White Paper

For SAP Landscapes, Migration Means Much More Than Just Linux

Sponsored by: Red Hat

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IDC OPINION

SAP customers and prospects will have a strong incentive to standardize their SAP landscapes on Linux for the simple reason that SAP HANA is a Linux-only database. Even if an organization is running SAP on a non-SAP HANA database today, SQL Server or DB2, for example, with Windows or AIX as the operating system (OS), at some point in its journey, the organization will have to migrate to SAP HANA on Linux. SAP's deadline for support for non-SAP HANA databases expires in 2027 (after a recent two-year extension). But even before that date, many SAP innovations will be focused on SAP HANA and the intelligent ERP solution SAP S/4HANA. IDC sees most organizations making the move to SAP HANA well before the original deadline of 2025 in order to benefit from these innovations.

One commonly misunderstood aspect of this journey, especially for organizations that have little familiarity with Linux but also for those organizations that have Linux in the datacenter albeit not yet for SAP, is that Linux is "just the operating system" and, in essence, a commodity. IDC believes that this is a misconception that should be quickly corrected. The Linux operating system in an SAP landscape is part of a larger open source technology portfolio that plays a critical role in managing the landscape. It is with regard to this broader portfolio that businesses should consider the distinct differences between the current SAP-certified Linux offerings.

Modernizing an ERP system without disrupting operations is a challenging task, one that is fraught with risk. Organizations typically initiate multiple-step projects that can take anywhere from 3 to 18 months and that require multiple decisions, including infrastructure choices, operating system, cloud versus on premises, and brownfield versus greenfield. Within this journey, the platform choice should be carefully evaluated, and IDC believes that there are compelling reasons for organizations to consider Red Hat to standardize, automate, and modernize their SAP landscapes.

SITUATION OVERVIEW

By 2027, SAP will cease support for SAP applications on top of the SAP NetWeaver technology platform. With that, support also ends for databases other than SAP HANA – such as DB2, MS SQL, Oracle, and MaxDB – that have been successfully used to run SAP applications for many years. For SAP, this is a logical strategy as it has allowed the company to integrate key solutions, such as SAP Business Suite and Business Warehouse, with the SAP HANA database for faster and more integrated transactional and analytical processing and for innovative functionalities.

For SAP customers, the deadline (which originally was set for 2025 but has been extended) is not quite yet looming, but as long as they remain on their current non-SAP HANA database, they will not be able to take advantage of the new SAP integrations and innovations. The vendors of their non-SAP HANA databases are also innovating, but it is the tight integration between the in-memory database and the applications that businesses find compelling about SAP's approach.

Thousands of businesses (33,000 per SAP Corporate Fact Sheet, October 2020), therefore, have taken the step to migrate to SAP HANA for their SAP applications. Furthermore, in June 2020, SAP reported that there are 14,100 customers with SAP S/4HANA. Often, organizations migrate in sync with their on-premises hardware cycles or in combination with a general migration to the cloud. For some, this is not easy. IDC has found that the move to SAP HANA or SAP S/4HANA can be lengthy, costly, and wrought with complexities, especially for businesses with large, heavily customized landscapes that run on older, siloed hardware. Figure 1 shows when businesses expect to migrate to SAP HANA or SAP S/4HANA if they do not plan to do so in the next 24 months.

FIGURE 1

Expected Year When Migrating to SAP HANA or SAP S/4HANA
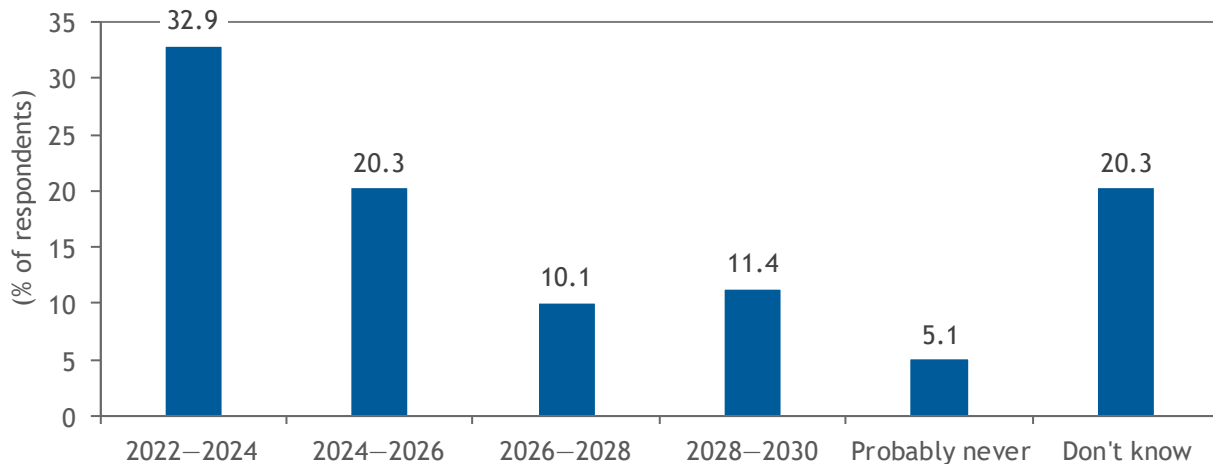
Source: IDC, 2020

