HPE ConvergedSystem 500 for SAP HANA Scale-up and Scale-out configurations solution architecture

HPE ProLiant DL580 Gen9 server platform
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Executive summary

HPE ConvergedSystem 500 for SAP HANA Scale-up and Scale-out configurations system architecture provides a highly available and resilient SAP HANA® in-memory database. The configurations are hardware and software solutions that integrate SAP HANA with HPE ProLiant DL580 Gen9 servers. The Scale-up configurations are available with two processors or four processors, and memory configurations up to 4TB. These solutions are optimally configured software and hardware configurations for your SAP application environment. HPE ConvergedSystem 500 for SAP HANA Scale-out configurations are available with four processor and supports 1TB, 1.5TB and 2TB configurations.

These configurations, in an appliance delivery model, provide the following benefits:

- Fully vetted hardware and software infrastructure architected by Hewlett Packard Enterprise product engineers to host SAP HANA database and certified by SAP®.
- Configured, integrated, and tested before shipment to customer data centers.
- HPE on-site installation and configuration.
- Each release is subject to a full suite of validation and verification tests.
- Redundant network pathways for resilient highly available access to components and data.
- Disk redundancy using mirroring or parity.
- Each compute engine is an HPE ProLiant DL580 Gen9 server with:
  - A choice of two or four x86 Intel® Xeon® E7-8880 v4 or E7-8890 v4 processors
  - Total of 22 or 24 cores per socket for high performance computing
- Scale-up configuration and memory size can be paired with:
  - An HPE D3700 enclosure with two I/O modules and 15 x 18TB SAS disks and 5 x 400GB SSD (for HPE Smart Cache) for maximum availability and performance.
  - 128GB to 4TB of RAM. 2-processor configuration is only available up to 2TB memory size.
- Scale-out configuration and memory size can be paired with HPE 3PAR StoreServ 8400 storage with 96 x 1.2TB SAS disk drives.
  - 1TB, 1.5TB and 2TB of RAM. 4-processor configuration is only available for Scale-out configuration.

An in-memory database requires high performance storage for data and log storage to preserve the integrity and availability of information across shutdown and fail-over scenarios. The HPE ConvergedSystem 500 for SAP HANA Scale-up relies on an HPE Smart Array P830i/4GB FBWC 12Gb 2-port SAS controller for internal storage, HPE Smart Array P431/4GB FBWC 12Gb 2-port SAS controllers for external storage, and high speed HPE networking controller cards to best meet this requirement.

The SAP HANA platform, running on SUSE Linux® Enterprise Server or Red Hat® Enterprise Linux®, provides the basis to dramatically increase the performance of your applications. Customers are adopting SAP HANA quickly because they value the ability to aggregate and analyze data in real time. SAP HANA data compression, in-memory caching, and connections to external application, for example big data technologies, provide key elements in the formula for faster response times.

The purchase of an HPE ConvergedSystem 500 for SAP HANA includes the pre-configured hardware, and installation of operating system and SAP HANA database. Loading operational data and integrating with your applications are additional to this effort. It is important for the success of your SAP HANA implementation to engage the HPE sales team to plan the extract, transform, and loading of data into SAP HANA database and integrating with your applications.

Target audience: Chief information officers (CIOs), chief technology officers (CTOs), IT directors, data center managers, and customers wishing to learn more about this solution from HPE. This document assumes the reader has a basic understanding of several key data center technologies including, but not limited to: servers, storage, networking, power, solution management, virtualization, and hypervisors.

This white paper describes the design, systems integration, and validation performed by HPE in June 2016, and the certification received from SAP. Refer to the Certified and Supported SAP HANA Hardware for more information on all hardware that has been certified or is supported by SAP.
Solution overview

HPE and SAP have joined together to deliver SAP HANA in-memory database, and optionally in a resilient highly available configuration. This compelling database technology brings a new and exciting foundation for business innovation. In memory platforms represent a technological shift in the way companies deal with data because it enables the processing of massive amounts of real-time data in a server’s main memory to provide significantly faster query results. The HPE ConvergedSystem 500 for SAP HANA Scale-up and Scale-out configurations may be positioned as an operational data platform, or as a sidecar configuration for analytics. With HPE ConvergedSystem 500 portfolio for SAP HANA, you have some great choices.

This paper describes the HPE ConvergedSystem 500 for SAP HANA Scale-up and Scale-out configurations.

