big data

Selecting the best infrastructure for SAP HANA®

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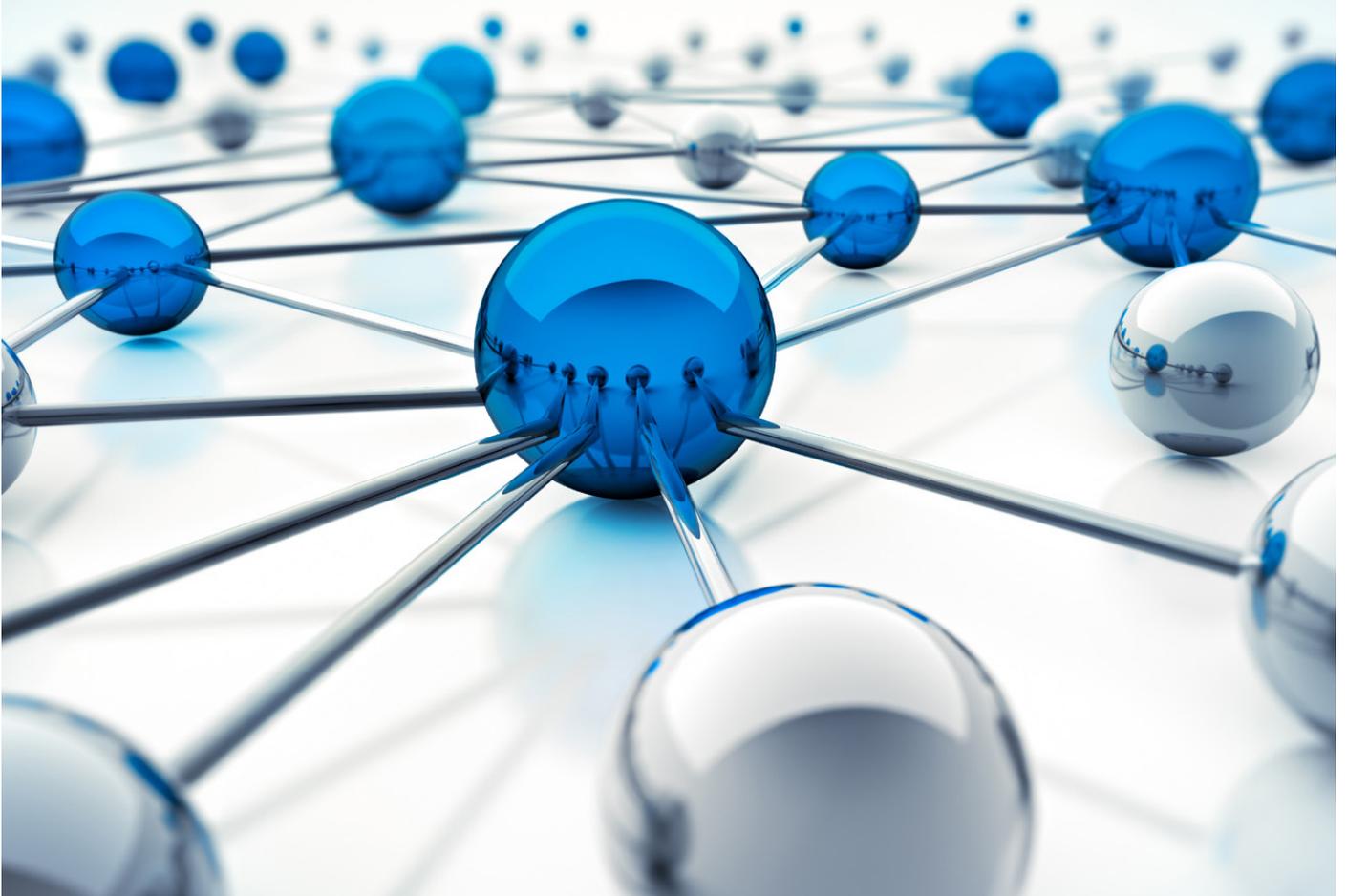
Summary

SAP® has integrated HANA® at the very heart of its strategy: a platform that delivers exceptional real-time performance to enable new business potentials. Now, the latest SAP solutions make use of the entire SAP HANA platform capabilities.

Outside a SAP environment, implementing HANA brings all the benefits of a fast, modern, in-memory database.

