

# Scaling Data Capacity for SAP HANA\* with Fujitsu PRIMERGY\*/PRIMEQUEST\* Servers



Intel, SAP, and Fujitsu deliver a major leap in scalability for real-time business

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## Executive Summary

In an ideal business environment, you would be able to combine and analyze all your data in microseconds and deliver the results instantly to decision-makers throughout your organization. SAP HANA\* provides that capability today, and companies are using it to achieve major competitive advantages across a range of industries. Instant financial closes, optimized customer engagements, personalized cancer treatments, predictive field maintenance, real-time supply chain optimization; these are just a few of the ways companies are using the SAP HANA platform to transform their business.

Developed in collaboration with Intel and powered by the Intel® Xeon® processor E7 family and the Intel® Solid-State Drive Data Center Family, this unique in-memory platform is helping businesses bring transactions and analytics together on the same platform to drive smarter innovation and improved efficiency. Working together, Intel, SAP and Fujitsu have introduced powerful new enhancements to the SAP HANA platform, so companies can integrate more data at lower cost into their real-time business environment.

Fujitsu offers two families of SAP HANA solutions based on the new Intel® Xeon® processor E7 v2 family:

- SAP HANA solutions based on Fujitsu PRIMERGY\* servers support up to 2 TB of in-memory data per server, twice the data capacity of previous-generation solutions<sup>1</sup>. Select systems can also be configured with the Intel® Solid-State Drive DC S3700 Series for the most demanding use cases<sup>2</sup>.
- SAP HANA solutions based on Fujitsu PRIMEQUEST\* servers support up to 6 TB of in-memory data, and provide even higher levels of reliability and availability for mission-critical environments.

With these improvements and with end-to-end service and support from Fujitsu, customers can implement SAP HANA quickly and with confidence to handle today's most daunting information challenges.

This paper describes the latest enhancements to the SAP HANA platform, and provides an overview to the configurations, services, and support offered by Fujitsu. It offers valuable information for anyone looking for ways to turn growing mountains of data into one of their most valuable assets.



### A Real-Time Platform for Smarter, Faster Business

SAP HANA has quickly become the fastest growing product in SAP history,<sup>3</sup> and for good reason. This real-time business platform shatters the barriers that have long prevented businesses from using all available data to drive better decision making in time-sensitive scenarios. Companies can now host all their applications, both transactional and analytical, on top of a single, blazingly fast, in-memory database that can readily handle the data volumes and workloads of a large enterprise (Figure 1).

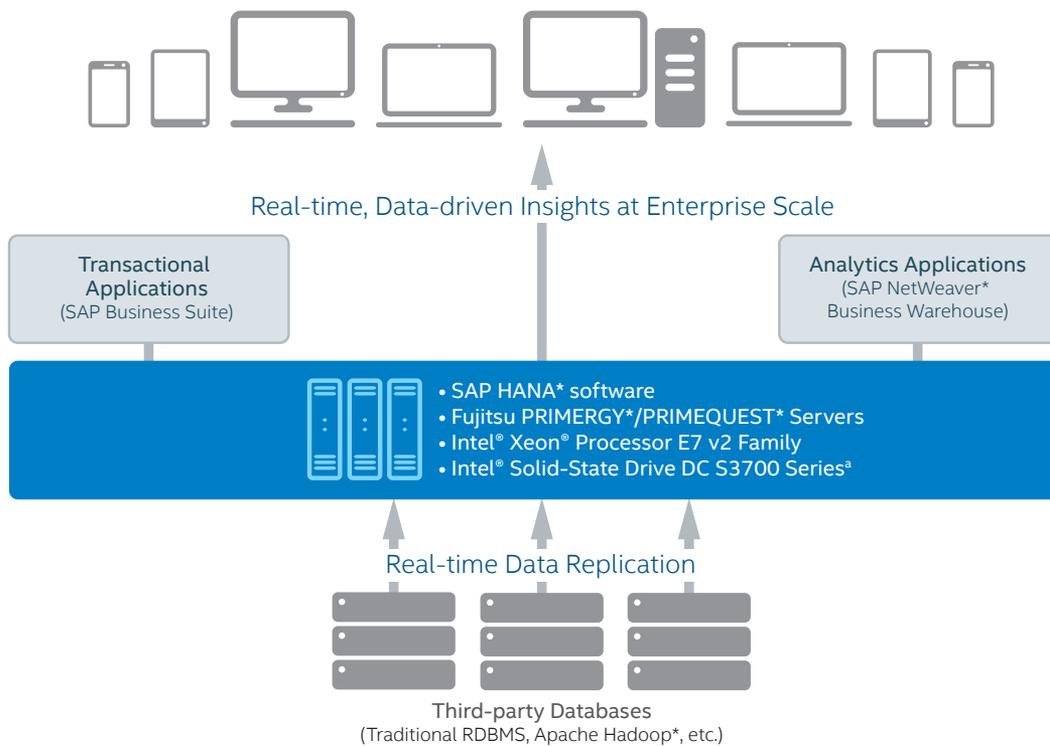
SAP HANA is as flexible as it is scalable. Customers can combine data from all available sources in real time, including structured, unstructured, historical, and fresh operational data. They can perform complex analyses in seconds and use the resulting insights to optimize critical processes, from front-line customer engagements to back-end financial and supply chain management.