Design principles

The key design objectives of the HPE ConvergedSystem 500 for SAP HANA Scale-up and Scale-out configurations are:

- Take advantage of HPE converged infrastructure servers with high density, low power consumption and low total cost of ownership (TCO)
- Factory integrated hardware and software for ease of deployment
- Exceed SAP Certification Requirements for the best performance
- Redundant components for high availability (HA)
- HPE ProLiant DL580 Gen9 server with x86 Intel Xeon E7-8880 v4 or E7-8890 v4 processors
- Larger memory footprint capability than was offered with the HPE ConvergedSystem 500 for SAP HANA Scale-up and Scale-out based on HPE ProLiant DL580 Gen8 servers
- The latest supported version of SAP HANA database and SUSE Linux Enterprise Server (SLES) 12 SP1 for SAP HANA OS
- The latest supported version of SAP HANA database and Red Hat Enterprise Linux (RHEL) 7.2 for SAP HANA OS

HPE ConvergedSystem 500 for SAP HANA Scale-up

HPE ConvergedSystem 500 for SAP HANA Scale-up configurations are optimized for SAP HANA in-memory databases. The configurations are based on the HPE ProLiant DL580 Gen9 server platform that includes x86 Intel Xeon E7-8880 v4 or E7-8890 v4 processors. When compared to the DL580 Gen8 server, the HPE ProLiant DL580 Gen9 server offers blazing fast results with enhanced processor performance, greater I/O bandwidth (9 PCIe Gen3.0 slots), and increased storage performance (12Gbps SAS). The HPE D3700 enclosure with 12Gb SAS enables a higher/faster data transfer rate doubling the current transfer rate of 6Gb solutions providing crucial bandwidth. The HPE ProLiant DL580 Gen9 server has security and data protection features for system resiliency that your business can depend on; and with intelligent manageability through HPE Integrated Lights-Out (iLO 4), and user-inspired features, you get faster, lower cost infrastructure management.

Solution components for Scale-up

HPE ConvergedSystem 500 for SAP HANA Scale-up configurations based on HPE ProLiant DL580 Gen9 servers have the following key components:

- A choice of two or four x86 Intel Xeon E7-8880 v4 or E7-8890 v4 processors
- 128GB to 4TB of RAM. 2-processor configuration is only available up to 2TB memory size
- 1 x HPE Smart Array P830i 4GB FBWC storage controller for connecting to internal drives
- Operating system choice of:
  - SUSE Linux Enterprise Server (SLES) 12 SP1 for SAP HANA OS
  - Red Hat Enterprise Linux (RHEL) 7.2 for SAP HANA OS
• Storage choice of:
  – 7 x 1.8TB SAS 10K HDD\(^1\) internal disk drives, and 3 x 400GB\(^2\) SSD for HPE Smart Cache
  or
  – HPE D3700 enclosure with 15 x 1.8TB SAS 10K HDD (DATA and LOG) and 5 x 400GB SSD (HPE Smart Cache) attached to an HPE Smart Array P431/4GB 2-port Ext SAS\(^3\) controller.

• SAP HANA SPS12 (customers must purchase licenses from SAP)

• Redundant 1GbE, 10GbE, or 40GbE network connections for Data (ERP), depending on configuration

• Redundant 1GbE, 10GbE, or 40GbE network connections for BI and client reporting

• Redundant 10GbE or 40GbE network connections for SAP HANA System Replication

• Redundant 1GbE, 10GbE or 40GbE network connections for Backup

• Redundant 1GbE or 40GbE network connections for Management

• Redundant 1GbE network connections for the Quorum Server (optional)

**Hardware for Scale-up**

HPE ConvergedSystem 500 for SAP HANA Scale-up configurations are as follows.

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\(^1\) This option is only available for 128GB to 1TB models

\(^2\) This option is only available for 128GB to 1TB models

\(^3\) This is not required if using the 7 x 1.8TB SAS internal disks instead of the HPE D3700 enclosure
Two-processor configurations
The two-processor configurations provide an entry level solution. Table 1 shows the two-processor configuration components.

