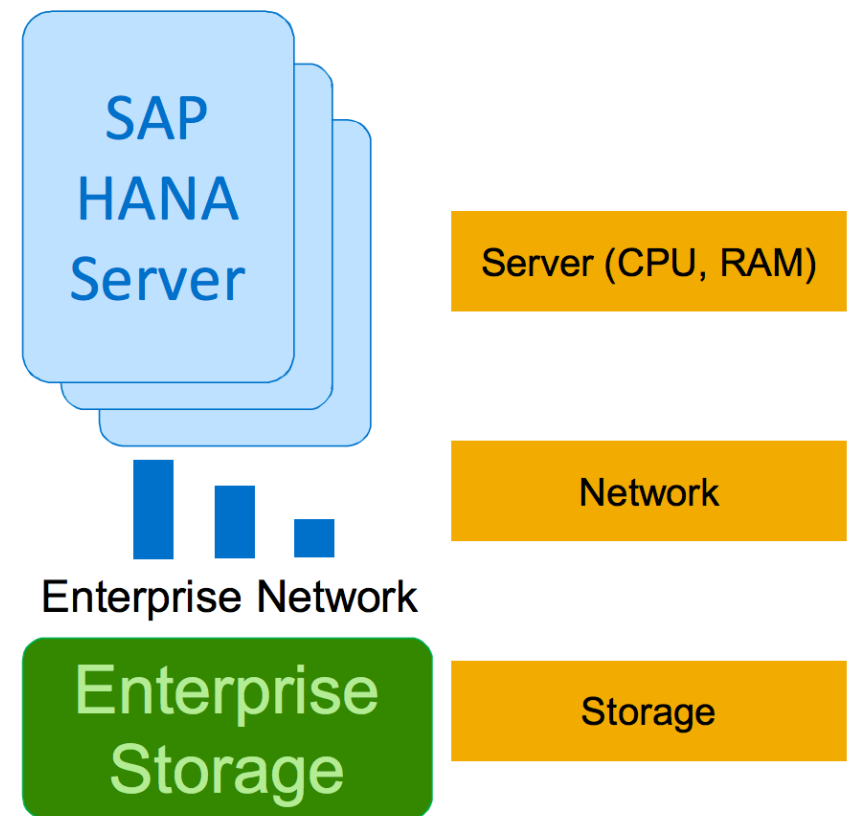


- Virtualization options available
- More than 570 certified hardware configurations (as of Oct. 2015)



Tailored Datacenter Integration (TDI)

- Run SAP HANA on customer's hardware
- Choose from certified components
- SAP HANA installed by a certified installer
- Best for customers who want
 - Flexibility for large-scale deployments
 - To leverage existing hardware
 - Architectural control



RHEL for SAP HANA Certified Configurations

- RHEL 6.5, 6.6, and 6.7 (as of Feb. 2016)
- HANA Version: HANA 1.0 SPS08 and newer
- CPU Architecture: Intel Ivy Bridge-EX, Haswell-EX
- Configurations:
 - Single Node
 - Scale Out
 - SoH: (Business) Suite on SAP HANA
- File Systems:
 - XFS and ext3 by most HW vendors
 - GPFS by IBM/Lenovo
- Up-to-date list of certified hw:
 - <http://global.sap.com/community/ebook/2014-09-02-hana-hardware/enEN/index.html>

RHEL For SAP Portfolio

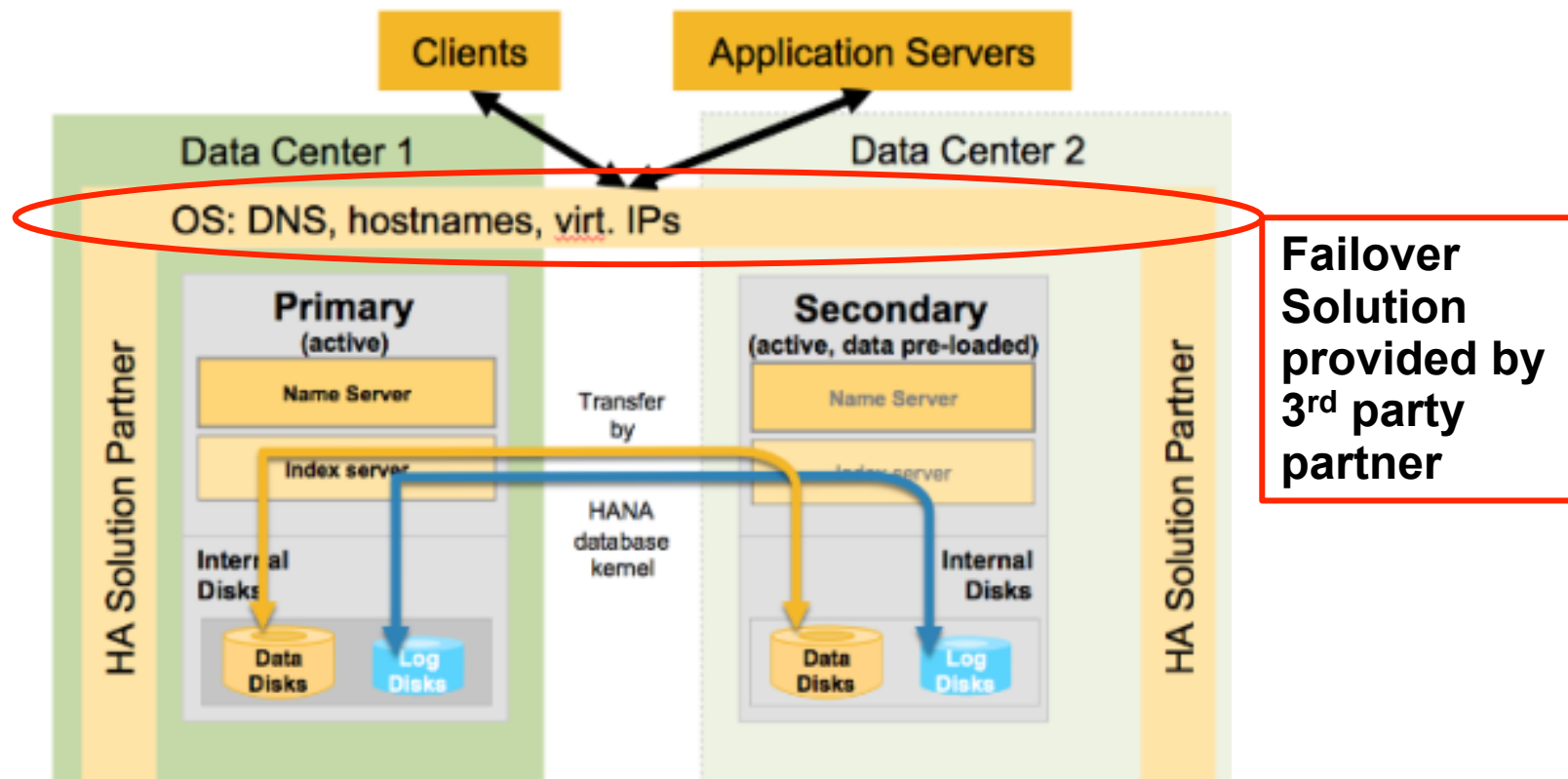
- Complete Red Hat Enterprise Linux for SAP portfolio for the entire SAP Landscape, including SAP Business Applications and HANA
- **RHEL for SAP HANA SKU**
 - <https://access.redhat.com/articles/1187363>
 - Required for HANA deployments
- **RHEL for SAP HANA w/ High Availability and Smart Management**
 - Required for Automated SAP HANA System Replication deployment
- **RHEL for SAP Business Application**
 - <https://access.redhat.com/knowledge/node/34169>
 - Required for Business Apps deployments
- Integrated support process

