# Your presenters for today
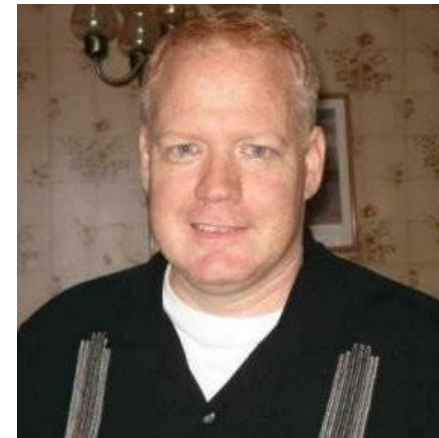


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# Forward-Looking Statements Contained in this Material

*Any statements regarding Red Hat, IBM's or SAP's future direction, intent or product plans are subject to change or withdrawal without notice.*

*Please refer to the trailing slides in this deck for the complete notices and disclaimers.*

**SAP runs
best on Red Hat with …
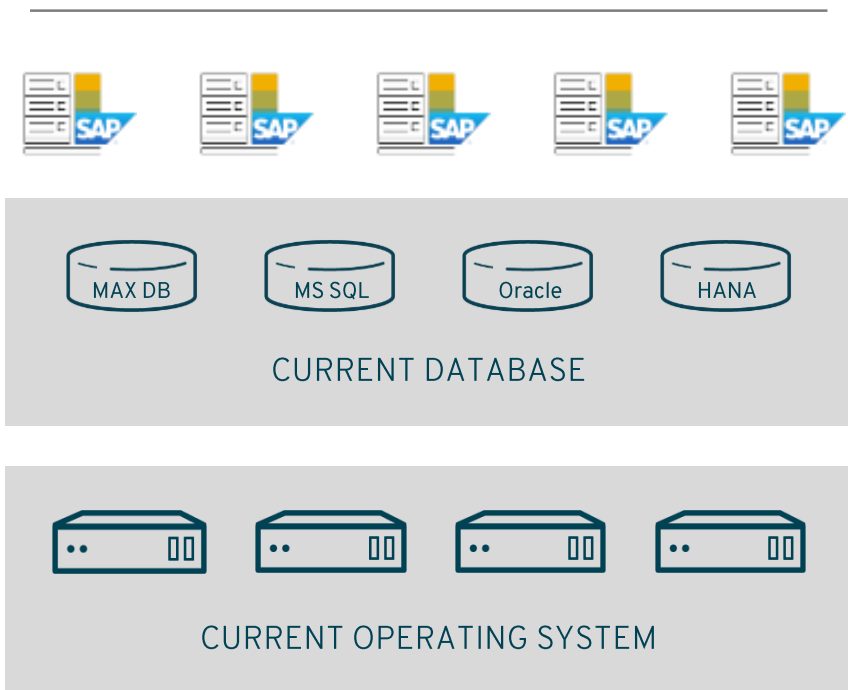Red Hat Enterprise Linux
for SAP Solutions**

Where to Go

**Red Hat architecture,
roadmap and
use cases**

# SAP's Digital Core Transformation

## Requiring an extensible infrastructure that spans current & future SAP deployments



TODO
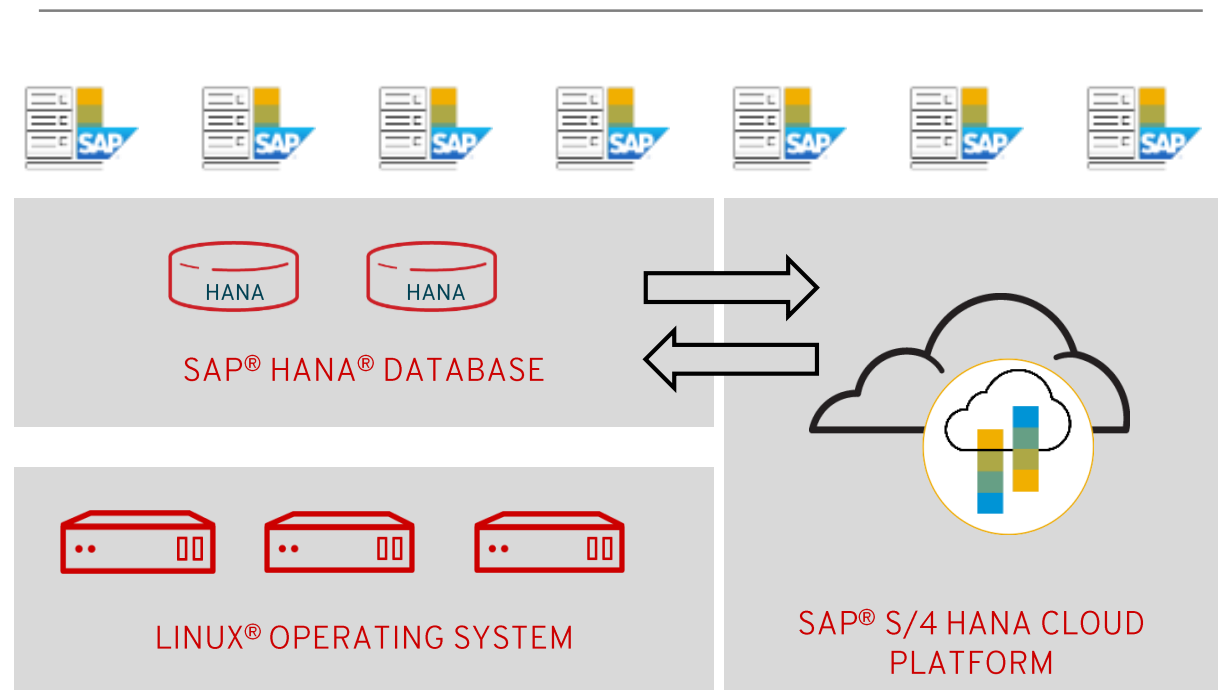
TODAY                                       YEAR 2027*

