SAP's next-generation enterprise applications have powerful in-memory and edge processing to enable real-time insights for business processes and machine learning. To run this new SAP platform, businesses often require new IT infrastructure and models.

Running Intelligent SAP Enterprise Applications Begins with a Modern IT Foundation

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Introduction

For many organizations, SAP has long represented the company jewels, running core mission-critical operational functions such as general ledger, sales and distribution, order management, manufacturing, planning, shipping, transportation, and receiving. Therefore, it is not unusual for organizations to experience some trepidation when they're faced with the inevitable scenarios that require them to rethink their SAP environment. Indeed, there is a growing realization that in a world where digital transformation defines winners and losers, data is rapidly becoming the most valuable asset for organizations. Companies of all sizes are recognizing that in order to fully unlock the potential of data, they must pay attention to where data resides as well as how it is managed and how it is protected. Every company should now consider itself to be a technology company and regard its data as its biggest competitive advantage. The ability to maximize the potential of data and treat data as a form of capital requires investment, and for many organizations, much of that data is captured and processed within SAP environments.

While the digital era offers significant new opportunities for businesses, it also brings formidable challenges to garner real-time insights across disparate types of data in large volumes. Many organizations are running traditional applications on siloed IT from an era when data was a by-product, not a capital asset. That leaves them ill-equipped to manage such large volumes of data and extract the tremendous business value that they harbor.

SAP's next-generation intelligent enterprise applications are based on SAP S/4HANA, together with SAP Leonardo — SAP’s platform for innovation with artificial intelligence (AI), big data, machine learning, and the Internet of Things (IoT). SAP S/4HANA is SAP's intelligent enterprise resource planning (ERP) solution, which replaces classic SAP ERP and SAP Business Suite applications with powerful in-memory and edge processing to enable real-time insights for business processes and machine learning. SAP refers to this solution as the "digital core."
IDC has seen that businesses often require new IT infrastructure and models to run this new SAP platform. On one hand, the processing, memory, and storage requirements are more demanding; on the other hand, the platform invites consolidation and simplification of IT. This means businesses that want to take advantage of the digital core should rethink the server, storage, and data protection infrastructure that supports their SAP landscapes.

For many organizations, adopting the digital core also means moving from a non-HANA database to HANA and S/4HANA. This is generally not a trivial exercise. Often, IT finds itself having to balance the resources required to maintain the traditional SAP ERP and business warehouse (BW) systems with the investments made in S/4HANA. While every business' path to transforming IT for SAP is unique, there are some common objectives in sustaining classic SAP deployments while migrating to SAP HANA and S/4HANA. These objectives include:

» Consolidating and simplifying IT to lower total cost of ownership (TCO) and improving productivity for traditional SAP ERP and BW landscapes on modern infrastructure that is designed for SAP HANA

» Deploying a cloud-enabled infrastructure to run SAP with the efficiency of a cloud operating model

» Supporting new, intelligent, data-driven applications that leverage diverse data from multiple sources, such as structured business data in SAP HANA and unstructured big data and IoT data stored outside SAP HANA

**It Begins with a Modern IT Foundation**

It is common to have four, six, or even ten or more SAP applications running in production, each with its own landscape made up of development, test, and quality assurance.

Historically, IT has run SAP production and nonproduction systems on siloed infrastructure, whether by design — to protect production performance — or ad hoc as new projects are added. This has often resulted in IT budgets and resources becoming strained to maintain, monitor, and manage a complex and sprawling system landscape.

Consolidating and simplifying SAP landscapes, therefore, have evolved as common considerations among many SAP users, even as performance remains a top priority. A modern infrastructure foundation can lead to lower TCO while boosting performance and productivity by:

» Consolidating and running "mixed" workloads on the same IT platform delivering performance at scale for highly virtualized SAP landscapes

» Reducing the size and cost for protecting "large" SAP data footprints

» Simplifying SAP landscape management through process automation for tasks such as system copy and refresh

Increasingly, in the digital era, business-critical SAP systems need to be "always on." A modern IT foundation provides the opportunity to revise and repurpose business continuity to eliminate single points of failure (SPOFs) enabling continuous availability for SAP operations.