More than 4,000 businesses are using the SAP HANA platform to achieve competitive advantage in industries as diverse as retail, energy, financial services, entertainment, scientific research, and healthcare.<sup>3</sup>

For example:

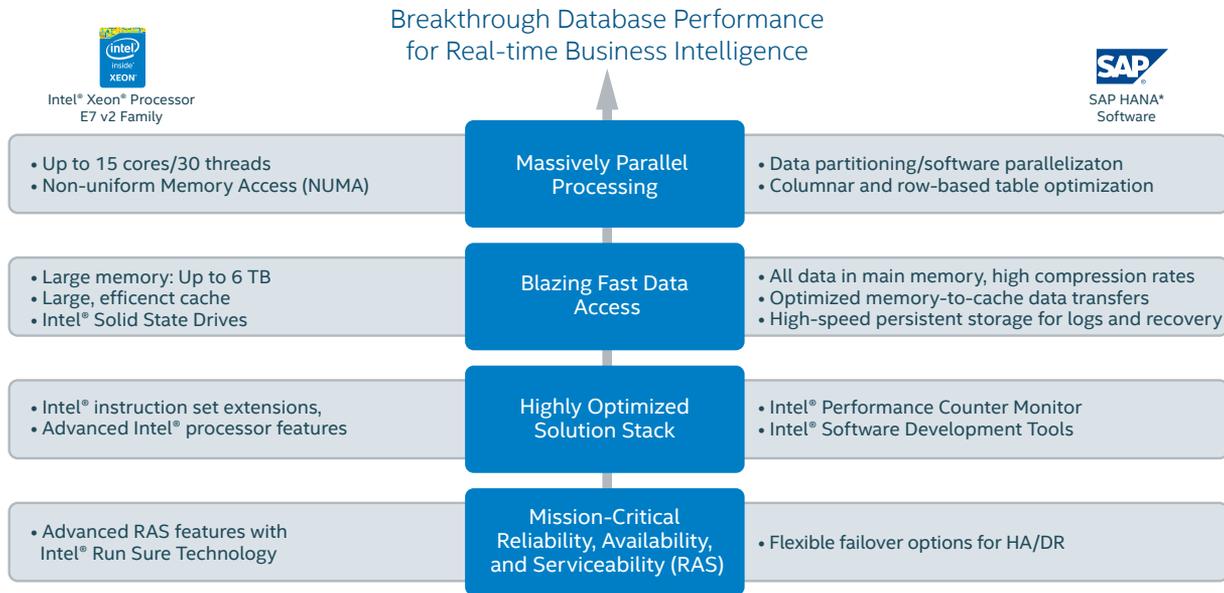
**Frucor Beverages**, one of the largest beverage manufacturers and distributors in Australia and New Zealand, migrated its SAP NetWeaver\* Business Warehouse solution onto SAP HANA in Fujitsu's cloud environment to enable advanced data analysis with increased speed and depth of analysis. The transition took just six weeks and reports now run 10-100 times faster. According to Mark Palmer, IS Program Manager for Frucor, "The speed is very impressive. Previously some reports would take nearly an hour to process. Now the same report is done in just a few seconds." For more information, visit: [www.fujitsu.com/au/Images/Fujitsu-Frucor-CaseStudy.pdf](http://www.fujitsu.com/au/Images/Fujitsu-Frucor-CaseStudy.pdf).

