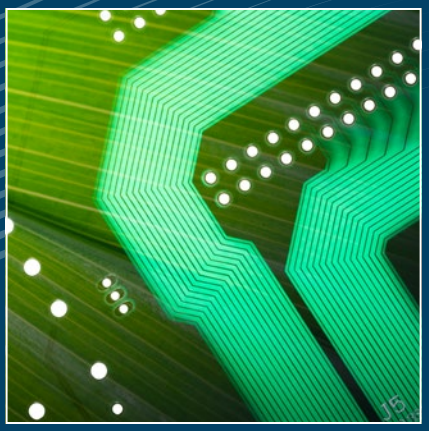
Harnessing the Potential of SAP HANA with IBM Power Systems

IBM | SAP



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Introduction

TODAY, SAP IS THE HEARTBEAT OF WORLDWIDE ORGANIZATIONS OF ALL sizes—across all industries. As SAP users plan for the transition to SAP HANA, they need to assess whether their current server infrastructure can support this inevitable migration. Can it meet growing performance requirements? Can it support the demands of tomorrow's SAP workloads? Can it provide the level of security required? Now is the time for SAP HANA adopters, as well as those considering a new SAP implementation, to determine the best infrastructure to support their data intense workloads.

Ensure your server performance, security and resiliency can handle the mission-critical demands of doing business today—and tomorrow—a decision that could influence business success. Fueled with the POWER8 processor, IBM Power Systems are the ideal partner for SAP HANA mission-critical workloads.

- A faster, more powerful infrastructure than x86 servers.
- A safer, swifter implementation.
- Fully supported by IBM with the clearest path to your most successful SAP HANA implementation

This paper outlines the benefits of SAP HANA on IBM Power Systems. You'll clearly see that the smart implementation choice is SAP HANA on Power Systems because of undisputable performance capabilities and flexibility compared to x86 options. Because SAP and IBM Power Systems are better together.

CHAPTER 1:

Transition to the Future with confidence: SAP HANA and IBM Power Systems

ACROSS INDUSTRIES, COMPANIES ARE IN THE PROCESS of digital transformation, exploring the opportunities for new operating models that increase interaction and collaboration with their customers. Taking advantage of innovative technology approaches helps businesses adapt to and benefit from the seemingly unlimited human access to information provided by ubiquitous social media and mobile devices.

People's expectations of how their needs will be met have fundamentally changed. They expect the companies they interact with to anticipate and accommodate their wishes, and they naturally gravitate toward those that do so. Increasingly, organizational success depends on being positioned to meet this new range of expectations.

The Disruptive Potential of SAP HANA

The customer intelligence that drives digital transformation comes from analytics, based on massive amounts of data, from sources of every description. Many businesses are finding that their existing systems and approaches to data processing are inadequate to meet this new set of business requirements. A new philosophy is required, based on quick, easy, and flexible handling of data, to satisfy rapidly emerging needs.

SAP HANA and S/4HANA are key enablers of this new approach to information. More than just an extraordinarily powerful in-memory database, SAP HANA is a digital platform for SAP customers and others to combine everything from transactions and the Internet of Things to big data analytics, in a single system. It creates a single version of the truth that defines and meets customer needs instantly, with the flexibility demanded by the accelerating pace of change.

This shift is disruptive to IT because it presents vast new demands for system requirements in terms of compute resources, memory, reliability, and scalability. It's also disruptive to the business itself because it enables new processes that take advantage of real-time visibility into business problems, for instant changes that can improve operations and profitability.

IBM and SAP have announced a partnership to help customers accelerate into digital transformation with SAP HANA. Co-innovation by IBM and SAP aims to produce cognitive extensions, enhanced user experiences, and industry-specific functionality, all enabled for SAP HANA.

Change and Opportunity for SAP HANA Customers

As companies adopt SAP HANA, they encounter tremendous opportunity for their line-of-business (LoB) organizations to devise new strategies based on real-time business. Control over data and dynamic visibility through dashboards and similar means empower LoB stakeholders with decision-making and analytical capabilities that used to be reserved for upper management alone.

SAP HANA gives people access to robust analytics and rapid decision support, based on large-scale, diverse data sets. As a result, and with optimized infrastructure, these individuals are able to pursue improvements such as replacing fraud detection with fraud prevention, or making informed purchase suggestions while a customer transaction is underway, rather than a week later by email.

As SAP transitions all its offerings to the SAP HANA platform, organizations throughout the business realm are identifying how SAP HANA will enable their next generation of solutions and

strategies. IBM Power Systems deliver flexibility, resilience, and performance that helps companies take full advantage of SAP HANA solutions.