| MAX DB | MS SQL | Oracle | HANA |

**CURRENT DATABASE**

**HANA**    **HANA**

**SAP® HANA® DATABASE**

**CURRENT OPERATING SYSTEM**

**LINUX® OPERATING SYSTEM**

**SAP® S/4 HANA CLOUD PLATFORM**

Red Hat | IBM | SAP Platinum Partner

# Transforming the Digital Enterprise

## Where SAP and Red Hat intersect present and future architecture

on premise       on premise       cloud

SAP Concur
SAP SuccessFactors
SAP Ariba
SAP Fieldglass

**SAP Business Suite**
SAP NetWeaver
Custom applications

**SAP S/4HANA On Premise**
**SAP HANA platform**

SAP S/4HANA Cloud

**SAP Data Intelligence (SaaS)**
**SAP Cloud Platform (PaaS)**
Custom cloud apps

**SAP**

future

kubernetes    K ⁿ    Istio

**RED HAT ENTERPRISE LINUX**

**RED HAT VIRTUALIZATION**

**RED HAT OPENSHIFT**

A **RED HAT ANSIBLE** Automation

**PHYSICAL**

**VIRTUAL**

**PRIVATE CLOUD**

**PUBLIC CLOUD**

7

Red Hat | IBM | SAP Platinum Partner
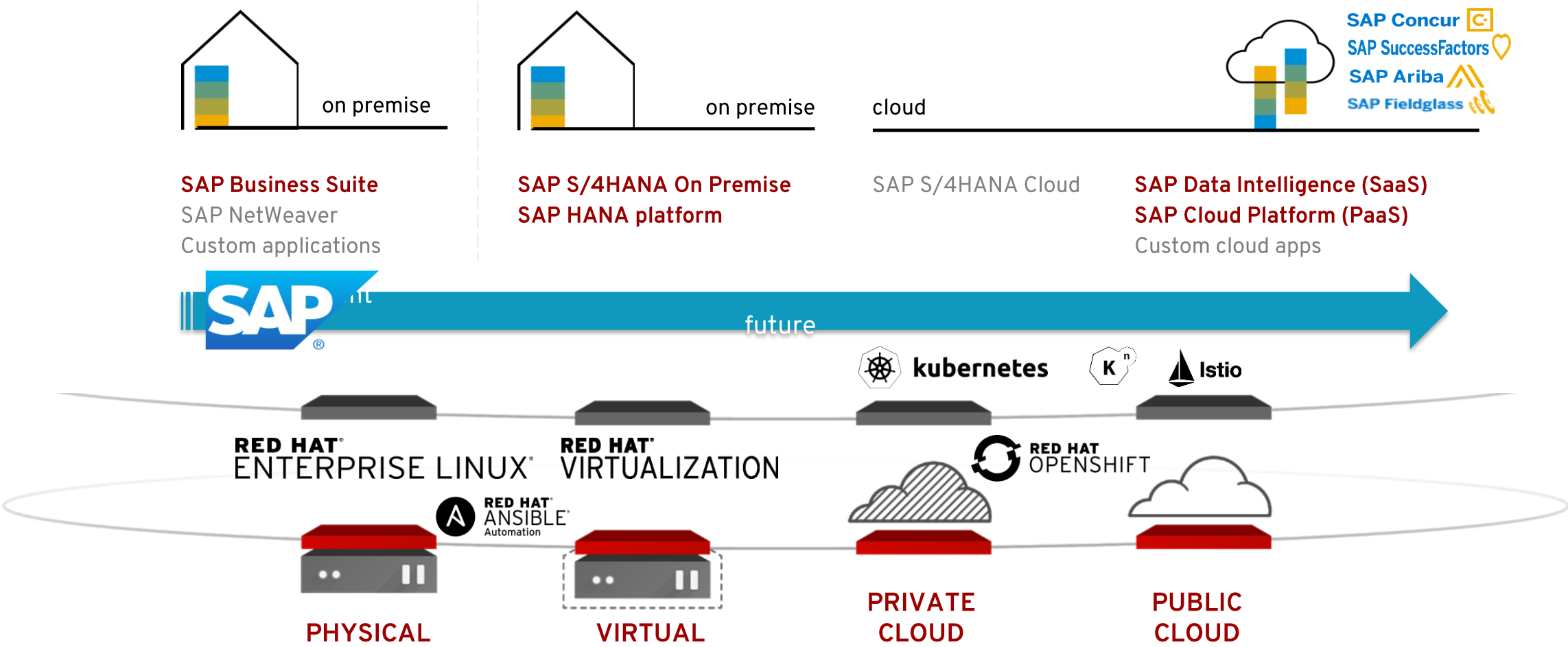
# Red Hat Infrastructure Suite for SAP

Supporting customer during transition from today's to the future SAP architecture

## 1. **Modernize**

Benefit from RHEL's advanced features and technologies, such as OCP migration tool and/or Ansible Playbooks, tailored and supported for the needs of SAP deployments. Pursue a single OS strategy for both VMs and Containers.

**RED HAT® ENTERPRISE LINUX®**

RED HAT INSIGHTS · RED HAT OPENSHIFT · RED HAT SATELLITE · RED HAT VIRTUALIZATION · RED HAT ANSIBLE Automation

## 2. **Integrate**

Connect SAP's future business applications & services with the rest of your Digital Enterprise using SAP certified and comprehensive API management capabilities of Fuse and 3Scale.

**RED HAT® JBOSS® FUSE**

kubernetes · K^n · Istio

**RED HAT® INTEGRATION**

## 3. **Build**

Red Hat CodeReady Workspaces offer customers a modern development environment to complement required business logic.

**RED HAT® CODEREADY**

RED HAT OPENSHIFT

Red Hat | IBM | SAP Platinum Partner

# Red Hat Enterprise Linux for SAP Solutions

Maximize the value of your SAP environment with Red Hat Enterprise Linux for SAP

➢ **Reduce risk** with a standard, community-accepted foundation
➢ **Support continuous availability** of your SAP applications
➢ **Boost performance** with an SAP HANA optimized platform
➢ **Protect your business** with advanced, built-in security
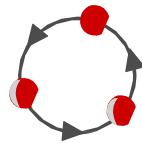➢ **Extensible infrastructure** that spans current & future SAP deployments

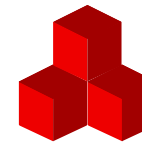| High availability failover orchestration | Predictive risk analytics and guidance | Up to 4 years of minor release updates[3] | Infrastructure management tools | SAP-specific packages and content |

See "10 Reasons for SAP on Red Hat" Info Brochure from https://lnkd.in/dVrhB2P for more details how Red Hat can help to be successful running SAP with Red Hat
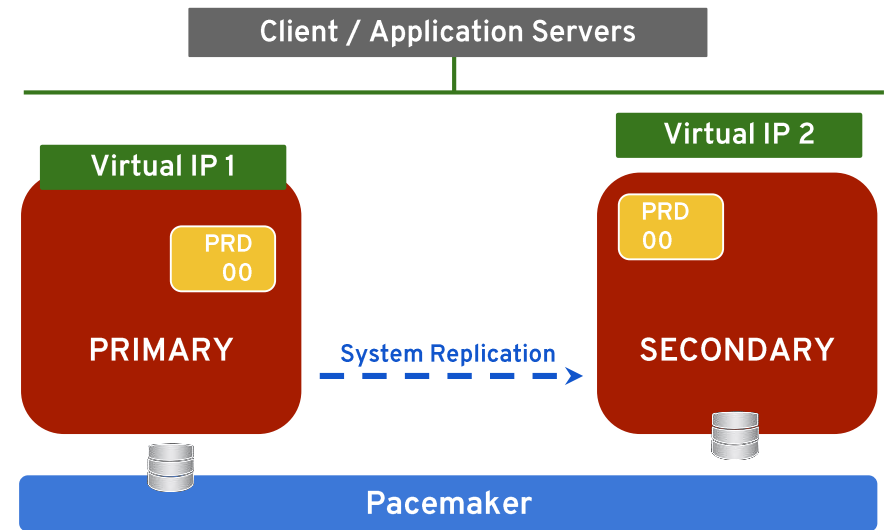
# Red Hat Enterprise Linux for SAP Solutions

## Enhanced stability and availability

- SAP's built-in HANA System Replication (HSR) does <u>not</u> support automated failover

- Red Hat's HA Add-on enables **automated** failover of both:
  - SAP HANA database, incl. scale-up and scale-out deployments
  - SAP S/4 HANA and NetWeaver applications incl. rolling kernel switch (RKS)

- Monitor the health of the SAP HANA database and trigger failover when failure is detected



