

Huawei Solutions for SAP HANA White Paper (Business One on SAP HANA)

Issue 02
Date 2018-08-13



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About This Document

Purpose

This document describes the Huawei 2288H V5 sever, RH2288H V3 server and Huawei RH5885H V3 server -based SAP HANA Business One solution in terms of SAP HANA's basic architecture, high-performance in-memory database, and the SAP Business One on SAP HANA application.

Intended Audience

This document is intended for the audience who want to get familiar with the Huawei 2288H V5 rack server-, RH2288H V3 rack server-, and RH5885H V3 server-based SAP HANA solution.




The audience are assumed to be familiar with the following products:



- Huawei 2288H V5 rack server
- Huawei RH2288H V3 rack server
- Huawei RH5885H V3 rack server

Symbol Conventions

The symbols that may be found in this document are defined as follows.

Symbol Conventions

Symbol	Description
 DANGER	Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.
 WARNING	Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
 CAUTION	Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

Symbol	Description
 NOTICE	Indicates a potentially hazardous situation which, if not avoided, could result in equipment damage, data loss, performance deterioration, or unanticipated results. NOTICE is used to address practices not related to personal injury.
 NOTE	Calls attention to important information, best practices and tips. NOTE is used to address information not related to personal injury, equipment damage, and environment deterioration.

Change History

Changes between document issues are cumulative. The latest document issue contains all the changes made in earlier issues.

Issue 02 (2018-08-13)

This issue is the second official release.

Issue 01 (2017-08-21)

This is the first official release.

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1 SAP HANA

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1.1 Overview

Along with scientific technology development, a large volume of data is generating no matter in a personal life or enterprise operation. As data volume gets larger and larger, commercial data analysis tools keep developing rapidly. Facing the ever-changing market environment and competition and customer requirements, enterprises are in need of an efficient data analysis and processing system. This system can analyze service data and then rapidly provide the processed results while receiving data. Using the analysis results combining with other elements, such as the market conditions, customer requirement trends, and price fluctuation, decision makers can make quicker and better market and development strategies.

The Huawei 2288h V5/RH2288H V3/RH5885H V3 server-based SAP HANA Business One solution helps solve the current problems. With simple operations, SAP Business One is a powerful solution that helps you control services and obtain data for service operation. In addition, customers can customize solutions based on service requirements and adjust the configuration to address the changing service requirements. SAP Business One analysis is supported by the SAP HANA in-memory database, which runs on the high-performance Huawei RH2288H V3 server, providing real-time, fast analysis and processing capability for small- and medium- sized enterprises (SMEs). The Huawei RH2288H V3 server (RH2288H V3 for short) uses the new-generation Intel® Xeon™ E5-2600 V4 series processors and provides multiple dual in-line memory module (DIMM) and Peripheral Component Interconnect Express (PCIe) slots, offering high scalability and computing capability.