But if it is to be really successful, the introduction of SAP HANA needs a suitable infrastructure.

This white paper examines how implementing SAP HANA affects the infrastructure and provides a guideline for your best possible SAP HANA infrastructure.

Bringing performance and innovation at the heart of your enterprise

Although generally seen as an 'in-memory' database, HANA is actually much more than that: it is based on real-time, analytical and data consumption capabilities that offer the ground-breaking prospect of combining datawarehousing and analytics services, integral middleware, an application server and development platform: enabling the construction of a modular platform, featuring optimum integration.

Its performance enables one of the three big issues associated with Big Data to be addressed: velocity, even if - to a lesser extent - volume and variety are too.

HANA is a go-to element when it comes to evolving SAP landscapes and, more widely, for all Big Data environments where very high speeds are essential. Its potential and benefits deliver both performance and innovation for the entire IT landscape.

SAP HANA is the SAP's strategic real-time platform for their new generation of applications and solutions. What's more – thanks to the new possibilities brought by high performance servers (multi-core, memory capacity...) that allow in-memory technology to provide real-time, multi-dimensional and multi-level analysis – HANA delivers considerable benefits to every organisations and LOB's.

So, on the one hand, HANA is at the heart of the SAP strategy. The company has announced that every future product runs on HANA with simplified applications to enable business innovation and that many existing SAP landscapes will be migrated towards SAP HANA. And on the other hand, HANA can also be used just as an ultra high-performance database or as a solution for Big Data where it uses its extreme analytical capabilities in a seamlessly integrated Hadoop landscape.

Boosting SAP application performance (SAP BW)

Applications and software packages are often based on databases that are subject to ever-increasing workloads, as the number of requests grows and they become more and more complex. To overcome performance issues, architectures have in turn become more complex (with the creation of duplicate databases or datasets in order to host aggregates/cubes/datamarts, dedicated for OLAP. HANA enables the simplification of architectures (making duplicate data objects and ETLs obsolete) and improves performance (a RVAUFERR report would run 1,290 times faster, according to SAP), as well as delivering a 37% reduction in TCO (according to a study by Forrester).

An essential step towards S/4 HANA®

S/4 HANA is the latest generation of SAP Business Suite, combining Big Data analytics and transactions on a single platform together with a highly reduced and optimized data structures. The new generation of SAP applications is, and will be, designed to use all of SAP HANA's and the unique characteristics that make it so powerful (simplification of the data base structures, removed aggregates, optimized objects and code). This allows "HANA Live" reports to function in real-time. Basically, S/4 HANA is the fully re-engineered business application suite that takes the full advantage of the HANA platform. The first available functional component is, Simple Finance (now called S/4 Finance) to be followed by Simple Logistics (S/4 Logistics).

When users want to update their SAP tools, there is an intermediate step known as SoH (Suite on HANA) in the migration of existing databases such as Oracle to HANA. But this step will deliver the intrinsic benefits of HANA ahead optimised business application code (S/4 HANA).

Delivering all the power of an in-memory database

HANA can be incorporated into the information system as an in-memory database for high speed transactions and analytics. Effectively, thanks to its SQL capabilities and libraries, HANA can provide a repository or support for third-party software or middleware, to deliver real-time analytics. The ability to store both analytical and transactional data in the same location (without the time and cost of data duplication or transferring it via ETL) makes it a powerful, practical enabler for innovation.

Opening up the doors to Big Data

Its wealth of interfaces for application development, modelling (R, predictive algorithms and natural language search functions) ..and data integration (integrated with HANA/Spark/Hadoop landscape, JSON) helps to ensure that it is a central component for accessing data, including unstructured data. As a result, HANA adds its high-speed processing capabilities to these massive amounts of data for cases like Predictive Analytics, Predictive Maintenance or Fraud Analytics. Besides the data modelling and manipulation functions in SAP HANA platform there are also various statistical and predictive libraries available, providing an interesting workbench for Data Scientists. This makes HANA the component of choice for Big Data environments: bringing performance and innovation to information systems!

SAP HANA infrastructure:
3 key points to check

The infrastructure dilemma

Introducing HANA brings more than significant benefits, provided you have an infrastructure that does not limit how it can be used. Transferring the data used from disks to server RAM requires a fundamental rethink of the infrastructure, especially when it comes to the server itself.