Client / Application Servers

Virtual IP 1 | Virtual IP 2

PRD 00 | PRD 00

PRIMARY | System Replication | SECONDARY

Pacemaker

Example based on ACTIVE/ACTIVE configuration

SAP® Certified
Integration with SAP S/4HANA®

RHEL 8 / Intel 64 & IBM Power 9
SAP certified

Source: <u>Supported HA Scenarios for SAP HANA, SAP S/4HANA, and SAP Netweaver</u>
& <u>SAP Note 1908655 – Support details for Red Hat Enterprise Linux HA Add-On</u>

# Red Hat Enterprise Linux for SAP Solutions

## Live kernel patching included



BEFORE PATCHING / AFTER PATCHING
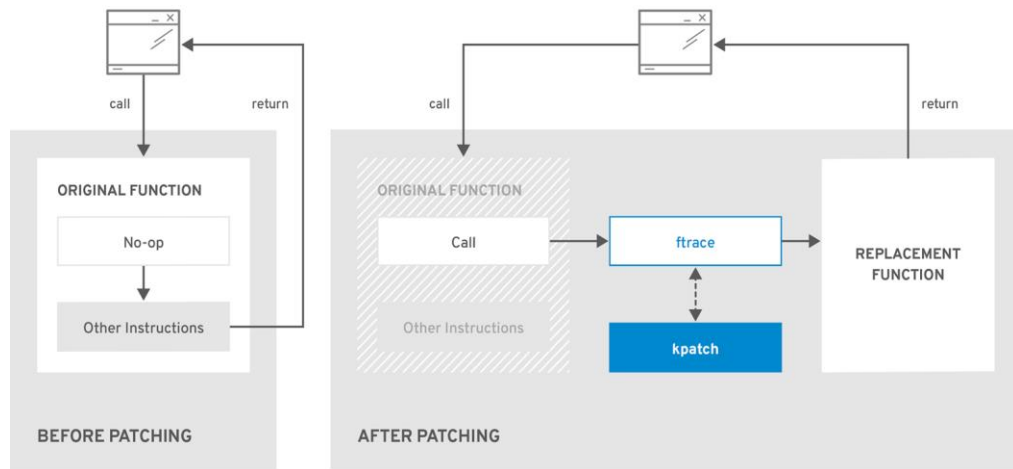
RHEL_424549_0119

### Replaces portions of the live kernel in memory

The kpatch module is loaded into the running kernel and patched functions are registered to the **ftrace** mechanism with a pointer to the location in memory of the replacement code.  Future calls are redirected, through **ftrace**, to the new code.

### Maintenance on your schedule

Important or Critical kernel CVE?  No problem.  Instead of scheduling an emergency maintenance for the affected systems, you can apply a kpatch to your running kernel and reconcile the system during a normally scheduled service window.

### Support for up to one year

kpatches will be created for a dot release kernel for up to one year.  Meaning the kernel released with RHEL 8.1 will continue to get kpatches through the service until November 2020.

# Red Hat Enterprise Linux for SAP Solutions

Insights and Smart Management included

**Red Hat Insights** identify & remediate threats to security, performance, availability and stability

**Red Hat Satellite** is a scalable platform to manage patching, provisioning, and subscription management of your Red Hat infrastructure.
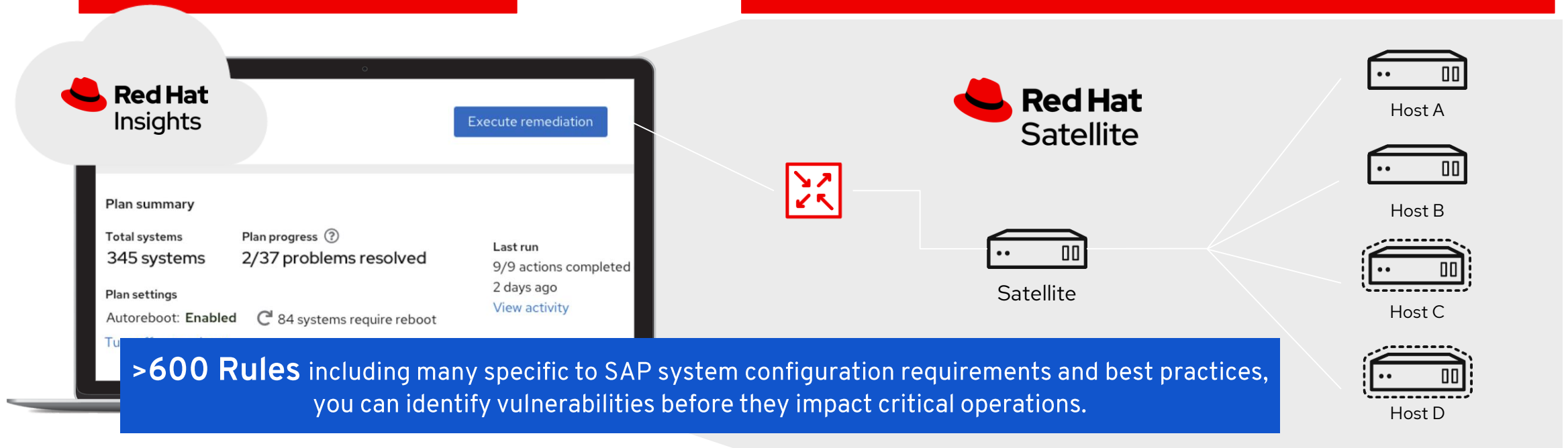


**>600 Rules** including many specific to SAP system configuration requirements and best practices, you can identify vulnerabilities before they impact critical operations.

With push–button remediation of issues identified by Insights. **74% less downtime according to IDC Study**

# Red Hat Enterprise Linux for SAP Solutions

A viable alternative to reinstallation

### AUTOMATED

Automated upgrade path from RHEL 6 to RHEL 7*. Currently working on adding support between RHEL 7 and 8

### EASY TO USE

Before proceeding with the upgrade users can see a pre-upgrade analysis on Red Hat Web Console

### PRESERVES SUBSCRIPTION

Original subscription stays attached to the system. Users do not have to re-register their systems post upgrade

### REDUCES TIME AND COST

Shorter maintenance window and lower cost of operation

*) See How do I upgrade from Red Hat Enterprise Linux 6 to Red Hat Enterprise Linux 7 with SAP HANA for detailed instructions on how to leverage in-place upgrade from RHEL 6 to 7 in context of SAP HANA. For general recommendations regarding upgrades between major versions of Red Hat Enterprise Linux see KB 21964.

# Red Hat Enterprise Linux for SAP Solutions

SAP Support … One Single Point of Contact

"Red Hat and SAP deliver enhanced support for all customers … by [providing] a **single point of contact for support** requests submitted to SAP support.