Migrating to SAP HANA is a carefully planned process for most organizations with significant SAP landscapes, often conducted in multiple orchestrated steps, and typically executed by special teams involving multiple stakeholders: lines-of-business staff, database managers, IT infrastructure teams, third-party consultants like systems integrators and servers and storage vendors, and sometimes even SAP for very large customers. Many variables need to be considered, among the first and foremost whether to deploy in the cloud or on premises.

SAP in the Cloud

Not only is SAP innovating and integrating its hundreds of offerings and urging customers to migrate to SAP HANA, the software company has also been promoting the cloud as the preferred deployment strategy for its solutions. While a robust cloud strategy is certainly in keeping with the times, it has added another set of variables to the decisions that CIOs and CTOs need to make with regard to their future SAP strategy.

There are various options: infrastructure as a service (IaaS) at one of the SAP HANA–certified public cloud service providers (cloud SPs), hosted infrastructure from managed service providers (managed SPs), and software-as-a-service (SaaS) platforms, including SAP's own cloud offerings.

IaaS providers have started offering a broad set of SAP-certified IaaS offerings, including bare metal and virtualized instances. Currently, certified IaaS for SAP providers are, in alphabetical order, Alibaba Cloud, Amazon Web Services (AWS), Google Cloud Platform (GCP), Huawei Technologies, IBM Cloud, Microsoft Azure, and Open Telekom Cloud. The four largest providers among them are, alphabetically, AWS, GCP, IBM Cloud, and Microsoft Azure. Many of SAP's solutions are cloud only, available for cloud and on premises, or a mixture of SAP hosting offerings as well as SaaS solutions.

IDC has found that businesses that are moving to an SAP software plan to deploy the SAP database, SAP analytics software, and SAP business applications in the cloud to a greater extent than they did with their non-SAP database, analytics, and business applications software. Figure 2 shows the shift to cloud deployments.

FIGURE 2

Shift to Cloud Deployments When Migrating from Non-SAP to SAP Software
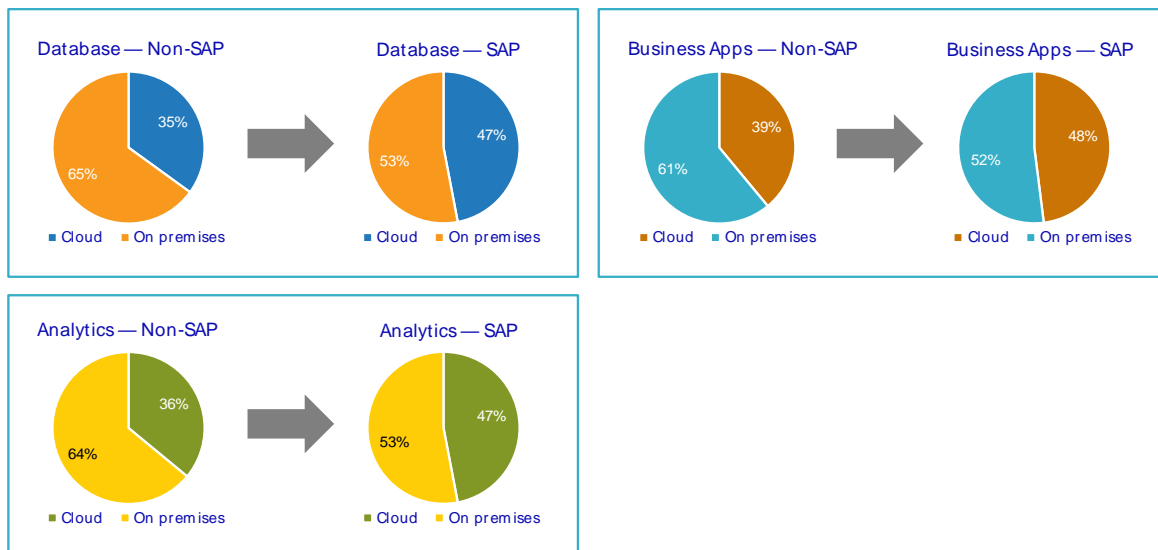
Source: IDC, 2020