The three issues that have to be addressed are scalability, resilience and flexibility.

It goes without saying that a successful SAP HANA implementation depends on having a SAP certified infrastructure: but that alone is not enough. Of course, certification indicates that performance will be guaranteed, but you also need to take into account other technological and financial factors. Failing to take these upfront measures could have a disastrous structural and financial impact.

Scalability

Scalability is an essential prerequisite for straightforward growth and protecting your investment, while optimising TCO. Indeed, the roadmap towards HANA often starts with a limited implementation, which rapidly evolves. It is often the case that short to medium-term capacity turns out to be many times greater than the initial capacity envisaged. Add to this the 'natural' growth in structured data which, according to analysts, currently stands at around 20% a year.

That means being able to absorb all this data growth on the same platform. In terms of the server, this means being able to easily access more processors (cores) and memory (RAM). If the chosen platform has no built-in scalability, this can lead either to fragmented developments and increasingly complex IT set-ups (with a proliferation of single databases) or to wasted investment because technology has to be changed in a 'rip and replace' scenario. So it is vital to plan for the future, while optimising TCO.

Resilience

This is a crucial feature when it comes to ensuring data integrity and the availability of the platform. Effectively, in-memory offers unprecedented performance compared with disk-based database technologies. But RAM is volatile: so it is vital to ensure data resilience, and all the more so for critical applications. Memory protection becomes essential. What's more, in-memory applications can be relatively slow to restart, so the service quality offered by the infrastructure must allow for in-service support – with no shutdowns if possible – for routine maintenance and even upgrades. This service quality makes a huge difference in HANA environments.

Flexibility

Flexibility is needed to build the most appropriate infrastructure and further optimise TCO. There are two main forms of SAP HANA platform: Appliances and TDI (Tailored Datacenter Integration). In appliances, hardware and software are pre-integrated, in a fully managed and dedicated environment, with predictable performance, but also often limited scalability. TDI is a SAP program that enables existing Data Center components such as storage and networks to be reused, most notably to optimise the TCO of HANA implementations and ensure continuing return on investment.

As well as these kinds of implementation, there are virtualised infrastructures, which allow for sharing of resources and do not require dedicated 'locked in' hardware. This approach is particularly well suited to test environments or for disaster recovery.

Ideally, the HANA technology platform should be able to support all three types of implementation.

bullion™: the benchmark server

The server used to host HANA must, of course, have significant in-memory capacity. As a result, its processor power and memory capacity are pivotal criteria.

Various bullion-based configurations are certified by SAP, to ensure successful SAP HANA implementations even in the most critical environments.

From 2 CPUs/48GB of RAM to 16 CPUs/24TB of RAM, bullion is the only x86 server that can respond reliably, flexibly and cost-effectively to the specific needs of in-memory computing applications such as SAP HANA.

When capacity needs to be increased, there is no need to invest in a new blade chassis (with high entry cost) or completely 'rip and replace' the existing hardware as the result of an essential change in server families.

Bullion – which is positioned among the best servers in the SPECint benchmark and SPECvirt tests– scales from 2 CPU/48GB RAM up to 16 CPU/24TB RAM. In terms of RAM – a key parameter for in-memory computing – bullion goes up to 24TB and breaks glueless architecture limits.

Perfect scalability

Thanks to the new- generation Bull Coherence Switch (BCS), which allows simple interconnection of up to 16 processors, and the Connecting Box, a column that allows you to connect modules easily and without visible cabling – adding more computing power becomes a formality.

The same goes for memory and I/O elements: with the patented blade system from Bull you can 'hot add' to bullion's capacity, quickly and easily. This means you always have a suitable configuration while managing costs since you invest gradually as business needs grow.

To scale resources dynamically in line with business growth, you just need to:

▸ Add memory blades to enlarge memory footprint
▸ Add I/O blades to increase I/O performance
▸ Add CPU modules to increase system performance.

Mainframe-class reliability

In critical environments, where server reliability without compromise is mandatory, bullion brings a unique dimension where the ability to anticipate failure is essential. On top of existing RAS features, including Intel RunSure technology (a set of methods to improve RAM and platform reliability), the new Intel® Xeon® processor Family E7v4 add new RAS capabilities with enhanced thermal and power management features.