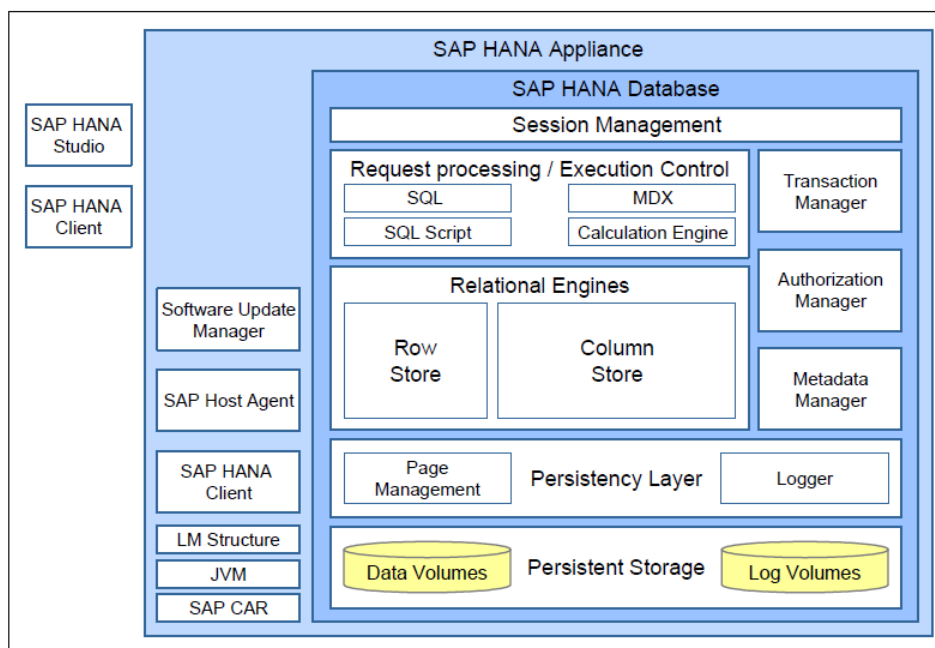
1.2 SAP HANA Architecture

As an application solution with integrated software and hardware, SAP HANA provides a flexible, real-time, data-source-independent big data analytic platform. Without the need for data modeling and aggregation, customers can directly query and analyze a large volume of service data. Hardware devices for SAP HANA are certified by SAP HANA, provided by

SAP's hardware partners, and commissioned together with SAP HANA to achieve the optimal performance. Running in the memory, SAP HANA database is an object-oriented database technology based on rows and columns. Using the most advanced hardware parallel processing technology, SAP HANA ensures analysis for a large volume of data and real-time query.

Figure 1-1 shows the SAP HANA architecture.

Figure 1-1 SAP HANA architecture



The SAP HANA platform consists of the SAP HANA in-memory database, modeling tool, and client tool, as shown in Figure 1-1. It processes CRUDQ operations using the HANA computing engine and supports Structured Query Language (SQL), Multidimensional Expressions (MDX), SAP data, and non-SAP data. Data in SAP's in-memory database is not only stored in the memory but also written to hard disks. This ensures data security.

1.2.1 SAP HANA Database

SAP HANA database is the core component of the SAP HANA platform. It comprises of the following functional components:

- Row store and column store used in the same relational database engine: In the SAP HANA database, customers can specify row store or column store for a table.
 - Row store

Similar to the traditional databases, SAP HANA database stores data based on rows. Row store provides high write performance and supports lower data compression rate and query performance than column store.

Row store is recommended for the following scenarios:

 - A small volume of data is stored in a table.
 - A program processes a record at a time.

- A program accesses all recorded data regularly.
- A column contains different values, and the data compression rate of the table is low.
- Aggregation and quick search are not required.
- Column store
Column store is used for storing tables to provide high performance for large data tables, and data aggregation, compression, and analysis.
Column store is recommended for the following scenarios:
 - Computing operations are executed on a single column or several columns.
 - The search operation is executed based on values only in several columns.
 - A table has many columns.
 - A table has many rows, and operations based on columns need to be executed, including aggregation, search, and scanning.
 - Most columns contain only a few different values, and the data compression rate of the table is high.
- Computing engine and external interfaces: SAP HANA supports access via various interfaces. Databases such as SQL (JDBC or ODBC), MDX (ODBO), and BICS (SQL DBC) are supported. The computing engine can directly operate in the in-memory database without the need for removing data to the application layer. SAP HANA uses the unique SQL scripts as the extended SQL statements to import high-density service data at the application logic layer to the SAP HANA in-memory database.
- Data security: The SAP HANA in-memory database provides a logic layer with permanent data storage. All service data is not only stored in the memory but also synchronized to hard disks. SAP HANA in-memory database provides the log recording function. Every transaction and operation are recorded and saved to the data storage zone and log storage zone of the logic layer with permanent data storage. The log volume of the log storage zone uses the high-performance solid-state flash storage media and technology, providing high I/O performance and low latency and ensuring data security.
- SAP HANA database has several management components, including data transmission management, database rights management, metadata management, upper-layer session management. Using these management functions, SAP HANA database works efficiently and securely, and provides various relational data management and rights management functions.

