



# IBM Systems Solution for SAP HANA™ appliance Quick Start Guide







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**Note**

Before using this information and the product it supports, read the general information in “Notices” on page 45, the *Warranty Information* document, and the *IBM Safety Information* and the *Environmental Notices and User Guide* documents on the IBM Documentation CD.

**The most recent version of this document is available at <http://www.ibm.com/supportportal>.**

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## Chapter 1. Introduction

The IBM Systems Solution for SAP HANA™ appliance, is a hardware and software solution that integrates the SAP HANA database with IBM System x eX5 and X6 enterprise servers. This solution is optimally configured as an optimized system solution for use in your corporate SAP application environment.

Delivered as an optimized system solution based on IBM System x eX5 and X6 enterprise servers, SAP HANA includes the following features:

- High-performance SAP HANA database and a powerful data calculation engine
- Real-time replication service to access and replicate data from SAP enterprise resource planning (ERP)
- Data repository to retain views of business information
- Highly tuned integration with SAP BusinessObjects Business Intelligence (BI) solutions for insight and analytics
- SQL and MDX interfaces for third-party application access
- Unified information-modeling design environment
- Data services to provide access to virtually any SAP and non-SAP data source

**Note:** Throughout this document, SAP HANA appliance is referred to as SAP HANA.

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## License information

This IBM computer system is preconfigured and delivered with the SAP HANA appliance Platform Edition. You are not licensed to use this copy of the SAP software contained in the IBM hardware system until you have purchased or licensed the use of the SAP software from SAP or its authorized distributors. Use of the SAP software is subject to the applicable SAP end-user license agreement. Your purchase of the IBM hardware system does not include a license to use the SAP software or to any other SAP software. SAP is under no obligation to license the included SAP software to you. Contact your responsible SAP representative to obtain the applicable license rights to use the SAP software.

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## Documentation and related information

In addition to this *Quick Start Guide*, the following resources are available on the web:

- **IBM ServerProven program for compatibility information of IBM Servers and selected products**

You can obtain compatibility information about IBM® System x® and IBM BladeCenter® products from <http://www.ibm.com/systems/info/x86servers/serverproven/compat/us/>.

- **IBM Systems and servers documentation and technical support**

Go to <http://www.ibm.com/supportportal> to locate the most recent versions of all IBM System x and IBM BladeCenter documentation, and also obtain support for Windows hardware and systems-management software.

- **SAP HANA appliance support and information**

## Notices and statements in this document

The following notices and statements are used in this document:

- **Note:** These notices provide important tips, guidance, or advice.
- **Important:** These notices provide information or advice that might help you avoid inconvenient or problem situations.
- **Attention:** These notices indicate potential damage to programs, devices, or data. An attention notice is placed just before the instruction or situation in which damage might occur.
- **Caution:** These statements indicate situations that can be potentially hazardous to you. A caution statement is placed just before the description of a potentially hazardous procedure step or situation.
- **Danger:** These statements indicate situations that can be potentially lethal or extremely hazardous to you. A danger statement is placed just before the description of a potentially lethal or extremely hazardous procedure step or situation.



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## Chapter 2. Overview

This section provides a technical overview of the IBM Systems solutions for SAP HANA.

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### What IBM Systems Solution for SAP HANA offers

IBM Systems Solution for SAP HANA on IBM System x enterprise servers offers the following features and technologies.

#### Leading performance

IBM System x enterprise servers offer extreme memory and performance scalability. With improved hardware economics and new technology offerings, IBM is helping SAP realize a real-time enterprise with in-memory business applications. IBM enterprise servers deliver a long history of leading SAP benchmark performance.

In addition, eX5 features such as eXFlash solid-state disk technology can yield significant performance improvements in storage access, helping deliver an optimized system solution for SAP HANA. Standard features in the solution such as the High IOPS Adapter for IBM System x server also provide fast access to storage.

The new System x X6 enterprise server leverages 50% more processor cores, up to three times the amount of memory compared to the previous generation, the latest in Flash memory technologies, 50% more PCIe slots, a unique rack design which incorporates modular component books and more advanced features, providing significant advantages to the IBM Systems Solution for SAP HANA.

#### Future-proof scalability

Based on scalable IBM System x technology that is included in IBM System x3690 X5, x3950 X5, x3850 X6 and x3950 X6 servers, SAP HANA on IBM System x enterprise servers offer a solution that can help meet the need to analyze growing amounts of transactional data and deliver significant gains in both performance and scalability in a single, flexible appliance.

IBM System x enterprise servers feature Intel Xeon E7 series microprocessors. These microprocessors deliver performance that is ideal for your most data-demanding SAP HANA workloads and offer improved scalability along with increased memory and I/O capacity, which is critical for SAP HANA. Advanced reliability and security features work to maintain data integrity, accelerate encrypted transactions, and maximize the availability of SAP HANA applications. In addition, Machine Check Architecture Recovery, a reliability, availability, and serviceability (RAS) feature built into Intel Xeon E7 series microprocessors, enables the hardware platform to generate machine check exceptions. In many cases, these notifications enable the system to take corrective actions that enable uninterrupted SAP HANA application operations when an outage would otherwise occur.

The powerful and reliable Intel Xeon E7 series microprocessors allow for extreme scaling to running demanding workloads such as SAP HANA.

## High-performance SAP HANA database

SAP HANA allows companies to make smarter business decisions supported by increased visibility into large volumes of operational data, and react faster to business events through real-time analysis and reporting of operational data. The ability to quickly analyze vast amounts of business information with no impact on transactional performance includes the following benefits:

- Optimized in-memory persistence of operational data with zero latency
- Readily available information for real-time, ad hoc analysis and reporting
- Integrated data modeling studio for design of in-memory analytic and reporting scenarios on operational systems
- Native access to SAP enterprise resource planning (ERP) data without traditional extract, transform, and load processes

## Real-time replication

With real-time replication service to access and replicate data from SAP ERP, you can offload analytical reporting, easing the load on the transactional system. In addition, IBM DB2® is SAP HANA-ready and can efficiently replicate data into SAP HANA in near-real time using Sybase Replication Server.

## Rapid deployment

SAP HANA helps organizations streamline the IT network environment without compromising power and functionality—plus, it is simple to deploy and does not disrupt existing network services. Highlights include SAP HANA has the following features:

- Significant rationalization of existing SAP ERP landscapes to help lower total cost of ownership (TCO)
- Optimization as a “ready to deploy” software and system solution
- In-memory computing that provides primary persistence model for the enterprise data warehouse
- “Side-by-side” deployment with existing SAP transactional and SAP business warehouse systems for analytic data mart scenarios

## IBM General Parallel File System (GPFS)

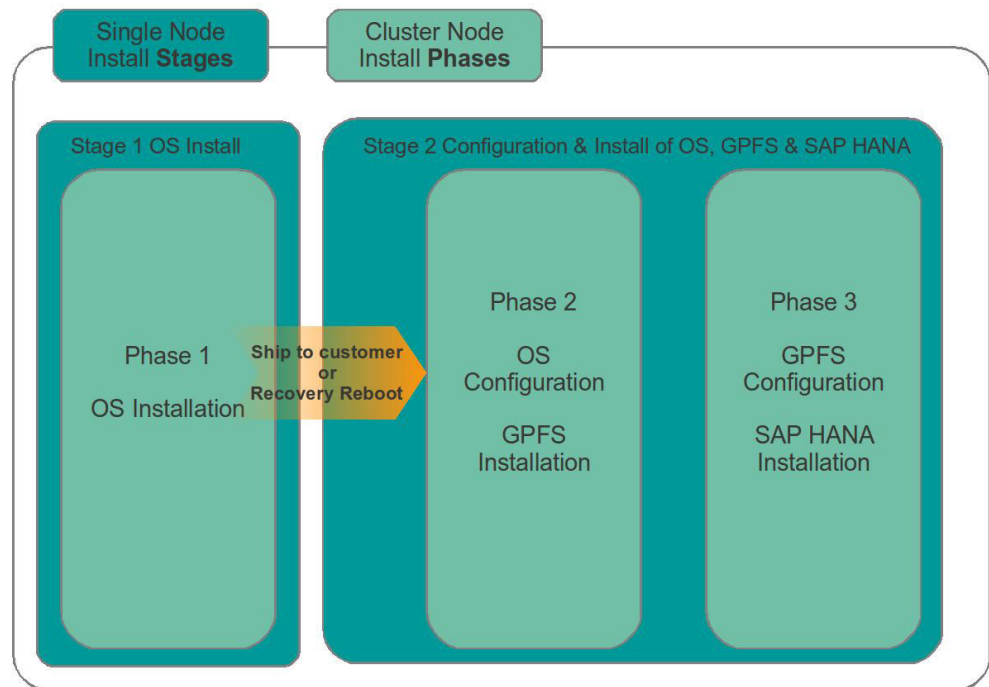
Rapid increase in the amount of data, and the number of transactions and digitally-aware devices are straining IT infrastructure and operations, while storage costs and user expectations are increasing. IBM General Parallel File System™ (GPFS™), with its high-performance enterprise file management, can help move beyond simply adding storage to optimizing data management for SAP HANA. High-performance enterprise file management using GPFS provides the following benefits to SAP HANA applications:

- Performance to satisfy the most demanding SAP HANA applications
- Seamless capacity expansion to handle the rapid growth of SAP HANA information
- High reliability and availability through storage replication to help eliminate production outages and provide disruption-free maintenance and capacity upgrades

Seamless capacity and performance scaling help your company foster innovation by simplifying your environment and streamlining data workflows for increased efficiency.

## IBM three-phased guided installation of SAP HANA

The IBM Systems Solution for SAP HANA comes with a SUSE AutoYaST-based guided installation. You can easily and comfortably install all the necessary components for the SAP HANA appliance without detailed knowledge of the installation routines or dependencies.



## IBM Workload Optimized Solution for SAP HANA

IBM Workload Optimized Solution for SAP HANA, which is based on the 2-socket IBM System x3690 X5, 4-socket IBM System x3950 X5, x3850 X6 and 8-socket x3950 X6 servers, is optimally designed and certified by SAP.

**Note:** Throughout this document, IBM Workload Optimized Solution for SAP HANA is referred to as the server.

These servers are delivered with key software components to help speed delivery and deployment of SAP HANA. The IBM System x3690 X5-based configurations offer 128 GB or 256 GB of memory solely based on solid-state disks. The IBM System x3950 X5-based configurations leverage the scalability of eX5 and offer the capability to pay as you grow, starting with a 256 GB memory configuration and expanding to a 1 TB memory configuration. The IBM System x3950 X5-based configurations integrate the 1.2 TB High IOPS MLC mono adapter.

### IBM System x eX5 Technology

The IBM System x3850 X6-based configurations start with 2 processors at 128 GB and scale up to 4 processors and 2 TB of memory to support SAP workloads

powered by SAP HANA. All configurations do provide the required storage locally with leading Flash technologies providing the required bandwidths and low latency.

**Note:** A server configuration uses a scalability kit that combines server models 7143-H2x (or 7143-HBx) and 7143-H3x (or 7143-HCx) to create a single 1 TB system.

The following illustration shows an IBM System x3690 X5 server.



The following illustration shows an IBM System x3950 X5 server.



**Note:** The illustrations in this document might differ slightly from your server.

The following table shows a summary of the features on IBM Workload Optimized Solution models.