As part of a consolidation strategy, IT needs to consider the implications of managing and maintaining traditional SAP ERP and SAP BW systems running on storage-based databases while transitioning to an SAP HANA in-memory database and ultimately to SAP S/4HANA. Thus, it is important to invest in an infrastructure foundation designed to invigorate legacy SAP ERP with reduced cost and ready to power the intelligent enterprise with S/4HANA.
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Cloud-Enabled Infrastructure

Increasingly, SAP customers are considering running SAP in the "cloud." With S/4HANA and SAP Leonardo becoming critical enablers of the digital business, IT organizations, accustomed to operating as a back-office support function, must transform to deliver greater efficiency, predictability, and business agility.

There are various options to run SAP in public and managed clouds, but for many businesses, the benefits of an on-premises deployment of core SAP applications outweigh those of running SAP in the cloud. Indeed, IDC has seen significant repatriation of mission-critical applications that were running in a cloud back to on-premises. Reasons for this repatriation are high availability, lower cost, greater security, and full control over these environments. However, these on-premises deployments will also need to be agile and cloud enabled to facilitate an efficient hybrid cloud model. Businesses that are modernizing their SAP infrastructure for SAP HANA and S/4HANA often take the opportunity to fully cloud enable that infrastructure and ensure that they are ready for an operating model that includes interacting with cloud deployments of new, intelligent SAP applications.

Managing Diverse Data from Core to Edge

With the increasing role of the edge in the transformation that businesses are going through, IDC believes that efficient data management between the core and the edge (and also the cloud) is becoming ever more important. This is especially relevant for use cases that combine structured and unstructured data. With regard to SAP, this translates into combining business-generated data in SAP HANA with unstructured external data such as big data from social media or data streams from the edge that are run through machine learning models, with the results forwarded to the core. In addition, when one considers the dramatic increases in data volumes, it becomes clear that the resulting data flows require a comprehensive and secure data management and orchestration framework across the entire core-edge-cloud deployment. Ultimately, the infrastructure that supports this framework will become the platform on which businesses build their new SAP Leonardo–based industry use cases, which leverage diverse data structures.

Scalable Data Persistence Next to the In-Memory Database

SAP HANA is an in-memory database, meaning that the operational data that the SAP applications leverage resides entirely in memory, dramatically speeding up access to that data. However, large volumes of various data types are stored not in SAP HANA but in an adjacent data lake. The raw data in a data lake often needs to be refined and enriched before it can be useful, meaning that it is pipelined through various, often complex, data operations. This requires strong governance and orchestration. To enable these operations, data lakes are therefore ideally built from secure, scale-out network-attached storage (NAS) that supports any file size and that can scale to petabytes in a single cluster.

Considering Dell EMC

Converged Systems

IDC has seen businesses increasingly address infrastructure complexity and the associated costs by moving their mission-critical applications to converged systems. Converged systems are pre-integrated, vendor-certified systems containing server hardware, storage and data protection, networking, and systems management software. As such, converged infrastructure provides a platform for consolidation, reduced complexity, lower TCO, agility, and the ability to run mixed workloads on the same platform. According to IDC research, infrastructure convergence has been and continues to be an important investment driver for many businesses. With regard to SAP, converged infrastructure can provide a range of
important capabilities. With its SAP-certified VxBlock converged infrastructure system, Dell EMC fully delivers the capabilities necessary to support SAP workloads. VxBlock provides high availability of mission-critical SAP applications; data protection across SAP and non-SAP applications; efficient backup and restore of SAP data; a cloud-enabled infrastructure; and scalable data persistence next to the in-memory database. In addition, Dell EMC offers SAP-certified solutions that provide continuous data protection and recovery consistency for interdependent SAP and non-SAP applications. Also, Dell EMC’s SAP-certified backup and restore solutions are designed to provide SAP administrators with centralized visibility and control.

VxBlock is built with Cisco UCS blade and rack servers, VMware virtualization, and Dell EMC storage and data protection. While multiple storage arrays are offered, PowerMax and Unity are the two storage arrays used most often. PowerMax offers six-nines availability, 10 million IOPS, and Symmetrix Remote Data Facility (SRDF). Unity offers flexibility by supporting both file and block, and it integrates well with the rest of Dell EMC’s suite of products, including the Dell EMC data protection solution.