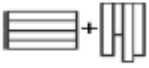
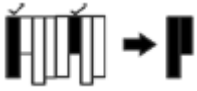






1.2.2 SAP HANA Application


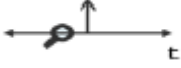
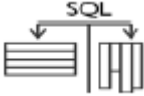



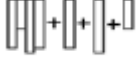


The SAP HANA application layer has the components such as the SAP HANA database, Software Update Manager, SAP Host Agent, SAP HANA Client, SAP HANA Studio, as shown in [Figure 1-1](#). These components operate and manage the SAP HANA database. Management and installation files based on the Eclipse tool provide simple methods to enable customers' applications to connect to the SAP HANA database. Other than SAP HANA Client, a series of library files are required for connecting to the SAP HANA database. In general, SAP HANA Studio, SAP HANA Client, and library files are installed in the client terminal computers or servers.

SAP HANA's Software Update Manager automatically downloads and updates software in the SAP HANA architecture. All update software can be downloaded on SAP's official website or through other channels using SAP Host Agent. SAP HANA also provides a life cycle manager for managing life cycles of software in the SAP HANA architecture. In addition, Software Update Manager can be used to update this manager.

1.2.3 SAP HANA's Memory-based Innovative Technologies

Table 1-1 SAP HANA's innovative technologies

Name	Description
 Column and row store	Each database system supports both row store and column store, making SAP HANA suitable for the system application architecture with mixed loads.
 Minimal projections	The property association technology helps automatically create and maintain the combination main key, which can combine several data columns into one column. This technology enables faster access performance for simple search.
 Insert only	The insert only technology implements all data update operations, and uses multiversion concurrency control (MVCC) and asynchronous increment combination to completely solve problems of online transaction processing (OLTP) applications that are supported by column store.
 Bulk load	Besides business-type data insertion, HANA also supports bulk load in memory. This technology enables a large volume of data to be written to HANA without using business resources and supports super high loads for data loading.
 Multi-core/parallelization	This technology fully utilizes advantages of the multi-core, large-memory architecture and manages processor threads at the software layer, which perfects parallelization. Each server node in the HANA cluster can access only the local memory.
 Active/passive & data aging	Data in memory can be released based on requirements. Only the frequently used data is stored in memory. The system automatically stores data in the memory or puts the data into sleep at the persistence layer. Users can manually choose to store data in memory or hard disks.
 Partitioning	This technology enables data to be divided vertically and horizontally and evenly distributed to each server node in the HANA cluster. This maximizes utilization of all system computing resources. If the data needs to be redistributed later, use data redistribution based on the in-memory computing technology, which distributes the data faster than traditional technologies.
 In-memory compression	This technology enables data to be compressed in memory, which facilitates data transmission to processors in the unit time. Then, processors can process data faster, such as scan and aggregate data.

Name	Description
 Multi-threading within nodes	This technology enables data to be processed in parallel. To evenly use all computing resources, users can set the number of threads for data processing on each node.
 Analytics on historical data	This technology supports data query and analysis based on time periods. Users can specify various time periods and analyze data changes during these periods.
 SQL interface on columns & rows	This technology supports SQL access to row store and column store and association computing between a row store table and a column store table.
 No aggregates	The dynamic aggregation technology supports modeling based the most detailed data without using materialized views and aggregation tables, generating physical intermediate computing results, or requiring redundant storage for materialized views. This resolves differences for data of various versions.
 Single and multi-tenancy	This technology enables services to be provided by a single node, a HANA cluster with PB-level memory, or a cloud platform.
 Reduction of tiers/layers	This technology simplifies the software architecture, eliminates materialized views, reduces data redundancy, and implements service computing at the application layer in a high-performance database.
 Dynamic extensibility	This technology enables a database table to be instantly expanded with new columns without reorganizing the original data. Adjustments can be dynamically made to the model on modeling without affecting the front-end data access interface.
 MapReduce	This technology implements the MapReduce programming mode in HANA and allows application R&D personnel to define map functions for processing a large volume of data in parallel without worrying about execution efficiency and parallelization of the computing engine in HANA.
 Group key	This technology uses the group key defined in memory to associate the service data index table with the detail item table, which enables the access to a detail item without scanning the entire table.