Table 1. IBM Workload Optimized Solution model feature summary - x3950 X5

Model	IBM System x3950 X5: Workload Optimized Solution for SAP HANA				
	7143-HAx	7143-HBx	7143-HCx (upgrade option)	7143-HDx	7143-HEx (upgrade option)

Table 1. IBM Workload Optimized Solution model feature summary - x3950 X5 (continued)

Model	IBM System x3950 X5: Workload Optimized Solution for SAP HANA				
Microprocessor (Intel Xeon Processor E7 Series)	2	4	4	4	4
Memory	256 GB	512 GB	512 GB	1024 GB	1024 GB
Solid-state disk	IBM 1.2 TB High IOPS MLC Mono Adapter	IBM 1.2 TB High IOPS MLC Mono Adapter	IBM 1.2 TB High IOPS MLC Mono Adapter	IBM 1.2 TB High IOPS MLC Mono Adapter	IBM 1.2 TB High IOPS MLC Mono Adapter
Hard disk	Eight IBM 900 GB 10K 6Gbps SAS 2.5-inch Slim-HS HDD	Eight IBM 900 GB 10K 6Gbps SAS 2.5-inch Slim-HS HDD	Eight IBM 900 GB 10K 6Gbps SAS 2.5-inch Slim-HS HDD	Eight IBM 900 GB 10K 6Gbps SAS 2.5-inch Slim-HS HDD	Eight IBM 900 GB 10K 6Gbps SAS 2.5-inch Slim-HS HDD
Networking	<ul style="list-style-type: none"> <li>Four 10 Gb Ethernet ports</li> <li>Six 1 Gb Ethernet ports</li> </ul>	<ul style="list-style-type: none"> <li>Four 10 Gb Ethernet ports</li> <li>Six 1 Gb Ethernet ports</li> </ul>	<ul style="list-style-type: none"> <li>Four 10 Gb Ethernet ports</li> <li>Six 1 Gb Ethernet ports</li> </ul>	<ul style="list-style-type: none"> <li>Four 10 Gb Ethernet ports</li> <li>Six 1 Gb Ethernet ports</li> </ul>	<ul style="list-style-type: none"> <li>Four 10 Gb Ethernet ports</li> <li>Six 1 Gb Ethernet ports</li> </ul>
Software component	<ul style="list-style-type: none"> <li>SUSE Linux for SAP</li> <li>IBM GPFS</li> <li>SAP HANA</li> </ul>	<ul style="list-style-type: none"> <li>SUSE Linux for SAP</li> <li>IBM GPFS</li> <li>SAP HANA</li> </ul>	<ul style="list-style-type: none"> <li>IBM GPFS</li> </ul>	<ul style="list-style-type: none"> <li>SUSE Linux for SAP</li> <li>IBM GPFS</li> <li>SAP HANA</li> </ul>	<ul style="list-style-type: none"> <li>SUSE Linux for SAP</li> <li>IBM GPFS</li> </ul>

Table 2. IBM Workload Optimized Solution model feature summary - x3690 X5

Model	IBM System x3690 X5: Workload Optimized Solution for SAP HANA	
	7147-HAx	7147-HBx
Microprocessor (Intel Xeon Processor E7 Series)	2	2
Memory	128 GB	256 GB
Solid-state disk	IBM eXFlash 10x IBM 200 GB SATA 1.8-inch MLC SSD	IBM eXFlash 10x IBM 200 GB SATA 1.8-inch MLC SSD
Hard disk		
Networking	<ul style="list-style-type: none"> <li>Four 10 Gb Ethernet ports</li> <li>Six 1 Gb Ethernet ports</li> </ul>	<ul style="list-style-type: none"> <li>Four 10 Gb Ethernet ports</li> <li>Six 1 Gb Ethernet ports</li> </ul>
Software component	<ul style="list-style-type: none"> <li>SUSE Linux for SAP</li> <li>IBM GPFS</li> <li>SAP HANA</li> </ul>	<ul style="list-style-type: none"> <li>SUSE Linux for SAP</li> <li>IBM GPFS</li> <li>SAP HANA</li> </ul>

Table 3. IBM Workload Optimized Solution model feature summary - introduced in June, 2011

Model	IBM System x3690 X5: Workload Optimized Solution for SAP HANA			IBM System x3950 X5: Workload Optimized Solution for SAP HANA		
	7147-H1x	7147-H2x	7147-H3x	7143-H1x	7143-H2x	7143-H3x (upgrade option)
Microprocessor (Intel Xeon Processor E7 Series)	2	2	2	2	4	4

Table 3. IBM Workload Optimized Solution model feature summary - introduced in June, 2011 (continued)

Model	IBM System x3690 X5: Workload Optimized Solution for SAP HANA			IBM System x3950 X5: Workload Optimized Solution for SAP HANA		
	128 GB	256 GB	256 GB	256 GB	512 GB	512 GB
Solid-state disk	IBM eXFlash 8x IBM 50 GB SATA 1.8-inch MLC SSD	IBM eXFlash 8x IBM 50 GB SATA 1.8-inch MLC SSD	IBM eXFlash 10x 200 GB 1.8-inch MLC SSD	IBM 320 GB High IOPS SD Class SSD PCIe Adapter	IBM 640 GB High IOPS MLC Duo Adapter	IBM 640 GB High IOPS MLC Duo Adapter
Hard disk	Eight 300 GB 10k SAS HDD	Eight 300 GB 10k SAS HDD		Eight IBM 600 GB 10K 6 Gbps SAS 2.5-inch SFF Slim-HS HDD	Eight IBM 600 GB 10K 6 Gbps SAS 2.5-inch SFF Slim-HS HDD	Eight IBM 600 GB 10K 6 Gbps SAS 2.5-inch SFF Slim-HS HDD
Networking	<ul style="list-style-type: none"> <li>Two 10 Gb Ethernet ports</li> <li>Six 1 Gb Ethernet ports</li> </ul>	<ul style="list-style-type: none"> <li>Two 10 Gb Ethernet ports</li> <li>Six 1 Gb Ethernet ports</li> </ul>	<ul style="list-style-type: none"> <li>Two 10 Gb Ethernet ports</li> <li>Six 1 Gb Ethernet ports</li> </ul>	<ul style="list-style-type: none"> <li>Two 10 Gb Ethernet ports</li> <li>Six 1 Gb Ethernet ports</li> </ul>	<ul style="list-style-type: none"> <li>Two 10 Gb Ethernet ports</li> <li>Six 1 Gb Ethernet ports</li> </ul>	<ul style="list-style-type: none"> <li>Two 10 Gb Ethernet ports</li> <li>Six 1 Gb Ethernet ports</li> </ul>
Software component	<ul style="list-style-type: none"> <li>SUSE Linux for SAP</li> <li>IBM GPFS</li> <li>SAP HANA</li> </ul>	<ul style="list-style-type: none"> <li>SUSE Linux for SAP</li> <li>IBM GPFS</li> <li>SAP HANA</li> </ul>	<ul style="list-style-type: none"> <li>SUSE Linux for SAP</li> <li>IBM GPFS</li> <li>SAP HANA</li> </ul>	<ul style="list-style-type: none"> <li>SUSE Linux for SAP</li> <li>IBM GPFS</li> <li>SAP HANA</li> </ul>	<ul style="list-style-type: none"> <li>SUSE Linux for SAP</li> <li>IBM GPFS</li> <li>SAP HANA</li> </ul>	<ul style="list-style-type: none"> <li>IBM GPFS</li> </ul>

Models described in Table 1 on page 6 and Table 2 on page 7 are fully compatible with the previous models described in Table 3 on page 7. A scale-out configuration is provided. The previous models can be expanded by adding new models of the same memory size.

## IBM System x X6 Technology

The following illustration shows an IBM System x3850 X6 server:





*Table 4. IBM Workload Optimized Solution model feature summary - x3850 X6 (2 processors)*

2 processors			
128 GB 	256 GB 	384 GB 	512 GB 
x3850 X6	x3850 X6	x3850 X6	x3850 X6
3837-AC3	3837-AC3	3837-AC3	3837-AC3
AC32S128S	AC32S256S	AC32S384S	AC32S512S
Standalone	Standalone	Standalone	Standalone
2x E7-8880v2	2x E7-8880v2	2x E7-8880v2	2x E7-8880v2
128 GB DDR3 (16x 8 GB)	256 GB DDR3 (16x 16 GB or 32x 8 GB)	384 GB DDR3 (48x 8 GB)	512 GB DDR3 (32x 16 GB)
6x1.2 TB HDD 2x400 GB SSD	6x1.2 TB HDD 2x400 GB SSD	6x1.2 TB HDD 2x400 GB SSD	6x1.2 TB HDD 2x400 GB SSD
1x M5210	1x M5210	1x M5210	1x M5210
3.6 TB RAID5 data/log	3.6 TB RAID5 data/log	3.6 TB RAID5 data/log	3.6 TB RAID5 data/log
4x 10GbE 4x 1GbE	4x 10GbE 4x 1GbE	4x 10GbE 4x 1GbE	4x 10GbE 4x 1GbE
Upgrade Options: 128 -> 256	Upgrade Options: 256 -> 384 256 -> 512 2S -> 4S	Upgrade Options: 2S -> 4S	Upgrade Options: 2S -> 4S
<b>Table note:</b> Alternate processor types: <ul style="list-style-type: none"> <li>• E7-8890v2 for improved performance</li> <li>• E7-4880v2 only if customer agrees not to plan an upgrade to 8S ever</li> <li>• E7-4890v2 resp.</li> </ul>			

*Table 5. IBM Workload Optimized Solution model feature summary - x3850 X6 (4 processors)*







4 processors					
256 GB 	512 GB 	768 GB 	1 TB 	1.5 TB <sup>1</sup> 	2 TB <sup>1</sup> 
x3850 X6	x3850 X6	x3850 X6	x3850 X6	x3850 X6	x3850 X6
3837-AC3	3837-AC3	3837-AC3	3837-AC3	3837-AC3	3837-AC3
AC34S256S	AC34S512S	AC34S768S	AC34S1024S	AC34S1536S	AC34S2048S
Standalone	Standalone	Standalone	Standalone	Standalone	Standalone
4x E7-8880v2	4x E7-8880v2	4x E7-8880v2	4x E7-8880v2	4x E7-8880v2	4x E7-8880v2
256 GB DDR3 (32x 8 GB)	512 GB DDR3 (32x 16 GB or 64x 8 GB)	768 GB DDR3 (96x 8 GB)	1 TB DDR3 (32x 32 GB or 64x 16 GB)	1.5 TB DDR3 (96x 16 GB)	2 TB DDR3 (32x 64 GB or 64x 32 GB)

Table 5. IBM Workload Optimized Solution model feature summary - x3850 X6 (4 processors) (continued)

4 processors					
6x1.2 TB HDD 2x400 GB SSD	6x1.2 TB HDD 2x400 GB SSD	15x1.2 TB HDD 4x400 GB SSD	15x1.2 TB HDD 4x400 GB SSD	15x1.2 TB HDD 4x400 GB SSD	15x1.2 TB HDD 4x400 GB SSD
1x M5210	1x M5210	1x M5210 1x M5120	1x M5210 1x M5120	1x M5210 1x M5120	1x M5210 1x M5120
3.6 TB RAID5 data/log	3.6 TB RAID5 data/log	13.2 TB RAID5 data/log	13.2 TB RAID5 data/log	13.2 TB RAID5 data/log	13.2 TB RAID5 data/log
4x 10GbE 4x 1GbE	4x 10GbE 4x 1GbE	4x 10GbE 4x 1GbE	4x 10GbE 4x 1GbE	4x 10GbE 4x 1GbE	4x 10GbE 4x 1GbE
Upgrade Options: 256 -> 512	Upgrade Options: 512 -> 768 512 -> 1T	Upgrade Options: -	Upgrade Options: 1T -> 1.5T 1T -> 2T	Upgrade Options: -	Upgrade Options: 2T -> 3T 2T -> 4T

**Table note:**

1. For Suite on HANA only, not for Datamart and BW
2. Alternate processor types:
  - E7-8890v2 for improved performance
  - E7-4880v2 only if customer agrees not to plan an upgrade to 8S ever
  - E7-4890v2 resp.
3. All systems upgradable to 8S

The IBM Workload Optimized Solution for SAP HANA does come with the proper storage configuration in order to ensure that the performance requirements for the data and the log volumes are met. The quotas are set to prevent the LOG and SHARE volumes consuming more than the equivalent of the memory capacity in order not to reduce the available storage capacity for the DATA volumes. The size of the LOG has to be monitored according to SAP HANA guidelines and the logs have to be released regularly to avoid a hang situation caused by a filled-up LOG volume.