SAP On Premises

If the software will be remaining – entirely or partially – on premises, an organization can choose to procure an SAP HANA appliance from any of the server vendors that offer those. There are hundreds of SAP-certified server options with different memory configurations for the various SAP modules from more than a dozen vendors. Similarly, for SAP-certified storage devices, a business can decide to build the SAP HANA server storage solution itself utilizing some or all existing components in its datacenter, using SAP's Tailored Datacenter Integration (TDI) certification solution. Here too, there is the decision about running on bare metal or virtualized servers.

When Migrating, There Is Opportunity to Optimize

Consolidation

When businesses migrate to SAP HANA, many take the opportunity to optimize their landscape as part of the initiative. One often pursued optimization initiative is consolidation of servers and storage, which is sometimes proving to be an elusive goal. According to IDC data, the number of servers and storage devices tend to go up when businesses move to SAP HANA, from an average of 11.4 servers for the non-SAP HANA database to 14.4 servers for an SAP HANA appliance with Business Warehouse (BW) on SAP HANA, SAP BW/4HANA, and Data Mart or 14.3 servers on an average for SAP S/4HANA. Nevertheless, IDC has seen successful consolidation efforts when the new platform has significantly more memory and performance characteristics plus partitioning capabilities or when the new platform is a significantly more performant converged appliance.

Streamlining

Another optimization opportunity is to combine migration to the Linux-based SAP HANA database with streamlining the landscape that the database will be a part of. Key elements of a SAP landscape are SAP HANA (the in-memory database), SAP S/4HANA (the integrated SAP ERP and database solution), SAP AI Business Services (the software platform for enabling IoT, machine learning [ML], blockchain, analytics, and Big Data), and SAP Data Intelligence (the data sharing and orchestration solution). For many businesses, streamlining their SAP landscape – whether on premises, in a public cloud or multicloud, or as SaaS – means:

- **Datacenter efficiency.** This is about fast deployment and change management, downtime prevention, and automation.
- **Hybrid cloud management.** Businesses want hybrid cloud simplicity, governance, policy-based control, self-service functionalities, and automation.
- **Integration.** Businesses consider it fundamental that SAP and non-SAP applications and data are integrated to improve the data quality and enrich the business insights they can derive from them.
- **New solution development.** With new technologies such as AI, blockchain, or IoT becoming competitive drivers, businesses need a platform like SAP Data Intelligence that combines integration, orchestration, metadata management, and connectivity with SAP AI Business Services machine learning in the cloud to help IT and data science teams collaborate.

Containerization

Containerization is taking over the software world, and SAP is actively engaged in reengineering its applications, such as SAP Ariba, SAP SuccessFactors, SAP Concur, and even SAP HANA and SAP S/4HANA, toward containerization. SAP has not published a road map for containerized versions of its applications, but it is expected that this effort will take a few years, depending on the nature of each application. Once the SAP applications are containerized, it will be much easier to integrate them and they can simply run both on a public cloud provider and in a customer's datacenter. Businesses that cannot go to the cloud with their SAP applications can still run them in a cloud-native way.

To accelerate this effort, Red Hat and SAP set up a combined team in 2019 that has since actively been developing containerization for SAP. In the meantime, SAP has developed a managed Kubernetes service, called project "Gardener," to provide managed Kubernetes cluster to SAP internal development for all the infrastructures needed. SAP has many solutions that are non-standardized and on a different code base. Integrating them can be done via SAP Business Technology Platform (SAP BTP), but to

containerize some of them, SAP has provided its developers a synchronized way to execute that containerization with Gardener, a managed Kubernetes-as-a-service solution.

Note that SAP-managed Kubernetes is not available to SAP customers directly (only via the corresponding open source project "Gardener"); it is available as a managed offering only. It is expected that SAP will integrate Gardener with SAP Business Technology Platform so that in the future there will be services in SAP BTP that are based on Gardener.

