CAN YOU BENEFIT FROM RUNNING YOUR SAP HANA PLATFORM ON IBM POWER SYSTEMS?

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Introduction

The adoption of the SAP HANA in-memory platform is continuing, with many businesses having completed the first step with a migration to SAP Business Warehouse (BW) on SAP HANA. This is a good starting point for an SAP HANA in-memory database because Business Warehouse is very useful with high ROI and immediately obvious performance improvements, coupled with a fairly straightforward implementation.

A significant portion of SAP customers worldwide have purchased BW on HANA, and most of these are now actively in production. Attention is therefore turning to the more challenging task of migrating the core SAP platforms of R/3 and the Business Suite ERP Central Component (ECC) set of applications to SAP Business Suite 4 HANA, commonly known as SAP S/4HANA.

S4/HANA is SAP's long-term development platform, replacing the current R/3 and ECC ERP platforms. There is a level of urgency to this transition, as SAP has ceased developing new capabilities for ECC and has set a date of 2027 for end of support for ECC. This means that existing customers that rely on SAP R/3 or ECC to run their business should already be planning to migrate to S/4HANA or to another ERP platform.

> ### AT A GLANCE
>
> #### WHAT'S IMPORTANT
>
> SAP HANA is SAP's in-memory database. With its roots as a business warehouse for analytics and decision support, it now supports a full range of enterprise applications all working from a single HANA database. SAP's new long-term ERP platform is moving to HANA, and existing SAP ERP customers should start planning today for their migration to SAP S/4HANA from their current R/3 or ECC solutions.
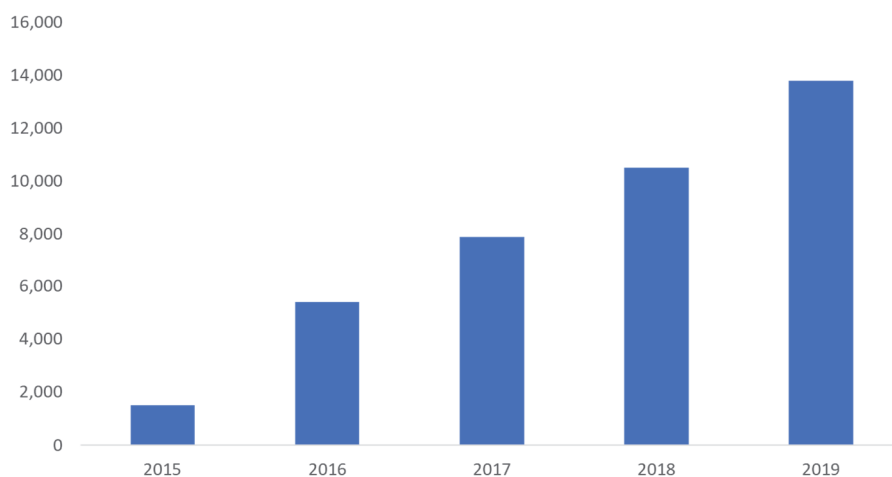>
> #### KEY TAKEAWAYS
>
> IBM has a long history of supporting HANA on IBM Power Systems with high performance, scalability, and reliability. Since 2013, IBM has released successively more capable generations of Power Systems platforms and now has a leading position among existing HANA solution providers, with almost a third of SAP S/4HANA users running their implementations on IBM Power Systems. IBM also has the business, IT, and financial skills and services to enable a successful transition and migration for this critical enterprise workload.

HANA Is Now a Full Platform for Business

SAP HANA is a high-performance in-memory database that accelerates data-driven, real-time decision making and actions, supports many workloads with a broad range of advanced analytics, and is now available on-premises or in the public cloud. The SAP HANA in-memory platform was released in 2011, initially to support data warehousing with Business Warehouse. This continues to be a popular platform and many customers adopted the HANA platform. As time has passed, more business applications have been developed to take advantage of HANA's capabilities. HANA is now a platform supporting a full range of business functions including Business Warehouse (BW), Customer Relationship Management (CRM), Enterprise Resource Planning (ERP), Advanced Planning and Optimization (APO), Supplier Relationship Management (SRM), and Human Capital Management (HCM) — all capable of running from a single HANA database rather than multiple individual databases common in many legacy platforms.