The software components come preconfigured in form of an installation image with IBM GPFS and SAP HANA included. The media kit for SUSE Linux for SAP Applications is included on a DVD.

## IBM Workload Optimized Solution for SAP HANA on VMware

You can run the SAP HANA appliance within a VMware virtual machine (VM) from SAP HANA FRU Pkg version 1.5.53-5 and the following versions.

Virtual machines are only allowed for non-productive SAP HANA instances in single node configuration on HANA-certified IBM System x hardware. Thus, you must observe the following notes:

- You are not allowed to run virtualized SAP HANA appliances on a scale-out configuration.
- Installations are not allowed on non-certified hardware or larger capacity SAP Business Suite models.



- You are only allowed to run development, quality assurance, and testing instances.

You can find more detailed information in SAP Note 1788665.

The following parts are required for the products.

*Table 6. Components required for SAP HANA on VMware*

Model	Description	Part number	Quantity
All	IBM USB Memory Key for VMWARE ESXi 5.1	41Y8311	1
7143-HA <sub>x</sub>	Vmware vSphere 5 Enterprise for 1 processor Lic and 3 Year Subs	4817TE3	2
7143-HB <sub>x</sub>			4
7143-HC <sub>x</sub>			4
7147-HA <sub>x</sub>			2
7147-HB <sub>x</sub>			2
3837-AC3 (AC32S...)			2
3837-AC3 (AC34S...)			4
<b>Table note:</b> The amount of 4817TE3 parts is equivalent to the number of microprocessor sockets in your machine. For example, if you upgraded a 7143-HA <sub>x</sub> machine to a 7143-HB <sub>x</sub> model, you have to acquire additional two 4817TE3 (Vmware vSphere 5 Enterprise for 1 processor Lic and 3 Year Subs).			

**Note:** The IBM Workload Optimized System for SAP HANA appliance you received can either be installed bare metal or with one virtual machine under VMware vSphere. If you intend to run more than one virtual machine on such system, please contact SUSE to upgrade the SLES for SAP Applications operating system to an 'Unlimited Virtualized' version.



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## Chapter 3. Requirements

This section provides requirements of the IBM Systems Solution for SAP HANA. You must configure the integrated management module (IMM) for the server and the corresponding network modules in your network based on the requirement from SAP. To perform the initial server configuration and installation, there are both network and information requirements that you must obtain from your IT administrator.

The IBM Workload Optimized Solution for SAP HANA requires the following networks (minimum requirements):

- SAP Business Suite access to customer network
- SAP HANA internal communications (hananode)
- IBM internal GPFS communications (gpfsnode)
- IBM server management via integrated management module (IMM)

### Notes:

- In a single node installation, the internal networks are connected to the server. No connection to any external infrastructure.
- In a cluster installation, the internal networks are connected to the internal 10 Gigabit Network Switch which is part of the IBM appliance.

---

## Network requirements

### Single Node Configuration

The server provides the following connectivity options in the standard configuration:

- A 100 Mb or 1 Gb network connection using IMM interface
- Four to six 1GbE ports
- Four 10GbE SFP+ ports

Other configuration may be available upon request.

In the single node configuration, depending on your network environment, the 1GbE port or the 10GbE SFP+ port may be used for connecting the server to your network. Any two NIC ports may be used for the connections to your network. Thus, two single, non-bonded ports must be assigned to the internal HANA and GPFS communications and must not be connected to your network.

### Clustered Configuration

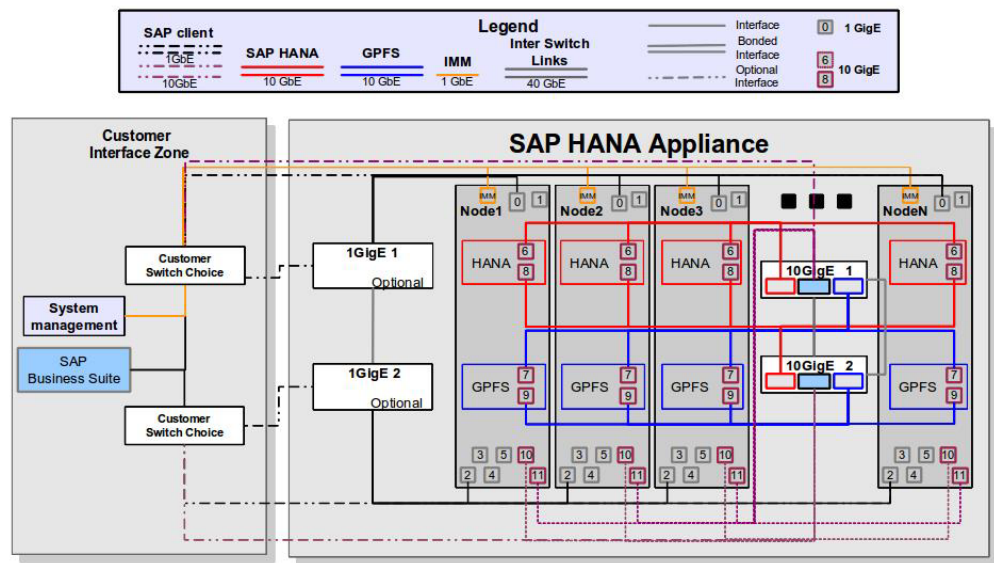
The server provides the same connectivity options in the standard configuration. Other configuration may be available upon request.

- **Non-HA configuration:** Each server uses two of the four 10GbE SFP+ ports for the internal HANA and GPFS communications. Thus, two 10GbE SFP+ ports and four to six 1GbE ports are available for the integration into your network environment.
- **HA configuration:** Each server uses all 10GbE SFP+ ports for creating the internal networks regarding HANA and GPFS communications. Thus, four to six 1GbE ports are available for connecting the server to your network. The

integration of the appliance servers into your network can either be done through 1 Gigabit Ethernet switch delivered by IBM as part of the solution (e.g. the IBM G8052 1 Gigabit RackSwitch) or by connecting the servers to other switches provided by you.

**Note:** If a 10 Gb uplink is needed or the redundant connections are required for higher availability, additional 10 Gb Emulex adapters can be installed into the server. Contact your IBM sales representative for more information.

The following illustration shows a possible network configuration for the clustered configuration.



**Note:** The "Customer Switch Choice" labeled switches are either 1 Gigabit Ethernet adapter or 10GbE SFP+ switches provided by you or IBM. Make the switch uplink redundant when possible.

## Network Time Protocol (NTP)

- **Clustered Configuration:** NTP is mandatory and must be configured during the installation. All nodes have to run in the same time zone.
- **Single Node Configuration:** NTP is highly recommended.

## Information requirements

Before you configure the server and install SAP HANA, gather the following network information from your network administrator.

Table 7. Server network information

Server ID	Network description	IP address	Host name
Server 1	Customer network		
	GPFS (Private network)	192.168.x.0/24 192.168.1.101 (default)	gpfsnode01 (mandatory)
	HANA (Private network)	192.168.y.0/24 192.168.2.101 (default)	hananode01 (mandatory)
	IMM remote management		

Table 7. Server network information (continued)

Server ID	Network description	IP address	Host name
Server 2	Customer network		
	GPFS (Private network)	192.168.x.0/24 192.168.1.102 (default)	gpfsnode02 (mandatory)
	HANA (Private network)	192.168.y.0/24 192.168.2.102 (default)	hananode02 (mandatory)
	IMM remote management		
...			
Server NN	Customer network		
	GPFS (Private network)	192.168.x.0/24 192.168.1.1nn (default)	gpfsnodenn (mandatory)
	HANA (Private network)	192.168.y.0/24 192.168.2.1nn (default)	hananodenn (mandatory)
	IMM remote management		

You may use the following tables to record the DNS and gateway information for your network.

Table 8. Default network information

Default IPv4 Network Prefix	Default Netmask	Default Gateway

Table 9. SAP HANA appliance routes information

Application	Host Network	Netmask	Gateway <sup>1</sup>	Interface Labels
SAP Business Suite customer network				
SAP HANA private network	192.168.x.y	255.255.255.0	None	
IBM GPFS private network	192.168.x.y	255.255.255.0	None	
IBM Integrated Management Module				i
<b>Table note:</b> 1. If the network is not accessible using the default gateway in Table 8.				

Table 10. Network DNS information

Domain	Primary DNS	Secondary DNS

Table 11. Server name information

NTP Server Name	Server Name

Table 12. Network account information

Account Information	Value
System administrator password	
SAP HANA SID	
SAP HANA instance number	
SAP HANA master password	

**Important:** Make sure not to misplace the information provided with the system.

- SUSE Linux Enterprise Server for SAP Applications media kit (DVD)
- SUSE Linux Enterprise Server for SAP Applications license key
- Non-OS content for IBM Systems Solution for SAP HANA media (DVD)
- Confirmation of Software Order Placement and Acknowledgement, and additional paperwork enclosed.

This material will be required by the IBM approved service technician to complete the installation and configuration of your system.

---

## Chapter 4. Configuring the server and installing SAP HANA

This section describes the various system configuration steps that are required when you first start the server or after you reinstall the software images on the server. These steps are to be performed by an IBM educated service technician who is familiar with the required steps. Provide the required information upfront to avoid any delay with the deployment of the server.

Before you start, make sure that you have the network information ready and that the server meets the requirements for SAP HANA (see Chapter 3, “Requirements,” on page 13).

**Attention:** Installation and configuration through IBM approved service technicians is mandatory. If you try to install or configure the system by yourself or by a non-approved technician, the system might get damaged and you would run out of support.

---

### Accessing the system

This section describes how to remotely access the system using the integrated management module (IMM) web interface.

**Note:** Before you turn on the server for the first time, connect the server to a KVM (keyboard, video, monitor) console for initial remote access configuration.

#### Obtaining or changing the IP address for the web interface access

To access the web interface and use the remote presence feature, you need the IP address for the IMM. You can obtain the IMM IP address through the Setup utility. To locate the IP address, complete the following steps:

1. Turn on the server.
2. When the prompt <F1> Setup is displayed, press F1. If you have set both a power-on password and an administrator password, you must type the administrator password to access the full Setup utility menu.
3. From the Setup utility main menu, select **System Settings**.
4. In the next window, select **Integrated Management Module**.
5. In the next window, select **Network Configuration**.
6. Find the IP address and write it down.
7. Exit from the Setup utility.

#### Logging on to the web interface

To log on to the web interface to use the remote presence functions, complete the following steps:

1. Open a web browser on a computer that connects to the server and in the **Address** or **URL** field, type the IP address or host name of the IMM to which you want to connect.