SAP already has some containerized applications, notably SAP Data Intelligence, a data integration tool that runs on Red Hat OpenShift and that allows businesses to pull data from outside of the SAP landscape into an SAP application. Also containerized is SAP Commerce – it too can run natively on the Red Hat OpenShift Container Platform. In addition, there are many applications other than those from SAP that already run on Red Hat OpenShift, Cloudera for example, and SAP wants its applications to be able to get data from these applications and integrate them. Finally, SAP wants customers to be able to easily integrate their own in-house-developed cloud-native applications with SAP software.

If, in the future, the SAP HANA database is containerized, the benefits for customers will be significant. A migration of SAP HANA from on premises to the cloud will demand a fraction of the effort, cost, and complexity that is involved today. Furthermore, once in the cloud, customers could easily move the SAP HANA database from cloud provider to cloud provider, for cost reasons, for example.

Considerations for Selecting an Open Source Provider for SAP

SAP HANA and SAP S/4HANA only run on Linux, and there are two SAP-certified Linux vendors – Red Hat and SUSE. One should not forget that Linux is an open source OS and that innovations, even those on commercial distributions, somehow always make their way back to the community and into other distributions.

However, there are still distinct differences, and not all of those relate directly to the Linux code. Rather, they relate to the operating ecosystem, which are the technologies that enable the three basic stages of a business' SAP strategy: the modernization to SAP HANA or SAP S/4HANA, the integration of third-party and custom applications with the digital core, and the development of new cloud-native applications. IDC believes that, in light of these, the following considerations are important when outlining an SAP HANA migration strategy:

- **Consistency in the datacenter.** Businesses want to achieve a consistent platform from an operating ecosystem point of view that can help them: seamlessly migrate their SAP environment, no matter whether they are deploying from bare metal or virtualized servers to private, hybrid, or public cloud; harmonize SAP and non-SAP workloads so that SAP workloads simply run as an extension of the entire environment.

- **Performance of the SAP applications.** The operating system can help boost the performance of SAP workloads, for example, through optimizations that have been developed with a server vendor or by supporting technologies such as Intel Optane Persistent Memory, which allows for a very fast reboot of the in-memory database after planned or unplanned downtime.

- **Integration with SAP Business Technology Platform.** SAP Business Technology Platform is the platform for the Intelligent Enterprise, which includes database and data management solutions, analytics, application development and integration, and intelligent technologies – from on premises to cloud. This includes the SAP HANA database and connects to on-premises and cloud-based systems running other SAP software. Depending upon the operating system, it is available from various cloud SPs that offer SAP solutions.

- **High availability (HA) and data recovery.** SAP HANA, SAP S/4HANA, and SAP applications are running mission-critical workloads that demand robust high availability and disaster recovery (DR). HA can be achieved in a myriad way, all the way from processor features to hardware redundancy to clustering and failover software. Different operating ecosystems deliver different capabilities, such as active/active disaster recovery, where two nodes in a cluster run the same workload for fast recovery should one of them fail.

- **Seamless upgrades, live patches, and fixes.** With downtime expectations approaching zero for SAP workloads in today's 24 x 7 world, capabilities such as live kernel patching – patching a kernel without taking the system offline – are critical operating system capabilities as are features such as enabling upgrades and fixes with no or minimal disruption.

- **Server OEM partners.** While both Linux distributions for SAP are available on all the solutions that server OEMs offer, the different operating system vendors have different relationships with those server OEMs that can benefit their customers, for example, when it comes to reference architectures, optimizations, or enabling specific SAP solutions to run on the broader operating ecosystem.

- **Predictive analytics on the OS.** Continuous monitoring of the SAP environment and preventing issues through predictive analytics are essential operating system capabilities to avoid issues with security, networks, system configurations, and other aspects of the landscape.

- **Virtualization.** Virtualization technologies enable efficient utilization and resource consolidation of hardware resources (server, storage, and networking) through infrastructure abstractions, thereby reducing capex. They provide programmatic access to provision and manage infrastructure resources, which enable IT admins to manage IT efficiently. Currently, most businesses deploy their SAP platform and applications on virtualized infrastructure, and the underlying operating system must support virtualization.

- **Containerization.** Containers are operating system processes that provide necessary and sufficient runtimes to run an application. Since they do not need an entire operating system, they have a small footprint, have fast start times, and are incredibly efficient. Containers also enable porting applications across heterogeneous environments. They enable large-scale and increased operational efficiency due to these reasons, and businesses are increasingly deploying containerized custom applications integrated with SAP's "Digital Core." All major operating systems currently support container runtimes and container orchestration platforms. Nevertheless, the key differentiation is the ability to provide enhanced security to containerized applications and enable more accessible access to accelerated hardware capabilities such as GPUs.