VxBlock has been designed to provide SAP customers with the following:

» **Flexibility.** With VxBlock, organizations have a broad choice of technologies to configure for supporting SAP and any other workloads that they want to run on it; Dell EMC will architect the system accordingly. Another aspect of that flexibility is that businesses can outline a multiyear plan for their SAP landscape and, over time, continue adding to the platform based on their business needs while amortizing the cost over the agreed-on years. Dell EMC supports businesses that are opting for a multicloud model, and when it comes to flexible financing and consumption options, Dell Financial Services offers a balanced mix of capex and opex that customers require.

» **Purpose-fit sizing for current and future needs.** SAP software consists of different modules that each require their own HANA database. Therefore, a typical production system will run on several HANA databases of different sizes. For example, when there are three different systems — core ERP, business warehouse, and an application — a business may have deployed a landscape for development, test, quality assurance, and a sandbox. Each deployment will run on its own virtual or physical server, depending on its size.

Dell EMC will spec out and architect the different servers and purpose-fit size them for the business’ current and future needs within one VxBlock System. With an in-memory database, this is an important service that Dell EMC provides to its customers because in-memory servers can become expensive. What’s more, with VxBlock, Dell EMC can flexibly purpose-fit and economize the server sizes within the SAP HANA certification requirements.

**Both SAP HANA and Non-SAP Applications in One System**

Another advantage is that VxBlock can allocate certain server and storage resources for the HANA database while allocating other resources for other databases and applications, including custom applications. The single-system approach leverages common infrastructure such as the network and data protection across application landscapes. Dell EMC’s practice of providing new firmware and hypervisor releases, all pretested for interoperability across the VxBlock System, is designed to unify, simplify, and de-risk the patch and upgrade process across the SAP and non-SAP landscapes.

Once a customer has decided on the various components, Dell EMC builds a system with SAP HANA–certified servers and storage as part of SAP’s Tailored Datacenter Integration (TDI) model with the configuration built partially in the factory and partially onsite at the customer. Dell EMC says this step typically takes a week and leaves the customers with a validated, ready-to-go SAP HANA platform. At this point, if an organization requires support with replatforming and data conversion, Dell EMC can either perform those functions or work with a customer to engage a partner.
High Availability and Data Protection

In addition to the Dell EMC VxBlock "no single point of failure" design, the system has a variety of high-availability and data protection options. Examples include HANA backup in a single VxBlock System and HANA replication between two VxBlock Systems at different sites. Two commonly used options for SAP environments are RecoverPoint Appliance (RPA) and SRDF in PowerMax storage. RPA is an appliance that can provide replication between different types of arrays, while SRDF is a full suite of data replication software specific to the PowerMax storage array. Either of these options used in conjunction with SAP HANA System Replication can provide full business continuity for HANA and supporting applications between multiple sites.

Various Grades of RTO and RPO Windows

Dell EMC data protection products built into VxBlock can deliver various grades of recovery time objectives (RTOs) and recovery point objectives (RPOs) depending on the business need, even extremely short RPO and RTO windows that require significant architecting. Failover can take place to a passive node within the VxBlock or to a second VxBlock. Because HANA is an in-memory database, an extra node will be available in the production system at the server level in case a node fails or to facilitate ongoing maintenance. However, customers may decide not to reserve an extra node for nonproduction systems such as test and development.

According to Dell EMC, many businesses decide to install a second VxBlock at a remote datacenter for disaster recovery. Dell EMC works with an organization to determine a range of parameters for that type of setup based on questions such as the following: What environmental and other types of risks is the organization exposed to? Does the organization have a second datacenter, perhaps in one of its remote facilities? If yes, how far away is it? What are the company's required RTOs and RPOs? Dell EMC then integrates RPA or a similar solution into the VxBlock installations.

Dell EMC Data Capital

In a world in which data has become a capital asset, it is critical that businesses tackle the sprawling complexity that has taken shape as a result of the explosive growth of data — estimated at 50% to 80% per year. Just addressing that complexity is not enough; next on the agenda must be preparing to scale, protect, and manage backups. Once data becomes capital, data protection and continuous availability gain the utmost importance for a transformed digital business.