RHEL For SAP HANA SKU

- Required for SAP HANA Deployment
- Contents of the SKU
 - RHEL Server Base Channel
 - RHEL for SAP HANA Child Channel
 - Updated GCC runtime libraries required by SAP HANA
 - Tuned profiles optimize HANA performance
 - Resource agents for RHEL HA add-on to manage SAP HANA System Replication
 - Scalable File System Add-On (with the XFS file-system)

SAP HANA System Replication

- SAP HANA replicates all data to a secondary SAP HANA system (standard SAP HANA feature).
- Data is constantly pre-loaded on the secondary system to minimize recovery time objective (RTO)



Automated SAP HANA System Replication

- Automates the failover of a SAP HANA System Replication
- Using the RHEL Pacemaker cluster stack
 - Provided by the RHEL HA add-on
- Resource agents
 - SAPHana
 - SAPHanaTopology
- Configuration Guide
 - <https://access.redhat.com/articles/1466063>

Automated SAP HANA System Replication - Supported Configuration

Currently the following scenarios and parameters are supported:

- Two-node clusters only
- SAP HANA SPS8 and SPS9 are supported
- SAP HANA Scale-Up (single-box to single-box) System Replication only, no support for HANA Scale-Out SR or HANA installations configured with a standby node
- Both SAP HANA instances must have the same SAP Identifier (SID) and Instance-Number
- Having a second SAP HANA system (like QAS or TST) running on the replicating node ("Cost-Optimized" scenario) which needs to be stopped during takeover is possible, but should therefore be developed together with a partner
- "Multitier System Replication"/"replication chains" are possible, but the tertiary site can not be managed by the cluster

Automated SAP HANA System Replication - Supported Configuration - continued

- No support for SAP HANA System Replication "Multiple components One Database (MCOD)". MCOS is only supported if all databases running on the hosts are replicated and the replication is always to the same secondary node
- All nodes must be in the same network segment (layer 2)
- Technical users and groups such as "<SID>adm" must be identically defined on all cluster nodes
- Name resolution of the cluster nodes and the virtual IP address can be done locally on all cluster nodes
- Time on all cluster nodes must be in sync (using NTP or some other time synchronization method)
- If the cluster nodes are installed in different data centers or data center areas, the environment must match both the requirements defined by SAP for HANA System Replication (see chapter "4.2 Distance between data centers" in the SAP ["How to Perform System Replication for SAP HANA"](#) guide) and also the RHEL HA add-on stretch cluster requirements, specifically the network latencies between the nodes and the recommended maximum distance

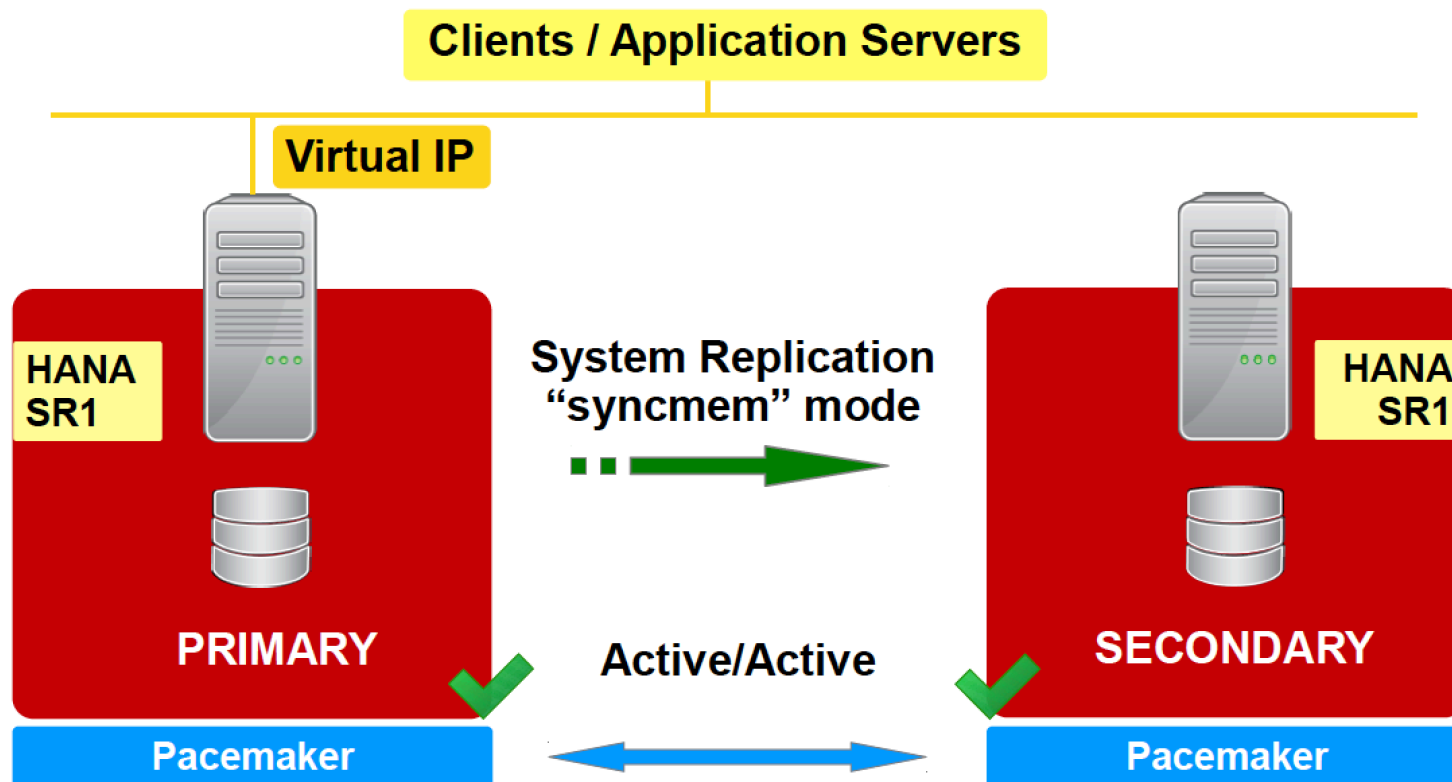
Automated SAP HANA System Replication - Resource Agents

- SAPHana
 - Manages pre-configured SAP HANA System Replication environment
- SAPHanaTopology
 - Gathers information about the current status of SAP HANA System Replication
- Both are bundled in resource-agents-sap-hana rpm

