Data Sheet

Dell Validated Systems for SAP HANA™

SAP HANA is at the forefront of in-memory computing technology for business analytics and business processing. Dell and SAP continue their partnership to deliver an SAP HANA platform portfolio that provides a multipurpose, data source-agnostic, in-memory data engine, optimally configured on Dell PowerEdge server hardware.

Overview of the Dell Validated System for SAP HANA

For more than a decade, Dell has collaborated with SAP to deliver hundreds of solutions to customers across many industries. Dell helps organizations achieve rapid and sustainable business results with standards based solutions that are high-performing and end-to-end. Customers can choose from a portfolio of end-to-end solutions and services in support of SAP HANA applications. Our complement of assessment, implementation, management, data modeling, and use case assistance services help reduce IT costs while helping organizations transform their business. Dell's innovative platforms can dramatically increase the availability and speed of attaining business information, leading to insightful decision-making using SAP HANA.

Dell and SAP have teamed up to offer an optimally configured SAP HANA solution that includes a hardware platform, pre-loaded software and a full range of services. This solution is reliable, scalable and offered in multiple configurations to address your specific business needs. Dell's end-to-end solutions give your organization full access to the power of SAP HANA.

The combination of Dell's PowerEdge R930 platform and SAP HANA software allows users to conduct analytics, performance management and operations in a single system. Together, the solutions help enable a business to react faster to events impacting operations today.

Above all, organizations can enable themselves to identify and analyze trends and patterns, improving planning, forecasting and price optimization. Enterprise customers taking advantage of Dell's SAP HANA platform get a cost-effective, optimized, in-memory computing solution that can increase availability and reduce risk.

Achieve more, deliver quick results and maximize efficiency

Dell Validated System for SAP HANA includes:

A high performance in-memory computing database and a powerful data calculation engine.

Real-time replication service to access and replicate data from ASAP Business Suite and other sources.

Data integration services to access and index information from virtually any data source.

A data repository to persist views of business information.

Highly-tuned integration with SAP BusinessObjects BI solutions for insight and analytics.

SQL and MDX interfaces for third-party application access

A unified information modeling and design environment.

Support for OLTP database applications, enabling the deployment of SAP Business Suite applications such as ERP, SCM, and CRM

Dell's SAP HANA configuration portfolio

The Dell Validated System for SAP HANA is offered in a wide variety of pre-configured and optimized sizes to meet virtually any customer need. Whether the dataset is large or small, Dell and SAP have worked together to provide solutions that are right sized for each data analysis environment.

The Dell PowerEdge Server R930 platform is the foundational platform for the Dell Validated System for SAP HANA, and is consistently used across all configurations. By utilizing the same powerful platform from smallest to the largest configuration, customers can be assured of a stable environment for SAP HANA that will not require learning a whole new system as their needs grow. Instead, consistency of platform offers a migration path, rather than "rip and replace".

The Dell PowerEdge R930 provides:

- Performance and reliability in a scalable 4U, four-socket server allowing large workload consolidation and scale for the SAP HANA in-memory database.
- Integrated diagnostics with Intel® Advanced RAS (Reliability, Availability, Serviceability) Technology.
- Robust infrastructure, including performance resources, power efficiency, I/O, and memory scalability.
- Processing power using high performing Intel E7v4 processors, up to 6TB of DDR4 RAM, 24 hot swap 12Gbps SAS drives, and 2 x 10Gb LOM with 10 PCIe slots.

The linear scalability of our SAP HANA software platform makes scaling to meet larger workload demands a very straightforward and non-disruptive process.

Using the same R930 servers as our single server configurations, Dell combines the superior scalability and RAS features of this platform into a multi-node configuration, utilizing 10GbE networking, and sharing data across Dell Compellent SAN Storage.

Using modular scalability as a primary design construct creates a system that grows seamlessly, without requiring a hardware change when expansion is needed, and without disrupting the existing system. That can yield a much better total cost of ownership as application use evolves over the life of the system.

> "We also have greater flexibility with our Dell SAP HANA appliance because we can respond quickly to requests for new reports to uncover trends and patterns, helping create a more agile business."
>
> Zhang Wei, IT Administrator, HollySys Group

Dell Validated System for SAP HANA Scale-Out configurations

Dell offers multi-node configuration solutions to meet your scalability needs. Utilizing the processing power of the PowerEdge R930, Dell's certified scale out solution for SAP HANA analytics supports modular scaling in 1, 1.5 or 2TB increments, growing from 2 to 32TB. (Certification is currently underway to enhance performance further with the introduction of the Intel E7v4 processors.)