**Notes:**

- a. If you are logging on to the IMM for the first time after installation, the IMM defaults to DHCP. If a DHCP host is not available, the IMM uses the default static IP address 192.168.70.125.
  - b. You can set the DHCP-assigned IP address or the static IP address using the Setup utility on the server (see the documentation that comes with your server for detailed information).
2. On the Login page, type the user name and password. If you are using the IMM for the first time, you can obtain the user name and password from your system administrator. All login attempts are documented in the system-event log. A welcome page opens in the browser.

**Note:** The IMM is set initially with a user name of USERID and password of PASSWORD (passw0rd with a zero, not the letter O). You have read/write access. For enhanced security, change this default password during the initial configuration.

3. On the Welcome page, type a timeout value (in minutes) in the field that is provided. The IMM will log you off the web interface if your browser is inactive for the number of minutes that you entered for the timeout value.
4. Click **Continue** to start the session. The browser opens the System Status page, which displays the server status and the server health summary.



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## Chapter 5. Software entitlement

The IBM Workload Optimized Solution for SAP HANA comes with SUSE Linux Enterprise Server for SAP Applications, the IBM General Parallel File System (GPFS), and the SAP HANA appliance. All software applications must be installed by a certified SAP HANA installer. To receive support, these products have to be registered with the respective suppliers as described in this section.

If you encounter problems on your SAP HANA system, access the SAP Online Service System (SAP OSS) website to create a service request ticket using BC-HAN as the problem component at <https://service.sap.com>. IBM support works closely with SAP and is dedicated to supporting SAP HANA software and hardware issues.

---

### SUSE Linux Enterprise Server for SAP Applications

The IBM Workload Optimized Solution for SAP HANA includes an activation card with the unique product registration number that will be needed to access maintenance and support from SUSE. After the product is registered, you can obtain the latest code updates for SUSE Linux Enterprise Server from the SUSE website at <http://www.suse.com/products/sles-for-sap/> and receive support from SUSE directly.

**Note:** An IBM x3950 X5 8-socket system is delivered as two 4-socket systems that are combined to a single system using the QPI scalability kit (see Table 1 on page 6). With such system two SUSE activation cards are provided. Please get these two licenses activated through SUSE and provide the following information to [POM@suse.com](mailto:POM@suse.com) to get this upgraded to a single 8-socket license:

- Company name
- Customer contact email
- Activation code 1
- Transaction date 1
- Subscription term 1 (Maint end date)
- Activation code 2 (to be combined with activation code 1)
- Transaction date 2
- Subscription term 2 (Maint end date)

For those customers upgrading from 4 to 8 sockets at a later point in time, SUSE will determine the Co-Term Date to define the duration of maintenance of the overall system.

For example:

- 4-socket system (e.g. 7143-HBx) acquired 01/01/2013 with a maintenance end of 12/31/2015.
- 4-socket upgrade option (e.g. 7143-HCx) acquired 08/01/2013 with a maintenance end of 07/31/2016.

**Note:** This will lead to a maintenance end of the combined system (Co-Term Date) of 05/16/2016 with respect to SUSE Linux Enterprise Server.

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## IBM General Parallel File System (GPFS)

The new IBM Workload Optimized Solution for SAP HANA contain the IBM General Parallel File System (GPFS) Single Server. GPFS server licenses are required for the scale-out configurations. Contact your IBM sales representative or IBM business partner to know what components and licenses are required with such configurations.

**Note:** In the scale-out configurations with more than three servers, if you use  $n$  servers in your scale-out configuration, you have to acquire 3 GPFS server licenses and  $n-3$  GPFS File Placement Optimizer (FPO) licenses. Make sure you acquire the correct number of licenses for both license types.

Customers receive **Confirmation of Software Order Placement and Acknowledgement** and **IBM International Passport Advantage Express Agreement - Registration** with the shipment of the IBM Workload Optimized Solution for SAP HANA.

# Confirmation of Software Order Placement and Acknowledgement

**IBM**

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## Confirmation of Software Order Placement and Acknowledgment

Keep this document for your records. This offering entitles the end user to three years of software subscription and support. Registration by the end user indicates acceptance of Passport Advantage® or Passport Advantage Express™ Terms and Conditions and initiates the entitlement processes. Registration for this offering should be completed prior to receipt of this form.

Thank you for your order.

Name: \_\_\_\_\_

Company: \_\_\_\_\_

Address: \_\_\_\_\_

City: \_\_\_\_\_ State: \_\_\_\_\_ Zip: \_\_\_\_\_ Country/Region: \_\_\_\_\_

Customer PO Number: \_\_\_\_\_

Quantity	Part Number	Description
_____	_____	_____

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(1P) P/N: 68Y9524



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## IBM International Passport Advantage Express Agreement - Registration

### **IBM** International Passport Advantage Express Agreement – Registration

Customer Contact Information	Customer Company Data
Passport Advantage Express Site # (if known):	*Company Name (full legal name required):
*First Name:	*IBM Customer number:
*Last Name:	*Street Address:
*Telephone Number:	*City, State/Province, Zip/Postal Code:
Fax Number:	*Country:
*Email Address:	*Telephone Number:
Reseller Name	*EU Countries: Value Added Tax Number (or equivalent):
Reseller IBM Customer Number (If Applicable):	*Israel - VAT
Purchase Order Number:	*France - VAT and SIRET
	*Netherlands - Need VAT and KVK
	*Greece - Need VAT, Tax office #
	*Turkey - Need Tax Office address and Tax office #
	*Australia – ABN #
	*Revenue for the Orders:

#### Language preference for Passport Advantage Express communications from IBM:

***You must provide all information requested above in order to be registered.***

#### **Note:**

The terms of the IBM International Passport Advantage Express Agreement ("Agreement"), including the Attachment for Sub-Capacity Terms ("Attachment"), govern your acquisition of certain IBM Programs, authorizations to increase your use of a Program, and annual IBM Software Subscription and Support renewals, whether you obtain them from IBM or a reseller. IBM is providing these documents to you with this IBM International Passport Advantage Express - Registration form.

IBM's acceptance of your order is conditioned upon 1) your prior acceptance of the Agreement and the Attachment that are in effect at the time of each transaction, and 2) your return to IBM of a completed IBM International Passport Advantage Express – Registration form.

IBM Programs that you obtain under the Agreement are governed by the terms of the IBM Program License Agreement ("IPLA"). If there is a conflict between the terms of the Agreement and those of the IPLA, including its License Information document, the terms of the Agreement prevail.

By registering, you

1. acknowledge that you have had the opportunity to read and understand the Agreement, including the Attachment, and the IPLA before you completed this form;
2. accept the terms of these documents and represent and warrant that you have full authority to do so on behalf of the registering Site; and
3. agree that each of us may communicate with the other by e-mail and that such communication is acceptable as a signed writing to the extent permissible under applicable law. Both of us agree that for all such communication, an identification code (called a "user ID") contained in the e-mail is sufficient to verify the sender's identity and the document's authenticity. If a signed writing is required, notify IBM.

Completed Forms should be returned to: TRex Project Office/Brazil/IBM or [trexp@br.ibm.com](mailto:trexp@br.ibm.com)

Z125-7510-00 01/2007

In the enrollment forms, customers have to provide a primary contact person, an administrative contact person, and a site technical contact person who will be authorized to manage the account with the program. After completing the enrollment, customers will receive entitlement forms, support renewal forms, and technical information about GPFS, respectively.

To receive country-specific language support, the enrollment forms are provided at <http://www.ibm.com/software/lotus/passportadvantage/paenrollments.html>.

These documents together with the registration form are required to be returned to IBM for proper registration. After registering successfully, the support for GPFS is granted. Thus, IBM can provide timely support regarding GPFS related issues.

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## **IBM Systems Director**

You can download the IBM Systems Director Agent, updates, and new versions at <http://www.ibm.com/systems/software/director/downloads/agents.html>. IBM Systems Director agent can be installed to connect to an IBM Systems Director Server running on a distinct server in your environment. No registration is required to install the agent. However, you have to purchase IBM Systems Director Server installation separately to receive support.

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## **SAP HANA appliance**

You have to acquire the license for the SAP HANA appliance from SAP. The IBM Workload Optimized Solution for SAP HANA provides the platform for running the software and the software preloaded. You have to obtain and activate a license key for running the SAP HANA appliance.



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## Chapter 6. Software updates

The IBM Systems Solution for SAP HANA appliance contains several different components that may be required to be upgraded (or downgraded) at times based on the respective recommendations from the SAP, SUSE, and IBM support representatives. These components can be divided into four general categories: firmware, operating systems, hardware drivers, and software. The IBM System x SAP HANA development team, once informed, reserves the right to perform basic system tests on these levels when they are deemed to directly affect the SAP HANA appliance. In general, specific recommendations to which levels are allowed for the SAP HANA appliance will not be given by the IBM System x SAP HANA development team.

The IBM System x SAP HANA development team provides new images for the SAP HANA appliance at regular intervals. These images have dependencies regarding the hardware, operating systems, and hardware drivers. The use of the latest image for maintenance and installation of SAP HANA appliance is recommended.

Whenever the firmware level recommendations (fixes for known firmware issues) for the IBM components of the SAP HANA appliance are given by the individual IBM System x support representatives, it is the customers' responsibility to upgrade (or downgrade) to the recommended levels as instructed by IBM System x support representatives.

Whenever the operating systems recommendations (fixes for known operating systems issues) for the SUSE Linux components of the SAP HANA appliance are given by the SAP, SUSE, or IBM support representatives, it is the customers' responsibility to upgrade (or downgrade) to the recommended levels as instructed by SAP through an explicit SAP Note or a Customer OSS Message. SAP describes their operational concept, including updating of the operating system components in SAP Note 1599888 - SAP HANA: Operational Concept. If the Linux kernel is updated, you have to recompile the IBM High IOPS drivers and IBM GPFS software as described in the *IBM Operations Guide* for SAP HANA.

Whenever the IBM High IOPS driver or IBM GPFS recommendations (fixes for known issues) is given by the individual IBM support representatives (for example, System x, Linux, GPFS) to update the software, ask the IBM System x SAP HANA development team via a SAP OSS Customer Message before performing the update.

Whenever other hardware or software recommendations (fixes known issues) for IBM components of the SAP HANA appliance are given by the individual IBM support representatives, it is the customers' responsibility to upgrade (or to downgrade) to the recommended levels as instructed by IBM support representatives.

If software and documentation updates are available, you can download them from the respective IBM, SUSE or SAP website. To check for updates, go to the following websites. Follow the procedure in the included documentation to update the software.

- Firmware and drivers for IBM System x3690 X5

You can obtain updates for IBM System x3690 X5 servers on the IBM support website at <http://www.ibm.com/support/fixcentral/options?source=SPE&productGroup0=ibm/Systemx&productGroup1=ibm/Systemx3690X5>

- Firmware and drivers for IBM System x3950 X5

You can obtain updates for IBM System x3950 X5 servers on the IBM support website at <http://www.ibm.com/support/fixcentral/options?source=SPE&productGroup0=ibm/Systemx&productGroup1=ibm/Systemx3950X5>

- Firmware and drivers for IBM System x3850 X6

You can obtain updates for IBM System x3850 X6 servers on the IBM support website at <http://www.ibm.com/support/fixcentral/systemx/selectFixes?product=ibm/systemx/3837&&platform=All&function=all>

- IBM General Parallel File System (GPFS) updates

You can obtain updates for GPFS on the IBM support website at <http://www.ibm.com/support/fixcentral/?productGroup0=ibm/fcpower&productGroup1=ibm/ClusterSoftware&productGroup2=ibm/power/IBM+General+Parallel+File+System>

- SUSE Linux Enterprise for SAP Applications 11 SP1

You can download the installation package from the Novell's SUSE website at [http://download.novell.com/Download?buildid=ut\\_49uTDXYc~](http://download.novell.com/Download?buildid=ut_49uTDXYc~).