Failover Scenario

– System Replication on Pacemaker

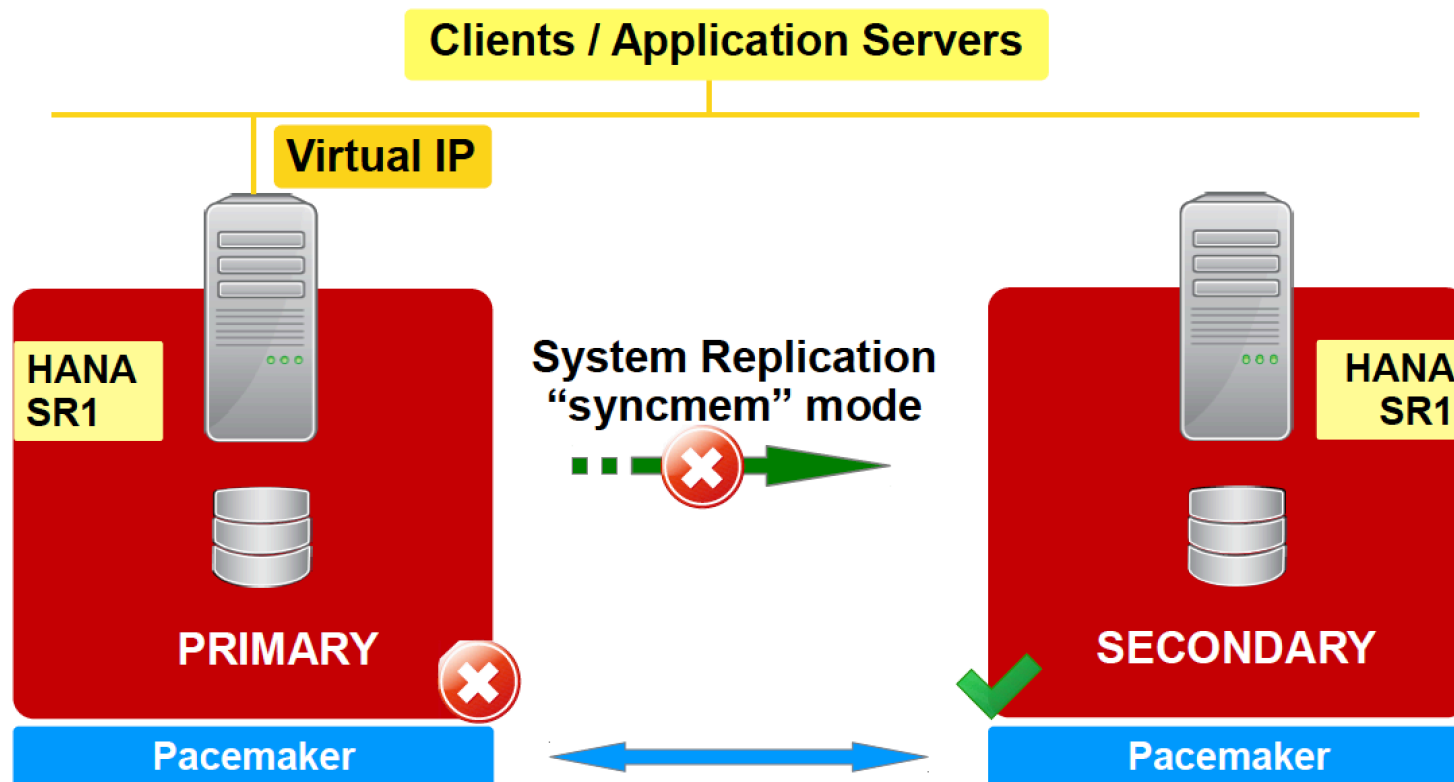
- System Replication modes: sync, [syncmem], async
- PREFER_SITE_TAKEOVER = True
- AUTOMATED_REGISTER = False
- No shared storage



Failover Scenario

– Primary Node Down

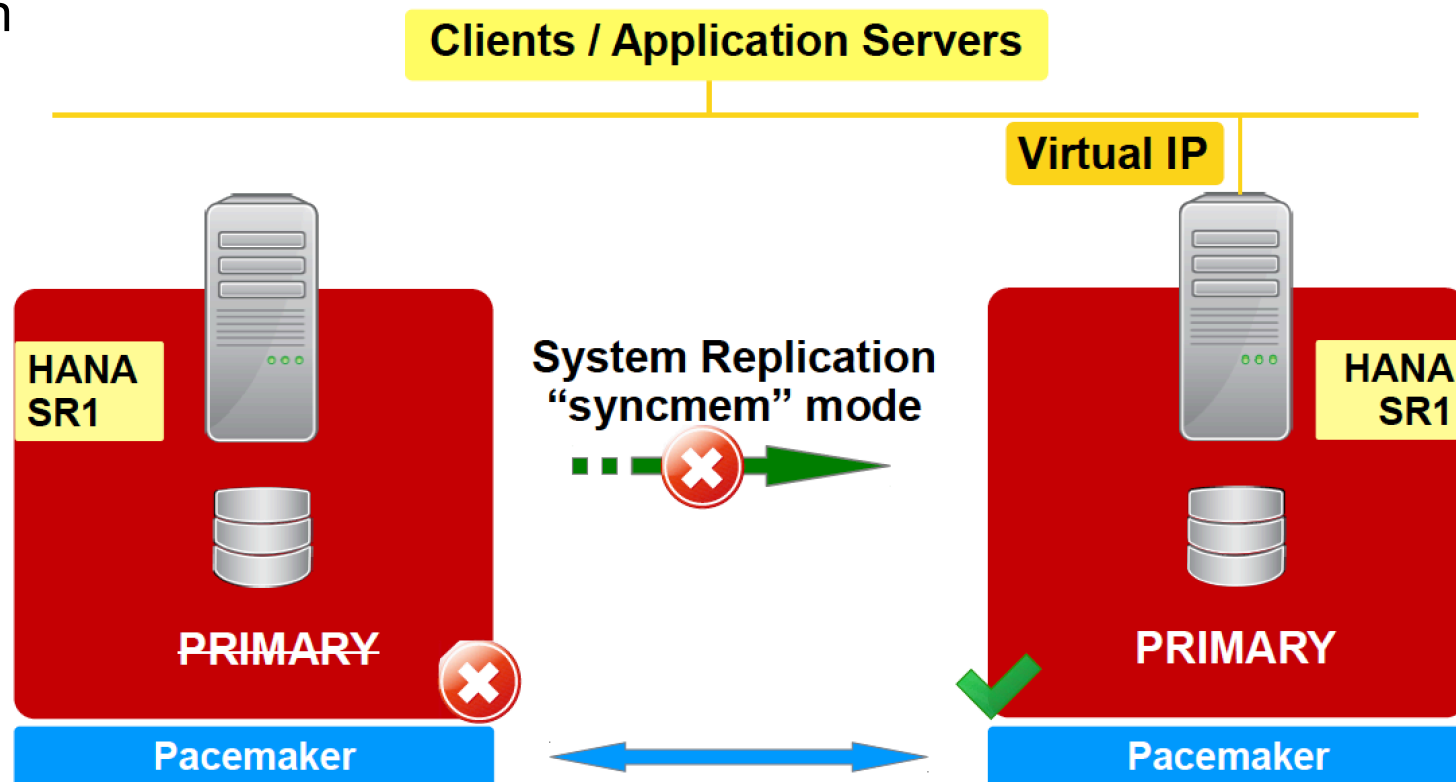
- Primary node down
- System Replication interrupted
- Pacemaker cluster fence the primary node