Table 1. Two-processor configuration components

<table>
<thead>
<tr>
<th>COMPONENTS</th>
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<tbody>
<tr>
<td>HPE ProLiant DL580 Gen9 with x86 2 x Intel Xeon E7-8880 v4 or E7-8890 v4 processors (22/24 cores each)</td>
</tr>
<tr>
<td>128GB, 256GB, 384GB, 512GB, 768GB, 1TB, 1.5TB and 2TB memory with memory cartridges</td>
</tr>
<tr>
<td>DIMMs</td>
</tr>
<tr>
<td>For 128GB or 256GB or 384GB configurations:</td>
</tr>
<tr>
<td>• 32GB DIMM: 4x or 8x or 12x 4R x4 PC4 DDR4</td>
</tr>
<tr>
<td>For 512GB or 768GB or 1TB configurations:</td>
</tr>
<tr>
<td>• 32GB DIMM: 16x or 24x or 32x 4R x4 PC4 DDR4 (or)</td>
</tr>
<tr>
<td>• 64GB DIMM: 16x 4R x4 PC4 DDR4 (64GB DIMMs only supported for 1TB or larger configurations)</td>
</tr>
<tr>
<td>For 1.5TB or 2TB configurations:</td>
</tr>
<tr>
<td>• 32GB DIMM: 48x or 64x x4R x4 PC4 DDR4 (or)</td>
</tr>
<tr>
<td>• 64GB DIMM: 24x or 32x x4R x4 PC4 DDR4</td>
</tr>
<tr>
<td>1 x Smart Array P830i with 4GB flash backed write cache</td>
</tr>
<tr>
<td>1 x HPE Smart Array P431/4GB FBWC 12Gb 2-port SAS controller (if using an HPE D3700 enclosure)</td>
</tr>
<tr>
<td>Either 7 x 1.8TB 12G SAS 10K HDD (RAID5): 3 x 400GB SSD (RAID5)\ (for HPE Smart Cache)</td>
</tr>
<tr>
<td>Or 1 x HPE D3700 enclosure with 15 x 1.8TB 12G SAS 10K HDD and 5 x 400GB SSD (for HPE Smart Cache)</td>
</tr>
<tr>
<td>Optional for dual purpose\ additional storage:</td>
</tr>
<tr>
<td>1 x HPE D3700 enclosure with 15 x 1.8TB 12G SAS 10K HDD (RAID 50) and 5 x 400GB SSD (for HPE Smart Cache)</td>
</tr>
<tr>
<td>2 x 10/40GbE 2 Port NIC (Mellanox cards - HPE IB FDR/EN 40Gb 2P 544+QSFP Adptr)</td>
</tr>
<tr>
<td>1 x HPE Ethernet 1Gb 4-port 331FLR FIO Adapter</td>
</tr>
<tr>
<td>1 x HPE Ethernet 1Gb 4-port 331T Adapter</td>
</tr>
<tr>
<td>2 x 1500 watt hot plug power supply</td>
</tr>
</tbody>
</table>

Note
Instead of using Mellanox cards (HPE IB FDR/EN 40Gb 2P 544+QSFP Adptr), customer can choose to use 10GbE fiber cards (HPE Ethernet 10Gb 2P 560SFP+ Adptr / fiber), or 10GbE copper cards (HPE Ethernet 10Gb 2P S61T Adptr/ copper).

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\* Two socket or two CPU configurations in 1024GB, 1536GB and 2048GB memory sizes are only allowed for use with SAP Business Suite on HANA
\* Not available for 1.5TB and 2TB configuration
\* Not available for 1.5TB and 2TB configuration
\* Dual purpose storage is used for non-production SAP HANA instances
Figure 1a depicts the front view of HPE ConvergedSystem 500 for SAP HANA Scale-up 128GB to 1TB internal disk configurations. Figure 1b depicts the rear view of HPE ConvergedSystem 500 for SAP HANA Scale-up 128GB to 1TB network annotation. Figure 1c depicts the front view of HPE ConvergedSystem 500 for SAP HANA Scale-up 128GB to 2TB internal and external disk configurations. Figure 1d depicts the rear view of HPE ConvergedSystem 500 for SAP HANA Scale-up 128GB to 2TB network annotation with HPE D3700 disk enclosure.

**Figure 1a. Front view of 2-processor 128GB to 1TB internal disk configurations**

**Figure 1b. Rear view of 2-processor 128GB to 1TB configurations with network annotation**

**Server and Storage Block**
- 1x DL580 Gen9 with x86 2x Intel Xeon E7-8880 v4 or E7-8890 v4 processors
- 128GB, 256GB, 384GB, 512GB, 768GB, 1TB, and 2TB RAM
- 3x 1.8TB SAS 10K HDD (Operating system and HANA LOG)
- 4x 1.8TB SAS 10K HDD (HANA DATA)
- 3x 400GB 12G SSD for SmartCache
- 2x 10/40GbE 2 Port NIC
- 1x 1GbE 4 Port NIC (PCIe)
- 1x 1GbE 4 Port NIC (ALOM)