While Business Warehouse has been a great success and has seen over 30,000 customers adopt it to date, there is a more pressing issue for SAP ERP customers when it comes to SAP HANA.

You Need a Plan Now to Migrate to SAP S/4HANA

SAP released the first native ERP business suite for HANA — S/4HANA — in February 2015. Since then, it has steadily built up a customer base running S/4HANA. In the first half of 2020 SAP had over 14,500 S/4HANA customers — with more than 7,400, or just over half, in production.

FIGURE 1

SAP S/4HANA Customer Adoption, 2015–2019

Source: SAP Investor Relations, 2015–2020

This progression will continue and even accelerate over the coming years as more SAP R/3 and ECC customers firm up their plans to move to S/4HANA by the end of support deadline in 2027. S/4HANA is now SAP's long-term ERP platform, with a commitment to develop and support the platform until at least 2040. New development has ceased on the prior R/3 and ECC platforms, and ECC now has the status of support and maintenance only updates until paid support finally ceases in 2027.

IDC's *European Multicloud Survey 2019* (with 218 SAP users responding) shows that only 10% of ECC users plan to migrate to another ERP platform and only 3% are considering staying on ECC beyond end of support in 2027. This means that over 85% of ECC users are planning to migrate to, or have already moved to, S/4HANA.
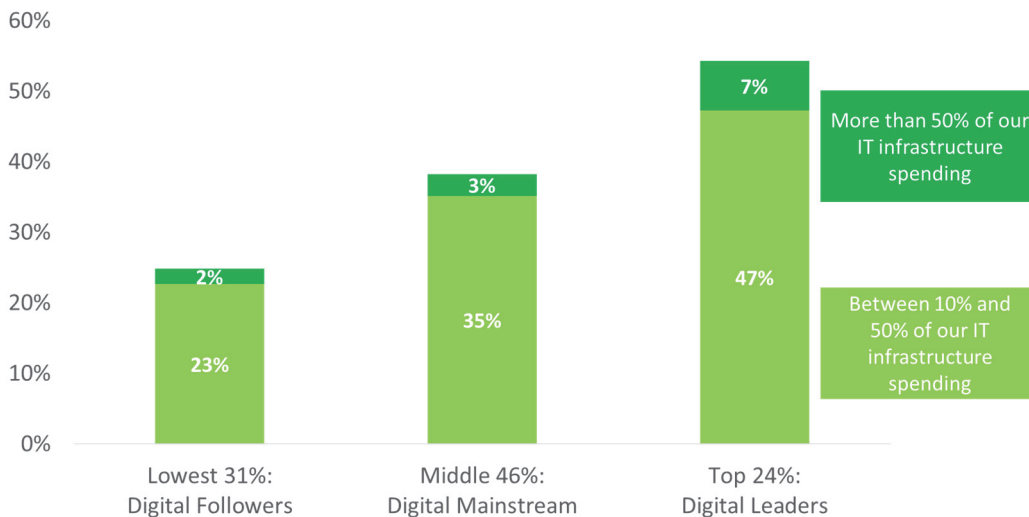
If your organization is running SAP R/3 or ECC and has not yet started planning its S/4HANA migration, now is the time to build an initial team to begin evaluating your options and timescales.

Using Financial Services to Aid Your SAP HANA Migration

One of the prime considerations when moving to a new platform is considering how to fund it. An SAP HANA suite is typically a critical business platform and a migration brings benefits over many years. Funding this all upfront can be a big ask, so you should ideally be looking at ways to spread the cost over many years of use while gaining all the benefits of the platform from the beginning.