Core tenets of this data capital approach are as follows:

- **Simplify the data landscape.** Dell EMC aims to support any workload at any scale to power today's digital business in the most simple and consistent fashion possible for on-premises, edge, and cloud consumption.

- **Automate data services.** This is about data management, data mobility, data placement, and proactive health management. Essentially, businesses should not need to spend too much time on their infrastructure. The ideal is to provision and offer self-service and act like a DevOps organization while the data remains mobile. Dell EMC builds its data solutions around portability with multiple tiers to deliver performance while holding costs down.

- **Secure data assets.** As data becomes the lifeblood of the organization, it needs to be available anytime and anywhere, backed up and protected across multicloud environments, with security elevated to top priority.
Dell EMC offers the following data storage solutions within VxBlock:

» **Dell EMC PowerMax** is a SAN array built with end-to-end NVMe to ensure the highest levels of performance for the most demanding mission-critical workloads. It is architected to support future storage media innovations such as storage-class memory (SCM).

» **Dell EMC Unity All-Flash** is midrange all-flash storage built for speed and efficiency with a focus on multicloud.

» **Dell EMC XtremIO X2 All-Flash Array** is a high-performing, purpose-built all-flash array that transforms application workflows through the use of copy data management and that reduces storage capacity needs with inline data deduplication.

» **Dell EMC Isilon** is a scale-out NAS platform targeted at large, persistent file storage and unstructured data lakes and analytics adjacent to servers running in-memory databases.

**Challenges**

Delivering on-premises infrastructure solutions for SAP platforms and applications means participating in a highly competitive market. There are 13 server OEMs competing in the SAP-certified server space and even more in the SAP-certified storage market. At least 8 OEMs market both server and storage solutions, and they offer various options for converged systems. All the server and storage offerings from these OEMs have been specifically tailored for the requirements of SAP HANA.

At the same time, SAP has been encouraging its customers to move to the cloud for SAP platforms and applications if available. There are hundreds of SAP applications with a minority running on-premises only; a significant percentage running on-premises and in the cloud; and an equally large percentage available in the cloud only. For a server or storage OEM, there is no business to be gained from cloud deployments unless they deliver hardware to the clouds, which very few do, or unless they market solutions with private/hybrid cloud capabilities, which most of them do, to gain tangential benefit from cloud deployments. Therefore, high server and storage performance and integration should be considered as the baseline, while differentiation lies within the ability to provide tailored configurations, customer-focused sizing, high availability, data protection and recovery, security, and strong customer support. Most importantly, the characteristics of an OEM’s SAP solutions need to be packaged into an overall vision that revolves around what SAP customers value most, which is their data. IDC believes that the OEM that builds its solutions on the critical importance of data availability, mobility, protection, and so forth, will be a competitive player in this space.

**Conclusion**

As the title of this paper states, running intelligent SAP enterprise applications begins with a modern IT foundation. The emphasis here is on “begins.” IDC has seen many businesses go through the transition from a non–SAP HANA database to SAP HANA or from SAP Business Suite to S/4HANA, and the process is rarely trivial. What’s more, many new SAP capabilities are greatly expanding what businesses can do with their data. Some of these capabilities are delivered on-premises, some in the cloud, some in a hybrid model, but ultimately, this transformation is about doing exponentially more with your data by intelligently bringing very high volumes and various types of data together in a compute and data management package that maximizes potential outcomes. None of that will be feasible on previous-generation infrastructure or on infrastructure that is not highly optimized for all aspects of moving data to where it’s needed and
protecting, securing, and processing the data with the highest possible performance. This is why the process must begin with a modern IT foundation. Dell EMC considers its PowerMax portfolio to be the workhorse for SAP, capable of handling the most demanding SAP landscapes, whether they run on HANA or on an alternative database, including serving as the storage platform for a migration from a non-HANA database to S/4HANA. IDC believes that if Dell EMC can address the challenges outlined in this paper, the company has a significant opportunity for success in the market for SAP solutions.

**About the Analyst**

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Mr. Rutten focuses on high-end, accelerated, and heterogeneous infrastructures and their use cases, which include supercomputing, massively parallel computing, artificial intelligence (AI) and analytics, and in-memory computing. He also covers compute for various workloads such as SAP HANA.
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