Failover Scenario

– Secondary Node Take-Over

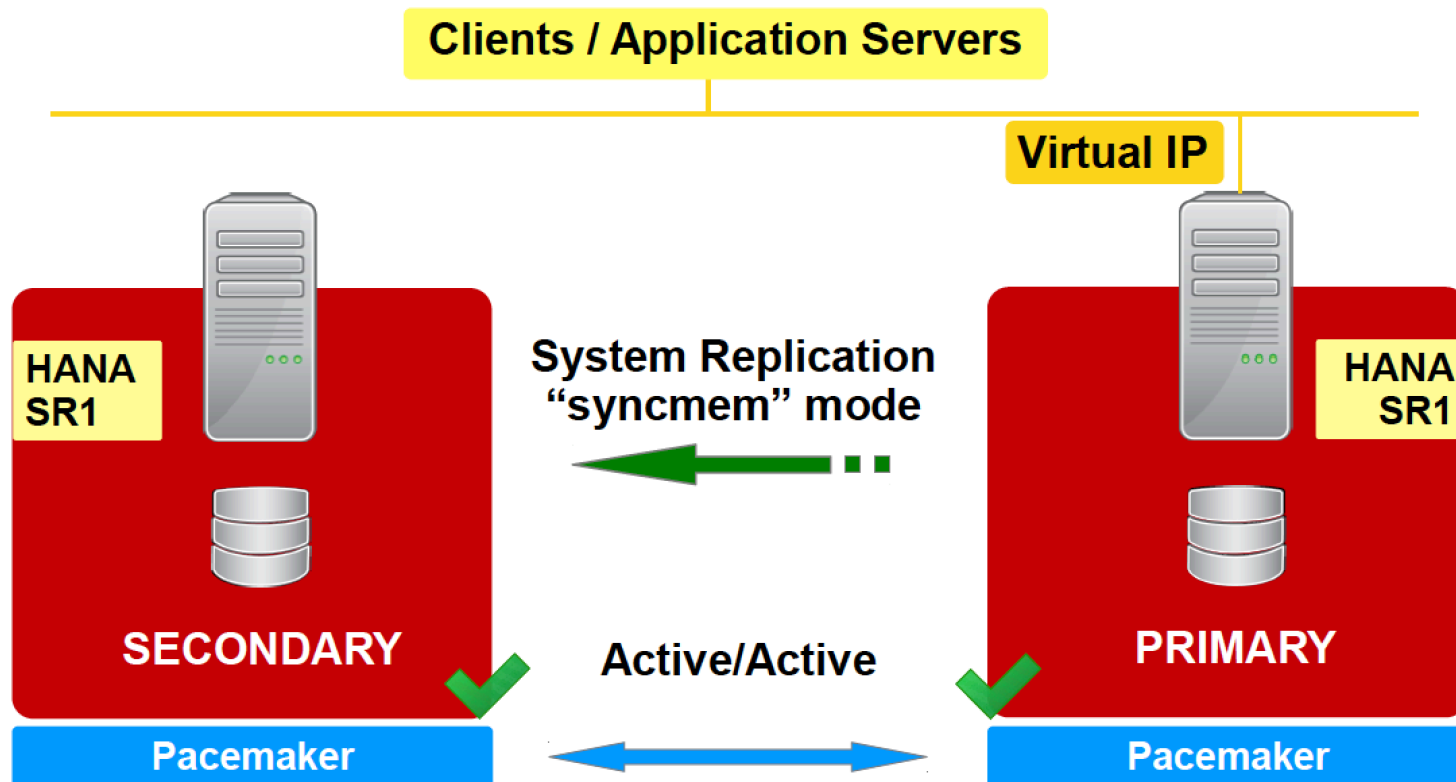
- Secondary becomes the new Primary
- Virtual IP binds to the new Primary node
- Previous Primary remains Primary, because “AUTOMATED_REGISTER = False”, and Administrator must decide if the setup failback or register the old Primary as the new secondary before HANA System Replication can start again



Failover Scenario

– What if “AUTOMATED_REGISTER = True”

- Wait for “DUPLICATE_PRIMARY_TIMEOUT” timeout
- Former Primary registers as the new Secondary
- System Replication starts, in the opposite direction



RHEL For SAP HANA w/ HA & Smart Management SKU

- Provides solution for automated failover of SAP HANA System Replication
- Using Pacemaker cluster stack
- Contents of the SKU
 - RHEL Server Base Channel
 - RHEL for SAP HANA Child Channel
 - Updated GCC runtime libraries required by SAP HANA
 - Tuned profiles optimize HANA performance
 - Resource agents for RHEL HA add-on to manage SAP HANA System Replication
 - Scalable File System Add-On (with the XFS file-system)
 - High Availability Add-On
 - Provides the cluster framework for automated SAP HANA System Replication
 - Smart Management Add-on

RHEL For SAP Business Applications Components

- Certified in RHEL 7 and RHEL 6
- RHEL for SAP Business Applications SKU
 - RHEL Server Base Channel
 - RHEL for SAP Business Applications Child Channel
 - sapconf OS provisioning tool
 - SAP certified pacemaker-based HA resource agents
 - Legacy SAP locales to migrate non-unicode SAP from Unix/Windows
 - vhostmd for SAP monitoring on KVM

sapconf – Automating RHEL Configurations for SAP

- Provision a RHEL system based on SAP Notes including kernel parameters, additional rpms installation, and network settings, etc.
- Can be used in a kickstart file and integrated with RHN Satellite Server to automate the installation and provision of a RHEL system
- Shortened learning curve – useful for Unix migration
- Available in RHEL 7.x and 6.5+
- SAP Notes
 - SAP Note 2002167 - Red Hat Enterprise Linux 7.x: Installation and Upgrade
 - SAP Note 1496410 - Red Hat Enterprise Linux 6.x: Installation and Upgrade

High Availability for SAP Business Applications

- SAP HA-Interface Certified
- Pacemaker based cluster resource agents
- Support available in RHEL 7 and RHEL 6.5+
- Supports SAP NetWeaver based SAP Solutions (ERP (aka ECC), CRM, SRM, Solution Manager, Portal, ...)
- Supported Databases:
 - Oracle
 - IBM DB2 LUW
 - SAP MaxDB
 - SAP ASE
- HA inside VM's
 - RHEL KVM
 - RHEV
 - VMware ESX/ESXi

Performance

Leading Performance

#1 for 2-processor and 4-processor SD benchmarks *

System	OS/Database	Users	SAP ERP/ ECC Release	SAPS	SAPS/ Proc	Date	Certification
Dell PowerEdge R930 4p /72c/144t Intel Xeon E7-8890	RHEL 7.1 ASE 16	31,000	ERP6.0 EhP5 (Unicode)	170030	42,507	5/5/15	2015012
HP ProLiant DL580 Gen9 4p /72c/144t Intel Xeon E7-8890	RHEL 6.7 ASE 16	31,000	ERP6.0 EhP5 (Unicode)	169,430	42,358	05/5/15	2015020
Dell PowerEdge R730 2p /36c/72t Intel Xeon E5-2699	RHEL 7 ASE 16	16500	ERP 6.0 EhP5 (Unicode)	90,120	45,060	9/10/14	2014033

*: #1 on 4-processor overall, #1 on 2-processor on Linux

On January 1, 2009, the SAP SD Benchmark was updated. Alongside the upgrade to SAP Business Suite 7 and the SAP enhancement package 4 for SAP ERP 6.0, a number of additional, necessary updates were implemented. Business changes constantly, for example, Unicode and the use of the new general ledger are now common practice for SAP customers across all industries, and the SAP standard application benchmarks need to reflect this change. The updates are transparent; that is, the steps of the benchmark scenario remain unchanged. Please be aware that these changes make the SD benchmark more resource-intensive, which has a direct impact on the benchmark results.