FIGURE 2

Use of Financial Services — Leasing or Consumption Models

Q. To what extent do you use financial services, such as quarterly/monthly consumption-based pricing or leasing, to fund your on-premises IT infrastructure spending?
Source: *IDC European Infrastructure and Multicloud Survey, 2020* (n = 1,187)

Recent IDC research shows that financial services such as leasing and now increasingly consumption-based billing with monthly payments based on actual usage are gaining traction. We see this very strongly in the 24% of companies that are most advanced at building and running IT — which we class as Digital Leaders. These companies invest heavily in IT infrastructure even in tough economic times and make the most extensive use of leasing or a shift to a consumption-based approach to delivering IT services.

When planning your migration to S/4HANA, IDC recommends evaluating vendors or solution providers that offer a financial services or consumption model approach as part of their integrated solution offering.

Choosing Where to Run SAP HANA

Going somewhat hand-in-hand with the question of cloud-like flexible funding for your SAP HANA suite comes the question of where to run it. Public cloud has been gaining traction in recent years, and a number of providers now offer HANA, including S/4HANA, as a public cloud service. This does offer convenience for many, with the attraction of a fully configured and provisioned service immediately available with a monthly recurring cost compared with the complexity of designing, building, and capex funding an on-premises solution. So, is the public cloud the way to go for your HANA needs?

For most companies, a blend of on-premises and public cloud services is the preferred approach. In fact, in our 2020 *European Enterprise Infrastructure and Multicloud Survey*, only 2% of companies favored using only the public cloud, and 14% avoided using the public cloud. The rest were in favor of a hybrid cloud approach, with a preference still toward on-premises. When it comes to business-critical applications, most companies are still quite wary when it comes to moving key workloads into the public cloud.

When we look more closely at where SAP users are running workloads, around a third have adopted public cloud services. Over half are running SAP on-premises, with an increasing proportion using a private cloud to do so compared with traditional IT architectures. Using a managed services provider is also a popular approach to delivering SAP, with around one in five companies choosing this approach.

FIGURE 3

Factors Favoring On-Premises S4/HANA Deployments

Top reasons to keep S/4HANA on-premises	Top reasons why public cloud deployments are unsucessful
Security	Security
Performance and latency	Performance
Regulatory compliance	Skills shortages
Application integration	Insufficient reliability
Operational costs	Lack of standards

Source: *IDC Multicloud Survey 2019* (SAP users n = 218); *IDC European Infrastructure and Multicloud Survey 2020* (n = 1,187)

SAP HANA is a business-critical platform for both real-time operations and decision support, and for many customers moving to the public cloud it can introduce many challenges that may be unanticipated. It is no surprise that security is top of mind given the sensitivity of data in an ERP system. However, many HANA customers view the performance and latency characteristics as a defining platform choice. When coupled with the fact that performance is often a reason for the failure of a public cloud deployment, a move to public cloud should require a thorough suitability