Red Hat and SAP customers can benefit from the **integration of the SAP and Red Hat customer support ticketing systems** by gaining a single point of contact for support issues, **streamlined resolution of incidents** and continued collaboration for running SAP workloads on Red Hat"
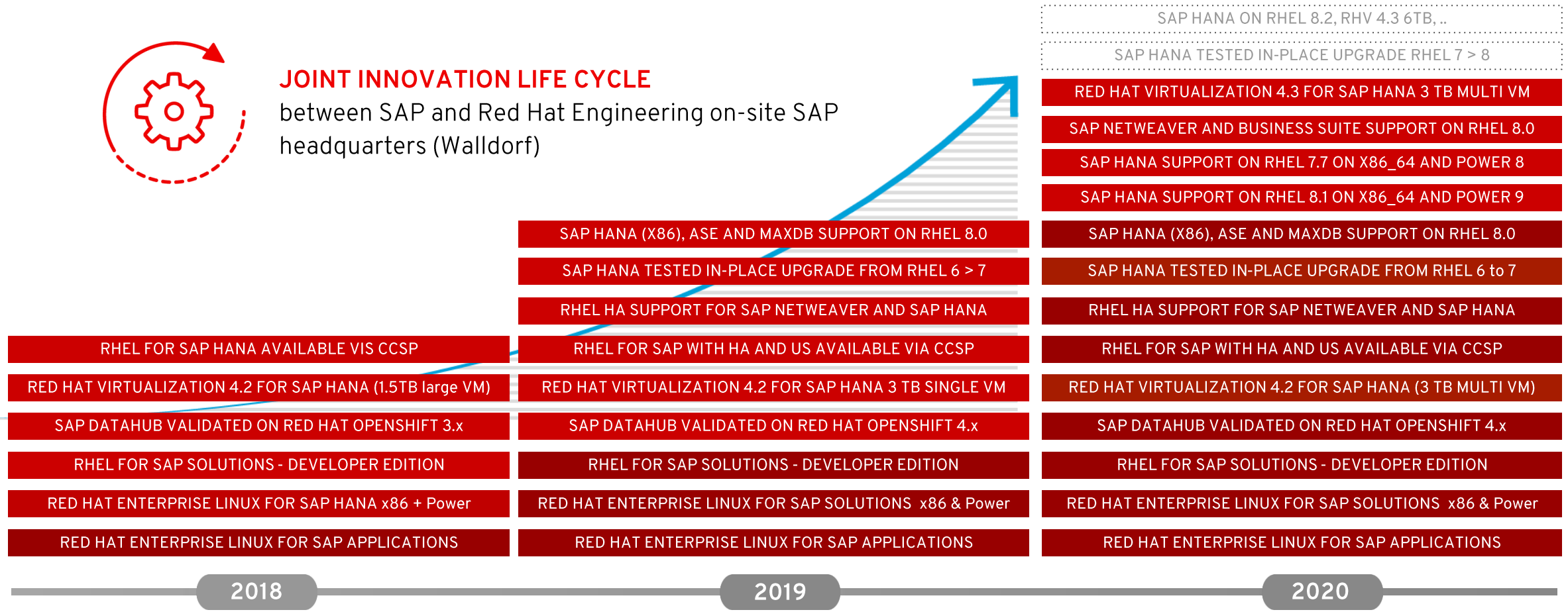
Source: SAP Note 2526952

# Red Hat Enterprise Linux for SAP Solutions

## Continuous innovation and collaboration
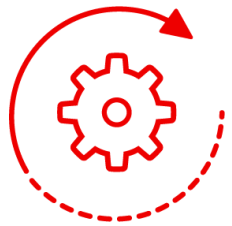
**JOINT INNOVATION LIFE CYCLE**
between SAP and Red Hat Engineering on-site SAP headquarters (Walldorf)

| 2018 | 2019 | 2020 |
|------|------|------|
| | | SAP HANA ON RHEL 8.2, RHV 4.3 6TB, .. |
| | | SAP HANA TESTED IN-PLACE UPGRADE RHEL 7 > 8 |
| | | RED HAT VIRTUALIZATION 4.3 FOR SAP HANA 3 TB MULTI VM |
| | | SAP NETWEAVER AND BUSINESS SUITE SUPPORT ON RHEL 8.0 |
| | | SAP HANA SUPPORT ON RHEL 7.7 ON X86_64 AND POWER 8 |
| | | SAP HANA SUPPORT ON RHEL 8.1 ON X86_64 AND POWER 9 |
| | SAP HANA (X86), ASE AND MAXDB SUPPORT ON RHEL 8.0 | SAP HANA (X86), ASE AND MAXDB SUPPORT ON RHEL 8.0 |
| | SAP HANA TESTED IN-PLACE UPGRADE FROM RHEL 6 > 7 | SAP HANA TESTED IN-PLACE UPGRADE FROM RHEL 6 to 7 |
| | RHEL HA SUPPORT FOR SAP NETWEAVER AND SAP HANA | RHEL HA SUPPORT FOR SAP NETWEAVER AND SAP HANA |
| RHEL FOR SAP HANA AVAILABLE VIS CCSP | RHEL FOR SAP WITH HA AND US AVAILABLE VIA CCSP | RHEL FOR SAP WITH HA AND US AVAILABLE VIA CCSP |
| RED HAT VIRTUALIZATION 4.2 FOR SAP HANA (1.5TB large VM) | RED HAT VIRTUALIZATION 4.2 FOR SAP HANA 3 TB SINGLE VM | RED HAT VIRTUALIZATION 4.2 FOR SAP HANA (3 TB MULTI VM) |
| SAP DATAHUB VALIDATED ON RED HAT OPENSHIFT 3.x | SAP DATAHUB VALIDATED ON RED HAT OPENSHIFT 4.x | SAP DATAHUB VALIDATED ON RED HAT OPENSHIFT 4.x |
| RHEL FOR SAP SOLUTIONS - DEVELOPER EDITION | RHEL FOR SAP SOLUTIONS - DEVELOPER EDITION | RHEL FOR SAP SOLUTIONS - DEVELOPER EDITION |
| RED HAT ENTERPRISE LINUX FOR SAP HANA x86 + Power | RED HAT ENTERPRISE LINUX FOR SAP SOLUTIONS x86 & Power | RED HAT ENTERPRISE LINUX FOR SAP SOLUTIONS x86 & Power |
| RED HAT ENTERPRISE LINUX FOR SAP APPLICATIONS | RED HAT ENTERPRISE LINUX FOR SAP APPLICATIONS | RED HAT ENTERPRISE LINUX FOR SAP APPLICATIONS |

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# The world's leading Enterprise Linux platform

## Why wouldn't you want to run SAP on RHEL, too?

**SAP Business Suite / RHEL 8.x**
on Intel 64, Z System and IBM Power
as of SAP Note 2772999

**SAP HANA / RHEL 8.0 + 8.1**
on Intel 64 and IBM Power 9,
as of SAP Note 2235581

**SAP NetWeaver / RHV 4.3**
on Intel 64, Z System and IBM Power
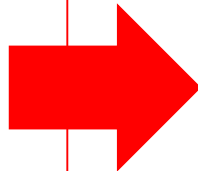as of SAP Note 1400911