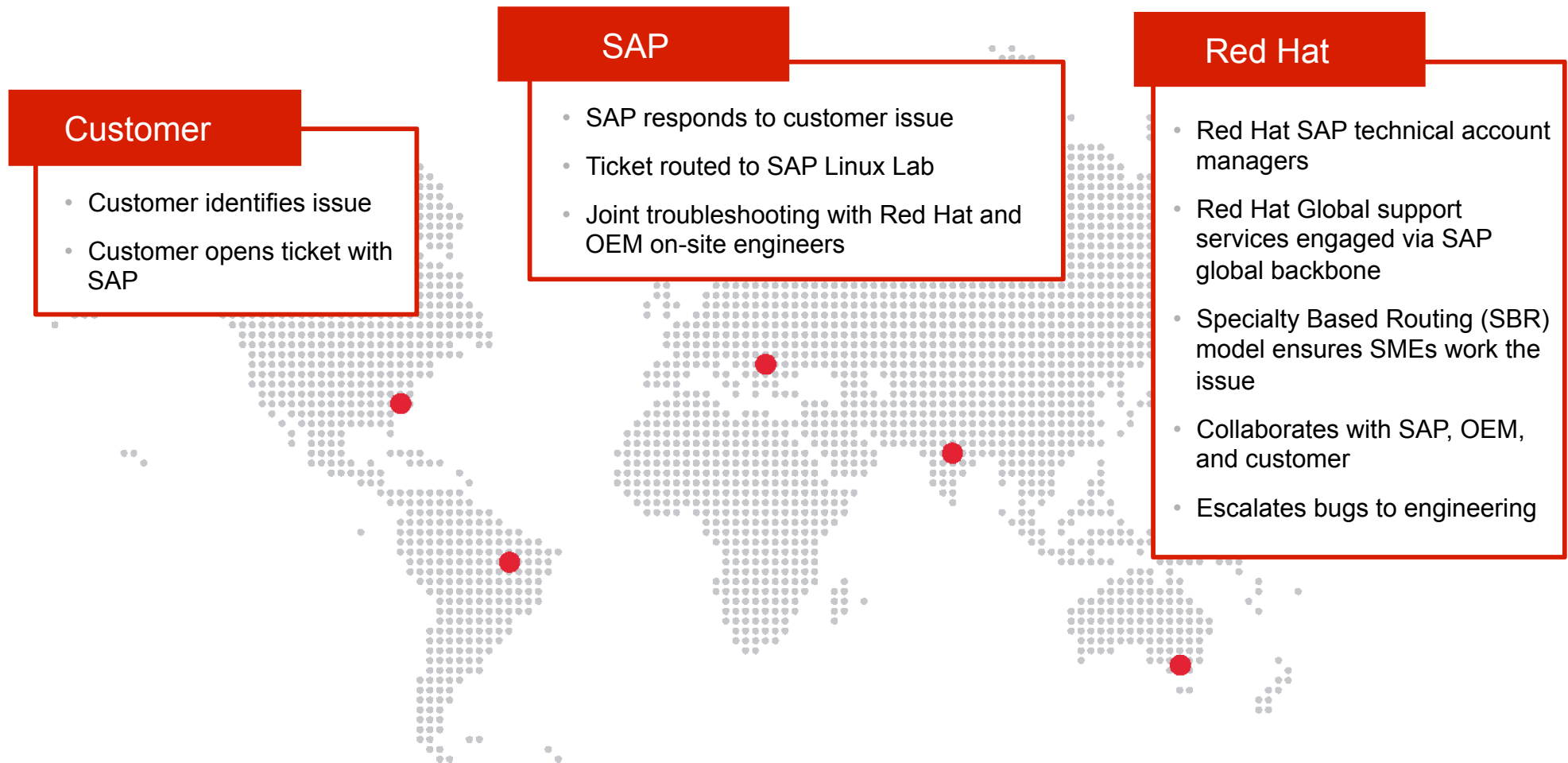
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Support Process

CEE Support Structure for SAP

Integrated ticketing system—Customer has single support interface



Technical Account Manager (TAM) for SAP

Provide the specialized product knowledge and industry expertise needed for your unique technical environment

Currently, Red Hat offers TAM services for the following:

RED HAT®
ENTERPRISE LINUX
OPENSTACK PLATFORM

RED HAT® JBOSS®
MIDDLEWARE

 **OPENSIFT®**
by Red Hat®

RED HAT®
STORAGE

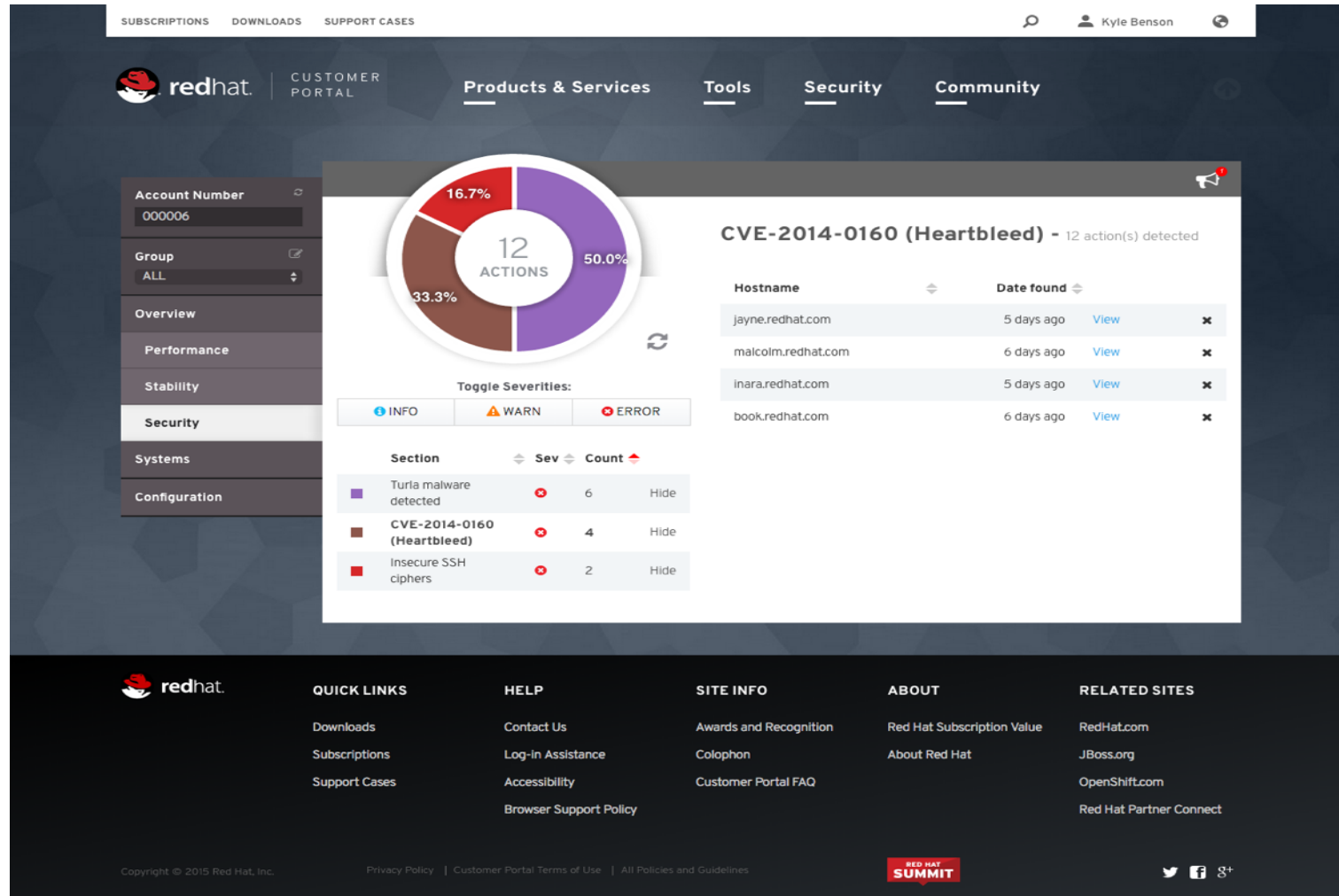
RED HAT®
ENTERPRISE
LINUX®



Technical Account Manager (TAM) – Benefits

TAM for SAP	Details
TAM for SAP	<ul style="list-style-type: none">• Enjoy a direct relationship with a SAP-trained TAM specialist with deep experience in Red Hat Enterprise Virtualization for SAP and Red Hat Enterprise Linux for SAP solutions. These specialists also have SAP Solution Manager background knowledge• Prevent issues before they occur with proactive planning, Red Hat SAP—related roadmap meetings, and Red Hat and SAP solution architecture reviews• Coordinate support services for ticket resolution and joint customer escalation• Direct path to Red Hat Global Support Services and the SAP support team, as well as early access to Red Hat Enterprise Linux for SAP or Red Hat Enterprise Virtualization software• Use Red Hat and SAP best practices to find out what's coming next from Red Hat relative to SAP solutions, including SAP notes, patches, and current benchmarks

Red Hat Access Insights



<https://access.redhat.com/insights/splash/>

JBoss Middleware for SAP HANA

Ted Jones
Red Hat, Inc.