**Figure 1c. Front view of 2-processor 128GB to 2TB internal and external disk configurations**

**Figure 1d. Rear view of 2-processor 128GB to 2TB network annotation with HPE D3700 disk enclosure**

**Server and Storage Block**
- 1x DL580 Gen9 with x86 2x Intel Xeon E7-8880 v4 or E7-8890 v4 processors
- 128GB, 256GB, 384GB, 512GB, 768GB, 1TB, and 2TB RAM
- 2x 1.8TB SAS 10K HDD (Operating system)
- 1x D3700 Enclosure with
  - 12x 1.8TB SAS 10K HDD (HANA DATA)
  - 3x 1.8TB SAS 10K HDD (HANA LOG)
  - 5x 400GB 12G SSD for SmartCache
- 2x 10/40GbE 2 Port NIC
- 1x 1GbE 4 Port NIC (PCIe)
- 1x 1GbE 4 Port NIC (ALOM)
Figure 1d. Rear view of 2-processor 128GB to 2TB configurations with network annotation with HPE D3700 enclosure

Figure 1e depicts the front view of HPE ConvergedSystem 500 for SAP HANA Scale-up 128GB to 1TB internal and dual purpose disk configurations. Figure 1f depicts the front view of HPE ConvergedSystem 500 for SAP HANA Scale-up 128GB to 2TB internal, external and dual purpose disk configuration. Figure 1g depicts the rear view of HPE ConvergedSystem 500 for SAP HANA Scale-up 128GB to 2TB network annotation with HPE D3700 disk enclosure with dual purpose storage.

**Dual Purpose Storage Block (for non-production HANA DATA and LOG)**
- 1 x D3700 Enclosure w/ 15 x 1.8TB 12G SAS 10K HDD (RAID50)
- 12 x 1.8TB SAS 10K HDD (HANA DATA)
- 3 x 1.8TB SAS 10K HDD (HANA LOG)

**Server and Storage Block**
- 1 x DL580 Gen9 with x86 2 x Intel Xeon E7-8880 v4 or E7-8890 v4 processors
- 128GB, 256GB, 512GB, 768GB and 1TB RAM
- 3 x 1.8TB SAS 10K HDD (Operating system and HANA LOG)
- 4 x 1.8TB SAS 10K HDD (HANA DATA)
- 3 x 400GB 12G SSD for SmartCache
- 2 x 10/40GbE 2 Port NIC
- 1 x 1GbE 4 Port NIC (PCIe)
- 1 x 1GbE 4 Port NIC (ALOM)

Figure 1e. Front view of 2-processor 128GB to 1TB internal and dual purpose disk configurations
Four-processor configurations
The enhanced four-processor configuration builds upon the two-processor configuration with the following additional components:

- Two processors, these processors enable PCIe slots 1-5
- HPE D3700 enclosure for production HANA DATA and LOG (15 x 1.8TB external disks)
- Five 400GB SSD disks for HPE Smart Cache
- Two 10/40GbE 2-Port NIC
• An additional HPE Smart Array P431 controller at slot #9 is attached with HPE D3700 enclosure with 15 x 1.8TB 12G SAS 10K HDD (RAID50) (for dual purpose storage)

Table 2 shows the four-processor configuration components.

### Table 2. Four-processor configuration components

<table>
<thead>
<tr>
<th>COMPONENTS</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>HPE ProLiant DL580 Gen9 with x86 4 x Intel Xeon E7-8880 v4 or E7-8890 v4 processors (22/24 cores each)</td>
<td>256GB to 4TB memory with memory cartridges</td>
</tr>
</tbody>
</table>
| DIMM       | For 256GB or 384GB configurations:  
• 32GB DIMM: 8x or 12x 4R x4 PC4 DDR4  
For 512GB or 768GB or 1TB configurations:  
• 32GB DIMM: 16x or 24x or 32x 4R x4 PC4 DDR4 (or)  
• 64GB DIMM: 16x 4R x4 PC4 DDR4 (64GB DIMMs only supported for 1TB or larger configurations)  
For 1.5TB or 2TB configurations:  
• 32GB DIMM: 48x or 64x 4R x4 PC4 DDR4 (or)  
• 64GB DIMM: 24x or 32x 4R x4 PC4 DDR4  
For 3TB configurations:  
• 32GB DIMM: 96x 4R x4 PC4 DDR4 (or)  
• 64GB DIMM: 48x 4R x4 PC4 DDR4  
For 4TB configurations:  
• 64GB DIMM: 64x 4R x4 PC4 DDR4 |
| 1 x Smart Array P830i with 4GB flash backed write cache | 1 x Smart Array P431 with 4GB flash backed write cache |
| 2 x 1.8TB 12G SAS 10K HDD for operating system | 1 x HPE D3700 enclosure with 15 x 1.8TB 12G SAS 10K HDD (RAID50) and 5 x 400GB SSD for HPE Smart Cache |
| Optional for dual purpose storage:  
1 x Smart Array P431 with 4GB flash backed write cache and  
1 x HPE D3700 enclosure with 15 x 1.8TB 12G SAS 10K HDD (RAID50) and 5 x 400GB SSD for HPE Smart Cache | 4 x 10/40GbE 2-Port NIC (Mellanox cards - HPE IB FDR/EN 40Gb 2P 544+QSFP Adptr)  
1 x HPE Ethernet 1Gb 4-port 331FLR FIO Adapter  
1 x HPE Ethernet 1Gb 4-port 331T Adapter  
4 x 1500 watt hot plug power supply |