Configuration	2-4TB (2 + 1 nodes)	4-8TB (4 + 1 nodes)	6-12 TB (6 +1 nodes)	8-16TB (8 +1 nodes)	10-20TB (10 + 2 nodes)	12-24TB (12 + 2 nodes)	14-28TB (14 + 2 nodes)	16-32TB (16 + 2 nodes)
Compute/PEF	N * Active + 1 or 2 standby Dell PowerEdge R930 servers consisting of: – 1, 1.5, or 2TB RAM, 4 x Intel Xeon 10 core E7v3 processors (E7v4 coming soon) – Intel Ethernet X540 DP 10Gb BT + I350 1Gb BT DP Network Daughter Card – 2 x Intel 10GbE dual port RJ45 (X540-T2), 2 x Qlogic 2660 Single Port 16Gb Optical Fiber Channel HBA – Choice of operating system: SUSE Linux or Red Hat Linux for SAP HANA								
Storage (each Compellent storage array supports up to 8 active nodes + one standby)	Dell Compellent with: • 2 x SAS, 6Gb, 4 Wide-Port, PCI-e backend/per controller (dual chain) • 2 x FC16, 2-Port QLE2662, PCI-e front end/per controller • 2 x 24 bay 2.5" 1.2TB 10K RPM SAS with 7-24 spindles/per array • 1 x 24 bay 2.5" 400G SAS SSD with 7-24 disks/per array				Dell Compellent (2nd unit) with: • 2 x SAS, 6Gb, 4 Wide-Port, PCI-e back end/per controller (dual chain) • 2 x FC16, 2-Port QLE2662, PCI-e front end/per controller • 2 x 24 bay 2.5" 1.2TB 10K RPM SAS with 7-24 spindles/per array • 1 x 24 bay 2.5" 400G SAS SSD with 7-24 disks/per array			
Management, storage and networking fabrics (complete for entire infrastructure)	2 x Force 10 S4820T 1 x Force 10 S3048-ON 2 x Brocade 6510 1 x PowerEdge R620 server as management node							

Dell Compellent SAN Storage complements the power, performance, and manageability of Dell PowerEdge servers. It offers the additional benefit of the Fluid Data storage system– a virtualized environment that provides tremendous flexibility in storage management. Automated tiering of data – standard with Dell Compellent storage software - manages persistent storage to provide the quickest access to the data sets most needed for analysis, and high availability features that simplify backups, expansion, and data migration provide tangible enhancements to the SAP HANA analytics engine infrastructure.

Utilizing both fibre channel SAN technology and a highly available multi-node design, the Dell Validated System for SAP HANA scale out configurations are engineered to provide resiliency and easy expandability. This modular scalability is an important feature for IT departments deploying a mission critical solution for their business. The Dell SAP HANA solution lets you start with high availability at 2TB, and grow your system as your data analysis and

processing needs grow, 1, 1.5 or 2TB at a time, without disruption to the operation of the system. Above all, there is no requirement to change architectures or remove existing system components to facilitate expansion.

The Dell Engineered Systems for SAP HANA provide you with choice as you scale your infrastructure. Besides the variety of modularly scalable RAM configurations, you also have the option of using either SUSE or Red Hat as your operating system. Dell scale out configurations now support both SLES for SAP HANA, as well as RHEL for SAP HANA, allowing easier adherence to datacenter standards.

Dell engineers each of these components, end-to-end, to provide a completely integrated and fully supported ecosystem for high performance data analytics. And, the Dell scalable solution for SAP HANA is designed to support additional applications as they are released by SAP, providing even more investment protection over the life of your SAP HANA implementation.

Dell Validated System for SAP HANA single node configurations

The Dell Validated System for SAP HANA single node configuration is fully contained in the Dell PowerEdge R930 server, making use of fast internal SAS disks for storage and solid state (SSD) storage for data and logs, respectively. Solid state SAS storage technology offers high IOPs and low latency performance for SAP HANA system log maintenance while an array of internal 10Krpm SAS disks is used to maintain a copy of the data image.

Dell offers several different sizes of HANA appliances that are all based on the Dell PowerEdge R930 server platform to meet your needs, whether analytics or Business Warehouse implementations, or for transactional database usage running SAP Suite on HANA (SoH). These configurations offer several options for processor configuration, disk storage and DRAM size, depending on performance certification requirements, and whether the system will be upgraded in the future. Upgrades can be accomplished easily by adding RAM and/or processors, but planning for an upgrade at inception by using higher density DRAMs can alleviate the need to replace smaller DRAMs in the future. Your Dell representative can help you choose the right configuration for your implementation needs.