- SUSE Linux Enterprise for SAP Applications 11 SP2

You can download the installation package from the Novell's SUSE website at <http://download.novell.com/Download?buildid=7VOt4b-efjo~>.

- SUSE Linux patches and updates

You can obtain the latest code updates for SUSE from the Novell's SUSE website at <http://download.novell.com/patch/finder/>.

- SAP HANA appliance updates

You can obtain the latest code updates from SAP at the SAP Service Marketplace at <http://service.sap.com/swdc>.

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## Upgrading SUSE Linux Enterprise Server for SAP Applications 11 SP1 to SP2

Upgrade SUSE Linux Enterprise Server (SLES) for SAP Applications 11 SP1 to SUSE Linux Enterprise Server for SAP Applications 11 SP2.

Upgrade SUSE Linux Enterprise Server for SAP Applications 11 SP1 before December, 31<sup>st</sup> 2013. It requires software updates of various components of the system. See the latest version of the *IBM Systems Solution for SAP HANA Appliance Operations Guide* (SAP note 1650046) for further information.

Upgrade GPFS from 3.4 to 3.5. The support of GPFS 3.4 for SAP HANA ends in December, 2013.

**Note:** Both upgrades are disruptive and should be executed in one maintenance window. Contact IBM for further information and assistance. You do not need new licenses for these upgrades.



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## Upgrading SUSE Linux Enterprise Server for SAP Applications 11 SP2 to SP3

Upgrade SUSE Linux Enterprise Server (SLES) for SAP Applications 11 SP2 to SUSE Linux Enterprise Server for SAP Applications 11 SP3.

Upgrade SUSE Linux Enterprise Server for SAP Applications 11 SP1 before April, 30<sup>th</sup> 2015. It requires software updates of various components of the system. See the latest version of the *IBM Systems Solution for SAP HANA Appliance Operations Guide* (SAP note 1650046) for further information.

Maintain GPFS 3.5.

**Note:** The upgrade is disruptive and should be executed in one maintenance window. Contact IBM for further information and assistance. You do not need new licenses for these upgrades.



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## Chapter 7. Hardware and software add-ons

You can find the basic models of the IBM Workload Optimized Solutions for SAP HANA in Table 3 on page 7. The table includes the details of the existing hardware components. This section focuses on additional features to the basic configurations.

The first section of this chapter provides the PCIe card placement information of the currently delivered HANA models while the other sections show different upgrade possibilities of BWA Entry systems and HANA models.

---

### PCIe card placement information

Table 13. x3690 X5 Type 7147: models HAx and HBx

Slot	Description	Part number
1	Emulex 10GbE Virtual Fabric Adapter II	49Y7950
2	Intel Ethernet Quad Port Server Adapter I340-T4 <sup>1</sup>	49Y4240
3	ServeRAID M5015 SAS/SATA adapter	46M0829
4	ServeRAID M5015 SAS/SATA adapter	46M0829
5	Emulex 10GbE Integrated VFA II	49Y7942 (CRU part number)
<b>Table note:</b>		
1. You can change it with an Emulex 10GbE Integrated VFA II (CRU part number 49Y7942).		

Table 14. x3950 X5 Type 7143: models HAx, HBx, and HCx

Slot	Description	Part number
1	Emulex 10GbE Virtual Fabric Adapter II	49Y7950
2	Intel Ethernet Quad Port Server Adapter I340-T4 <sup>1</sup>	49Y4240
3	Reserved	
4	Reserved	
5	IBM 1.2 TB HIGH IOPS MLC Mono Adapter	90Y4377
6	Reserved	
7	Emulex 10GbE Integrated VFA II	49Y7942 (CRU part number)
Dedicated slot on the RAID adapter carrier	ServeRAID M5015 SAS/SATA adapter	46M0829
<b>Table notes:</b>		
1. You can change it with an Emulex 10GbE Integrated VFA II (CRU part number 49Y7942).		
2. Slot 2 is electrically only x4 (mechanically x8) and is suggested to install an Intel 1GbE quad-port adapter only.		
3. Slot 3, 4, and 6 are reserved for additional adapters as described in the following sections. To achieve a balanced system population, the suggested slot priority sequence is slot 3, slot 6, and then slot 4.		

Table 15. x3850 X6 Type 3837-AC3

Slot	Description	Part number
1	Mellanox ConnectX-3	00D9550
2	Reserved	
3	(Mellanox ConnectX-3) (optional)	00D9550
4	Mellanox ConnectX-3	00D9550
5	(Intel I340-T4) (optional)	49Y4240
6	(Mellanox ConnectX-3) (optional)	00D9550
7	ServeRAID M5120	81Y4478
8	(ServeRAID M5120) (optional)	81Y4478
9	Reserved	
10	Intel I350-T4 ML2	00D1998
11	Reserved	
12	ServeRAID M5210	46C9110
<b>Table notes:</b> 1. Slot 2, 3, 5, 6, 8, and 9 are reserved for additional adapters as described in the following sections. To achieve a balanced system population, the suggested slot priority sequence is slot 5 (for Intel I340-T4), slot 3 (for Mellanox ConnectX-3), slot 6 (for Mellanox ConnectX-3), slot 8 (for M5120), slot 9 (general purpose), and then slot 2 (general purpose).		

## Upgrade from BWA Entry System on IBM System x3850 X5

You can add the following components to upgrade an existing IBM Business Warehouse Accelerator (BWA) Entry System on IBM System x3850 X5-based configurations into an IBM Workload Optimized Solution for SAP HANA.

You have the following upgrade options:

- IBM System x3950 X5: Workload Optimized Solution for SAP HANA 7143-HAx, see Table 16.
- IBM System x3950 X5: Workload Optimized Solution for SAP HANA 7143-HAx with reduced memory (128 GB), see Table 17 on page 31.
- IBM System x3950 X5: Workload Optimized Solution for SAP HANA 7143-HBx, see Table 18 on page 31.
- IBM System x3950 X5: Workload Optimized Solution for SAP HANA 7143-HBx with reduced memory (256 GB), see Table 19 on page 32.

### Components required for 7143-HAx upgrade

Table 16. Components required for 7143-HAx upgrade

Description	Part number	Quantity
SUSE Linux Enterprise Server for SAP Applications, 4-socket, 24x7 SUSE support 3-year	00D8096	1
Memory, 16 GB, 2R x 4, 1.35V, PC3L-10600 CL9 ECC DDR3 1333MHz LP RDIMM	49Y1400	16
Intel Ethernet Quad Port Server Adapter I340-T4 for IBM System x	49Y4240	1
Emulex 10GbE Virtual Fabric Adapter II for IBM System x	49Y7950	1

Table 16. Components required for 7143-HAx upgrade (continued)

Description	Part number	Quantity
IBM General Parallel File System for x86 Architecture, GPFS Server Per 10 Value Units with 3-year SW S&S (subscription and support)	80Y9469	140
IBM 1.2 TB HIGH IOPS MLC Mono Adapter	90Y4377	1

**Note:** 7143-HAx supports only 2 microprocessors. You have to reduce the number of microprocessors to 2 by removing microprocessors (which cannot be reused in the future) in order to upgrade to 7143-HAx.

### Components required for 7143-HAx upgrade with reduced memory (128 GB)

You can upgrade to 7143-HAx with reduced memory (128 GB), using the original memory of the IBM BWA Entry System.

Table 17. Components required for 7143-HAx upgrade with reduced memory (128 GB)

Description	Part number	Quantity
SUSE Linux Enterprise Server for SAP Applications, 4-socket, 24x7 SUSE support 3-year	00D8096	1
Intel Ethernet Quad Port Server Adapter I340-T4 for IBM System x	49Y4240	1
Emulex 10GbE Virtual Fabric Adapter II for IBM System x	49Y7950	1
IBM General Parallel File System for x86 Architecture, GPFS Server Per 10 Value Units with 3-year SW S&S (subscription and support)	80Y9469	140
IBM 1.2 TB HIGH IOPS MLC Mono Adapter	90Y4377	1

**Note:** 7143-HAx supports only 2 microprocessors. You have to reduce the number of microprocessors to 2 by removing microprocessors (which cannot be reused in the future) in order to upgrade to 7143-HAx.

### Components required for 7143-HBx upgrade

Table 18. Components required for 7143-HBx upgrade

Description	Part number	Quantity
SUSE Linux Enterprise Server for SAP Applications, 4-socket, 24x7 SUSE support 3-year	00D8096	1
Memory, 16 GB, 2R x 4, 1.35V, PC3L-10600 CL9 ECC DDR3 1333MHz LP RDIMM	49Y1400	32
Intel Ethernet Quad Port Server Adapter I340-T4 for IBM System x	49Y4240	1
Emulex 10GbE Virtual Fabric Adapter II for IBM System x	49Y7950	1
IBM General Parallel File System for x86 Architecture, GPFS Server Per, 10 Value Units with 3-year SW S&S	80Y9469	150
IBM General Parallel File System for x86 Architecture, GPFS Server Per 250, 10 Value Units with 3-year SW S&S	80Y9470	1
IBM 1.2 TB HIGH IOPS MLC Mono Adapter	90Y4377	1

## Components required for 7143-HBx upgrade with reduced memory (256 GB)

You can upgrade to 7143-HBx with reduced memory (256 GB).

**Note:** You must use thirty-two 8 GB DDR3 DIMMs to achieve 256 GB memory.

*Table 19. Components required for 7143-HBx upgrade with reduced memory (256 GB)*

Description	Part number	Quantity
SUSE Linux Enterprise Server for SAP Applications, 4-socket, 24x7 SUSE support 3-year	00D8096	1
Intel Ethernet Quad Port Server Adapter I340-T4 for IBM System x	49Y4240	1
Emulex 10GbE Virtual Fabric Adapter II for IBM System x	49Y7950	1
IBM General Parallel File System for x86 Architecture, GPFS Server Per, 10 Value Units with 3-year SW S&S	80Y9469	150
IBM General Parallel File System for x86 Architecture, GPFS Server Per 250, 10 Value Units with 3-year SW S&S	80Y9470	1
IBM 1.2 TB HIGH IOPS MLC Mono Adapter	90Y4377	1

---

## Upgrade from SAP HANA System on IBM System x3690 X5 and x3950 X5

You can upgrade existing SAP HANA models with the following options:

- 7147-H1x upgrade to 7147-H2x or 7147-HAx upgrade to 7147-HBx, see Table 20 for more details.
- 7147-H3x upgrade to 7147-HBx, see Table 21 on page 33 for more details.
- 7143-H1x upgrade to 7143-HBx, see Table 22 on page 33 for more details.
- 7143-HAx upgrade to 7143-HBx, see Table 23 on page 33 for more details.
- 7143-H1x upgraded model (or 7143-H2x) upgrade with 7143-HCx option.
- 7143-H1x upgraded model (or 7143-HAx upgraded model, or 7143-HBx) upgrade with 7143-HCx option.
- 7143-HDx and 7143-HEx upgrade to a 4 TB model, see Table 24 on page 34 for more details.

**Note:** The upgrade of existing 7147-H1x or 7147-H2x models to 7147-HBx can also be supported with a new installation. Consult your IBM sales representative or IBM business partner for more information.