**Publiacqua S.p.A** deployed SAP HANA on a Fujitsu PRIMERGY server to improve its efficiency in managing integrated water services for more than a million people. Managers across the organization now have near-instant access to high-quality, up-to-date information that was previously spread across multiple systems. According to Luciano Caroti, Head of IT Systems for Publiacqua S.p.A, "Updating the SAP environment and achieving more dynamic business intelligence has had a positive effect on the entire organization." For more information, visit: [www.fujitsu.com/fts/Images/121113%20PUBLIACQUA-en.pdf](http://www.fujitsu.com/fts/Images/121113%20PUBLIACQUA-en.pdf).



\*Certified for use in SAP HANA solutions based on the Fujitsu PRIMERGY RX4770 M1 server

**Figure 1.** The SAP HANA\* platform enables both transactional and analytics applications to be deployed on top of a single, blazingly fast, in-memory database to support real-time business scenarios while dramatically reducing total costs.



**Figure 2.** Intel and SAP engineers have collaborated closely to ensure that SAP HANA\* software takes full advantage of the advanced features of the Intel® Xeon® processor E7 v2 family and the Intel® Solid-State Drive Data Center Family.

## New Capability Drives Higher Business Value

The unmatched performance and scalability of the SAP HANA platform is the result of exceptionally tight integration between hardware and software. Intel and SAP worked together to optimize the SAP HANA software for the Intel Xeon processor E7 family, which is specifically designed to accommodate the needs of mission-critical enterprise workloads. The SAP HANA database engine is highly optimized to take advantage of the large memory capacity, efficient cache subsystem, and extensive parallel execution resources of these powerful processors (Figure 2).

Holding all relevant data in main memory is the first step in accelerating performance. Accessing data from memory is orders of magnitude faster than accessing data from disk. However, accessing data from cache is even faster (a few nanoseconds versus up to 100 nanoseconds). Intel and SAP have optimized and tuned memory-to-cache data transfer processes throughout the SAP HANA database engine to make more efficient use of the exceptionally large and fast cache of the Intel Xeon processor E7 family.

Because data is accessed so much faster, it must also be processed faster to avoid creating new performance bottlenecks. To address this need, Intel and SAP have optimized SAP HANA software to “divide and conquer.” Data is partitioned and database computations are heavily parallelized to execute efficiently across the large numbers of core and threads that are available in the Intel Xeon processor E7 family.

Intel and SAP also work closely with Fujitsu to deliver enterprise-ready solutions that are built to accommodate the rapidly growing volume, diversity, and speed of enterprise data. Working together, the three companies are delivering innovations that provide new levels of performance, scalability and flexibility, while providing optimized support across the complete continuum of business data.

### Massive Data Capacity with the Intel® Xeon® Processor E7 v2 Family

Business data volumes are growing rapidly and enterprise platforms must scale to address next-generation needs. Fujitsu PRIMERGY/PRIMEQUEST servers based on the Intel Xeon processor E7 v2 family are certified for up to 6 terabytes

for SAP HANA implementations—enough capacity to host many of today’s largest databases on a single server. These new processors also provide 50 percent more cores and threads, 25 percent more cache, and 400 percent higher system bandwidth<sup>4,5</sup> than the previous generation, so they can deliver sustainable, real-time query performance acting on very large data volumes.

The enhanced data capacity of the new Fujitsu PRIMERGY/PRIMEQUEST servers offers greater efficiency across a wide range of SAP HANA deployments. It is particularly valuable when SAP HANA is used as the underlying database for SAP Business Suite applications, such as SAP ERP or SAP CRM. These and other transactional applications currently run on single-server infrastructure, so doubling per-server data capacity also doubles overall platform scalability.<sup>1</sup>

Fujitsu PRIMEQUEST\* servers based on the Intel® Xeon® processor E7 v2 family are certified for



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per server for SAP HANA\* implementations – enough capacity to host many of today's largest databases on a single server.<sup>a</sup>

<sup>a</sup>For a current list of certified SAP HANA systems, see the official SAP Certification page [scn.sap.com/docs/DOC-52522](http://scn.sap.com/docs/DOC-52522)

### Faster and More Efficient Data Access with Intel® Solid-State Drives

Processor, cache, and memory performance are critical to SAP HANA performance, but high-speed storage is also important. SAP HANA is a SQL-compliant database with full ACID capabilities, meaning that atomicity, consistency, isolation, and durability are preserved in every database transaction.<sup>6</sup> Durability, in particular, requires that each database transaction be committed to persistent storage logs before it can be completed in memory. This is necessary to help ensure that the data from all completed transactions is recoverable in the event of unplanned downtime. Because of this requirement, overall database performance is dependent, in part, on the speed at which database logs are written to persistent storage.