Dell Validated System for SAP HANA single node configurations for analytics applications:

Analytics/BW	128-384GB	512GB	768GB	1.0TB	1.5TB	2.0TB
Server	Dell PowerEdge R930 (w/Intel E7v4 cpu)					
Processor	2x or 4x Intel E7-8880v4 or E7-8890v4			4x Intel E7-8880v4 or E7-8890v4		
Memory DIMM Size	8 or 32GB RDIMMs	16 or 32GB RDIMMs	16 or 32GB RDIMMs	32GB RDIMMs	32GB RDIMMs	32GB RDIMMs or 64GB LRDIMMs
Storage: OS + SAP + LOGS	5x800GB or 1.2TB SAS SSD + 1 hot spare (RAID 5 configuration)					
DATA	3-11x800G or 3-7x1.6TB SAS SSD + 1 hot spares (RAID 5 configuration)					
OS	SUSE Enterprise Linux (SLES) for SAP HANA / Red Hat Enterprise Linux (RHEL) for SAP HANA					
File System	XFS for DATA & LOG volumes					

To address the transactional capabilities and technical requirements in SAP HANA, Dell offers 1-4TB 4 processor server configurations that support SAP Business Suite applications running on SAP HANA. With these configurations, SAP Business Suite environments as large as 8-10TB uncompressed can take advantage of the acceleration offered by the in-memory database environment and data compression offered by SAP HANA.

Dell Validated System for SAP HANA single node configurations for transactional applications:

Suite on HANA	128-384GB	512GB	768GB	1.0TB	1.5TB	2.0TB	3.0TB	4.0TB
Server	Dell PowerEdge R930 (w/Intel E7v4 cpu)							
Processor	2x or 4x Intel E7-8880v4 or E7-8890v4					4x Intel E7-8880v4 or E7-8890v4		4x E7-8890v4
Memory DIMM Size	8 or 32GB RDIMMs	16 or 32GB RDIMMs	16 or 32GB RDIMMs	32GB RDIMMs or 64GB LRDIMMs	32GB RDIMMs or 64GB LRDIMMs	32GB RDIMMs or 64GB LRDIMMs	64GB LRDIMMs	64GB LRDIMMs
Storage: OS + SAP	5x800GB or 1.2TB SAS SSD + 1 hot spare (RAID 5 configuration)							6x1.2TB SAS SSD + hot spare
DATA + LOGS	3-14x800G or 3-8x1.6TB SAS SSD + 1 hot spares (RAID 5 configuration)							10x1.2TB SAS SSD + hot spare
OS	SUSE Enterprise Linux (SLES) for SAP HANA / Red Hat Enterprise Linux (RHEL) for SAP HANA							
File System	XFS for DATA & LOG volumes							

These single server configurations also support SAP HANA Virtualized on VMware vSphere, allowing the virtualization of multiple production or pre-production environments on a single server. You can also virtualize a single instance of HANA up to 4TB for greater flexibility and availability. (NOTE: Configurations must reserve 10% of server RAM for hypervisor operation.)

For SAP Suite on HANA environments requiring greater than 4TB of RAM, Dell also offers our partnership with SGI to provide single server configurations from 4TB to 15TB of RAM. The SGI UV-300H is an SAP certified single server platform that can scale to meet the largest business application demands, utilizing the same Intel E7 technology to grow as your needs grow.

Dell Validated Systems for SAP HANA also offer customers choice in operating system, expanding our certified portfolio to include configurations running Red Hat Enterprise Linux (RHEL) in addition to the standard SUSE Linux Enterprise Server (SLES). This offering gives

users the opportunity to choose an operating system standard for their IT infrastructure, without having to build expertise with a new platform.

Support infrastructure
Dell's Validated System for SAP HANA is designed to be an all-inclusive solution that comes as a pre-integrated unit with all necessary hardware, storage, and networking capabilities.

Additional software for enhanced features
Dell's Validated System for SAP HANA is an end-to-end and all-in-one solution that comes pre-loaded with all of the software and management tools necessary for productive operation in your data center. In the case of SAP HANA Virtualized configurations, the installed system would also include VMware vSphere software pre-installed. Dell also offers several management software tools – such as Toad for SAP HANA and Shareplex – that ease the daily administration of the system.