## Components required for 7147-H1x upgrade to 7147-H2x or 7147-HAx upgrade to 7147-HBx

*Table 20. Components required for 7147-H1x upgrade to 7147-H2x or 7147-HAx upgrade to 7147-HBx*

Description	Part number	Quantity
Memory, 16 GB, 2R x 4, 1.35V, PC3L-10600 CL9 ECC DDR3 1333MHz LP RDIMM	49Y1400	8

**Note:** You have to shut down and restart the system to adopt the changes. The system will maintain its original machine type and model name (7147-H1x or 7147-HAx), but the hardware checker will detect the correct model 7147-H2x or 7147-HBx after the upgrade.

## Components required for 7147-H3x upgrade to 7147-HBx

Table 21. Components required for 7147-H3x upgrade to 7147-HBx

Description	Part number	Quantity
IBM SFP+ SR Transceiver	46C3447	2
Emulex 10GbE Virtual Fabric Adapter II for IBM System x	49Y7950	1

**Note:** You have to shut down and restart the system to adopt the changes. The system will maintain its original machine type and model name (7147-H3x), but the hardware checker will detect the correct model 7147-HBx after the upgrade.

## Components required for 7143-H1x upgrade to 7143-HBx

Table 22. Components required for 7143-H1x upgrade to 7143-HBx

Description	Part number	Quantity
Memory, 16 GB, 2R x 4, 1.35V, PC3L-10600 CL9 ECC DDR3 1333MHz LP RDIMM	49Y1400	16
IBM System x3850 X5 and x3950 X5 QPI Wrap Card	49Y4379	1
IBM System x3850 X5 and x3950 X5 Memory Expansion Card	69Y1888	4
Microprocessor, Intel Xeon E7-8870 10C 2.4GHz 30MB 130W	69Y1899	2
IBM General Parallel File System for x86 Architecture, GPFS Server Per, 10 Value Units with 3-year SW S&S	80Y9469	10
IBM General Parallel File System for x86 Architecture, GPFS Server Per 250, 10 Value Units with 3-year SW S&S	80Y9470	1
IBM 1.2 TB High IOPS MLC Mono Adapter	90Y4377	1

**Note:** You have to shut down and restart the system to adopt the changes. The system will maintain its original machine type and model number (7143-H1x), but the hardware checker will detect the correct model 7143-HBx after the upgrade.

## Components required for 7143-HAx upgrade to 7143-HBx

Table 23. Components required for 7143-HAx upgrade to 7143-HBx

Description	Part number	Quantity
Memory, 16 GB, 2R x 4, 1.35V, PC3L-10600 CL9 ECC DDR3 1333MHz LP RDIMM	49Y1400	16
IBM System x3850 X5 and x3950 X5 QPI Wrap Card	49Y4379	1
IBM System x3850 X5 and x3950 X5 Memory Expansion Card	69Y1888	4
Microprocessor, Intel Xeon E7-8870 10C 2.4GHz 30MB 130W	69Y1899	2

**Note:** You have to shut down and restart the system to adopt the changes. The system will maintain its original machine type and model number (7143-HAx), but the hardware checker will detect the correct model 7143-HBx after the upgrade.

## Components required for 7143-H1x upgraded model or 7143-H2x model with 7143-HCx upgrade option

A 7143-H1x upgraded model or a 7143-H2x model can be extended to an eight-socket, 1 TB system by adding the 7143-HCx upgrade option.

**Note:** The 7143-H1x model must be upgraded to a 7143-HBx model before adding this option.

## Components required for 7143-H1x upgraded model or 7143-HAx upgraded model with 7143-HCx upgrade option

A 7143-H1x upgraded model (or 7143-HAx) to 7143-H2x (or 7143-HBx) models can be extended to an eight socket, 1 TB system by adding the 7143-HCx upgrade option.

**Note:** The 7143-H1x or 7143-HAx models must be upgraded to a 7143-H2x or a 7143-HBx model before adding this option.

## Components required for 7143-HDx and 7143-HEx upgrade to a 4 TB model

Table 24. Components required for 7143-HDx and 7143-HEx upgrade to a 4 TB model

Description	Part number	Quantity
IBM System Storage EXP2524 Express Storage Enclosure	174724X	1
IBM mini-SAS Cable - 3 m	39R6531	1
ServeRAID M5025 SAS/SATA Controller	46M0830	1
Hard disk drive, 900 GB 2.5-inch 10K 6Gbps SAS HDD	81Y9948	8
Memory, 32GB, 4R x 4, 1.35V, PC3L-8500 CL7 ECC DDR3 1066MHz LP RDIMM	90Y3101	64
IBM 1. 2TB High IOPS MLC Mono Adapter	90Y4377	2

A 2 TB system consisting of one 7143-HDx plus one 7143-HEx upgrade option can be upgraded to a 4 TB system by adding additional memory and hard drives. The hard drives are installed in an additional storage expansion.

**Note:** IBM System x3950 X5 can support up to 6 TB memory. However, this is not formally supported with the IBM Solution for SAP HANA under SAP's requirements.

## Components required to install 7143-H3x, 7143-HCx, or 7143-HEx as a 4-socket M or XM system

Table 25. Components required to install 7143-H3x, 7143-HCx, or 7143-HEx as a 4-socket M or XM system

Description	Part number	Quantity
SLES for SAP Applications 4 Socket 24x7 SUSE Support 3yr (required only with 7143-H3x)	00D8096	1
IBM x3850 X5 and x3950 X5 QPI Wrap Card	49Y4379	1



All upgrade options have to be performed by certified technicians. Only certified service technicians can perform hardware upgrades and the installation of the IBM Workload Optimized Solution for SAP HANA.

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## Upgrade from SAP HANA System on IBM System x3850 X6

"Please contact your IBM sales representative or business partner for more information." We will provide details as we proceed with further certification of the solution.

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## Supported hardware options

You can add additional hardware add-ons to the IBM Workload Optimized Solution for SAP HANA server in the following categories.

A standalone single server IBM Workload Optimized Solution for SAP HANA can be used in a clustered solution. You might need to add hardware or upgrade an existing solution to a model which is validated by SAP and supported by IBM for the use in a clustered configuration. It may require additional components (for example, switches, NICs) that are certified with this model and are dedicated to this model only. Consult your IBM sales representative or IBM business partner for more information.

IBM does provide scale-out solutions with up to 56 nodes certified by SAP for scale-out configurations. A scale-out cluster with 256 GB nodes consisting of a mix of 7147-H3x and 7147-HBx nodes or single-type nodes. A cluster with 512 GB nodes consisting of a mix with 7143-H2x and 7143-HBx nodes, a 1TB cluster of 7143-H2x and 7143-HBx paired with 7143-H3x and 7143-HCx according to the previously described upgrade configurations. There are two nodes required to support this scale-out configuration. At least one (the minimum) additional node is required to prevent a data-inconsistency scenario. The two-node configuration can provide a single node high availability solution: one is the worker node, and the other is the standby node. Though it is considered a scale-out configuration from the system perspective, it is deemed a standalone configuration from the SAP HANA appliance perspective as all data is loaded on one node only.

### Notes:

1. An IBM System x3550 M3 or x3550 M4 server can be added as additional nodes herewith. Consult your IBM sales representative or IBM business partner for such configuration.
2. If more than 56 nodes are required in a scale-out configuration, IBM will work with SAP to have such installation certified upon request.

All upgrade options have to be performed by certified technicians. Only certified service technicians can perform hardware upgrades and the installation of the IBM Workload Optimized Solution for SAP HANA.

- Expanding the internal storage by adding a storage expansion box.  
In order to provide additional local storage in an IBM Workload Optimized Solution for SAP HANA, a ServeRAID M5025 SAS/SATA Controller (option part number 46M0830) can be added in slot 3 in any of the 7143-Hxx models. An external EXP2524 Storage Expansion Unit (1747-24X) can then be connected through an external SAS cable and can hold up to twenty-four 2.5-inch hard-disk drives or solid-state drives.
- Connecting external storage for backup or restore purposes.

In order to provide a fiber channel connection from an IBM Workload Optimized Solution for SAP HANA, a host bus adapter (HBA) for IBM System x can be installed in slot 3 of the 7143-Hxx model.

- Adding more 10GbE network adapters.

If you want to use more than the provided 10GbE adapters, you can install more Emulex 10GbE Virtual Fabric Adapter II for IBM System x (option part number 49Y7950) to your machines. The suggested slot priority sequence is slot 3, slot 6, and then slot 4 for x3950 X5 Type 7143 to achieve a balanced system population.

- Using copper-based cabled with the 10GbE switch.

If you do not want to use the SFP+ cables together with the provided IBM 10GbE SW SFP+ Transceivers, you can use Molex Direct Attach Copper (DAC) Cables.

**Note:** The provided transceivers have to be removed.

These IBM provided hardware components are common components that are used and supported with the System x3690 X5, System x3850 X5, or System x3950 X5 model, respectively.

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## Additional software add-ons

You can find additional software add-ons on the IBM Workload Optimized Solution for SAP HANA in the following three categories:

- Supported - IBM provides a solution covering the respective area, no validation by SAP is required.
- Tolerated - Solutions provided by a third party that are allowed to be used on the IBM Workload Optimized Solution for SAP HANA. It is customers' responsibility to obtain support for such solutions. Such solutions are not validated by IBM and SAP. If issues with such solutions should occur and cannot be resolved, the use of such solutions might be prohibited in the future.
- Prohibited - Solutions that must not be used on the IBM Workload Optimized Solution for SAP HANA, using these solutions might compromise the performance, stability or data integrity of the SAP HANA appliance.

### Notes:

1. You must not install any additional software add-ons into the root (/) directory on the IBM Workload Optimized Solution for SAP HANA. Additional software add-ons should be installed into the /sapmnt/data directory. Sufficient disk space is provided to host applications in this directory.
2. All additional software add-ons should be configured not to interfere with the functionality or performance of the SAP HANA appliance. If any issue of the SAP HANA appliance occur, you might be asked by SAP to remove all additional software add-ons and to reproduce the issue.

## Backup and restore

- IBM supports the Tivoli Storage Manager Client installed on the IBM Workload Optimized Solution for SAP HANA in addition to the provided data backup capabilities of the SAP HANA appliance.
- Third party solutions (e.g., Symantec NetBackup or HP Data Protector) or open-source solutions (e.g., ReaR) are tolerated.

**Note:** Only scheduled backups are allowed which must not interfere with the functionality of the SAP HANA appliance. These backups have to be invoked during maintenance windows or at low workload periods where the interference can be excluded. Continuous backups are prohibited on the IBM Workload Optimized Solution for SAP HANA. You have to make sure that the backup software is configured correctly not to compromise the performance of the SAP HANA appliance.

## Systems management

- Installation of the IBM Systems Director Agent on IBM Workload Optimized Solutions for SAP HANA to connect to a distinct IBM Systems Director Server is supported.
- IBM supports Tivoli Monitoring on the IBM Workload Optimized Solution for SAP HANA with the client running on the machine connecting to a distinct server.
- IBM supports Tivoli Workload Scheduler running together with the SAP HANA appliance on the IBM Workload Optimized Solution for SAP HANA.
- Other systems management solutions are tolerated when these solutions implement a client or agent function on the IBM Workload Optimized Solution for SAP HANA with a management server running on a distinct server.

## Antivirus

Installation of an antivirus solution on IBM Workload Optimized Solution for SAP HANA is prohibited because such solution would highly interfere with the SAP HANA appliance.

## Other

Additional software that does not impact the function and performance of SAP HANA might be tolerated. Consult your IBM sale representative or IBM business partner for more information.