- **Support for hybrid cloud environments.** Hybrid cloud platforms provide enterprises the flexibility to run select components of their SAP deployments and applications across on-premises and public cloud environments. For example, they can run their SAP applications and databases on public cloud and SAP appliances on premises. IDC observes that enterprises are increasingly leveraging hybrid cloud platforms for their SAP deployments and applications. An ability to support and manage hybrid cloud environments consisting of on premises and public cloud is hence a critical ask from the underlying operating system.

- **Support for emerging data persistence technologies**. Modern applications such as containerized/cloud-native applications, microservices applications, and AI/ML applications have different data persistence requirements than traditional enterprise applications. Streaming platforms (such as Apache Kafka) and in-memory databases (such as SAP HANA) also have specific data persistence needs. The underlying operating system needs to support such data persistence requirements through various constructs such as persistent volumes (for containerized applications), log volumes and data volumes (for SAP HANA), and high-performance message queues (for streaming applications).

- **Software-defined storage (SDS).** Software-defined storage refers to abstracting storage resources from underlying physical storage by decoupling storage software from the hardware. SDS leverages storage virtualization technologies to enable block, file, and object storage capabilities at cloudlike scale, programmatic access for management, and automation. The underlying operating system should be able to support SDS capabilities and thus support SAP deployments and applications.

- **Automation.** Automation means the ability to automate enterprise IT operations such as provisioning, application life-cycle management, and network operations through programmatic methods, including configuring SAP HANA landscapes.

- **Regulatory compliance.** Enterprises have substantial compliance requirements based on the industry vertical, type of customers, geographic location, and more. Such requirements may need specific security certifications, cryptographic modules, and support for encryptions. The operating system should be able to support such requirements and provide an easy way to set and validate compliance policies.

- **Support.** Enterprises care about business continuity. With SAP deployments, enterprises typically encounter multiple infrastructure abstractions, deployment locations, and technologies. Troubleshooting downtimes in such environments is not trivial. Enterprises are better served by a single point of contact in such situations.

RED HAT SOLUTION PORTFOLIO FOR SAP

Red Hat offers an extensive portfolio of solutions that enable businesses to deploy, manage, and scale SAP solutions and applications across on-premises and public cloud environments. Ranging from an underlying operating system to comprehensive analytics, the Red Hat solution portfolio helps enterprises create a scalable, flexible, and intelligent infrastructure that sets them up for a future of innovation as an SAP-powered digital enterprise.

Red Hat Enterprise Linux

Red Hat Enterprise Linux is the flagship operating system offered by Red Hat. According to IDC's research, Red Hat Enterprise Linux is the leading Linux-based operating system constituting about 35% of server OS shipments in 2019. Red Hat Enterprise Linux is an open source operating system based on Fedora Linux distribution. Red Hat Enterprise Linux 8 was officially launched on May 7, 2019, with its most recent release being version 8.2 on April 28, 2020.

Red Hat Enterprise Linux 8 for SAP Solutions is an intelligent OS designed to provide a solid foundation that spans the hybrid cloud and one that fuels mission-critical workloads. Red Hat Enterprise Linux 8 for SAP Solutions provides several capabilities to improve performance of modern workloads such as SAP HANA. Included with Red Hat Enterprise Linux for SAP Solutions, Red Hat Enterprise Linux High Availability Add-On is an automated high-availability solution that reduces planned and unplanned downtime in scale-up and scale-out SAP HANA, SAP S/4HANA, and

SAP NetWeaver deployments. It also provides in-place upgrades and live patching capabilities for critical and important common vulnerabilities and exposures (CVEs). With the inclusion of Red Hat Insights and Red Hat Smart Management, customers also receive real-time assessment of risks related to performance, availability, stability, and security for their business-critical SAP applications. Further:

- Red Hat Enterprise Linux is a hardened, secure operating system that supports multiple CPU architectures (including x86, X86_64, IBM POWER, Itanium 2, IBM Z, and ARM) and file systems (including Ext3, Ext4, GFS, and XFS). Red Hat Enterprise Linux supports significant virtualization platforms, including Red Hat Enterprise Virtualization, VMware ESX, and KVM, and all major virtualization platforms support Red Hat Enterprise Linux on guest instances.