To deliver exceptional performance and scalability for the most demanding applications, Fujitsu now offers SAP HANA platforms configured with the Intel Solid-State Drive DC S3700 Series.<sup>2</sup> These SSDs provide extreme performance for both sequential read and sequential write operations. They also provide advanced, end-to-end data protection and High Endurance Technology (HET), making them an excellent choice for mission-critical infrastructure. Their low latency and high throughput are critical for maintaining ACID compliance without compromising the exceptional database performance of the SAP HANA platform, and they are ideal for addressing tough service level agreements for uptime, restart-times, and high availability.

### Even Higher Reliability for Mission-critical Implementations

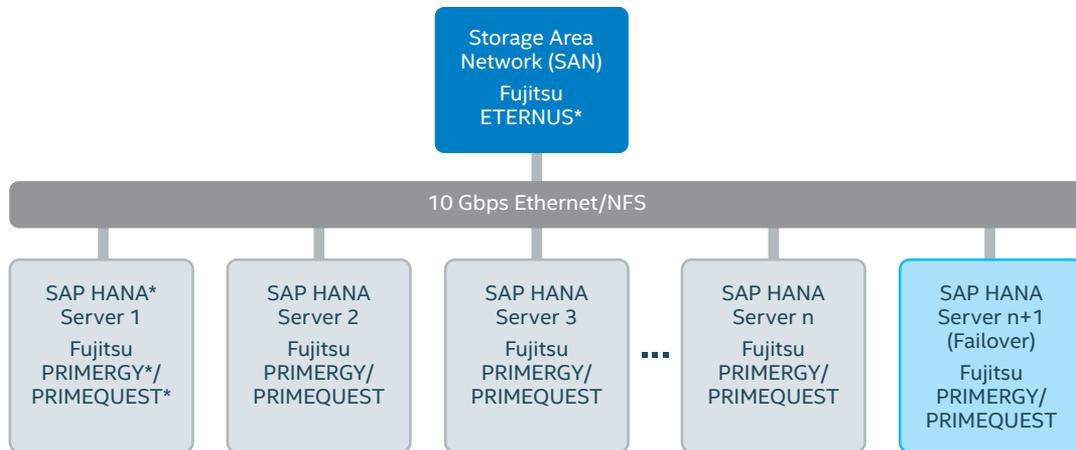
SAP HANA is designed specifically to support mission-critical business processes, and the most recent server platforms from Fujitsu extend this capability even further. Intel® Run Sure Technology<sup>7</sup> allows the server to diagnose and automatically recover from errors that would have been fatal on previous-generation platforms. As part of this protection, Resilient Memory Technologies continuously scan the memory subsystem to identify and resolve data errors and to enable proactive component replacement as needed. This advanced functionality enables higher data integrity and uptime in all environments and is particularly valuable for large, mission-critical, in-memory databases.

Intel and SAP have worked together to provide full support for these advanced capabilities in SAP HANA. Complex errors that cannot be fixed automatically in hardware or firmware are automatically passed through to the operating system for resolution and, if necessary, to the SAP HANA database engine. As discussed later in this paper, Fujitsu complements these advanced reliability technologies with advanced availability and serviceability options at the platform level. Customers can take advantage of these features to address their specific needs for data integrity, high availability, and disaster recovery cost-effectively.

### Enterprise-Ready Solutions from Fujitsu

SAP and Fujitsu have a long history of working together to deliver enterprise business solutions, and have collaborated closely to provide business-ready SAP HANA platforms that can be deployed quickly to address specific business needs. Fujitsu was responsible for the first-ever production implementation of SAP Business Warehouse running on SAP HANA,<sup>8</sup> and provides the hardware for SAP's own SAP HANA infrastructure.<sup>9</sup>

As one of the top-five server manufacturers and the fourth-largest IT service provider,<sup>10</sup> Fujitsu is well positioned to support customers in their journey toward a complete, real-time business platform. Fujitsu takes a holistic approach to SAP HANA implementation. Solution components are tightly integrated through deep engineering engagements among Intel, SAP, and Fujitsu. Fujitsu also provides customers with comprehensive service and support, including cost-effective resources for assessing potential business value and for designing and implementing a best-fit solution.