Setting the Stage for Success

In addition to providing one version of the truth, SAP HANA enables opportunity by consolidating data from multiple providers and driving ad-hoc decision support and reporting into the transaction system. SAP HANA is highly capable at adapting to changing business needs, rebalancing resources to cope with new transaction types.

Support for significant changes over time as part of a SAP HANA transition underlies a key value proposition of IBM Power Systems for SAP HANA: capacity on demand. This cloud-like approach enables customers to follow a "pay-as-you-grow" approach, purchasing additional components to increase capacity only when it is needed. Those components can be added non-disruptively, since the physical system does not need to be changed.

Customers have robust ability to adjust the size of systems from very small to very large over time, without changes to architecture or topology.

- **Add physical capacity** by adding cores, memory, and other components.
- **Add virtual capacity** by allotting more logical resources to individual partitions (virtual systems).

In an operational SAP HANA system, these same capabilities enable coverage for unforeseen peak loads and short-term changes to project demands.

The flexibility of IBM Power Systems lets you run multiple environments simultaneously, such as harnessing unused capacity from the production environment and using it for development or user-acceptance testing. Therefore, compared to most other architectures, IBM Power Systems capture increased efficiency from shared resources.

IBM Power Systems provide the resilience that SAP HANA customers demand for critical workloads. Market-leading features and capabilities for reliability, availability, and serviceability in the POWER architecture make these systems ideal for SAP HANA deployments. The joint solution also supports a wide variety of mechanisms, tools, and techniques that enhance resilience, including sophisticated support for redundancy and replication.

Performance and scalability of the infrastructure are vital to process increasing data volumes. In fact, the need for performance and scale is potentially open-ended, as business requirements and implementations evolve and grow. IBM POWER8 provides dramatic performance benefits that accelerate SAP HANA workloads and provide consistent load times, even in high-utilization conditions. For example, Power Systems now support eight software threads per core—four times the number on Intel systems. Together with higher memory capacity and speed than typical Intel platforms, these features provide industry-leading throughput per core.

Conclusion

Deployment of SAP HANA on IBM Power Systems is consistent with the philosophy that IT should be transparent to the business. That is, technology should enable companies, rather than requiring them to morph according to the needs of IT. POWER architecture is well suited to this point of view, because its flexibility, resilience, and performance enable customers to adopt changes as they become applicable, without significant disruptions.

IBM Power Systems provide an excellent basis for the SAP HANA ecosystem, enabling businesses to transform digitally. The systems that drive that transformation consolidate applications and services from all over the business, as well as facilitating the creation of new ones. Moreover, existing servers and storage assets previously used for traditional SAP workloads can be re-purposed into the new SAP HANA environment.

All these operations are critical to the companies that depend on them. They require SAPA HANA to be deployed on systems that are engineered to be rock-solid, in terms of reliability, availability, and serviceability. IBM is well known in the industry as the preeminent provider of mission-critical computing systems. For both on-premises and cloud-based deployments, IBM Power Systems will be the platform of choice for transforming and driving businesses using SAP HANA for many years to come.

Learn more about opportunities from IBM and SAP:
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CHAPTER 2:

SAP HANA on IBM Power Systems: Synergies for the Enterprise

SAP HANA PLATFORMS RUNNING ON IBM POWER SYSTEMS execute some of the largest high-volume transactional workloads in the world, ranging from the financial services industry and online retail to the transportation sector. They also drive real-time intelligence from data sources of every description that make businesses more profitable, protect against fraud, and reveal insights about the world around us.

Driving digital transformation based on big data, including with cognitive capabilities of IBM Watson, Power Systems are ideally suited to the needs of SAP HANA. Complementary advances by SAP and IBM facilitate unmatched flexibility, resilience, and performance from the combination of their technologies. Collaboration and synergies between the two companies is a testament to their long-standing relationship, which enhances the value and potential of SAP HANA on IBM Power Systems for customers.

The Ideal Environment for Critical SAP HANA Deployments

Flexibility

IBM Power Systems inherently provide superior flexibility to meet the individual needs of organizations deploying SAP HANA. One aspect of that flexibility is that robust virtualization is supported out of the box, consolidating multiple SAP HANA virtual machines on a single Power Systems server. IBM PowerVM virtualization is fully supported by SAP, allowing customers to deploy SAP HANA in a virtual environment that supports both dedicated and shared processor resources, as well as running both production and non-production workloads on a single server.