Flexible configuration options

In 2013, SAP introduced the Tailored Data Center Integration (TDI) delivery model. Many customer have existing infrastructure and business processes they wish to utilize with SAP HANA. TDI allows customers to build their own SAP HANA configuration with certified servers, storage, and networking. TDI deployment services are utilized to install hardware, configure SAP HANA, and certify for support. TDI provides the widest flexibility of any SAP HANA solution, and is ideal for smaller HANA production environments, proofs of concepts and "sandbox" environments. Dell offers several different TDI SAP HANA configurations based on Dell PowerEdge 13G servers and Dell Compellent Storage.

Certified Dell Server	CPU processor type	Operating Systems	RAM	Storage
R630	2-socket rack server Intel® Xeon® E5-2600 v4	RedHat® Enterprise Linux SUSE® Linux Enterprise Server	128GB-768GB	R630 Specification **Minimum Disk configuration required for HANA:** **OS+SAP+LOG**: 5 x 1.2TB SAS + 1 hot spare configured as RAID5 **DATA volume**: 5 x 800GB or 3 x 1.6TB SAS SSD + 1 hot spare configured as RAID 5
T630	2-socket tower server Intel® Xeon® E5-2600 v4	RedHat® Enterprise Linux SUSE® Linux Enterprise Server	128GB-768GB	T630 Specification **Minimum Disk configuration required for HANA:** **OS+SAP+LOG**: 5 x 1.2TB SAS + 1 hot spare configured as RAID5 **DATA volume**: 5 x 800GB or 3 x 1.6TB SAS SSD + 1 hot spare configured as RAID 5
R730	2-socket rack server Intel® Xeon® E5-2600 v4	RedHat® Enterprise Linux SUSE® Linux Enterprise Server	128GB-768GB	R730 Specification **Minimum Disk configuration required for HANA:** **OS+SAP+LOG**: 5 x 1.2TB SAS + 1 hot spare configured as RAID5 **DATA volume**: 5 x 800GB or 3 x 1.6TB SAS SSD + 1 hot spare configured as RAID 5
R730XD	2-socket rack server Intel® Xeon® E5-2600 v4	RedHat® Enterprise Linux SUSE® Linux Enterprise Server	128GB-768GB	R730xd Specification **Minimum Disk configuration required for HANA:** **OS+SAP+LOG**: 5 x 1.2TB SAS + 1 hot spare configured as RAID5 **DATA volume**: 5 x 800GB or 3 x 1.6TB SAS SSD + 1 hot spare configured as RAID 5
M630	2–sockets blade server Intel® Xeon® E5-2600 v4	RedHat® Enterprise Linux SUSE® Linux Enterprise Server	128GB-768GB	M630 Specification **Minimum Disk configuration required for HANA:** **OS+SAP+LOG**: 5 x 1.2TB SAS + 1 hot spare configured as RAID5 **DATA volume**: 5 x 800GB or 3 x 1.6TB SAS SSD + 1 hot spare configured as RAID 5
R930	2-4–sockets E7-8880 v4 2.3GHz OR E7-8890 v4 2.2GHz	RedHat® Enterprise Linux SUSE® Linux Enterprise Server	128GB-2TB for Analytics and BW 128GB-4TB for SoH (4TB requires 4x E7-8890 v4 2.2GHz)	R930 Specification **Memory and Disk Configurations for HANA:** Please refer to latest Dell SAP HANA Solutions data sheet at: http://www.dell.com/en-us/work/learn/business-intelligence-sap#Overview

SAP HANA appliance configurations are limited to Xeon E7 processor technology. For those customer requiring a broad set of choices Dell offers Xeon E5 SAP HANA TDI Configurations. The E5 family provides an entry-level platform that is cost-effective, simple to deploy, and supported by SAP and Dell.   Dell offers a complete line of certified servers and storage for this program.

TDI (and all SAP HANA) installations require a certified SAP HANA installer that has successfully completed the "SAP Certified Technology Specialist – SAP HANA Install" training and certification workshop. Dell provides TDI services with certified installers to complete all aspects of the deployment and the TDI certification process including the SAP HANA HW Config Check tool to validate the hardware and performance KPI.

NOTE - SAP HANA TDI currently does not support:
- Intel Xeon E5 4 socket systems
- SAP HANA Scale-out solutions based on Xeon E5 compute nodes

Services and Support

SAP HANA services are also available to assist you with implementing your solution. Dell offers end-to-end solutions to support SAP HANA applications — helping you reduce IT costs and transform your business. The Dell Validated System for SAP HANA appliance is delivered fully installed and configured with all the required software for Dell and SAP Service engineers to connect it to customer source system(s).