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## Chapter 8. Recovering from a hardware failure

This chapter contains general information about how to recover from a hardware failure. If the operating system becomes corrupted for any reason, you can restore the system from an earlier backup. If a restore from an earlier backup is not applicable or there is no recent system backup available, the server can be restored to the factory default installation.

**Attention:** The recovery process for the server is only available with the support of the certified IBM SAP HANA installation service representative at this time. If a factory restore of the server operating system or its components is required, contact your IBM sales or service representative for more information.

To abide by the various legal requirements from all software parties involved, the IBM certified installation service representative needs the following CD/DVDs provided by you in order to restore the server:

### X5 systems:

- SUSE Linux Enterprise Server for SAP Applications 11, which is available for download from the SUSE website (see Chapter 6, “Software updates,” on page 25 for more information)
  - Use SUSE Linux Enterprise Server for SAP Applications 11 SP1 for non-OS content of IBM Systems Solution for SAP HANA prior to version 1.5.53-5.
  - Use SUSE Linux Enterprise Server for SAP Applications 11 SP2 for non-OS content of IBM Systems Solution for SAP HANA version 1.5.53-5 and 1.5.53-6.
  - Use SUSE Linux Enterprise Server for SAP Applications 11 SP3 for non-OS content of IBM Systems Solution for SAP HANA version 1.5.53-9.
- Non-OS content for IBM Systems Solution for SAP HANA appliance which is included in the original package. Alternatively, you may order a replacement through IBM support using the latest field replaceable unit (FRU) part number below:

*Table 26. X5 systems only: Non-OS parts listing, SUSE Linux Enterprise Server for SAP Applications 11 SP3*

FRU part number	Description	Remark
00KC183	SAP HANA FRU Pkg for X5 v1.7.73-9	The latest version
00AK795	SAP HANA FRU Pkg version v1.6.60-7	Replaced by FRU part number 00KC183

*Table 27. X5 systems only: Non-OS parts listing, SUSE Linux Enterprise Server for SAP Applications 11 SP2*

FRU part number	Description	Remark
00AK795	SAP HANA FRU Pkg version v1.6.60-7	The latest version
00AK712	SAP HANA FRU Pkg version v1.6.60-6	Replaced by FRU part number 00AK795
46W8273	SAP HANA FRU Pkg version 1.5.53-5	Replaced by FRU part number 00AK712

Table 27. X5 systems only: Non-OS parts listing, SUSE Linux Enterprise Server for SAP Applications 11 SP2 (continued)

FRU part number	Description	Remark
<b>Note:</b> Previous versions not supported with SUSE Linux Enterprise Server for SAP applications 11 SP2		

Table 28. X5 systems only: Non-OS parts listing, SUSE Linux Enterprise Server for SAP Applications 11 SP1

FRU part number	Description	Remark
46W8234	SAP HANA FRU Pkg version 1.5.46-4	Replaced by FRU part number 46W8273.
00V9892	SAP HANA FRU Pkg version 1.4.28-3	Replaced by FRU part number 46W8234.
00V9854	SAP HANA FRU Pkg version 1.4.28-2	Replaced by FRU part number 00V9892.
00D7760	SAP HANA FRU Pkg version 1.4.28-1	Replaced by FRU part number 00V9854.
00D7753	SAP HANA FRU Pkg version 1.3.20-1	Replaced by FRU part number 00D7760.
00D7752	SAP HANA FRU Pkg version 1.0/2.0	Replaced by FRU part number 00D7753.

In addition, you can also refer to the document that comes with your server for information on solving hardware problems that might occur with your server. It describes the diagnostic tools that come with the server, error codes and suggested actions, and instructions for replacing failing components.

#### X6 systems:

- SUSE Linux Enterprise Server for SAP Applications 11, which is available for download from the SUSE website (see Chapter 6, “Software updates,” on page 25 for more information)
  - Use SUSE Linux Enterprise Server for SAP Applications 11 SP3 for non-OS content of IBM Systems Solution for SAP HANA version 1.5.53-8 and 1.5.53-9.
- Non-OS content for IBM Systems Solution for SAP HANA appliance which is included in the original package. Alternatively, you may order a replacement through IBM support using the latest field replaceable unit (FRU) part number below:

Table 29. X6 systems only: Non-OS parts listing, SUSE Linux Enterprise Server for SAP Applications 11 SP3

FRU part number	Description	Remark
00KC186	SAP HANA FRU Pkg for X6 v1.7.73-9	The latest version
00FL018	SAP HANA FRU Pkg version v1.7.70-8	Replaced by FRU part number 00KC186

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## Appendix. Getting help and technical assistance

This section contains information about where to go for additional information about IBM and SAP products, what to do if you experience a problem with your system, and whom to call for service, if it is necessary.

### Online service system (OSS)

If you encounter problems on your SAP HANA appliance, access the SAP Online Service System (OSS) website to create a service request ticket using **BC-HAN** as the problem component. Provide the SUSE Linux license key, server model and serial number, and respective SAP application information. IBM support representative works closely with SAP and is dedicated to supporting SAP HANA software and hardware issues.

All questions and requests for support should be sent to SAP via their OSS messaging system. A dedicated IBM representative is available at SAP to work on the issue resolution. Even if it is a clear hardware problem, a SAP OSS message should be opened to provide the best direct support for this product.

After opening a SAP OSS message, the first level support directs the message to the responsible supporters.

- SAP application problem → SAP support
- Operating system (Linux) problem → Linux lab or SUSE support
- Hardware or GPFS problem → IBM support

If an issue with respect to IBM components is determined, you might want or be asked to open an IBM Problem Management Record (PMR) ticket for problem resolution. In most cases, issues are related to the solution configuration, setup, or operation. In such case the OSS ticket is sufficient, no IBM PMR ticket is required.

- Problems in a Virtual Machine on VMware → VMware support

You might be asked to recreate your issue on a bare-metal installation outside of VMware.

When opening a SAP support message, we recommend using the following text template when it is obvious that you have a hardware problem. This will expedite all hardware related problems within the SAP support organization. Otherwise, the SAP support teams will gladly help you with the questions regarding the SAP HANA appliance in general.

Text template:

A problem was found on our IBM Systems Solution for SAP HANA appliance. We believe that this may be a hardware issue, but to be certain, and also to follow the procedures set out by SAP's development support, we have opened this OSS message and ask that this message be transferred to the appropriate SAP queue regarding this product and that the appropriate SAP development support team has been informed of this issue. We have collected information from SAP OSS 1661146 and SAP OSS 618104 and attached them to this note. (Further information related to this message, like IBM PMR number, can be added here for SAP.)

Regards,

## Service offerings

To help speed up deployment and simplify maintenance of your IBM System x3690 X5, x3950 X5, or IBM System x3850: Workload Optimized Solution for SAP HANA, IBM Lab Services and Global Technology Services offer quick-start services to help set up and configure the appliance and health-check services to ensure the server continues to run optimally. In addition, IBM also offers skills and enablement services for administration and management of IBM System x enterprise servers.

- **Quickstart Services:** Implementation services for SAP HANA, including installation, update/upgrade and configuration, hardware and software stack (OS, GPFS, SAP) validation, basic skills transfer, and post-installation documentation, on IBM System x enterprise servers
- **Healthcheck Services:** Validate existing SAP HANA installation: verify firmware and software levels against recommended best practices, recommend and perform upgrades in consultation with customers, investigate logs and customer concerns and recommend resolution
- **Skills Enablement Services:** Customized training sessions for SAP HANA in selected areas (such as Linux OS, GPFS, and IBM hardware)
- **Managed Services:** Ongoing support for SAP HANA, including 24x7 monitoring, ongoing remote healthchecks, firmware and software upgrades and patch application, and problem tracking and resolution

Many customers require more than software and hardware products. They need a partner to help them assess their current capabilities, identify areas for improvement and develop a strategy for moving forward. This is where IBM Global Business Services® provides immeasurable value with thousands of SAP consultants in 80 countries. The SAP Consulting Practice offers a broad range of services for SAP HANA such as:

- Discovery and assessment services to maximize business impact
- Architecture assessment and benchmark services
- Proof of concept services
- Express deployment offerings, including industry best practices

By drawing on these resources, IBM can help you take full advantage of SAP HANA running on IBM System x enterprise servers.

## Before you call

Before you call IBM support, make sure that you have taken these steps to try to solve the problem yourself:

- Check all cables to make sure that they are connected.
- Check the power switches to make sure that the system and any optional devices are turned on.
- Use the troubleshooting information in your system documentation, and use the diagnostic tools that come with your system. Information about diagnostic tools is in the document on the IBM *Documentation* CD that comes with your system.
- Go to the IBM support website at <http://www.ibm.com/supportportal> to check for technical information, hints, tips, and new device drivers or to submit a request for information.
- For SAP HANA software-related issues you can search the SAP OSS (Online Service System) website for problem resolutions. The OSS website has a knowledge database of known issues and can be accessed at <https://service.sap.com/notes>. The main SAP HANA information source is



available at <https://service.sap.com/sap/support/notes/1514967>. See “Online service system (OSS)” on page 41 for more information.

## Support disclaimer

The IBM Systems Solution for SAP HANA is delivered to you as a preconfigured system. This implies certain restrictions with hardware modifications and software updates. All hardware components have been configured and tuned for optimal performance with SAP HANA. The solution must be operated only with hardware components and software levels that have been certified by IBM and SAP. Adding unsupported hardware or software components may void support.

## Getting help and information from the World Wide Web

On the World Wide Web, the IBM website has up-to-date information about IBM systems, optional devices, services, and support. You can find service information for IBM systems and optional devices at <http://www.ibm.com/supportportal>.

General information about SAP HANA can be found on the SAP Developer Network (SDN) website at <http://www.sdn.sap.com/irj/sdn/in-memory>.

SAP Service Marketplace (<https://service.sap.com>) is the main entry point for SAP support, software downloads, and documentation. SAP HANA 1.0 documentation about Installation, Update, Migration is available at <https://service.sap.com/hana>.

**Note:** An SAP Service Marketplace ID is required to access the portal.

The SAP Help Portal provides information on SAP HANA 1.0 administration and configuration at <https://service.sap.com/hana>. General information about SAP HANA can be found on the IBM solutions website at <http://www.ibm.com/solutions/sap/us/en/landing/hana.html> and on the SAP Developer Network (SDN) website at <http://www.sdn.sap.com/irj/sdn/in-memory>. Access to SDN requires a free-of-charge registration.

## Software service and support

The IBM SAP International Competence Center (ISICC) InfoService serves as single point of entry for all SAP-related questions for customers who are using IBM Systems and Solutions with SAP applications. It is a key support function of the IBM and SAP Alliance. As a managed question and answer service, the ISICC InfoService has access to a worldwide network of experts on technology topics around IBM products in SAP environments.

Contact information: [infoservice@de.ibm.com](mailto:infoservice@de.ibm.com)

IBM General Parallel File System (GPFS) support information can be found at [http://publib.boulder.ibm.com/infocenter/clresctr/vxrx/topic/com.ibm.cluster.gpfs.doc/gpfs\\_faqs/gpfsclustersfaq.pdf](http://publib.boulder.ibm.com/infocenter/clresctr/vxrx/topic/com.ibm.cluster.gpfs.doc/gpfs_faqs/gpfsclustersfaq.pdf).

For support information about SUSE Linux Enterprise Server for SAP Applications 11 SP1, SP2, and SP3, go to the website at <http://www.suse.com/products/sles-for-sap/frequently-asked-questions/>.