assessment and acceptance testing — and you should also keep in mind the need for a Plan B should the public cloud solution not perform to your required levels.
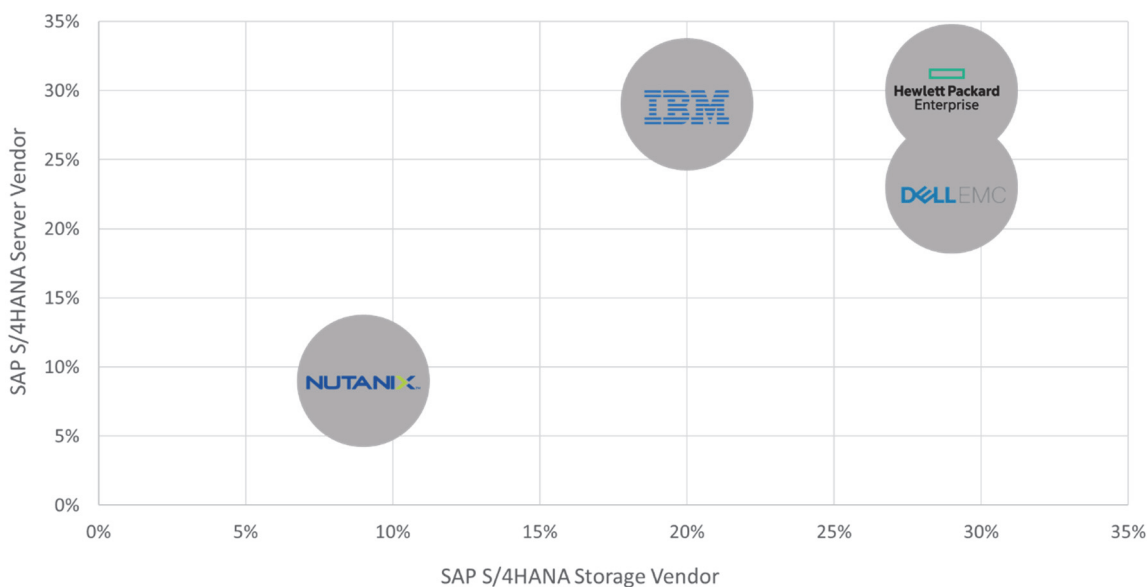
Another issue to consider early on in your migration planning is the real lifetime cost of public cloud. Digital Leaders found that difficulty controlling overall lifetime cost as well as unanticipated data transfer costs factored high on their challenges with delivering public cloud workloads successfully.

IDC recommends clarifying and documenting the required business characteristics and outcomes needed from SAP S/4HANA before assessing whether public cloud or an on-premises solution that may be third-party managed or self-managed will be the most appropriate solution. IDC also recommends reassessing whether prior assumptions are holding up as the project progresses to avoid discovering issues late in implementation when it may be more difficult to change course.

Choosing the Best Hardware Solution for Your SAP HANA Platform

One of the most overlooked decisions when implementing a HANA platform is the choice of server solution. There are over 10 major infrastructure vendors offering SAP HANA solutions, each with a different mix of servers, storage, financing, and services. In Europe, our 2019 European multicloud survey of SAP users indicates that there are three standout S/4HANA infrastructure vendors. When it comes to servers, HPE and IBM are very close, at about 30% each, with Dell EMC at 23%. An S/4HANA solution is also heavily dependent on a high-performance storage system, and here HPE and Dell EMC tie for the top spot at 29% each, with IBM also featuring strongly, being in use at 20% of S/4HANA customers.

FIGURE 4

SAP S/4HANA Preferred Choice of Server and Storage Vendor

Source: *IDC European Multicloud Survey 2019* (SAP users n = 218)

While there are 12 certified server vendors, there are only two main CPU architectures that are currently certified to run S/4HANA — Intel x86/64 Xeon CPUs (with Transactional Memory Extensions) which are used by most vendors, and IBM POWER9 CPUs. IBM POWER9 CPUs are an intrinsic part of IBM Power Systems servers, which, while available only from IBM as a server vendor, can be purchased through a wide variety of resellers and systems integrator partners.

SAP S/4HANA has been available on IBM Power Systems since 2015. IDC believes Power Systems is a strong differentiator for IBM with SAP S/4HANA, including a number of advanced features and innovations that make it very well suited for running very data-intensive workloads such as S/4HANA, with powerful built-in virtualization that is SAP certified and numerous reliability, availability, and serviceability (RAS) features that ensure the highest uptime.

In addition, IBM has a refreshed Enterprise Storage Systems portfolio based on native NVMe Flash that offers scalable storage with high bandwidth and IOPS capabilities with common features and management across the FlashSystems product range.

IDC recommends evaluating IBM Power Systems alongside Intel Xeon–based solutions to determine whether it is a more suitable platform for performance, availability, or price for hosting S/4HANA for your actual production workloads across a five-year time horizon.