Virtualization with PowerVM also provides superior ability to handle the varying utilization patterns that are typical in SAP HANA workloads. Dynamic capacity sizing allows for fast, granular reallocation of compute resources among SAP HANA virtual machines. This approach to load balancing and tailoring capacity to the workload enhances agility compared to competing processor architectures that require capacity to be allocated in larger chunks.

Another contributor to the flexibility of Power Systems is that they are designed to be deployed as part of SAP's Tailored Datacenter Integration (TDI) model. The goal of this approach is to reuse existing IT resources such as server, storage, and networking assets. By supporting TDI in the deployment of SAP HANA, Power Systems give organizations superior choice over the technology they use, compared to the rigidly defined hardware appliances used in many competing SAP HANA infrastructures.

Resilience

Mission-critical, 24/7 reliability is built into Power Systems by default. This factor is increasingly vital as customers consolidate SAP HANA workloads onto fewer physical systems, following the vendor recommendation from SAP. For example, taking advantage of robust support for virtualization out of the box, customers can create virtual footprints as failover targets on scale-up production systems. This approach dramatically improves efficiency compared to the necessity of providing idle spare nodes on traditional scale-out architectures.

IBM POWER8 also runs sophisticated heuristics in the background of SAP HANA workloads that provide predictive failure alerts to warn system administrators when a failure is likely to occur. This capability can dramatically reduce the risk of

unplanned outages, enhancing the overall availability of the system. Likewise, chipkill memory is an advanced error-checking and correcting technology that isolates and neutralizes failing memory chips. It is enabled by default, unlike competing technologies from Intel and others that can cause a significant performance hit when turned on.

Performance

Designed specifically for big data workloads such as SAP HANA, POWER8 provides substantial performance benefits compared to competing systems. One aspect of the platform's ability to out-perform Intel systems on a per-core basis is its superior level of simultaneous multi-threading. Where an Intel processor can execute, at most, two software threads per core, POWER8 can handle eight. This 4x superiority enables IBM Power Systems to handle more instructions per clock cycle, which correlates to less time spent by users waiting for workloads to complete.

In addition, POWER8's memory subsystem provides direct performance advantages for the in-memory operation of SAP HANA. A single scale-up Power Systems server can support up to 16 TB of memory, enabling organizations to add memory as needed to drive up performance. That raw capacity is complemented by higher memory bandwidth, providing fast data access to the CPU, as well as large processor caches that keep data close to the CPU, where it's needed to drive high performance.

Co-Innovation to Drive Ongoing Evolution

An important aspect of the joint value proposition between IBM and SAP for digital transformation stems from the unique and long-standing relationship between the two companies. These factors position IBM well beyond its competitors as a hardware-technology provider for SAP software, especially for SAP HANA.

- Full-stack support and service offerings cover the full range of IBM, SAP, and Linux components of the SAP HANA solution.
- IBM is the only organization in the world that participates at every one of SAP's partnership levels, from technology, to cloud, to services, to software.
- IBM is among SAP's top five customers; running a large-scale SAP implementation makes IBM a peer with other SAP customers.
- IBM has more code-development projects underway with SAP than all other companies combined, including system integrators, OEMs, and software vendors.

Beyond the capabilities of the POWER architecture itself, IBM also brings the breadth and depth of this relationship with SAP to every customer engagement for SAP HANA. Moreover, ongoing and close communication between the two companies helps reveal opportunities for IBM to deliver hardware capabilities to enhance SAP HANA capabilities on Power Systems. At any given time, IBM is actively pursuing a number of such requests from SAP.

Part of the ongoing advantage of running SAP HANA on IBM Power Systems relates to the aligned nature of the two technologies' roadmaps. Over time, this results in mutual exploitation of emerging software and hardware functions that benefit customers in the form of improved business functionality and platform efficiency.

The **announcement** of collaboration between IBM and SAP to co-innovate solutions for cognitive computing are a further example of how the partnerships between the two companies continue to drive digital transformation.

Conclusion

Deploying SAP HANA on POWER architecture provides industry-leading flexibility, resilience, and performance that drive digital transformation for companies as they look toward the future. The long-standing relationship between the companies has resulted in interlocked product roadmaps that help ensure that IBM and SAP will continue to drive growing capabilities for their joint customers.

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CHAPTER 3:

IBM Power Systems for Flexible, Robust Deployment of SAP HANA

SAP HANA ACCELERATES LARGE-SCALE TRANSACTIONAL systems while also combining the transactional and analytics tiers in enterprise systems, to enable real-time decision making. Companies can now respond to business data as it emerges, rather than after the fact. For example, supply chains can be better aligned with ongoing market needs, pricing can be tuned to optimize profitability, and consumer experiences can precisely target individual needs, based on real-time analysis using massive data sets.