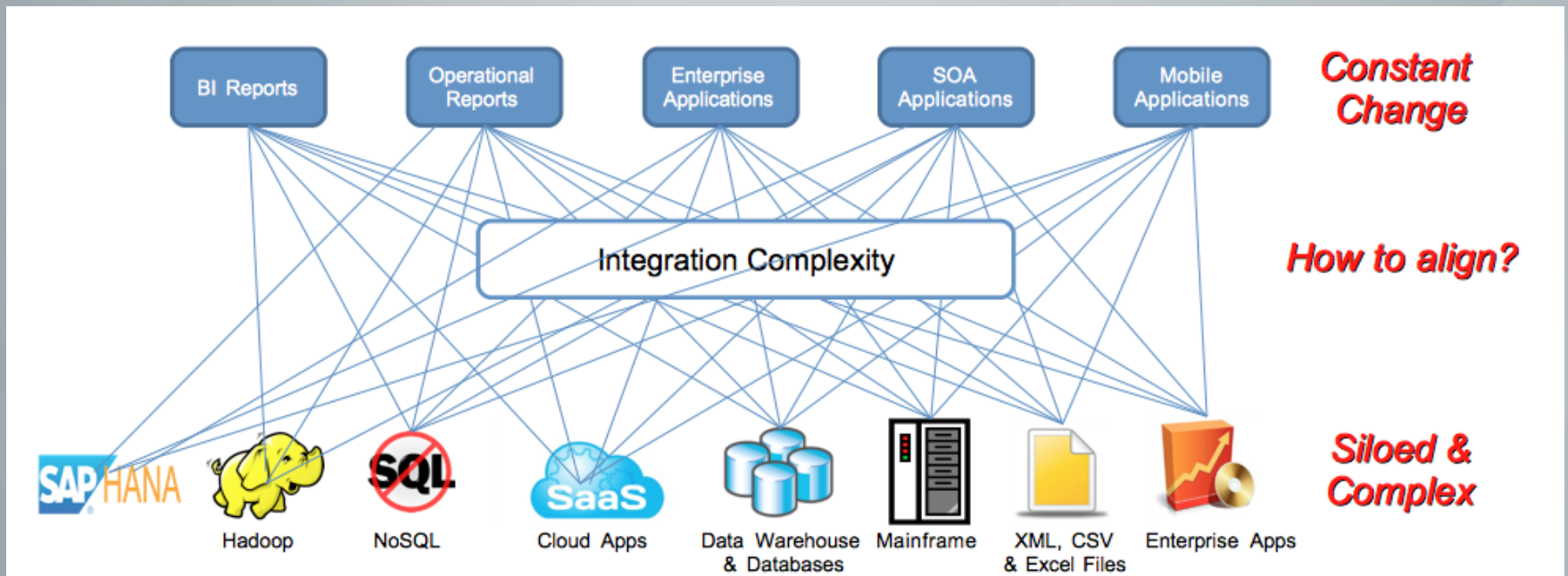
Data Driven Economy

Data is becoming the new raw material of business: an economic input almost on a par with capital and labor. "Everyday I wake up and ask, 'How can I flow data better, manage data better, analyze data better?'".

- Walmart CIO

Data Challenges Getting Bigger

- Big Data, Cloud and Mobile



An iceberg floating in a blue ocean under a blue sky with white clouds. The small tip of the iceberg is above the water, while the much larger, jagged base is submerged. The text is overlaid on the image, with the top part on the visible tip and the bottom part on the submerged base.

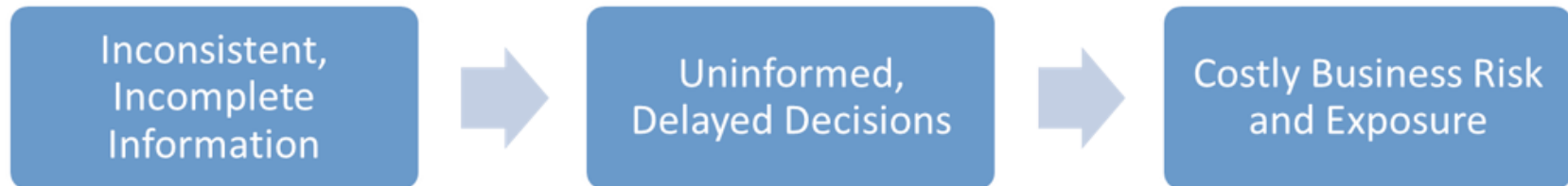
Only **28%**
Users have any meaningful
data access

- **Reduce costs** for finding and accessing highly fragmented data

Over **70%**
BI project efforts lies in the
integration of source data

- Improve time to market for new products and services by **simplifying data access and integration**
- **Deliver IT solution agility** necessary to capitalize on constantly changing market conditions
- **Transform fragmented data** into actionable information that delivers competitive advantage

Consider...



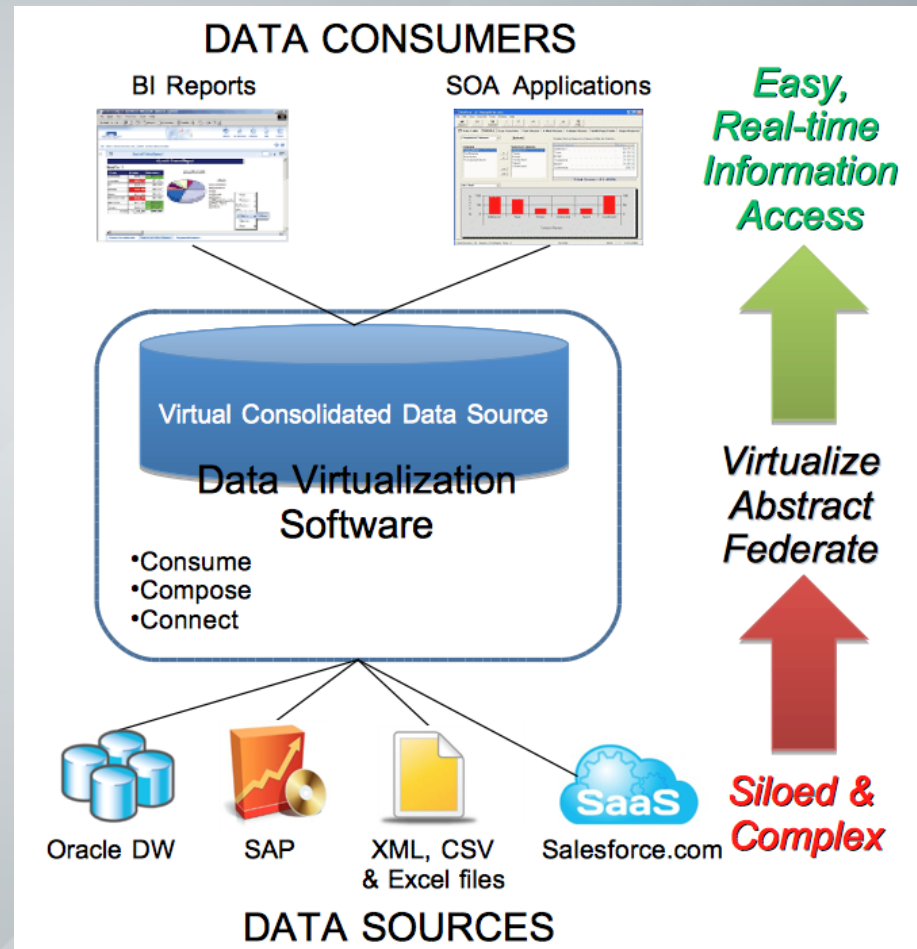
How would your organization change...