**Figure 3.** Fujitsu offers a wide range of SAP HANA\* infrastructure solutions, including single-node appliances and massively scalable, multi-node solutions that provide mission-critical support for data replication, high availability, and disaster recovery.

### Start Small and Scale Almost without Limit

Fujitsu integrates SAP HANA software with robust, flexible Fujitsu PRIMERGY servers to deliver pre-configured, pre-tested SAP HANA appliances. Systems are available to match customer demands at virtually any scale, from small business customers to the largest global enterprises. Single-node appliances range in size from systems that support up to 128 GB of memory to systems that support up to 6 TB of memory, and the hardware and software platform is built to scale even higher.<sup>11</sup> These single-node systems are ideal as high-speed database engines for small to mid-sized data warehouses and for SAP Business Suite applications.

Fujitsu also provides single-node SAP HANA appliances running VMware virtualization software. Although SAP HANA running in VMware virtual machines still has some limitations from a production standpoint, these virtualized appliances are certified for many production use cases and also provide enhanced flexibility and efficiency for test and development environments.<sup>12</sup>

Fujitsu's single-node SAP HANA systems can be used as building blocks in clustered environments and in the SAP HANA Enterprise Cloud to support enterprise data warehouses up to petabyte scale. Customers can

start with a single node and scale out their SAP HANA cluster incrementally as workloads and data volumes grow (Figure 3).

For a current list of certified SAP HANA systems, see the official SAP Certification page [scn.sap.com/docs/DOC-52522](http://scn.sap.com/docs/DOC-52522)

### Implement High Availability for Mission-Critical Processes

Many businesses use SAP HANA to support revenue-generating processes and other mission-critical business functions. Fujitsu solutions are designed to support required levels of high availability and business continuity across the full range of business requirements.

High availability in single-node SAP HANA appliances is provided by Fujitsu PRIMEQUEST servers, which include redundant components such as hot-plug fans and power supplies. Even higher availability is supported in multi-node configurations through the inclusion of standby nodes that automatically take over if a production server should fail. Additional protections are provided by Network File System\* (NFS) and a shared Fujitsu ETERNUS\* or NetApp FAS\* storage system, which help to ensure that all data is constantly mirrored. If data is lost in main memory, it can be copied back from the storage system.

This high availability solution can be extended across two sites to provide comprehensive disaster recovery. In this topology, all infrastructure components and data are reflected in a second data center. NetApp Fabric Metro Cluster\* FAS3250 and the NFS V3 Synchronous Replication\* protocol ensure synchronous mirroring to deliver continuous availability and zero data loss, even if an entire data center fails. If the secondary site is equipped with an additional NetApp FAS3250 storage unit, the failover infrastructure can be used as a test and development system during normal operations.

Advanced, automated data backups can be implemented in single-node and multi-node configurations by adding certified SAP HANA backup solutions, such as Symantec NetBackup\* or CommVault Simpana\*. Automating the backup process provides incremental, point-in-time recovery to protect against human error, which is the most common cause of data loss in database environments.

Fujitsu works closely with NetApp, Symantec, and CommVault to ensure tight integration across the solution stack, so replication, backup, recovery, and failover are efficient, reliable, and easy to implement and manage. Customers benefit from a proven solution and a single point of contact for all infrastructure-related issues.

### **Simplify Management Across Your SAP Landscape**

Many businesses are integrating SAP HANA into their existing SAP application landscapes to accelerate performance and simplify infrastructure and operations. Fujitsu FlexFrame\* Orchestrator makes it easier to manage these complex environments. FlexFrame Orchestrator has been supporting SAP landscapes for more than a decade to help IT organizations simplify administration and high availability, while reducing total cost of ownership. Support for SAP HANA extends these benefits to real-time environments powered by SAP HANA, providing a single interface for managing all deployment models, whether they are hosted in the customer's own data center, delivered as a managed hosted service, or deployed in the cloud.