Running SAP S/4HANA on IBM Power Systems Platforms

While S/4HANA vendors all offer slightly different value propositions, only IBM with Power Systems offers a distinctly stronger per-core performance, thanks to its POWER9 processor technology. IBM Power Systems processors are designed for intense data processing, and have a built-in SAP-certified virtualization solution that provides flexibility and availability advantages. IBM Power Systems is only offered as a TDI solution to give businesses the greatest amount of flexibility.

Commonality of Linux and S/4HANA Skills

Functionally, SAP S/4HANA on IBM Power Systems is practically identical to running it on Intel Xeons. S/4HANA runs on Linux, and IBM Power Systems supports both SUSE and Red Hat Linux depending on customer choice. The code base for S/4HANA is also identical and then compiled for each target architecture, ensuring feature parity for each release. Skills wise, this means that running S/4HANA on IBM Power Systems is very similar to that of Intel Xeons and does not need significant investment in training and certification. The same Linux and SAP skills needed for S/4HANA on Intel Xeon can be used for S/4HANA on IBM Power Systems. Architecturally, IBM Power Systems has included many features that have been designed to accelerate or assist demanding workloads such as S/4HANA.

Memory Scale and Reliability

As would be expected of a system designed to run large in-memory databases, the POWER9 architecture has focused on memory and IO performance and reliability. S/4HANA systems

typically feature 4TB or more of RAM. The largest installations are now pushing 12TB and even 24TB. This requires not only the ability to install this huge number of RAM modules, but to have an approach that ensures the reliability and serviceability of the memory in use. POWER9 scale-up CPUs feature buffered memory interfaces, enabling many more memory modules and therefore multiple terabytes per socket to achieve the memory capacity SAP S/4HANA requires without needing an excessive number of CPU sockets to install it.

POWER9 has comprehensive RAS features with memory protection enabled by default, with memory mirroring, memory sparing, faulty memory de-allocation through Chipkill, and hot-swappable memory modules to enable memory faults to be isolated and repaired without needing to take the system down.

POWER9 introduced a major step forward on memory bandwidth with peak bandwidth improving to 192GB/s from the 96GB/s with POWER8. POWER9' enhanced this to over 600GB/s with a new OpenCAPI Memory Interface (OMI), which significantly enhanced throughput. POWER10, to be available in 4Q21, will build on this memory performance with up to 1TB/s of bandwidth, while supporting multiple different memory types for near, medium, and far memory with different price and performance characteristics.

POWER10 will also introduce support for multipetabyte memory clusters with Memory Inception. This will enable remote memory access at near-native speed and is designed to improve the capacity and economics for memory-intensive workloads like SAP S/4HANA.

Performance and IO

IBM Power Systems has always had a focus on high-end performance, with scale-up support for 16 sockets and many threads per socket. This results in high throughput for S/4HANA on fewer sockets, enabling other workloads to run alongside such as AI and data analytics. Beyond the raw thread count, POWER9 also focused on high performance by keeping large amounts of data local to the cores, with a huge 120MB cache as well as a high-throughput on-chip fabric capable of over 7TB/s of bandwidth per CPU chip.

The new generation of POWER10 CPUs will improve the overall architecture with a move to a Samsung 7nm process that triples the density of transistors compared with the 14nm POWER9 and offers a major improvement in performance within the same thermal envelope compared with POWER9. In addition, for high-speed data transfers POWER9 supports PCIe Gen 4, which has yet to become established in the Intel Xeon server platforms. POWER10 will extend this to Gen 5 for even higher performance potential.

Resiliency of HANA on IBM Power Systems

Resiliency is critical for an in-memory database workload like SAP S/4HANA. IBM Power Systems has an undisputed reputation for its built-in high-end RAS features. Since 2016, IDC has included IBM Power Systems enterprise-class servers in its highest category for fault tolerance — availability Level 4, which represents more than 99.999% uptime. Note that the performance metrics of IBM Power Systems are measured with these built-in RAS features. On Intel Xeon–

based platforms, memory-related RAS features are often optional — they increase reliability but usually at the expense of performance and are usually not weighed in performance claims.