**Note**

Instead of using Mellanox cards (HPE IB FDR/EN 40Gb 2P 544+QSFP Adptr), customer can choose to use 10GbE fiber cards (HPE Ethernet 10Gb 2P 560FLR-SFP+ Adptr / fiber), or 10GbE copper cards (HPE Ethernet 10Gb 2P 561T Adptr / copper).
Figure 2a depicts the front view of HPE ConvergedSystem 500 for SAP HANA Scale-up 256GB to 1TB internal disk configurations. Figure 2b depicts the rear view of HPE ConvergedSystem 500 for SAP HANA Scale-up 256GB to 1TB network annotation. Figure 2c depicts the front view of HPE ConvergedSystem 500 for SAP HANA Scale-up 256GB to 4TB internal and external disk configurations. Figure 2d depicts the rear view of HPE ConvergedSystem 500 for SAP HANA Scale-up 256GB to 4TB network annotation with HPE D3700 enclosure.

**Server and Storage Block**

1 x DL580 Gen9 with x86, 4 x Intel Xeon E7-8880 v4 or E7-8890 v4 processors
256GB, 384GB, 512GB, 768GB and 1TB RAM
3 x 1.8TB SAS 10K HDD (Operating system and HANA LOG)
4 x 1.8TB SAS 10K HDD (HANA DATA)
3 x 400GB 12G SSD for SmartCache
4 x 10/40GbE 2 Port NIC
1 x 1GbE 4 Port NIC (PCIe)
1 x 1GbE 4 Port NIC (ALOM)

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**Figure 2a.** Front view of 4-processors 256GB to 1TB internal disk configurations

**Figure 2b.** Rear view of DL580 Gen9 4-processor configurations with network annotation

**Server and Storage Block**

1 x DL580 Gen9 with x86, 4 x Intel Xeon E7-8880 v4 or E7-8890 v4 processors
256GB, 384GB, 512GB, 768GB, 1TB, 2TB, 3TB and 4TB RAM
2 x 1.8TB SAS 10K HDD (Operating system)
1x D3700 Enclosure with
12 x 1.8TB SAS 10K HDD (HANA DATA)
3 x 1.8TB SAS 10K HDD (HANA LOG)
5 x 400GB 12G SSD for SmartCache
4 x 10/40GbE 2 Port NIC
1 x 1GbE 4 Port NIC (PCIe)
1 x 1GbE 4 Port NIC (ALOM)

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**Figure 2c.** Front view of 4-processor 256GB to 4TB internal and external disk configurations
Figure 2d. Rear view of HPE ProLiant DL580 Gen9 4-processor configurations with network annotation with HPE D3700 enclosure.

Figure 2e depicts the front view of HPE ConvergedSystem 500 for SAP HANA Scale-up 256GB to 1TB internal and dual purpose storage configuration. Figure 2f depicts the front view of HPE ConvergedSystem 500 for SAP HANA Scale-up 256GB to 4TB internal, external and dual purpose disk configurations. Figure 2g depicts the rear view of HPE ConvergedSystem 500 for SAP HANA Scale-up 256GB to 4TB network annotation with HPE D3700 disk enclosure with dual purpose storage.