Based on the long-standing partnership between IBM and SAP, the general availability of SAP HANA across the IBM Power Systems product line represents a compelling choice for large-scale transactional workloads. POWER architecture provides distinct advantages for SAP HANA implementations, including flexibility, resilience, and performance.

Expanding the Range of Customer Choice

Traditionally, SAP HANA has been deployed using a hardware appliance model that required customers to use fixed preconfigured, preinstalled hardware and software. That closed approach to infrastructure placed rigid limitations on customer choice.

By contrast, deploying SAP HANA on IBM Power Systems gives customers broad latitude to select from the range of POWER8-based servers and complementary storage options to best meet their individual needs. The solution fits flexibly into existing infrastructure based on general-purpose Power Systems servers, rather than requiring the purchase of specialized, single-purpose dedicated hardware appliances.

IBM Power Systems also offer customers pre-engineered, pre-tested systems for deploying SAP HANA. This approach simplifies solution design because the systems are tailored to specific workload requirements.

Advanced Capabilities for System Flexibility

Building on the flexibility of SAP HANA implementations based on IBM Power Systems, PowerVM virtualization on POWER8 architecture reduces hardware requirements for failover of mission-critical systems. Rather than deploying idle servers that would be utilized only in the event of system failure, customers can configure virtual systems on the primary production physical hosts as failover targets.

This approach avoids capital expense that does not contribute to everyday productivity. Moreover, the resources that underlie these virtual systems can be used for development and test environments during normal enterprise operation. These capabilities can dramatically increase the efficiency with which the SAP HANA environment takes advantage of Power Systems infrastructure to support mission-critical high availability.

Built for System Resilience

IBM POWER8 offers a variety of mission-critical features and technologies to support reliability, availability and serviceability (RAS). Out-of-the-box virtualization creates built-in resilience that performs efficient failovers. Predictive failure alerts preemptively warn users to take action before a failure is likely to occur.

Designed for Performance and Faster Data Access

The combination of IBM Power Systems and the SAP HANA platform is well suited to the needs of large-scale, real-time transaction processing. The POWER architecture features a number of advantages over x86 architectures for these deployments in forward-looking business environments.

- **4x threads per core.** Each Power Systems processor core can execute up to eight simultaneous threads (up to 1,536 threads per system), compared to two threads per core for x86.
- **4x the memory bandwidth.**[1] Power Systems has an extremely fast interface to the memory subsystem, benefiting overall performance in memory-intensive SAP HANA operations.
- **6x the processor cache.**[2] Larger, four-level cache (compared to the smaller, three-level cache of x86) helps ensure continuous data load to processors, for fast responsiveness.

Together, these advantages enable SAP HANA solutions running on IBM Power Systems infrastructure to handle massive amounts of work per core and help keep computational resources fully utilized. These factors make the POWER architecture an excellent choice for the largest-scale challenges faced by businesses as they undergo their digital transformations, now and in the future.

Preparing the Path Forward with SAP HANA on IBM Power Systems

As business customers adopt SAP HANA on IBM Power Systems infrastructure, they gain the flexibility to scale up those systems as emerging business needs dictate, with minimal impact on the environment as a whole. For example, if a company increases dramatically in size due to organic growth or acquisitions, IBM Power Systems have the inherent ability to grow by simply adding physical memory and cores. PowerVM also has the ability to allocate additional logical resources to virtual partitions.

Line of Business organizations also have the ability to implement new processes and strategies as needs arise, using the access to analytics and improved decision support afforded to them by SAP HANA. Because these decisions are typically made at the director or manager level (as opposed to upper management), the ability of IBM Power Systems to implement additional computing resources without large-scale infrastructural changes is essential.

Conclusion

Deploying SAP HANA on Power Systems provides choice to customers that enables them to realize the full transformational benefit of real-time computing, coupled with the flexibility to grow, shrink, allocate, and de-allocate resources on demand, with mission-critical resilience and availability. Running massive transactional and analytical workloads on the same hardware highlights the scalability advantages of POWER architecture, with industry-leading performance.

Customers can now simplify their infrastructures while accelerating transactional and analytical processing against a single copy of data, to enable innovative business processes using real-time analytics. The combination of SAP HANA and IBM Power Systems provides an option for forward-looking customers as they engage in digital transformation that will help safeguard and grow their profitability in the coming years.

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1—Up to 4X depending on specific x86 and POWER8 servers being compared.

2—Up to 6X more cache comparing Intel e7-8890 servers to 12 core POWER8 servers.