S/4HANA requires an extra passive node for failover, and an IBM scale-up system enables the built-in virtualization to set a PowerVM as the designated failover target. This VM can even be used for test and development while in standby mode on another node. This, again, contributes to a reduction in footprint and a lower TCO. Because of limited virtualization possibilities, this is not an option on SAP HANA appliances.

To detect emerging issues early on and prevent application failure, IBM Power Systems uses heuristics that run in the background during SAP HANA processing and that deliver predictive failure alerts to the operations team, which can then take immediate action and move the live workload to another VM before it is affected by the anticipated failure, greatly improving business continuity.

Flexibility

IBM Power Systems solutions for SAP S/4HANA are designed for Tailored Datacenter Integration (TDI), with a wide range of SAP-certified options, enabling maximum configurability and flexibility for customers. The IBM Power Systems platform gives businesses greater agility and flexibility than would be possible with an appliance-based solution. Businesses can consolidate multiple SAP HANA databases onto a single IBM Power Systems server using PowerVM. This provides greater speed and flexibility and avoids the complexities of a bare metal installation. Production and non-production S/4HANA instances can co-exist on a single server, as well as supporting other HANA workloads and traditional workloads at the same time.

The result is very efficient workload consolidation, requiring fewer servers while maximizing the utilization rates of the processors. This optimized system architecture with tightly coupled virtualization and partitioning utilization rates of POWER9 processors are demonstrably higher than with commodity architectures, which translates into substantial cost savings for businesses. Being able to consolidate S/4HANA solutions down to far fewer physical servers can significantly reduce datacenter footprint, decrease power consumption, and improve environmental considerations.

Another area of flexibility that IBM Power Systems has compared with Intel Xeon systems is that multiple generations of Power Systems and CPUs can be active within a single HANA instance. This makes incremental upgrades over time much simpler to implement, as well as making recovery from any hardware failure much simpler.

Security

IBM has long had a focus on secure computing. POWER10 will have new hardware-enabled end-to-end security capabilities including transparent memory encryption. It will have quadruple the number of AES encryption engines per core compared with POWER9, enabling significantly faster encryption for today's most demanding standards and anticipated future cryptographic standards like quantum-safe cryptography and fully homomorphic encryption. This enables encryption at full memory rate without impact on S/4HANA performance.

Conclusion

Being digital ready is vital for enterprises to thrive in the hyperconnected and real-time world — and this trend is only accelerating. SAP HANA is SAP's future digital-enterprise real-time data platform, supporting a whole host of business applications and functions. There are many journeys possible on the road to HANA, such as deploying Business Warehouse or Supplier Relationship Management — each of which can be valuable in its own right. But the most pressing issue for many SAP customers is migrating from existing R/3 or ECC platforms to S/4HANA before the end of support in 2027.

While going with the public cloud or an industry-standard Intel-based server may be the most obvious approaches at first glance, you could be missing out on a scalable and reliable SAP HANA platform that may cost less than you think if you do not have IBM Power Systems on your shortlist.

About the Analyst

Andrew Buss, Research Director, European Enterprise Infrastructure, IDC

Andrew Buss is responsible for driving IDC's research covering present and future trends impacting servers, storage, networking, and IT service delivery. Central to this is understanding how on-premises IT is evolving under the emergence of open source, software-defined enterprise, multicloud adoption, and cloud-native development practices, and how this will impact everything from low-level silicon underpinnings and system design, to design and integration of the different infrastructure components, to platform management and service delivery.

His research area focuses on understanding the convergence of different technologies and capabilities and how they need to integrate and work together to deliver efficient, effective, and agile IT services from the datacenter or cloud right through to the end user. He works with global, multinational, and local vendors to understand the dynamics of business technology requirements, technology purchasing and investment, organizational and operations structures, and customer mindsets and disconnects to help vendors effectively position and communicate their value and proposition.

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