**SAP HANA / RHV 4.3** ( 3TB VMs )
on Intel 64 (Skylake) as of SAP Note 2852117

**SAP certified RHEL HA solution /**
with RHEL 8 on Intel 64 & IBM Power 9

**SAP BI, ASE** and **Max DB / RHEL 8**
as of SAP Note 2489781 and 1444241

**All current RHEL major releases** are SAP HANA supported ! ✔

**RHEL HA certified / supported** for SAP NetWeaver & SAP HANA (including scale-out) ! ✔

**SAP HANA tested In-place upgrade & live kernel patching** capabilities ✔

**Automated configuration of SAP environments** using RHEL system roles ✔

**Intel Optane DC Persistent Memory support** including FS DAX for SAP HANA ✔

**Proactive monitoring and remote management** via Insights & Smart Management ✔

**SAP HANA production support** on Intel 64 and IBM Power 9 ✔

# Red Hat Enterprise Linux for SAP Solutions

## SAP allowed hardware for SAP HANA on IBM Power

| Vendor | Model | Power Architecture | Remarks | Max. cores/prod. HANA LPAR |
|---|---|---|---|---|
| International Business M... | E850 | Power 8 | | 32 |
| International Business M... | E850C | Power 8 | | 48 |
| International Business M... | E870, E870C | Power 8 | | 80 |
| International Business M... | E880, E880C | Power 8 | * SMT-4 mode; SAP HANA 1.0 SPS 12 or | 96/176*/192** |
| International Business M... | E950 | Power 9 | | 48 |
| International Business M... | E980 | Power 9 | *OLTP/ Mixed Workload: All Power9 | 48/192* |
| International Business M... | S822 | Power 8 | | 20 |
| International Business M... | S822L | Power 8 | | 24 |
| International Business M... | S824 | Power 8 | | 24 |
| International Business M... | S824L | Power 8 | | 24 |
| International Business M... | S922, H922 | Power 9 | * max. memory limited by SAPS capacity. See | 20* |
| International Business M... | S924, H924, L922 | Power 9 | | 24 |

- Memory Support for OLAP-type applications (BW on HANA, BW/4HANA) is
  - **16 TB /192 cores** per LPAR for workloads classified as "Large"
  - **24 TB /192 cores** per LPAR for workloads classified as "Medium" or "Small"

- Memory Support for OLTP-type applications (SoH+S/4H & Mixed workloads)
  - **up to 24TB / 176 (PW8)** or **192 (PW9)** cores per LPAR

- IBM Power 9 virtual PMEM Support
  - available with RHEL 8.2*

*) pending SAP HANA certification / support

Source: https://www.sap.com/dmc/exp/2014-09-02-hana-hardware/enEN/iaas.html

# Red Hat Enterprise Linux for SAP Solutions

General life cycle and support policy for SAP deployments

**10-year** product lifecycle

➢ **Full support for 5 years**
   Providing new features and new hardware enablement

➢ **Maintenance support for 5 years**
   Focus on security and bug fixes

Predictable **3-year major release cycle**

Predictable cadence of **Extended Update Support** (EUS) and **Update Service for SAP** (E4S) offerings

| FULL SUPPORT (5 years) | | | | | MAINTENANCE SUPPORT (5 years) | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 | Year 7 | Year 8 | Year 9 | Year 10 |

Source: https://access.redhat.com/support/policy/updates/errata

SAP NetWeaver

SAP Business Warehouse

SAP Business Suite

SAP® Certified
Integration with SAP S/4HANA®

SAP® Business Intelligence

SAP® ASE

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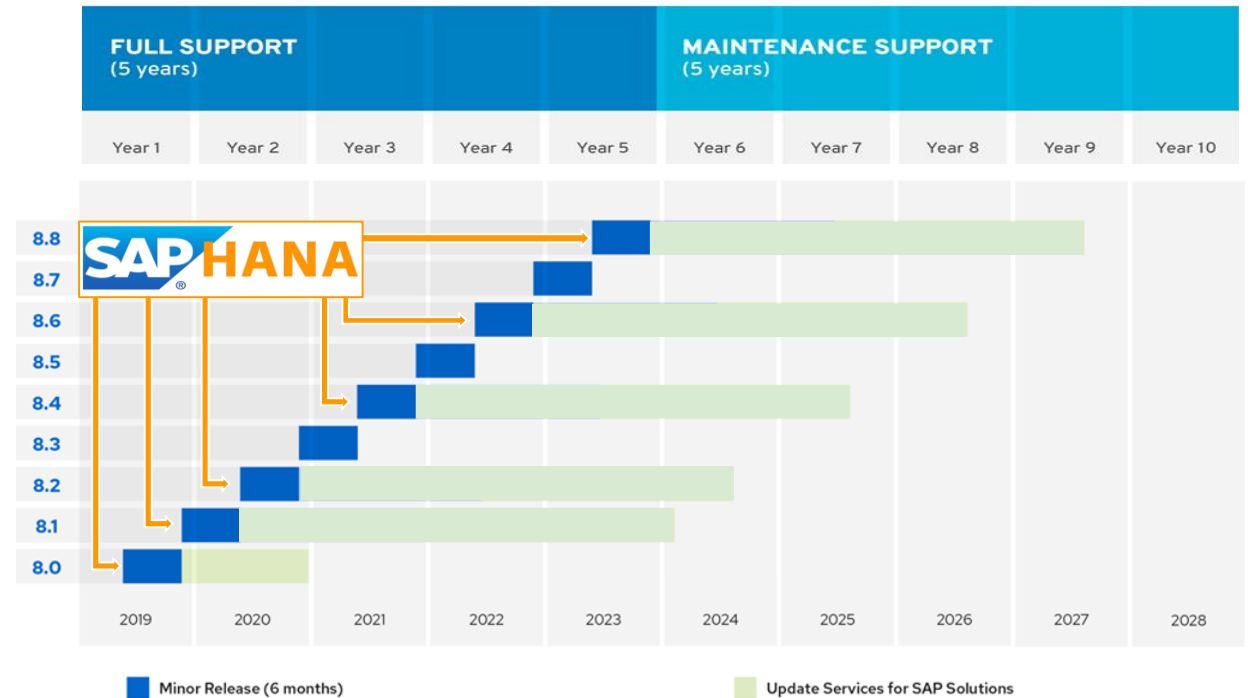
# Red Hat Enterprise Linux for SAP Solutions

## SAP HANA specific life cycle and support policy

➢ Unlike most other SAP business applications, **SAP HANA requires** re-certification of **minor releases.**

➢ As of SAP HANA certification policy, **only** minor releases with Extended **Update Service for SAP** do apply.

➢ **Certification is performed by SAP staff.** Red Hat has no control about timelines and certification schedule

➢ **Upcoming planned certifications:** RHEL 7.7, RHEL 8.2, RHEL 8.4, …



| FULL SUPPORT (5 years) | | | | | MAINTENANCE SUPPORT (5 years) | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 | Year 7 | Year 8 | Year 9 | Year 10 |

SAP HANA

8.8, 8.7, 8.6, 8.5, 8.4, 8.3, 8.2, 8.1, 8.0

2019 2020 2021 2022 2023 2024 2025 2026 2027 2028

■ Minor Release (6 months)　　Update Services for SAP Solutions

Source: https://access.redhat.com/support/policy/updates/errata

*** slide shows current planning. Timelines subject to change, and depending on SAP's certification policy and schedule ***

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# Red Hat Enterprise Linux for SAP Solutions

## SAP Solutions Roadmap

**RHEL features**

SAP HANA multi-target replication

IBM Power 9 virtual pMEM support

RHEL in-place upgrade

**Q3/20**

**SAP validations**

SAP HANA / RHEL 7.9

**Q1/21**

**SAP validations**

SAP HANA / RHEL 8.4

future

**Q4/20**

**Q2/21**

**SAP validations**

SAP HANA / RHEL 8.2

SAP HANA 6TB / RHV 4.3

SAP NetWeaver / RHV 4.4

**SAP validations**

SAP CP / Gardener / OCP 4

**Areas under development**

SAP system automation

SAP-admin user experience

Userspace live patching

RHEL 9 / IBM Power 10

21

*** slide shows current planning. Timelines subject to change, and depending on SAP's certification policy and schedule ***