Dell provides the following HANA services:
- HANA Quick-Start Service that enables installation, configuration and validation of the hardware, software and post-install documentation.
- HANA Managed Service providing ongoing management and support for SAP HANA landscape. This service includes 24x7 monitoring, ongoing remote health-checks, firmware and software upgrades, including application patching as well as assistance with problem tracking and resolution.
- Rapid Deployment Solutions - BW to HANA Migration providing rapid database migration of SAP Netweaver BW 7.3 to SAP HANA using SAP tools & best practices, as well as RDS services for profitability analysis and operational reporting on HANA.

Support for your system

Dell is an expert in SAP HANA system support. Dell has a strong systems management and support practice and an in depth understanding of SAP hardware and software solutions.

Dell's SAP HANA appliance is delivered with 3 years of Dell's award winning ProSupport Mission Critical services and a 3-year extended hardware warranty. Customers receive 24x7x365 phone support, escalation management and collaborative support leveraging Dell's global ProSupport infrastructure of more than 30,000 technicians supporting more than 100 countries in 55 languages.

Dell's ProSupport Mission Critical services are designed to accelerate rapid resolution by offering quick delivery of onsite parts and or labor and providing access to Dell's Critical Situation Process.

Key support features:

- Onsite Response – 2 hour onsite service with 6 hour hardware repair available 24x7, including holidays.
- CritSit Procedures – Severity level 1 issues will be reviewed by Dell and may be nominated for CritSit incident coverage through Dell Global Command Centers. During a CritSit incident, expert resource teams are mobilized to get you back up and running fast.
- Emergency dispatch – Onsite service technician dispatched in parallel with phone-based troubleshooting when you declare a Severity level 1 incident.

With Dell's SAP HANA appliance and implementation and solution consulting services companies can set themselves apart by delivering complex analytic solutions before their competition. The Dell solution for SAP HANA offers:

Powerful technology	Every configuration is based on the Dell PowerEdge R930 server platform to provide a consistent experience and a solid base for future expansion, without forcing "rip and replace" as system needs evolve. Dell's PowerEdge R930 incorporates Intel E7v3 and v4 technology, and is certified for SAP HANA and includes everything needed to support your SAP HANA solution.
Virtualization for development and production	Every Dell 4 socket server configuration is certified for the VMware VM environment to virtualize production and non-production environments with multiple VM instances of HANA per server. Production environments also benefit from virtualization up to a single 4TB VM instance (less 10% for hypervisor overhead).
Enterprise class availability	Utilizing both fibre channel SAN technology and a highly available multi-node design, the Dell scale out solutions for SAP HANA are engineered to provide resiliency and easy expandability from 2TB up to 32TB and beyond. High performance automated tiering of data with Dell Compellent storage software provides the quickest access to the data sets most needed for analysis. Intel E7v4 technology will be incorporated into Dell scale-out configurations when certification is complete.
Disaster recovery	Dell solutions for SAP HANA are all tested and able to provide remote disaster recovery through system replication. Scale out solutions will also offer storage based replication, leveraging the unique features found in Dell Compellent SAN storage.
Modular growth	The Dell scale out solution is designed to grow modularly using incremental building blocks, and do it without disruption to the existing system, preserving your investment as your system changes.
SAP applications in-memory:	Application deployment is now supported on Dell solutions for SAP HANA, enabling production business applications and business analytics to both enjoy the speed and performance of in-memory computing, without the need for multiple compute environments.
Single point of contact	Dell is your one source for all solution components – including SAP HANA software licenses - and engineering, and Dell Services provides end-to-end solution support and consulting expertise.
Comprehensive services	Dell's portfolio of SAP full lifecycle services leverage industry best practices to deliver better business outcomes for SAP clients. We offer workshops, readiness assessments and industry-specific solutions. Our HANA Quick-Start Service includes installation, configuration and validation of the hardware and software, and also provides you with post-installation documentation.
World-class support	Dell's ProSupport ™and Mission Critical Services keep your SAP HANA solution running smoothly. For more thorough support, our HANA Managed Services provide comprehensive management and support for your SAP HANA landscape, including 24 x 7 monitoring, ongoing remote health checks, firmware and software upgrades, including application patching, as well as assistance with problem tracking and resolution.

Dell and SAP - a long standing partnership

For more than a decade, Dell has collaborated with SAP to deliver hundreds of SAP solutions across many industries.

Dell offers customers a complete portfolio of end-to- end solutions in support of SAP HANA applications that help reduce IT costs while helping organizations transform their business. Our innovative platforms dramatically increase the availability and speed of business information, leading to more insightful decision-making using SAP HANA.

To learn more about the full portfolio of Dell Validated Systems for SAP HANA, visit our learning site at http://www.dell.com/SAP.