### **Fast Deployment with Reduced Risk and Higher Value**

SAP HANA can be used to accelerate existing processes, but the most dramatic business benefits are typically realized by using its speed, scale, and simplicity to implement innovative new usage models that would otherwise be impossible. Fujitsu services are therefore designed not only to speed deployment while minimizing cost and risk, but also to help businesses evaluate the transformational capabilities of SAP HANA within the context of their unique business needs and data environment.

### **Comprehensive Service and Support**

Professional services from Fujitsu offer efficient consulting, implementation and integration packages, providing a comprehensive approach that shortens time-to-value to just days, rather than weeks or months. Fujitsu's unique preconfiguration and installation processes include customer-specific settings for optimized integration into specific environments. These processes are based on best practices developed through successful SAP HANA

implementations across a wide range of industries. Customers benefit from a complete, optimized, ready-to-run SAP HANA solution delivered at a competitive, fixed price. They also benefit from a single point of contact and an integrated service level agreement that extends across all infrastructure-related support topics, including third-party components.

### **Experience the Power of SAP HANA**

You can get a personalized look at the transformative business value offered by SAP HANA through the Fujitsu Global Demo Center. This center is located in Neckarsulm, Germany, but can be accessed remotely from anywhere in the world. Fujitsu uses this resource to provide real-world demonstrations that help prospective customers better understand how SAP HANA running on Fujitsu PRIMERGY/PRIMEQUEST servers can be used to achieve competitive advantage through faster, smarter business processes.

Customers can also use the Global Demo Center to take the next step by uploading their data and running individual proof-of-concept projects. The Center is staffed by experienced consultants who can help you identify potential usage models and develop a customized plan for implementation.

### **Test Drive SAP HANA in Your Own Data Center**

Fujitsu Playgrounds for SAP HANA provide a more complete and realistic look at SAP HANA within your own data center environment. Based on SAP Rapid Deployment Solutions, Fujitsu Playgrounds combine certified infrastructure offerings with sandbox scenarios and implementation services. The infrastructure comes ready to run, preinstalled with test licenses and SAP software components, such as SAP HANA, SAP BusinessObjects\* and SAP System Landscape Transformation.\*

Fujitsu Playgrounds are cost-optimized, so they focus on the essential needs of non-production environments. Within that framework, they provide a complete, professional test bed so you can fully evaluate the potential of SAP HANA. It's a relatively quick and cost-effective way to gain clear, practical insight into the benefits and requirements of a production implementation.

### **Conclusion**

SAP HANA provides groundbreaking business capability. By enabling businesses to consolidate their transactional and analytics applications onto an ultra-fast, in-memory database, this real-time business platform eliminates the traditional time delays between data generation and data analysis. Businesses can combine and analyze all relevant data in real time to drive better and faster decision making.

The latest SAP HANA product availability matrix includes a wide range of configurations based on Fujitsu PRIMERGY/PRIMEQUEST servers, the Intel Xeon processor E7 v2 family, and the Intel Solid-State Drive DC S3700 Series. These systems provide dramatic increases in data capacity, improved reliability and availability, and cost-effective integration of petabyte-scale data. Just as importantly, Fujitsu offers end-to-end service and support, including expert consultation for evaluating the potential value of the platform in specific industries and business environments. Contact your Fujitsu or SAP representative today for more information, or visit the links on the following page for additional resources.

## **Additional Resources**

### **SAP HANA**

- [www.saphana.com/welcome](http://www.saphana.com/welcome)

### **Fujitsu Infrastructure for SAP HANA**

- [www.fujitsu.com/fts/solutions/infrastructure/dynamic-infrastructure/hana/](http://www.fujitsu.com/fts/solutions/infrastructure/dynamic-infrastructure/hana/)
- [solutions.us.fujitsu.com/www/content/services/dynamic\\_infrastructures/solutions/sap\\_infrastructure/sap\\_hana.php](http://solutions.us.fujitsu.com/www/content/services/dynamic_infrastructures/solutions/sap_infrastructure/sap_hana.php)

### **Intel Xeon processor E7 v2 family**

- [www.intel.com/content/www/us/en/processors/xeon/xeon-processor-e7-family.html](http://www.intel.com/content/www/us/en/processors/xeon/xeon-processor-e7-family.html)

### **Intel Solid-State Drive DC S3700 series**

- [www.intel.com/content/www/us/en/solid-state-drives/solid-state-drives-dc-s3700-series.html](http://www.intel.com/content/www/us/en/solid-state-drives/solid-state-drives-dc-s3700-series.html)