Red Hat Ansible Automation Platform

Red Hat Ansible Automation Platform enables scalable and secure automation of various aspects of enterprise IT operations, including resource provisioning, application life-cycle management, and network operations. It consists of Ansible Engine, Ansible Tower, and Ansible Hosted Services. All other products within the Red Hat portfolio can be integrated using the Red Hat Ansible Automation Platform. Further:

- Red Hat Ansible Automation Platform enables consistency in the datacenter by providing programmatic methods to deploy, manage, and secure infrastructure resources. Red Hat Ansible Automation Platform also enables the community to share best practices through modules called "Playbooks."

- Red Hat Ansible Automation Platform provides a wealth of SAP-specific roles for automating SAP HANA landscapes. It simplifies configuration of SAP HANA landscapes and Red Hat infrastructure. In combination with Red Hat Enterprise Linux for SAP Solutions, Red Hat Ansible Automation Platform makes it possible to automate critical transitions like system and software upgrades, with near-zero downtime.

Red Hat Virtualization

Red Hat Virtualization is an open virtualization platform built on top of KVM. Red Hat Virtualization supports a variety of guest operating systems, including Red Hat Enterprise Linux, Microsoft Windows Server, and Microsoft Windows desktop operating systems. Red Hat Virtualization provides a centralized dashboard and programmatic access to manage virtual resources. Red Hat Virtualization can also be integrated with other Red Hat products such as Red Hat OpenShift, Red Hat Ansible Automation Platform, and Red Hat OpenStack Platform to manage both virtual machine (VM)-based and containerized workloads. Further:

- Red Hat Virtualization supports a variety of software-defined storage solutions (including Red Hat Gluster Storage and Red Hat Ceph Storage), high availability of virtual machines, and third-party tools to enable backup and restoration of virtual machines in case of failure. Red Hat Virtualization is secured using Secure Virtualization (sVirt) and Security-Enhanced Linux (SELinux technologies) to help secure and harden the hypervisor against any attacks. Red Hat Virtualization is also well integrated with Red Hat OpenShift to be able to manage VMs across on-premises and public cloud environments.

- Red Hat Virtualization provides a reliable, high-performance, and cost-effective platform for critical enterprise applications, such as the SAP HANA in-memory data platform, which SAP supports running on Red Hat Virtualization since 2016.

Red Hat Integration

SAP's recommended Hybrid Integration Platform for SAP S/4HANA Integrations is SAP Integration Suite. SAP S/4HANA customers running on Red Hat environments can use the SAP Integration Suite for their SAP and non-SAP integrations with 2,000+ prebuilt integration flows, which reduce the integration efforts and maintenance costs. SAP Integration Suite also enables API-based integrations and innovations. For non-SAP integrations, they can also use Red Hat Fuse. Red Hat Integration solutions allow customers to integrate data and manage the entire API life cycle through Red Hat Fuse and Red Hat 3scale API Management, from design to implementation to API retirement, including SAP. With Red Hat 3scale API Management, a fully functional API management platform, customers can benefit from its full-featured developer portal. In addition, Red Hat 3scale API Management supports the OpenAPI specification, enabling import capabilities for all SAP API Business Hub APIs. Red Hat Fuse allows customers to create out-of-the-box and custom data and application integration flows using SAP and non-SAP systems. Red Hat AMQ for streaming messaging, cloud-native runtimes, and other Red Hat Middleware tools, such as Red Hat Decision Manager, offers a powerful foundation for building edge-native services. Further:

- Red Hat 3scale API Management makes it easy to share, secure, distribute, control, and monetize APIs on an infrastructure platform built for performance, customer control, and future growth. Businesses can place Red Hat 3scale API Management components on premises, in the cloud, or on any combination of the two.
- Red Hat Fuse provides SAP-certified side-by-side extensibility solutions to keep the SAP digital code clean while providing API-first capabilities for business and technical users.

Red Hat OpenShift

Red Hat OpenShift is an enterprise-grade, certified Kubernetes (a container orchestration) platform to build, deploy, and manage containerized applications. Red Hat OpenShift can be consumed as a full managed service on different cloud providers or customer managed using Red Hat OpenShift Container Platform or Red Hat OpenShift Kubernetes Engine. It can be deployed on premises on bare metal servers, virtualization platforms (Red Hat Virtualization, VMware, or Red Hat OpenStack Platform), or on major cloud providers such as AWS, Google, or Azure. In addition, Red Hat Advanced Cluster Management for Kubernetes can be used to manage multiple Red Hat OpenShift Clusters and applications from a single console, with built-in security policies, enabling customers on open hybrid cloud. Further:

- Red Hat OpenShift Container Platform supports deploying and managing both containerized applications and virtual machines through Red Hat OpenShift Virtualization, and it is integrated with the Red Hat Virtualization platform. Red Hat OpenShift Container Platform also provides the flexibility of using the complete Red Hat Enterprise Linux or a smaller footprint, a container-oriented operating system called Red Hat Enterprise Linux CoreOS.
- Bringing the strength of a commercial distribution of Kubernetes to the microservice architectures, containerization, and DevOps model of SAP's future digital enterprise, businesses can benefit from leveraging their own Red Hat OpenShift Container Platform instance with isolated data, storage, and network environments to adhere to their data security, privacy, and protection needs.