- If data were **readily reusable in place** rather than requiring significant effort to build new intermediary data tiers?
- If data could be repurposed **quickly** into new applications and business processes?
- If all applications and business processes could get **all of the information needed** in the form needed, where needed and when needed?

What does Data Virtualization Software Do?

Turns fragmented data into actionable information

- **Connect:** Fast access to data from diverse data sources.
- **Compose:** Easily create unified virtual data models and views by combining and transforming data from multiple sources
- **Consume:** Expose consistent information to data consumers in the right form through standard data access methods.



Data Virtualization Overview



*Easy,
Real-time
Information
Access*



*Virtualize
Transform
Federate*



*Siloed &
Complex*

BI Reports & Analytics

Mobile Applications

ESB,
ETL

SOA Applications & Portals



**Data
Consumers**

Consume

Standard based Data Provisioning
JDBC, ODBC, SOAP, REST, OData

Design
Tools

Dashboard

**JBoss Data
Virtualization**

Compose

Unified Virtual Database/Common Data Model
Data Transformations

Optimization

Caching

Connect

Native Data Connectivity

Security

Metadata

**Data
Sources**



Hadoop



NoSQL



Cloud Apps



Data Warehouse
And Databases



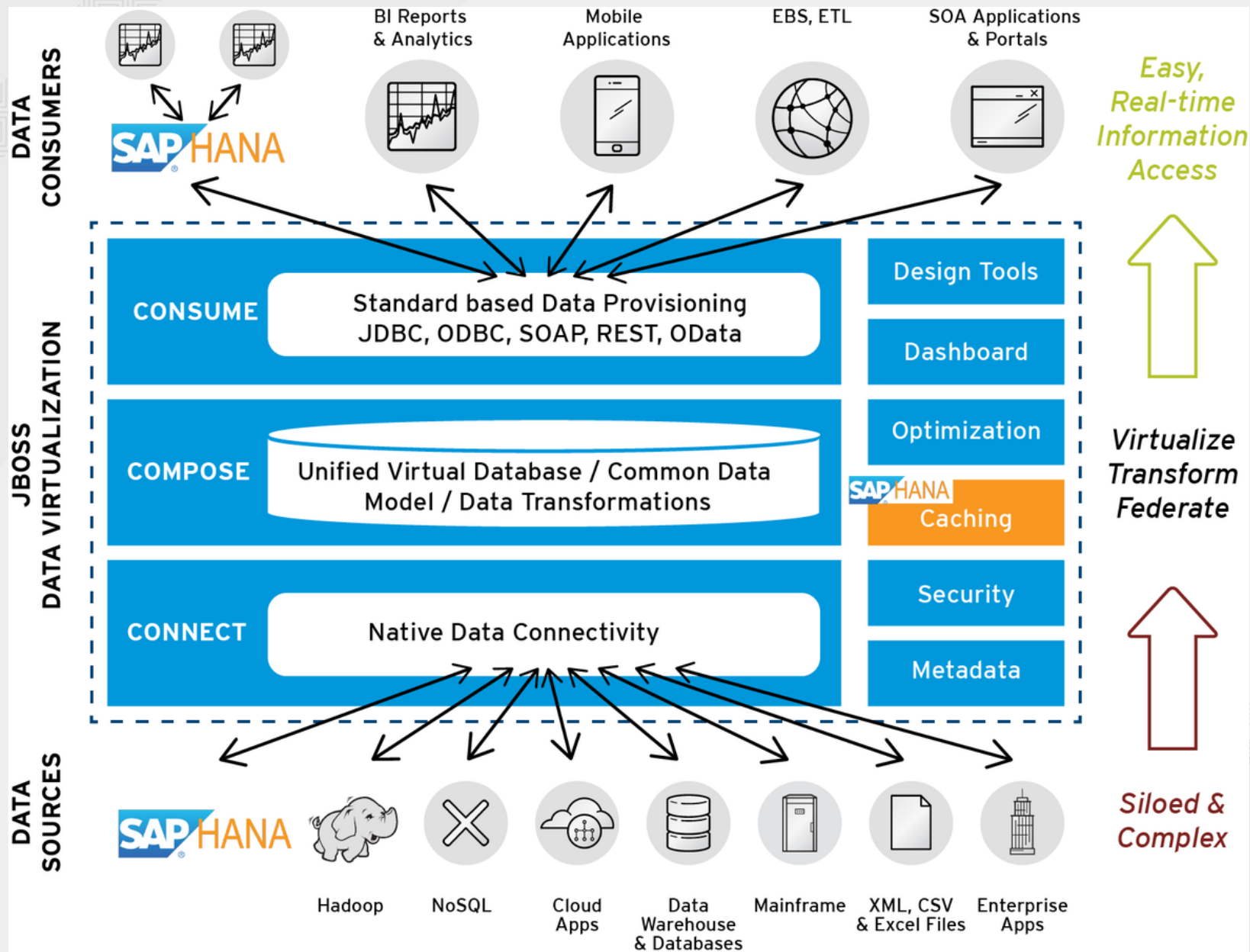
Mainframe



XML, CSV
& Excel Files



Enterprise Apps



Red Hat JBoss Data Virtualization Key Business Values

Increase ROA

- Improved utilization of data assets
- Derive more value from existing investments
- Complements existing systems

Boost Agility

- Better/faster than hand coding
- Faster, less costly than batch data movement
- Data virtualization provides loose coupling

Improve Productivity

- Right data at the right time to the right people
- Decision support, BI with a complete view of information

Better Information Control

- Powerful security, Auditing, Data Firewall
- Avoid data silo proliferation
- Central data access and policy, Compliance

Red Hat JBoss Data Virtualization Key Differentiators

Lowest TCO

- Cost leadership lower adoption barrier
- Core based subscription provide flexibility across small to large deployment

Openness

- Open, community based innovation
- No vendor lock-in

Cloud Ready

- Private, public and hybrid cloud deployments

Comprehensive

- Integrated with JBoss Middleware portfolio for end-to-end business solution
- Single vendor support simplify IT operations