# Transforming the Digital Enterprise

## Where SAP and Red Hat intersect present and future architecture



on premise

on premise

cloud

SAP Concur
SAP SuccessFactors
SAP Ariba
SAP Fieldglass

**SAP Business Suite**
SAP NetWeaver
Custom applications

**SAP S/4HANA On Premise**
**SAP HANA platform**

SAP S/4HANA Cloud

**SAP Data Intelligence (SaaS)**
**SAP Cloud Platform (PaaS)**
Custom cloud apps

present

future

kubernetes    K^n    Istio

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RED HAT VIRTUALIZATION

RED HAT OPENSHIFT

RED HAT ANSIBLE Automation

**PHYSICAL**

**VIRTUAL**

**PRIVATE CLOUD**

**PUBLIC CLOUD**

22

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# IBM / SAP / Red Hat  hybrid cloud strategy and landscape

More than 45% of applications in SAP systems are custom code*



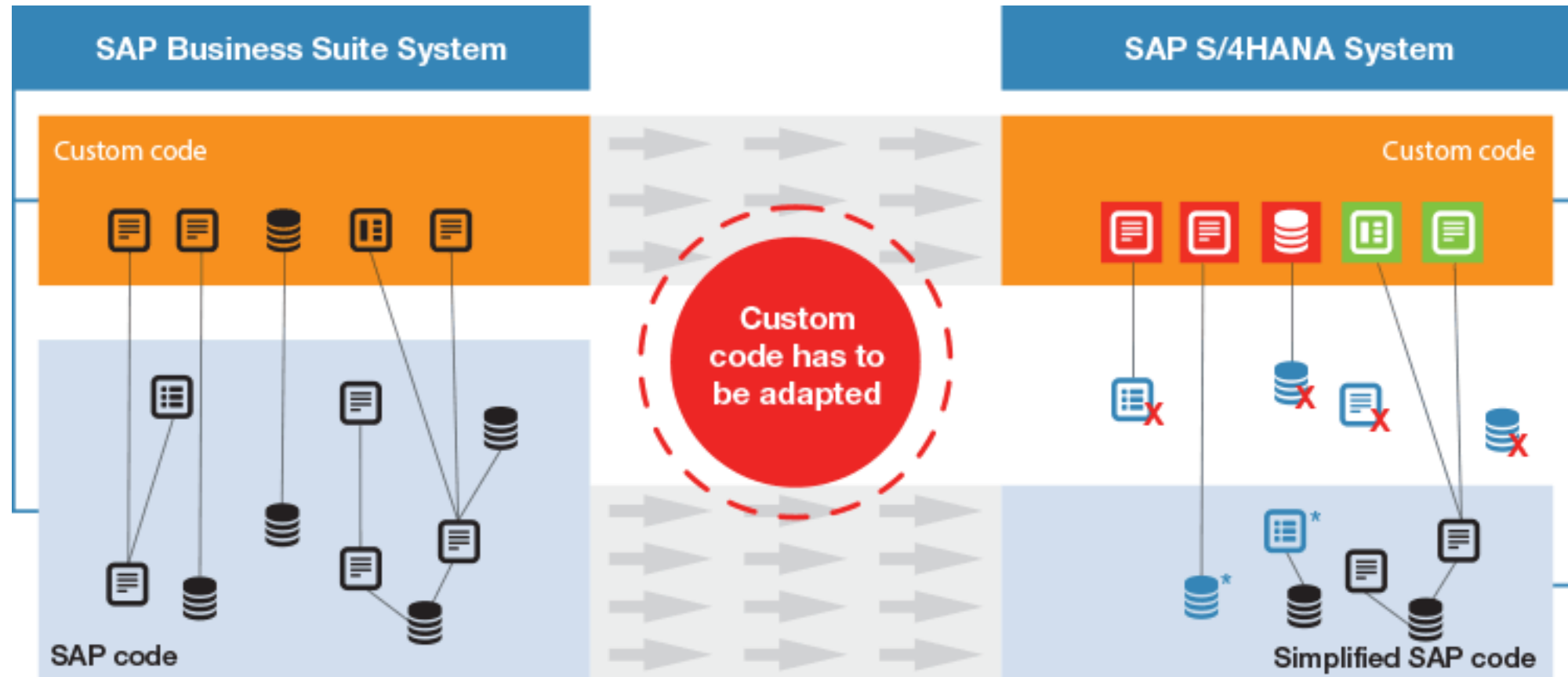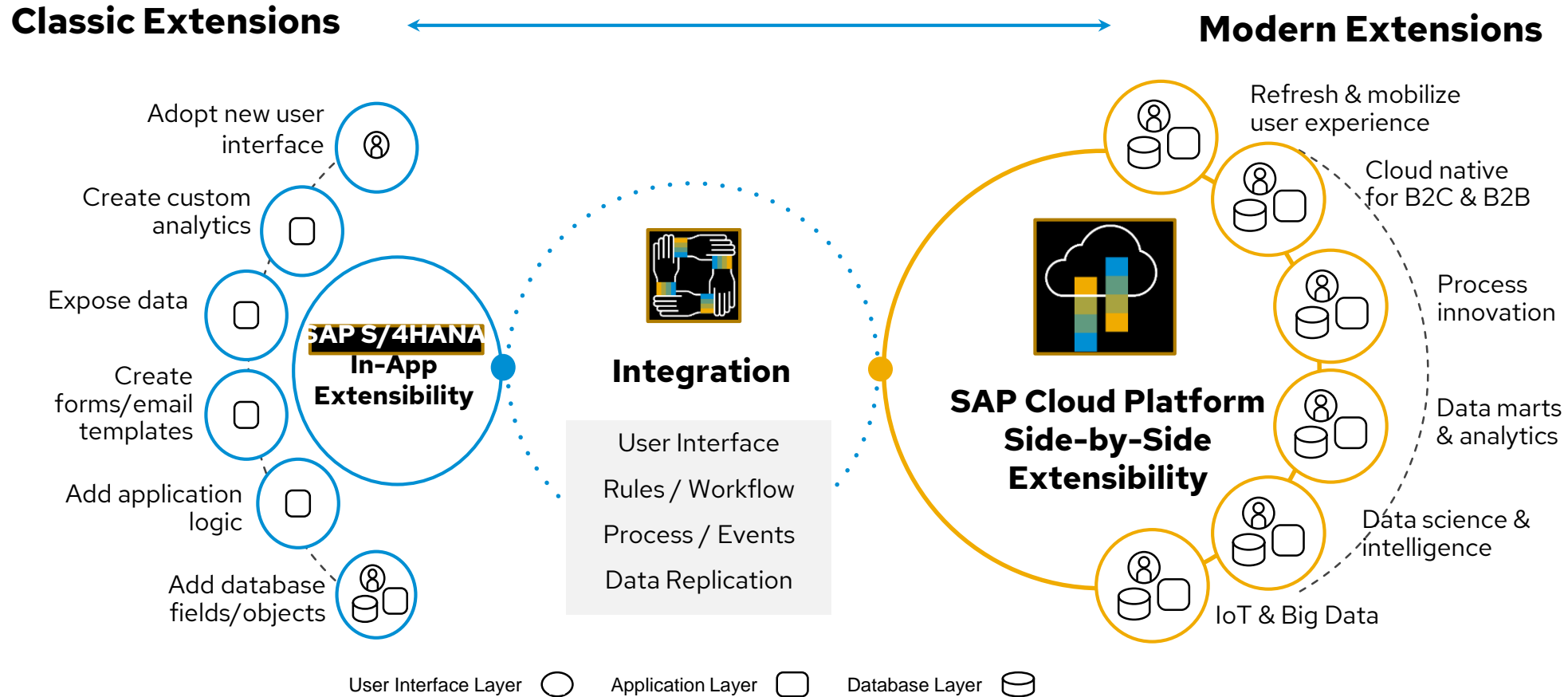*Figure 1 — Required custom code must be adapted to the new SAP S/4HANA data model*