- Red Hat OpenShift Container Platform and Red Hat's Integration solutions enable SAP customers to integrate non-SAP applications with SAP's Digital Core, IoT infrastructure with SAP Data Intelligence, and digitally transform their workloads for cloud-native development and hybrid cloud deployment strategies. In highly distributed environments, communication between services running on edge sites and cloud needs special consideration. Messaging capabilities of Red Hat AMQ support all communication patterns needed for edge computing use cases. Red Hat messaging, combined with a variety of cloud-native runtimes and tools such as Red Hat Fuse, offers a powerful foundation for building "edge-native services."

- Red Hat Decision Manager enables running decision services and runtimes on various architectures and deployment locations. It can be used to sort through the "noise" from unnecessary messages received from devices and reduce traffic passed to SAP Data Intelligence for further AI/ML processing in an intelligent edge deployment.

Red Hat Satellite

As an integrated part of the Red Hat Smart Management solution, Red Hat Satellite provides a system management solution that makes it easier to deploy, manage, and secure Red Hat solutions on bare metal and virtual servers across on-premises and cloud environments. Using Red Hat Satellite, IT admins can manage Red Hat software subscriptions and set and manage consistent system configurations such as access control across their entire IT infrastructure. Red Hat Satellite also enables applying security updates and patches efficiently with minimal disruptions. Further:

- Red Hat Satellite provides consistency in the datacenter, support for hybrid cloud platforms, and support for seamless upgrades, live patches, and fixes. Red Hat Satellite can be integrated with Red Hat Insights and Red Hat Ansible Automation Platform to leverage advanced analytics to detect and mitigate risks.

- In combination with other components of Red Hat Enterprise Linux Smart Management Add-On, which is included in every Red Hat Enterprise Linux for SAP Solutions subscription, Red Hat Satellite provides an easy-to-use management solution to keep Red Hat Enterprise Linux for SAP Solutions environments running efficiently and securely and lets users group sets of SAP systems to manage them centrally with Red Hat Satellite.

Red Hat Insights

Red Hat Insights enables IT admins to proactively manage systems running Red Hat Enterprise Linux through a single, consistent service. Red Hat Insights, offered as a SaaS service, uses predictive analytics to detect issues, monitor security and compliance, and prescribe mitigations. Further:

- Red Hat Insights minimizes system downtime, supports hybrid cloud environments, and enables regulatory compliance through proactive monitoring and mitigation. Red Hat Insights can be integrated with Red Hat Ansible Automation to implement prescribed mitigations.

- Since early 2019, the Red Hat Enterprise Linux subscription includes Red Hat Insights by default. Red Hat Insights analyzes IT infrastructure against Red Hat's constantly expanding knowledge base to provide real-time assessment for risks related to performance, availability, stability, and security. It also includes SAP-specific rules for alerting system configurations, which do not meet the specifications recommended by either Red Hat or SAP.

- Red Hat Insights complements SAP EarlyWatch Alert service, thereby providing a holistic view across the SAP environment that includes a bottom-up view on infrastructure health and a top-down EarlyWatch Alert view.

Through an extensive portfolio of solutions, Red Hat demonstrates a clear path for SAP migrations – from the operating system all the way up to comprehensive analytics. Red Hat helps efficiently develop, deploy, and run end-to-end business processes across hybrid cloud environments. Red Hat also simplifies enterprise IT landscapes by providing automation to configure, deploy, secure, and manage SAP environments on premises or in public cloud environments. Leveraging the Red Hat portfolio eases the complexity of SAP migrations while enabling the datacenter to operate more efficiently, making hybrid IT simple, powering the intelligent edge, and enabling new business insights from Big Data.

FUTURE OUTLOOK

- Businesses are also leveraging containerization technologies to deploy custom applications. While platforms such as Red Hat OpenShift enable running containerized custom applications, SAP needs to support containerized deployments of the SAP platform.