<sup>1</sup> The claim of double the data capacity is based on Fujitsu SAP HANA solutions that have been certified for production use. Certified SAP HANA solutions based on Fujitsu PRIMERGY servers and the Intel Xeon processor E7 family supported up to 1 TB of data. Certified SAP HANA solutions based on Fujitsu PRIMERGY servers and the Intel Xeon processor E7 v2 family support up to 2 TB of data. For a current list of certified SAP HANA systems, see the official SAP Certification page [scn.sap.com/docs/DOC-52522](http://scn.sap.com/docs/DOC-52522).

<sup>2</sup> The Intel® Solid-State Drive DC S3700 Series is certified for use in SAP HANA solutions based on the Fujitsu PRIMERGY RX4770 M1 server.

<sup>3</sup> Source: "Real-Time Enterprise Stories," by Real Time Research Reports, Sponsored by SAP, October 2014. [http://www.sap.com/bin/sapcom/en\\_us/downloadasset.2014-10-oct-13-21.sap-hana-real-time-enterprise-stories-pdf.bypassReg.html](http://www.sap.com/bin/sapcom/en_us/downloadasset.2014-10-oct-13-21.sap-hana-real-time-enterprise-stories-pdf.bypassReg.html).

<sup>4</sup> Up to 4x I/O bandwidth claim based on Intel internal estimates of the Intel® Xeon® processor E7-4890 v2 performance normalized against the improvements over dual-Input/Output Hub (IOH) Intel® Xeon® processor E7-4870 based on internal bandwidth tool running the 1R1W test.

<sup>5</sup> Software and workloads used in performance tests may have been optimized for performance only on Intel microprocessors. Performance tests, such as SYSmark and MobileMark, are measured using specific computer systems, components, software, operations and functions. Any change to any of those factors may cause the results to vary. You should consult other information and performance tests to assist you in fully evaluating your contemplated purchases, including the performance of that product when combined with other products.

<sup>6</sup> Atomicity requires that every transaction must be either completed in its entirety or not at all; Consistency requires that only valid data is written to the database (based on the database's consistency rules); Isolation requires that no transaction can impact any other transaction that executes concurrently; and Durability requires that any transaction, once committed to the database, cannot be lost, even if the database crashes. For more information, see The ACID Model, by Mike Chapple. <http://databases.about.com/od/specificproducts/a/acid.htm>.

<sup>7</sup> No computer system can provide absolute reliability, availability or serviceability. Requires an Intel® Xeon® processor E7-8800/4800/2800 v2 product families or Intel® Itanium® 9500 series-based system (or follow-on generations of either.) Built-in reliability features available on select Intel® processors may require additional software, hardware, services and/or an internet connection. Results may vary depending upon configuration. Consult your system manufacturer for more details.

<sup>8</sup> Fujitsu worked with Red Bull to implement the first SAP BW on SAP HANA production solution. For details, see this SAP and Red Bull video from SAPPHERE NOW + TechEd @ Madrid, November 23, 2011. <http://www.saphana.com/blogs/experts/2011/11/23/redbull-rocked-sapphirenow-teched-madrid>.

<sup>9</sup> Source: "How SAP Runs Better with Fujitsu Infrastructure Solutions for SAP HANA," a session presented at SAP SAPPHERE NOW in Orlando, 2012. <http://events.sap.com/sapphirenow/en/session/2273>.

<sup>10</sup> Source: <http://www.fujitsu.com/global/about/corporate/info/index.html>.

<sup>11</sup> SAP currently certifies single-server SAP HANA platform solutions designed to hold up to 6 TB of data. Eight-socket Fujitsu servers based on the Intel® Xeon® processor E7 v2 family can scale up to 12 TB using 32 GB DIMMs, although such systems have yet to be certified for SAP HANA.

<sup>12</sup> For more information, see "SAP HANA on VMware vSphere 5.5 for Production Environments." [http://www.vmware.com/files/pdf/SAP\\_HANA\\_on\\_vMware\\_vsphere\\_5.5\\_for\\_production\\_environments\\_FAQ.pdf](http://www.vmware.com/files/pdf/SAP_HANA_on_vMware_vsphere_5.5_for_production_environments_FAQ.pdf).

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