Figure 2e. Front view of 4-processor 256GB to 1TB internal and dual purpose disk configurations.
Figure 2f. Front view of 4-processor 256GB to 4TB internal, external and dual purpose disk configurations

Dual Purpose Storage Block (for non-production HANA DATA and LOG)
1 x D3700 Enclosure w/ 5 x 1.8TB 12G SAS 10K HDD (RAID50)
12 x 1.8TB SAS 10K HDD (HANA DATA)
3 x 1.8TB SAS 10K HDD (HANA LOG)

Server and Storage Block
1 x DL580 Gen9 with x86 4 x Intel Xeon E7-8880 v4 or E7-8890 v4 processors
256GB, 384GB, 512GB, 768GB, 1TB, 2TB, 3TB and 4TB RAM
2 x 1.8TB SAS 10K HDD (Operating system)
1 x D3700 Enclosure with
12 x 1.8TB SAS 10K HDD (HANA DATA)
3 x 1.8TB SAS 10K HDD (HANA LOG)
5 x 400GB 12G SSD for SmartCache
4 x 10/40GbE 2 Port NIC
1 x 1GbE 4 Port NIC (PCIe)
1 x 1GbE 4 Port NIC (ALOM)

Figure 2g. Rear view of HPE ProLiant DL580 Gen9 4-processor configurations with network annotation with HPE D3700 enclosure
**HPE ConvergedSystem 500 for SAP HANA Scale-out**

HPE ConvergedSystem 500 for SAP HANA Scale-out configurations provide highly available and resilient SAP HANA in-memory databases. The configurations are based on the HPE ProLiant DL580 Gen9 server platform that includes x86 Intel Xeon E7-8880 v4 or E7-8890 v4 processors. When compared to the HPE ProLiant DL580 Gen8 server, the HPE ProLiant DL580 Gen9 server offers blazing fast results with enhanced processor performance, and greater I/O bandwidth (9 PCIe Gen3.0 slots). The HPE ConvergedSystem 500 for SAP HANA Scale-out configuration relies on HPE 3PAR StoreServ 8400 storage for OS boot from SAN and SAP HANA log and data, and HPE networking switches to best meet this requirement. Each compute engine is connected through redundant storage area network (SAN) paths to the highly available HPE 3PAR storage unit with redundant controllers. The base rack HPE 3PAR StoreServ 8400 storage is configured for SAP HANA shared NFS file system across all SAP HANA nodes in the cluster. The HPE ProLiant DL580 Gen9 server has security and data protection features for system resiliency that your business can depend on; and with intelligent manageability through HPE Integrated Lights-Out (iLO 4), and user-inspired features, you get faster, lower cost infrastructure management.

**Solution components for Scale-out**

HPE ConvergedSystem 500 for SAP HANA Scale-out configurations based on HPE ProLiant DL580 Gen9 servers have the following key components:

- Four x86 Intel Xeon E7-8890 v4 processors
- 1TB, 1.5TB and 2TB of RAM
- 1 x HPE Smart Array P830i 4GB FBWC storage controller
- HPE 3PAR StoreServ 8400 4-node storage consists of:
  - 96 x 1.2TB SAS 10K SFF disk drives (16 disks drives for each node and 16 disks for File Persona® configuration)
- Redundant 40GbE network connections for Data (ERP), depending on configuration
- Redundant 40GbE network connections for BI and client reporting
- Redundant 40GbE network connections for SAP HANA System Replication
- Redundant 40GbE network connections for Backup
- Redundant 1GbE or 10GbE network connections for Management
- Redundant 1GbE network connections for the Quorum Server
- 2x HPE FlexFabric 5930 network switch
- 2x HPE SN6000B SAN switch
- Operating system for SAP HANA choice of:
  - SUSE Linux Enterprise Server (SLES) 12 SP1, or
  - Red Hat Enterprise Linux (RHEL) 7.2
- SAP HANA SPS12 (customers must purchase licenses from SAP)

*32 disks will be used for max scale configuration*
Hardware for Scale-out

HPE ConvergedSystem 500 for SAP HANA Scale-out 8TB configurations are as follows.

Base rack configurations

The base rack configuration components are shown in Table 3.