- IDC expects businesses to leverage both on-premises and public cloud environments for their entire SAP deployments. IDC also expects vendors to improve their support for hybrid deployments by enabling consistent operational experience across bare metal servers, virtual servers, and containers in both on-premises and public cloud environments.

- AI/ML capabilities are infused into the SAP platform (e.g., SAP S/4HANA, to improve user experience and accuracy). IDC expects this trend to continue. IDC further expects that businesses will be leveraging AI/ML capabilities in their custom applications used with SAP Digital Core.

CHALLENGES/OPPORTUNITIES

For Businesses

Choosing a platform for SAP workloads is just one small part of the many decisions that businesses have to make when they migrate to SAP HANA or SAP S/4HANA. The decision may well be based on the operating environment that already exists in the datacenter or Linux may be underrepresented in the datacenter and require new skill sets. In either case, businesses should look beyond the immediate OS and consider the entire platform that their SAP workloads will be running on or interacting with. This should be a consistent ecosystem for private, hybrid, public, and multicloud that delivers interoperability, orchestration, and automation.

Even though SAP has a few solutions that run as containers today, the applications that interact with SAP can run as containers. Also, SAP is driving its customers to the cloud and is planning to containerize its software in the future. With that in mind, businesses face the challenge of considering their entire environment as part of their already complicated-SAP migration initiative. IDC believes that many businesses are making decisions today with regard to what their SAP landscape and their larger IT environment will look like in the next 10 years. The implicit opportunity is that, if businesses do modernize their entire environment, they will be able to take advantage of the many capabilities for data and application integration this will afford them.

For Red Hat

For Red Hat, as a vendor of not just a SAP-certified Linux distribution but of a full-fledged open source ecosystem, the biggest challenge is to help current and future customers understand how choosing Red Hat for SAP will provide customers with the ability to run their SAP-related applications on Red Hat OpenShift, automate SAP deployments and day 2 operations with Red Hat Ansible Automation Platform, and enable customers on their journey to the Intelligent Enterprise with the other solutions that Red Hat provides. There is also the anticipation of future SAP solutions themselves becoming certified for these environments, which would be a major move toward de-siloing them.

Red Hat faces strong competition in the SAP market from a single competitor that, too, is working very closely with SAP. Yet Red Hat's own partnership with SAP has thrived as well and SAP's drive to the cloud, including the company's push to position SAP Business Technology Platform as the de facto platform for developing, integrating, and extending new applications in the cloud, as well as the company's plans to containerize a portion of its applications are big opportunities for Red Hat to get even closer to SAP. Both SAP and Red Hat, and ultimately their shared customers, will benefit enormously from these developments.

Finally, it is important to keep in mind that many opportunities will arise from Red Hat having become a part of the IBM family.

CONCLUSION

IDC believes that businesses need to evaluate multiple considerations with regard to the operating system they select when outlining an SAP HANA migration strategy. Those considerations are not just about the operating system itself. Rather, these are operating platform decisions that are a critical factor in how an organization modernizes its IT infrastructure as part of an SAP migration.

Businesses need to make sure that with the operating system, they obtain the following: a consistent platform for migrating an SAP landscape from bare metal or virtualized servers to private, hybrid, or public cloud; performance improvements from the operating platform for SAP HANA or SAP S/4HANA; integration with SAP Business Technology Platform; robust high availability and disaster recovery; seamless upgrades, live patches, and fixes; strong reference architectures and optimizations; predictive analytics for preventing security, network, and system configuration issues; virtualization technologies for utilization and resource consolidation; containerization for scalability and operational efficiency, with enhanced security access to accelerated hardware; a hybrid cloud platform to run SAP applications across on premises and public cloud; support for new data persistence technologies and for software-defined storage; a complete portfolio of regulatory compliance; and a single point of contact for troubleshooting support.

IDC believes that Red Hat Enterprise Linux for SAP Solutions provide a powerful solution set beyond the operating system to deliver these operating ecosystem capabilities to businesses.

About IDC

International Data Corporation (IDC) is the premier global provider of market intelligence, advisory services, and events for the information technology, telecommunications and consumer technology markets. IDC helps IT professionals, business executives, and the investment community make fact-based decisions on technology purchases and business strategy. More than 1,100 IDC analysts provide global, regional, and local expertise on technology and industry opportunities and trends in over 110 countries worldwide. For 50 years, IDC has provided strategic insights to help our clients achieve their key business objectives. IDC is a subsidiary of IDG, the world's leading technology media, research, and events company.

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