Combined with a wide range of diagnostic elements, this enables you to anticipate problems and react appropriately. Atos has added up to several thousand control points per rack, that continuously monitor all key server components to reduce failures and the risk of the system going down. A number of KPIs are implemented to monitor system information and may trigger notifications or alerts, for simplified and preventive maintenance.

For example, if many consecutive errors are detected within a DIMM bank (and even if they are corrected on the fly), bullion will migrate memory automatically in order to replace the faulty memory bank. What's more the hypervisor and OS are notified and will no longer use this memory address. Analysis of KPIs brings more efficient monitoring, as well as simplifying administration and maintenance to minimize the cost and inconvenience.

The capacity to add/change memory or I/O blades is not only a matter of elasticity but also of easier maintenance, resulting in increased productivity in the Data Center while also boosting availability.

To sum up, bullion is designed to rationalize operations. Frequently failing motorized components, such as the ventilators, power supplies and disk drives are now Customer Replaceable Units (CRUs).

The bullion SAP HANA platform comes in three configurations, for maximum flexibility.

Maximum flexibility

Organisations can take advantage of a dedicated SAP HANA Appliance, follow a SAP TDI approach for maximum reuse of existing components in the Data Center or set up a more limited HANA environment featuring virtualization. These three different approaches ensure that the architecture is optimized depending on the required SLA levels and financial constraints.

Appliance

The Appliance consists of pre-configured hardware and software, fully integrated and certified. This ensures successful implementation (in terms of timescales and interoperability between components) on the one hand and, on the other, contractually agreed performance commitments.

bullion SAP HANA is based on the bullion™ server and a VNX®5400 unified storage system from EMC, fully racked, with SAP HANA pre-installed and running under a Linux OS (Red Hat® or Suse®).

By delivering and implementing a pre-integrated and consistent package, Atos guarantees the best possible service quality, performance and reliability, by cutting implementation timescales. This also facilitates unified support and maintenance.

TDI mode

TDI (Tailored Datacenter Integration) is a SAP program that allows HANA customers to utilise existing components as long as they are certified for HANA environments. For example, a SAN bay can be reused in a client Data Center, with some disks dedicated for HANA implementation. It is also possible – for consistency of hardware and skills – to opt for a particular storage technology provider while also building a SAP certified HANA infrastructure and taking full advantage of bullion.

TDI also enables a scale-out solution, with several bullion servers working together to provide higher levels of processing in distributed mode. Up to 16 bullion 'nodes' can operate using a shared SAN.

So TDI addresses different needs from the Appliance, with on-site integration, increased flexibility and very high performance.

Virtualised VMware® mode

It is also possible to avoid dedicating some infrastructure for SAP HANA. Indeed, a bullion-based SAP HANA VMware solution can make sense for running tests, managing a pre-production set-up or even running via a remote Data Center, by reassigning a bullion resource that is used for lower priority operations. This solution also allows you to capitalise on a widely implemented, market-leading virtualisation layer.

In this mode, SAP HANA production will be restricted to the RAM capacities available with VMware (4TB in version 6) and to a single, virtual production machine: with no limits, however, when it comes to pre-production, testing.

So the bullion SAP HANA VMware solution delivers exceptional flexibility (moving VMs...) and infrastructure sharing, reducing the need for dedicated investment.

bullion/4 SAP HANA solutions	Infrastructure benefits	Custome target environment
bullion SAP HANA appliance	• Very high performance • Very high security • Customer dedicated infrastructure • Private network connectivity • Limited scability and flexibility	Critical production Production New & dedicated Infrastructure
bullion SAP HANA TDI	• Very high performance • High security • Customer dedicated physical server • Shared storage network • Scalable and flexible	Production Pre-production Development Shared Infrastructure
bullion SAP HANA VMware	• High performance • High security • Shared server (virtualization) • Shared storage network • High scability and flexibility	Production Pre-production Development Disaster recovery Shared Infrastructure

Towards a successful SAP HANA project

Beyond the bullion SAP HANA offering and the intrinsic qualities of the infrastructure – a major component of success - Atos is strongly committed to delivering advice and integration/migration expertise to ensure successful HANA implementations.

Often a SAP HANA project has a significant strategic and operational scope. Choosing the right partner, who can offer a wide range of services, from start to finish, is a key success factor.