Table 3. 8TB base rack configuration components

<table>
<thead>
<tr>
<th>COMPONENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>HPE ProLiant DL580 Gen9 with x86 4 x Intel Xeon E7-8890 v4 processors (24 cores each)</td>
</tr>
<tr>
<td>• 2-5 nodes with 4 sockets 1TB, 1.5 and 2TB memory each</td>
</tr>
<tr>
<td>• 2 x HPE StoreFabric SN1000Q 16Gb 2port FC HBA</td>
</tr>
<tr>
<td>• 2 x HPE InfiniBand Ethernet 10Gb/40Gb 2port 544+QSFP</td>
</tr>
<tr>
<td>HPE FlexFabric 5930-4Slot switch (2x)</td>
</tr>
<tr>
<td>HPE SN6000B 48port SAN switch (2x)</td>
</tr>
<tr>
<td>Management server (1 x HPE ProLiant DL380 Gen9)</td>
</tr>
<tr>
<td>HPE 3PAR StoreServ 8400-4 node, 4 shelves, FC storage</td>
</tr>
</tbody>
</table>

Figure 3 depicts the front and rear views of base rack configuration for HPE ConvergedSystem 500 for SAP HANA Scale-out configurations.
**Figure 3.** Front and rear view of Base rack configurations

**Software**
- Red Hat Enterprise Linux (RHEL) 7.2 for SAP HANA OS
- SUSE Linux Enterprise Server (SLES) 12 SP1 for SAP HANA OS
- SAP HANA Database Enterprise SP5.12
- HPE Insight & System Management Agents
- OS installation (SAN Boot)

**Hardware**
- HPE 5930 4-Slot Modular Switch (2x)
- HPE SN6000B 48-port SAN Switch (2x)
- Management server
  - HPE DL380 Gen9 (1x)
- HPE 3PAR 8400 4-node FC Storage
  - 16 x 1.2TB for File Persona
  - 32 x 1.2TB for node 1 and 2
  - 16 x 1.2TB for node 3
  - 16 x 1.2TB for node 4
  - Optional drives
- 4 x HPE DL580 Gen9 (3TB block)
- 1 x HPE DL580 Gen9 (Standby node)
Expansion rack configurations
HPE ConvergedSystem 500 for SAP HANA Scale-out 12TB configurations are as follows.

Table 4 shows the 12TB expansion rack configuration components.

Table 4. 12TB Expansion rack configuration components

<table>
<thead>
<tr>
<th>COMPONENTS</th>
</tr>
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<tbody>
<tr>
<td>HPE ProLiant DL580 Gen9 with x86 Intel Xeon E7-8890 v4 processors (24 cores each)</td>
</tr>
<tr>
<td>• 6 nodes with 4 sockets 1TB, 1.5TB and 2TB memory each</td>
</tr>
<tr>
<td>• 2 x HPE StoreFabric SN1000Q 16Gb 2port FC HBA</td>
</tr>
<tr>
<td>• 2 x HPE InfiniBand Ethernet 10Gb/40Gb 2port 544+QSFP</td>
</tr>
<tr>
<td>HPE FlexFabric 5930-4Slot switch (2x)</td>
</tr>
<tr>
<td>HPE SN6000B 48port SAN switch (2x)</td>
</tr>
<tr>
<td>HPE 3PAR StoreServ 8400-4 node, 4 shelves, FC storage</td>
</tr>
</tbody>
</table>

Figure 4 depicts the front and rear views of the expansion rack configuration for HPE ConvergedSystem 500 for SAP HANA Scale-out.
Figure 4. Front and rear view of Expansion rack

Software
Red Hat Enterprise Linux (RHEL) 7.2 for SAP HANA OS
SUSE Linux Enterprise Server (SLES) 12 SP1 for SAP HANA OS
SAP HANA Database Enterprise SP152
HPE Insight & System Management Agents
OS Installation (SAN Boot)
**Software**

**Insight Remote Support (optional)**
HPE Insight Remote Support (Insight RS) is a software solution that supports the HPE ConvergedSystem 500 portfolio for SAP HANA and enables reactive and proactive remote support to improve the availability of supported servers, storage systems, and other devices in your data center. Insight RS relies on several HPE components and communication between various software applications within the customer enterprise and between the customer enterprise and HPE to deliver support services. Agent software components are installed on the SAP HANA and auxiliary servers providing a holistic management for both virtual and physical environments.

**HPE ProActive Insight**
HPE ProActive Insight Architecture solutions with iLO Management Engine is a suite of embedded management technologies that supports the complete lifecycle of all HPE ProLiant Gen9 servers, from initial deployment to ongoing management and service alerting. The iLO Management Engine is a key component of the end-to-end HPE Insight Management server management portfolio, along with HPE Insight Control and HPE Insight Online. Together they provide the most comprehensive set of server management capabilities in the industry.