- The SUSE Linux Enterprise for SAP Applications 11 SP1 media is available for download at [http://download.novell.com/Download?buildid=ut\\_49uTDXYc~](http://download.novell.com/Download?buildid=ut_49uTDXYc~).

- The SUSE Linux Enterprise for SAP Applications 11 SP2 media is available for download at <http://download.novell.com/Download?buildid=7VOt4b-efjo~>.
- The SUSE Linux Enterprise for SAP Applications 11 SP3 media is available for download at <https://download.suse.com/Download?buildid=XL0RqEykJpc~>

**Note:** A free-of-charge registration is required before you can download software packages from the SUSE website.

## **Hardware service and support**

For IBM in Canada or the United States, call 1-800-IBM-SERV (or 1-800-426-7378). For IBM in the European Union (EU), Asia Pacific, and Latin America countries, contact IBM in that country or visit the following IBM websites:  
<http://www.ibm.com/supportportal/> or <http://www.ibm.com/planetwide/>.

Upon a successful repair of the server, perform a system recovery and restore from the backup. If a reinstallation of the system is required, call IBM lab services at 1-720-396-8555 or contact [csmit@us.ibm.com](mailto:csmit@us.ibm.com).

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## Important notes

Processor speed indicates the internal clock speed of the microprocessor; other factors also affect application performance.

CD or DVD drive speed is the variable read rate. Actual speeds vary and are often less than the possible maximum.

When referring to processor storage, real and virtual storage, or channel volume, KB stands for 1024 bytes, MB stands for 1,048,576 bytes, and GB stands for 1,073,741,824 bytes.

When referring to hard disk drive capacity or communications volume, MB stands for 1,000,000 bytes, and GB stands for 1,000,000,000 bytes. Total user-accessible capacity can vary depending on operating environments.

Maximum internal hard disk drive capacities assume the replacement of any standard hard disk drives and population of all hard disk drive bays with the largest currently supported drives that are available from IBM.

Maximum memory might require replacement of the standard memory with an optional memory module.

Each solid-state memory cell has an intrinsic, finite number of write cycles that the cell can incur. Therefore, a solid-state device has a maximum number of write cycles that it can be subjected to, expressed as total bytes written (TBW). A device that has exceeded this limit might fail to respond to system-generated commands or might be incapable of being written to. IBM is not responsible for

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Some software might differ from its retail version (if available) and might not include user manuals or all program functionality.

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## Particulate contamination

**Attention:** Airborne particulates (including metal flakes or particles) and reactive gases acting alone or in combination with other environmental factors such as humidity or temperature might pose a risk to the device that is described in this document.

Risks that are posed by the presence of excessive particulate levels or concentrations of harmful gases include damage that might cause the device to malfunction or cease functioning altogether. This specification sets forth limits for particulates and gases that are intended to avoid such damage. The limits must not be viewed or used as definitive limits, because numerous other factors, such as temperature or moisture content of the air, can influence the impact of particulates or environmental corrosives and gaseous contaminant transfer. In the absence of specific limits that are set forth in this document, you must implement practices that maintain particulate and gas levels that are consistent with the protection of human health and safety. If IBM determines that the levels of particulates or gases in your environment have caused damage to the device, IBM may condition provision of repair or replacement of devices or parts on implementation of appropriate remedial measures to mitigate such environmental contamination. Implementation of such remedial measures is a customer responsibility.

*Table 30. Limits for particulates and gases*

Contaminant	Limits
Particulate	<ul style="list-style-type: none"><li>• The room air must be continuously filtered with 40% atmospheric dust spot efficiency (MERV 9) according to ASHRAE Standard 52.2<sup>1</sup>.</li><li>• Air that enters a data center must be filtered to 99.97% efficiency or greater, using high-efficiency particulate air (HEPA) filters that meet MIL-STD-282.</li><li>• The deliquescent relative humidity of the particulate contamination must be more than 60%<sup>2</sup>.</li><li>• The room must be free of conductive contamination such as zinc whiskers.</li></ul>
Gaseous	<ul style="list-style-type: none"><li>• Copper: Class G1 as per ANSI/ISA 71.04-1985<sup>3</sup></li><li>• Silver: Corrosion rate of less than 300 Å in 30 days</li></ul>

Table 30. Limits for particulates and gases (continued)

Contaminant	Limits
	<p><sup>1</sup> ASHRAE 52.2-2008 - <i>Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size</i>. Atlanta: American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.</p> <p><sup>2</sup> The deliquescent relative humidity of particulate contamination is the relative humidity at which the dust absorbs enough water to become wet and promote ionic conduction.</p> <p><sup>3</sup> ANSI/ISA-71.04-1985. <i>Environmental conditions for process measurement and control systems: Airborne contaminants</i>. Instrument Society of America, Research Triangle Park, North Carolina, U.S.A.</p>

## Documentation format

The publications for this product are in Adobe Portable Document Format (PDF) and should be compliant with accessibility standards. If you experience difficulties when you use the PDF files and want to request a web-based format or accessible PDF document for a publication, direct your mail to the following address:

*Information Development  
IBM Corporation  
205/A015  
3039 E. Cornwallis Road  
P.O. Box 12195  
Research Triangle Park, North Carolina 27709-2195  
U.S.A.*

In the request, be sure to include the publication part number and title.

When you send information to IBM, you grant IBM a nonexclusive right to use or distribute the information in any way it believes appropriate without incurring any obligation to you.

## Telecommunication regulatory statement

This product may not be certified in your country for connection by any means whatsoever to interfaces of public telecommunications networks. Further certification may be required by law prior to making any such connection. Contact an IBM representative or reseller for any questions.

## Electronic emission notices

When you attach a monitor to the equipment, you must use the designated monitor cable and any interference suppression devices that are supplied with the monitor.

## Federal Communications Commission (FCC) statement

**Note:** This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio

communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

Properly shielded and grounded cables and connectors must be used in order to meet FCC emission limits. IBM is not responsible for any radio or television interference caused by using other than recommended cables and connectors or by unauthorized changes or modifications to this equipment. Unauthorized changes or modifications could void the user's authority to operate the equipment.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that might cause undesired operation.

### **Industry Canada Class A emission compliance statement**

This Class A digital apparatus complies with Canadian ICES-003.

### **Avis de conformité à la réglementation d'Industrie Canada**

Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

### **Australia and New Zealand Class A statement**

**Attention:** This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

### **European Union EMC Directive conformance statement**

This product is in conformity with the protection requirements of EU Council Directive 2004/108/EC on the approximation of the laws of the Member States relating to electromagnetic compatibility. IBM cannot accept responsibility for any failure to satisfy the protection requirements resulting from a nonrecommended modification of the product, including the fitting of non-IBM option cards.

**Attention:** This is an EN 55022 Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

Responsible manufacturer:

International Business Machines Corp.  
New Orchard Road  
Armonk, New York 10504  
914-499-1900

European Community contact:

IBM Deutschland GmbH  
Technical Regulations, Department M372  
IBM-Allee 1, 71139 Ehningen, Germany  
Telephone: +49 7032 15 2941  
Email: lugi@de.ibm.com



## Germany Class A statement

### **Deutschsprachiger EU Hinweis: Hinweis für Geräte der Klasse A EU-Richtlinie zur Elektromagnetischen Verträglichkeit**

Dieses Produkt entspricht den Schutzanforderungen der EU-Richtlinie 2004/108/EG zur Angleichung der Rechtsvorschriften über die elektromagnetische Verträglichkeit in den EU-Mitgliedsstaaten und hält die Grenzwerte der EN 55022 Klasse A ein.

Um dieses sicherzustellen, sind die Geräte wie in den Handbüchern beschrieben zu installieren und zu betreiben. Des Weiteren dürfen auch nur von der IBM empfohlene Kabel angeschlossen werden. IBM übernimmt keine Verantwortung für die Einhaltung der Schutzanforderungen, wenn das Produkt ohne Zustimmung der IBM verändert bzw. wenn Erweiterungskomponenten von Fremdherstellern ohne Empfehlung der IBM gesteckt/eingebaut werden.

EN 55022 Klasse A Geräte müssen mit folgendem Warnhinweis versehen werden:  
**Warnung:** Dieses ist eine Einrichtung der Klasse A. Diese Einrichtung kann im Wohnbereich Funk-Störungen verursachen; in diesem Fall kann vom Betreiber verlangt werden, angemessene Maßnahmen zu ergreifen und dafür aufzukommen.

### **Deutschland: Einhaltung des Gesetzes über die elektromagnetische Verträglichkeit von Geräten**

Dieses Produkt entspricht dem Gesetz über die elektromagnetische Verträglichkeit von Geräten (EMVG). Dies ist die Umsetzung der EU-Richtlinie 2004/108/EG in der Bundesrepublik Deutschland.

### **Zulassungsbescheinigung laut dem Deutschen Gesetz über die elektromagnetische Verträglichkeit von Geräten (EMVG) (bzw. der EMC EG Richtlinie 2004/108/EG) für Geräte der Klasse A**

Dieses Gerät ist berechtigt, in Übereinstimmung mit dem Deutschen EMVG das EG-Konformitätszeichen - CE - zu führen.

Verantwortlich für die Einhaltung der EMV Vorschriften ist der Hersteller:

International Business Machines Corp.  
New Orchard Road  
Armonk, New York 10504  
914-499-1900

Der verantwortliche Ansprechpartner des Herstellers in der EU ist:

IBM Deutschland GmbH  
Technical Regulations, Abteilung M372  
IBM-Allee 1, 71139 Ehningen, Germany  
Telephone: +49 7032 15 2941  
Email: lugi@de.ibm.com

### **Generelle Informationen:**

**Das Gerät erfüllt die Schutzanforderungen nach EN 55024 und EN 55022 Klasse A.**



## Japan VCCI Class A statement

この装置は、クラス A 情報技術装置です。この装置を家庭環境で使用する  
と電波妨害を引き起こすことがあります。この場合には使用者が適切な対策  
を講ずるよう要求されることがあります。 VCCI-A

This is a Class A product based on the standard of the Voluntary Control Council  
for Interference (VCCI). If this equipment is used in a domestic environment, radio  
interference may occur, in which case the user may be required to take corrective  
actions.

## Japan Electronics and Information Technology Industries Association (JEITA) statement

高調波ガイドライン適合品

Japan Electronics and Information Technology Industries Association (JEITA)  
Confirmed Harmonics Guidelines (products less than or equal to 20 A per phase)

## Japan Electronics and Information Technology Industries Association (JEITA) statement

高調波ガイドライン準用品

Japan Electronics and Information Technology Industries Association (JEITA)  
Confirmed Harmonics Guidelines with Modifications (products greater than 20 A  
per phase)

## Korea Communications Commission (KCC) statement

This is electromagnetic wave compatibility equipment for business (Type A). Sellers  
and users need to pay attention to it. This is for any areas other than home.

## Russia Electromagnetic Interference (EMI) Class A statement

ВНИМАНИЕ! Настоящее изделие относится к классу А.  
В жилых помещениях оно может создавать радиопомехи, для  
снижения которых необходимы дополнительные меры

## People's Republic of China Class A electronic emission statement

中华人民共和国“A类”警告声明

声明

此为A级产品，在生活环境中，该产品可能会造成无线电干扰。在这种情况下，可能需要用户对其干扰采取切实可行的措施。

## Taiwan Class A compliance statement

警告使用者：  
這是甲類的資訊產品，在  
居住的環境中使用時，可  
能會造成射頻干擾，在這  
種情況下，使用者會被要  
求採取某些適當的對策。

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