Consultancy advice: to streamline HANA strategy

SAP HANA implementation is essential in the deployment of a new application such as S/4HANA, a database upgrade or the enhancement of existing SAP environments. It could embrace a range of SAP and non-SAP applications, with the opportunity to significantly consolidate the entire landscape.

Consequently, one of the first steps should be to define a comprehensive SAP HANA strategy.

It's essential to assess existing environments, evaluate possible scenarios and define how best to deploy HANA, to minimize upgrade, migration and functional optimization work while maximizing ROI. Atos has defined a dedicated methodology to help organizations find the right path.

Carrying out bullet-proof migration

Most existing SAP applications require a database migration to HANA. This transition in SoH mode – where the software will use HANA as a data container – requires total control over migration. Atos can carry out bullet-proof migrations thanks to:

▶ A set of SAP tools to automatically transfer some data

▶ The expertise and methodology of many SAP certified experts

▶ Best practices resulting from accumulated experience in deploying and managing numerous SAP environments

▶ State of the art tools enabling demonstration, Proof of Concept or even blank migration in Atos SAP Competency Centers.

What's more, to prepare for the change, it is often helpful to see a solution that is more or less identical to the target set-up in action. A Proof of Concept (POC) or performance benchmarking exercise in a target environment are major advantages in ensuring a successful HANA project.

Strengthening availability

Security and availability has always been a pressing issue for critical business operations, as well as for the critical data used by BI and ERP systems. In the HANA environment, which combines both transactional and analytic systems, the need for high-availability (HA) architectures is even greater. As well as all the hardware features that optimize availability (hot-add or hot-swap components, RAS features...), setting-up a HA architecture ensures security, integrity and business continuity.

Ensuring 24x7, industrialized operations

SAP HANA environments often experience rapid growth. The bullion SAP HANA platform offers an exceptional level of scalability. Consequently, robust Data Center operational capabilities are required to deliver SAP HANA platform services with High Availability and Disaster Recovery.

Based on experience gained during several of the largest HANA deployments worldwide, Atos has developed advanced methodologies designed to reduce application, management and hosting costs, while strongly enhancing service quality and offering flexibility and resilience in equal measure.

With its unique end-to-end capabilities - from global consulting to integration, development, management services and even hosting facilities – Atos is the partner of choice for SAP projects.

Atos SAP expertise in numbers:

• 11,000 SAP experts in 42 countries

• 6,000+ implementations in more than 90 countries

• Over 1,400,000 end-users supported

• 130,000 servers managed in more than 100 Data Centers

Atos is recognised as a 'SAP HANA ramp-up' partner.

About Atos & Bull

Atos SE (Societas Europaea) is a leader in digital transformation with circa 100,000 employees in 72 countries and pro forma annual revenue of circa € 12 billion. Serving a global client base, the Group is the European leader in Big Data, Cybersecurity, Digital Workplace and provides Cloud services, Infrastructure & Data Management, Business & Platform solutions, as well as transactional services through Worldline, the European leader in the payment industry. With its cutting edge technologies, digital expertise and industry knowledge, the Group supports the digital transformation of its clients across different business sectors: Defense, Financial Services, Health, Manufacturing, Media, Utilities, Public sector, Retail, Telecommunications, and Transportation. The Group is the Worldwide Information Technology Partner for the Olympic & Paralympic Games and is listed on the Euronext Paris market. Atos operates under the brands Atos, Atos Consulting, Atos Worldgrid, Bull, Canopy, Unify and Worldline.

For more information, **visit atos.net**

**Bull, the Atos technologies
for the digital transformation**

Bull is the Atos brand for its technology products and software, which are today distributed in over 50 countries worldwide. With a rich heritage of over 80 years of technological innovation, 2000 patents and a 700 strong R&D team supported by the Atos Scientific Community, it offers products and value-added software to assist clients in their digital transformation, specifically in the areas of Big Data and Cybersecurity.

Bull is the European leader in HPC and its products include bullx, the energy-efficient supercomputer; bullion, one of the most powerful x86 servers in the world developed to meet the challenges of Big Data; Evidian, the software security solutions for identity and access management; Trustway, the hardware security module and Hoox, the ultra-secure smartphone. Bull is part of Atos.

For more information, **visit bull.com**

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