**Services**

All the configurations in the HPE ConvergedSystem 500 portfolio for SAP HANA are available as a standard offering with Factory Express Level 4 services that leverage HPE factory integration capabilities and skills on SAP HANA. These include installation of SUSE Linux Enterprise Server and Red Hat Enterprise Linux operating system software and SAP HANA database software at the factory, and on-site installation and configuration. With HPE Factory Express Deployment service, the majority of the integration is performed in the HPE factory so the solution is delivered pre-built and tested to the highest level of quality, ready to plug in and switch on. HPE helps customers in reducing the deployment time with hardware built to exact specifications, and tested as a complete solution, then shipped as a turn-key solution from the HPE factory – ready-to-run in their data center. This means the customers receive a pre-integrated, pre-tested, ready-to-use solution. The goal is to put our expertise to work for your business, saving you time, money, and resources while it frees your staff to focus on your core business.

Once the configuration is purchased, a process is started. (To order, please contact your HPE sales representative.)

- A site preparation document with all the pertinent information is filled in that is required to assemble and configure the configuration to conform to the site environment.
- The configuration is assembled, racked, cabled, software is loaded, and the configuration is tested at the HPE Factory Express integration facility.
- The configuration is carefully packaged and shipped to the site.
- An HPE Customer Engineer unpacks the configuration, moves it into location, and connects it to the site.
- An HPE team is engaged to assist with final configuration and bringing SAP HANA online.

HPE Services covers the complete lifecycle including design, factory integration, on-site deployment, in-field add-on upgrades and reconfiguration, and proactive and reactive support.

After this point, if additional service engagements have been ordered, these services may take over to help extract, transform, and load data from existing systems into SAP HANA and help integrate SAP HANA with existing systems.
Licensing considerations

The following software requires licensing in this configuration:

- SAP HANA In-Memory Database
- SAP HANA Studio
- HPE ProLiant Support Pack
- SUSE Linux Enterprise Server (SLES) 12 SP1
- Red Hat Enterprise Linux (RHEL) 7.2
- HPE Secure Encryption (optional)

All configurations in the HPE ConvergedSystem 500 portfolio for SAP HANA contain a copy of the SAP In-Memory Appliance software by SAP. Each SAP product is subject to its respective SAP end-user license agreement. The HPE computer product license does not contain a license to SAP In-Memory Appliance software by SAP. Please be advised that you must buy the appropriate SAP HANA Database software licenses from SAP or its authorized distributors. Contact your SAP representative to obtain the applicable license rights to use the SAP software.

Summary

HPE ConvergedSystem 500 for SAP HANA Scale-up configurations provide an excellent scale-up in-memory database ranging in sixteen different configuration sizes (2s/128GB, 2s/256GB, 2s/384GB, 2s/512GB, 2s/768GB, 2s/1TB, 2s/1.5TB, 2s/2TB, 4s/256GB, 4s/384GB, 4s/512GB, 4s/768GB, 4s/1TB, 4s/1.5TB, 4s/2TB, 4s/3TB, 4s/4TB), based on HPE ProLiant DL580 Gen9 servers. This ranges from 128GB with 48 cores to a maximum of 4TB with 96 cores.

HPE ConvergedSystem 500 for SAP HANA Scale-out configurations provide a highly available in-memory database. This appliance has a range of 2 to 34 nodes. With compute nodes available in 1TB, 1.5TB, or 2TB sizes, the total system size can be 34TB using 1TB nodes, 51TB using 1.5TB nodes, or 68TB using 2TB nodes.
Resources and additional links

HPE ConvergedSystem 500 portfolio for SAP HANA, hpe.com/info.sap/hana

QuickSpecs for HPE ConvergedSystem 500 for SAP HANA Scale-up Config (Intel Xeon E7 v4)  
hpe.com/h20195/v2/GetHtml.aspx?docname=c04998685

QuickSpecs for HPE ConvergedSystem 500 for SAP HANA Scale-out Config (Intel Xeon E7 v4)  
hpe.com/h20195/v2/GetHtml.aspx?docname=c04998743

HPE ProLiant DL580 Gen9 Server – Product documentation,  

Configuring Arrays on HPE Smart Array Controllers Reference Guide  

HPE ROM-based Setup Utility Guide,  

Comware CLI Commands in ProVision Software,  
http://h20564.www2.hpe.com/portal/site/hpsc/public/kb/docDisplay?docId=c03844893

SAP HANA Administration Guide  

HPE 3PAR File Persona,  

HPE Reference Architectures  
hpe.com/info/ra

Additional related sites

HPE & SAP Alliance, hpe.com/partners/sap

HPE IT Infrastructure Consulting Services for SAP HANA  

HPE Storage, hpe.com/storage

To help us improve our documents, please provide feedback at hpe.com/contact/feedback.