Source: *West Trax Benchmark Database: 1.600+ Benchmark Analyses in 15 Sectors
Source: Making the Move to SAP S/4HANA, *SAPinsider, Volume 18, Issue 1*

# IBM / SAP / Red Hat hybrid cloud strategy and landscape

## S/4HANA Extensibility Through Modern Cloud-Enabled DevOps Solutions

**Classic Extensions**

**Modern Extensions**

Adopt new user interface

Create custom analytics

Expose data

Create forms/email templates

Add application logic

Add database fields/objects

**SAP S/4HANA In-App Extensibility**

**Integration**

User Interface

Rules / Workflow

Process / Events

Data Replication

**SAP Cloud Platform Side-by-Side Extensibility**

Refresh & mobilize user experience

Cloud native for B2C & B2B

Process innovation

Data marts & analytics

Data science & intelligence

IoT & Big Data

User Interface Layer ⬭   Application Layer ▢   Database Layer ⬓

# IBM / SAP / Red Hat  hybrid cloud strategy and landscape

SAP Side-by-Side Extensibility to OpenShift Platform
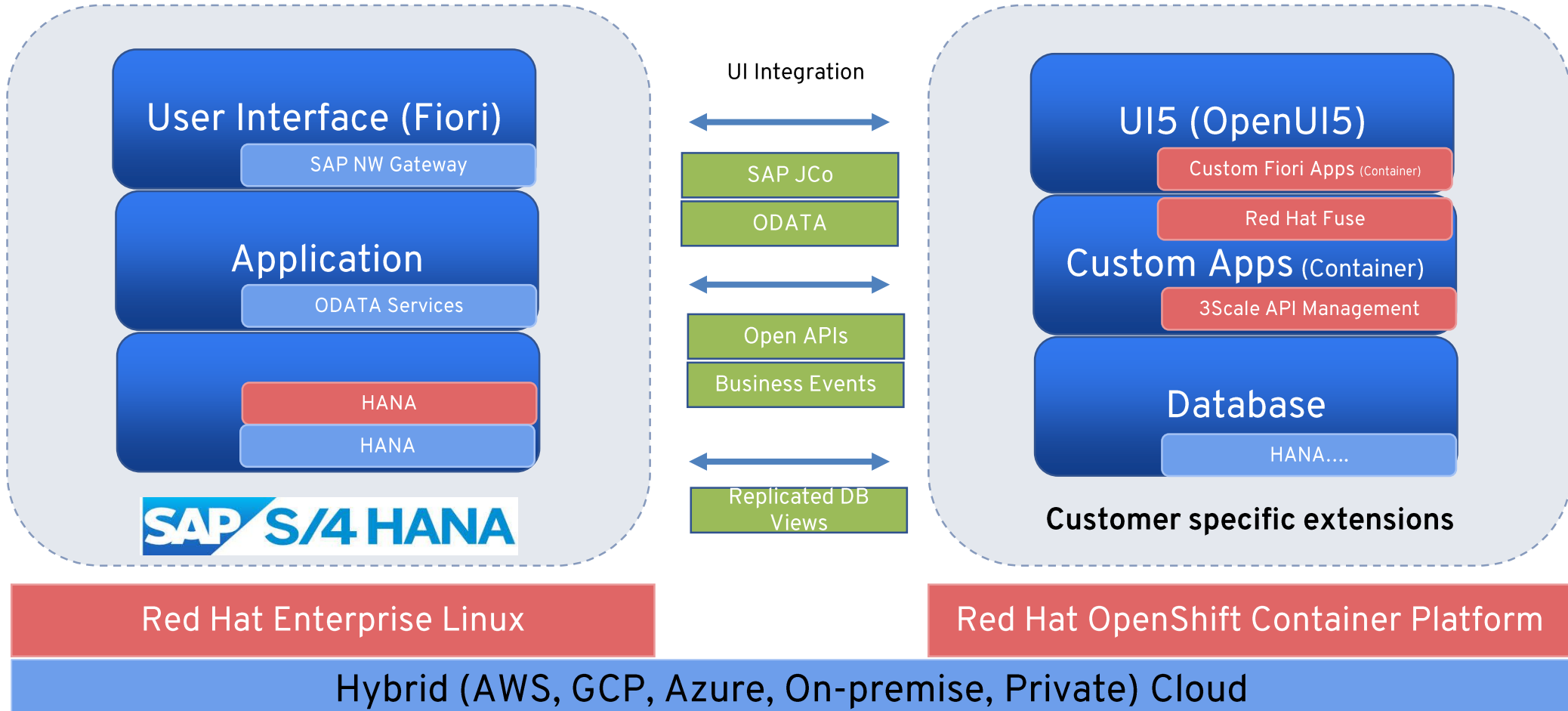
# IBM / SAP / Red Hat  hybrid cloud strategy and landscape

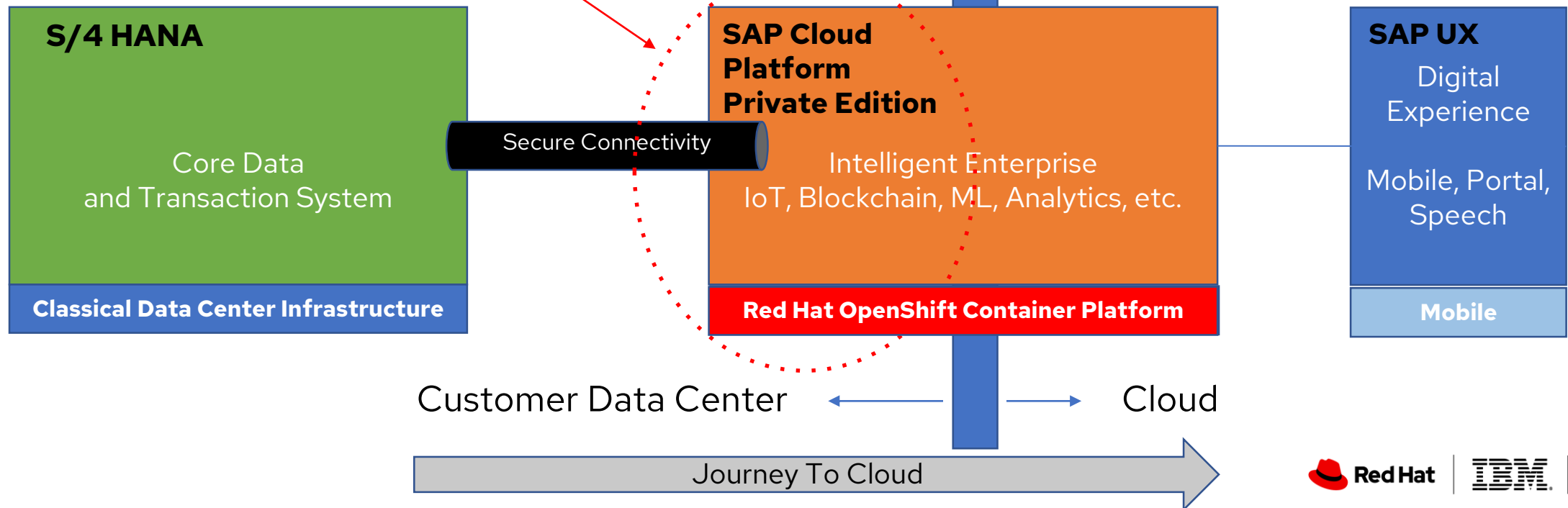## How to become an Intelligent Enterprise