Performance

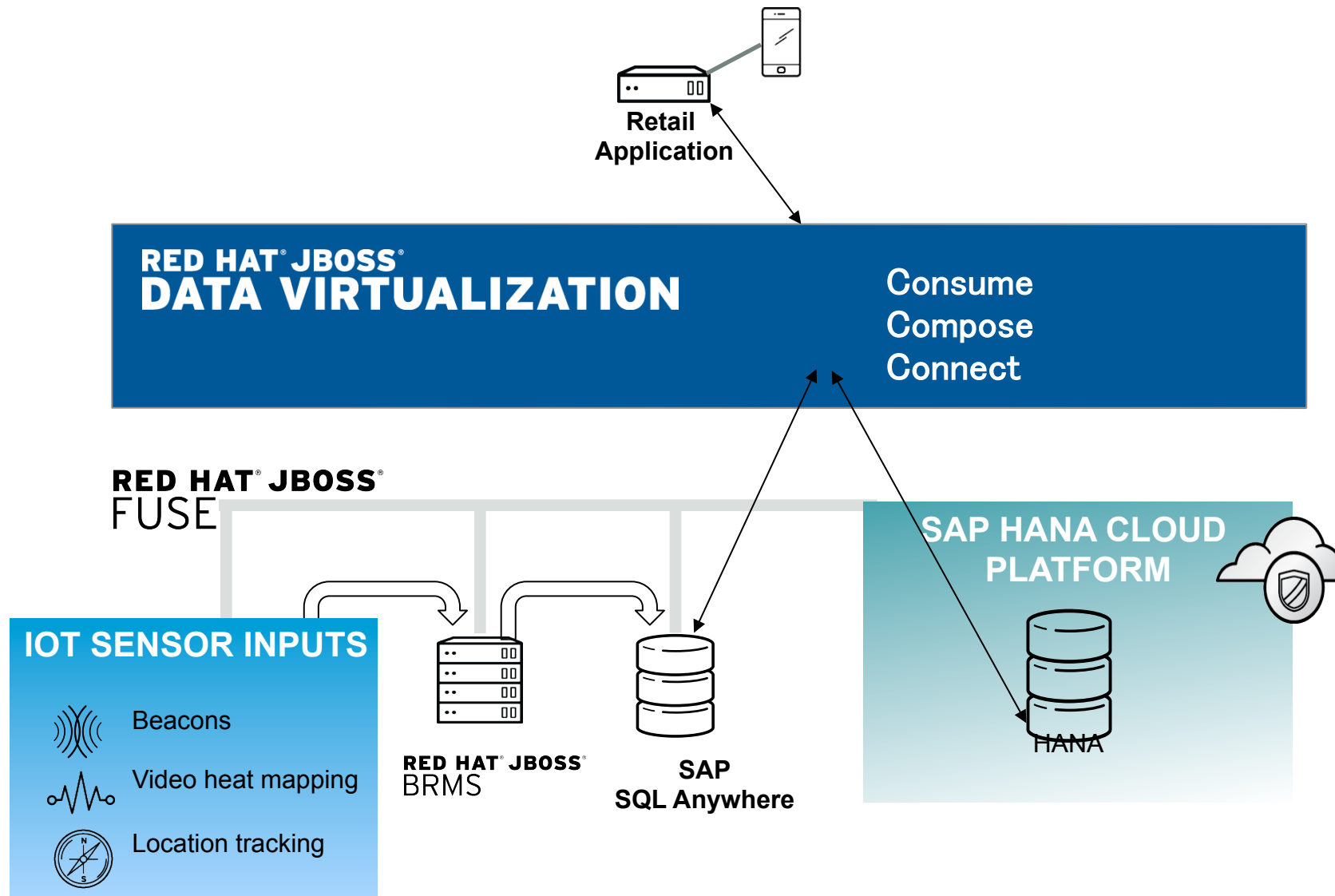
- Fast query processing optimizations, low footprint
- Comprehensive data provisioning options
- Quick data visualization through business dashboard

A person wearing a white lab coat and white gloves is holding a small, complex electronic component, possibly a microchip or a small circuit board, between their fingers. The background is a blurred laboratory setting. The entire image is overlaid with a semi-transparent teal color, and a diagonal line separates the teal area from a lighter grey area in the top-left corner.

DEMOS

SAP – Red Hat IoT Retail Architecture

Demo available



Travel Triage Reference Implementation v2.0

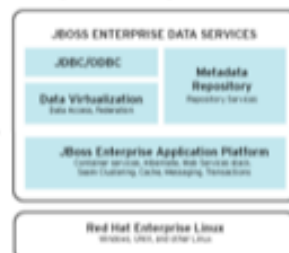
Android Application



Data
Virtualization
OData
Service



OPENSIFT



JDBC



JDBC



Resources and Contacts

Technical Documents – Installation Guide

- Single-Host Mode Installation Guide
 - ALL Hardware Vendors: SAP Note 2009879 - SAP HANA Guidelines for Red Hat Enterprise Linux (RHEL) Operating System - <http://service.sap.com/sap/support/notes/2009879>
 - SAP HANA on RHEL on IBM xServer using GPFS: <http://www.saphana.com/docs/DOC-4739>
- Multiple-Host Mode Installation Guide
 - SAP HANA Server Installation and Update Guide: http://help.sap.com/hana/SAP_HANA_Server_Installation_Guide_en.pdf

Technical Documents – SAP Notes

- SAP Note 2247020 - SAP HANA DB: Recommended OS settings for RHEL 6.7
 - <http://service.sap.com/sap/support/notes/2247020>
- SAP Note 2136965 - SAP HANA DB: Recommended OS settings for RHEL 6.6
 - <http://service.sap.com/sap/support/notes/2136965>
- SAP Note 2013638 - SAP HANA DB: Recommended OS settings for RHEL 6.5
 - <http://service.sap.com/sap/support/notes/2013638>
- SAP Note 2001528 - Linux: SAP HANA Database SPS 08 revision 80 (or higher) on RHEL 6 or SLES 11
 - <http://service.sap.com/sap/support/notes/2001528>
- SAP Note 2228351 - Linux: SAP HANA Database SPS 11 revision 110 (or higher) on RHEL 6 or SLES 11
 - <http://service.sap.com/sap/support/notes/2228351>

Technical Documents – Red Hat Support Articles

- Red Hat Enterprise Linux for SAP HANA: system update and supportability
 - <https://access.redhat.com/solutions/1243453>
- Why can I not install or start SAP HANA after a system upgrade?
 - <https://access.redhat.com/solutions/1236813>
- tmpwatch removing lock files needed by SAP HANA
 - <https://access.redhat.com/solutions/1323663>
- Why SAP HANA SP08 fails to install despite my server is a certified appliance and I have a valid RHEL for SAP HANA subscription?
 - <https://access.redhat.com/solutions/1129463>
- SAP HANA Multi host install fails with the message "LIBSSH2_ERROR_KEY_EXCHANGE_FAILURE , unable to exchange encryption keys"
 - <https://access.redhat.com/solutions/1370033>

Technical Documents on Automated SAP HANA System Replication

- Configuration Guide for Automated SAP HANA System Replication with Pacemaker on RHEL
 - <https://access.redhat.com/articles/1466063>
- Datasheet on Smart Management and High Availability
 - http://www.redhat.com/f/pdf/rhel/RHEL6_Add-ons_datasheet.pdf

Resources

- **Main Customer Page**

<https://engage.redhat.com/sap-hana-mo-201505231013>

- **Red Hat Enterprise Linux for SAP HANA Certified configurations**

<http://global.sap.com/community/ebook/2014-09-02-hana-hardware/enEN/index.html>

- **SAP on Red Hat SCN Landing Page**

<http://scn.sap.com/docs/DOC-37811>

- **SAP Notes**

- <http://scn.sap.com/docs/DOC-37812>

- **Questions: sap@redhat.com**