Scenarios
- Enterprise Resource Planning
- Core Transactions
- Workflows
- Sensitive Data

Scenarios
- Mobile Payment Solutions
- AI based Claim Processing
- Connected cars
- Digital Government Services
- Transportation Management based on Blockchain
- Protein Folding
- Analytics

SAP Cloud Platform running on OpenShift for deployments in Customer Data Centers

Launching an early adopter program later this year

**S/4 HANA**

Core Data
and Transaction System

**Classical Data Center Infrastructure**

Secure Connectivity

**SAP Cloud Platform Private Edition**

Intelligent Enterprise
IoT, Blockchain, ML, Analytics, etc.

**Red Hat OpenShift Container Platform**

**SAP UX**

Digital Experience

Mobile, Portal, Speech

**Mobile**

Customer Data Center ⟷ Cloud

Journey To Cloud

# IBM / SAP / Red Hat  hybrid cloud strategy and landscape

## OpenShift Container Platform 4

A smarter Kubernetes platform

| Manage workloads | Build cloud-native apps | Developer productivity |
|---|---|---|
| **Platform services** | **Application services** | **Developer services** |
| Service mesh · Serverless builds · CI/CD pipelines Full stack logging Chargeback | Databases · Languages Runtimes · Integration Business automation 100+ ISV services | Developer CLI · VS code extensions · IDE plugins CodeReady Workspaces CodeReady Containers |

**Cluster services**
Automated Ops · Over-the-air updates · Monitoring · Registry · Networking · Router · KubeVirt · OLM · Helm

**Kubernetes**

**Red Hat Enterprise Linux & Red Hat Enterprise Linux CoreOS**

Physical   Virtual   Private cloud   Public cloud   Managed cloud (Azure, AWS, GCP, IBM, Red Hat)   Edge cloud

**Automated, full-stack installation** from the container host to application services

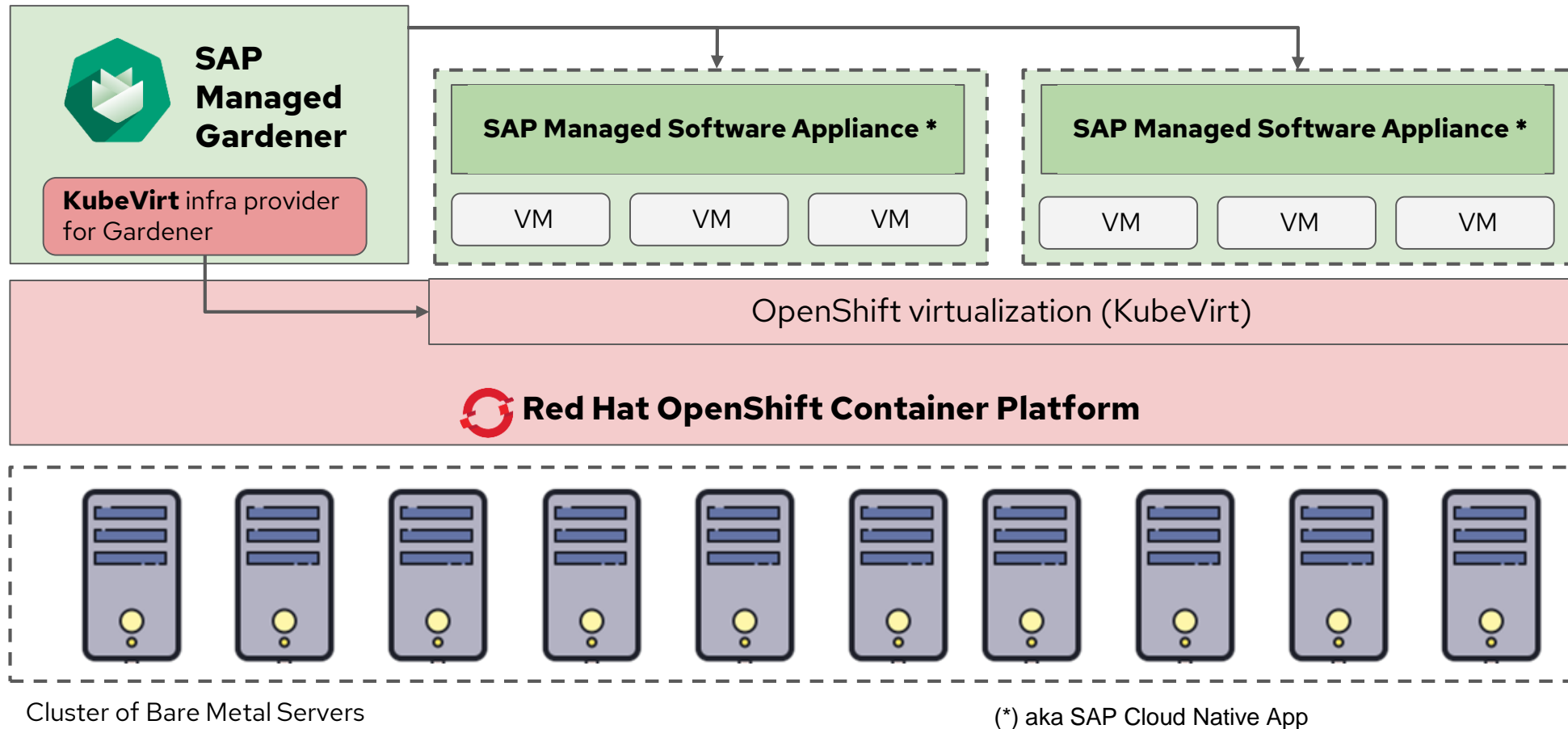**Seamless Kubernetes deployment** to any cloud or on-premises environment

**Autoscaling** of cloud resources

**One-click updates** for platform, services, and applications

# IBM / SAP / Red Hat hybrid cloud strategy and landscape

## Reference Architecture for SAP Cloud Platform Private Edition on Red Hat OpenShift

### OpenShift virtualization based Solution



**SAP Managed Gardener**

**KubeVirt** infra provider for Gardener

**SAP Managed Software Appliance ***

| VM | VM | VM |

**SAP Managed Software Appliance ***

| VM | VM | VM |

OpenShift virtualization (KubeVirt)

**Red Hat OpenShift Container Platform**

Cluster of Bare Metal Servers

(*) aka SAP Cloud Native App

# THe Red Hat Open Hybrid Infrastructure for SAP

## Your Differentiation Depends On Your Ability To Respond To Business Needs Faster

| Cloud-native Applications | AI & Machine Learning | Blockchain | Internet of Things | Innovation Culture |
|---|---|---|---|---|

LINUX, CONTAINERS, KUBERNETES, MICROSERVICES & DEVOPS ARE KEY INGREDIENTS TO BE ABLE TO ENABLE TRUE OPEN HYBRID CLOUD DEPLOYMENTS

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