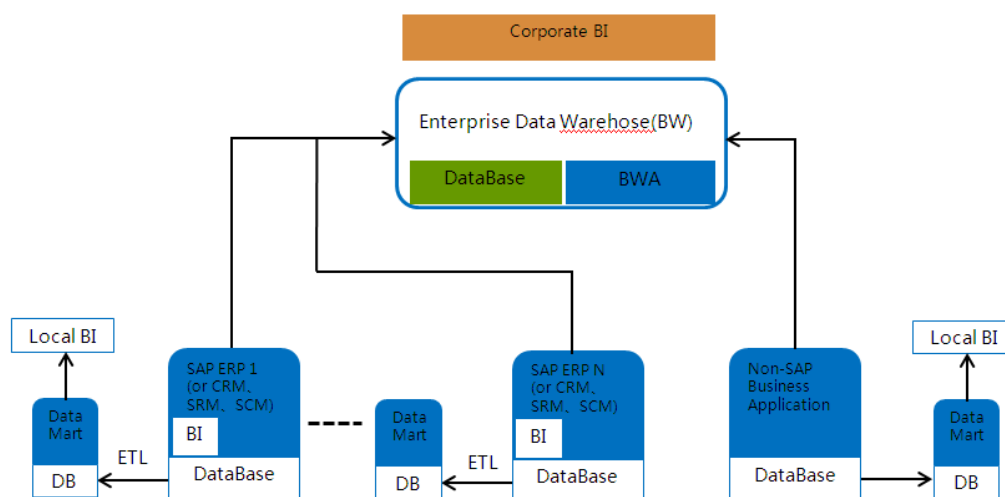
1.2.4 SAP HANA Application Scenarios

SAP HANA can be used in multiple application scenarios. Customers can analyze the existing IT deployment situation and choose the SAP HANA configuration. SAP HANA can be used as a data market, enterprise-level data warehouse, traditional system with SAP application acceleration, high-performance database, and memory application platform.

- SAP HANA data market

In a traditional relational database management system (RDBMS) or SAP-based application platform for enterprise, BI is used for helping data analysis and decision making. Data used for BI analysis can be collected and processed by a data market or enterprise-level data warehouse, such as SAP NetWeaver Business Warehouse (SAP BW). Through extract, transform, and load (ETL), data of related service systems is extracted to the data market or enterprise data warehouse. **Figure 1-2** shows the typical data application progress.

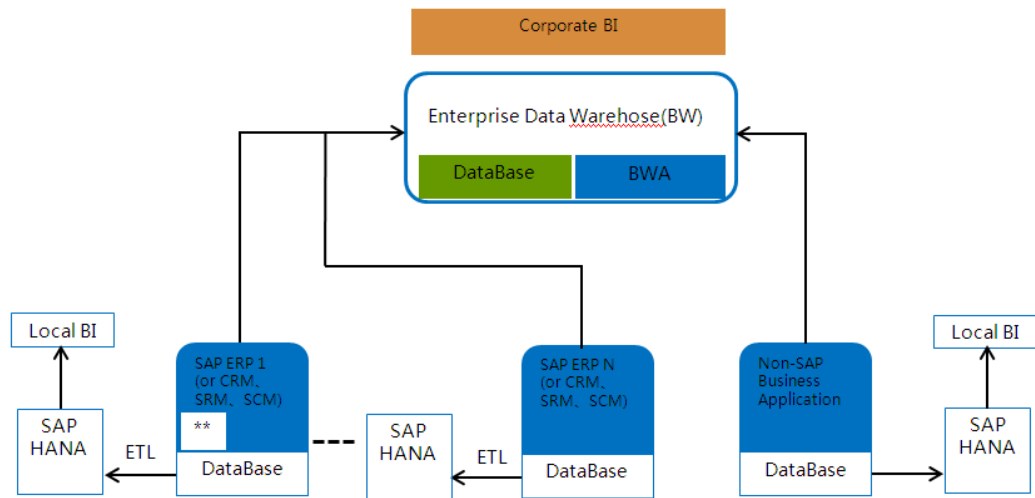
Figure 1-2 Typical data market application



A large volume of data needs to be extracted from the enterprise's data warehouse, and the data results are displayed by using queries or reports. This mode requires a long response time. SAP NetWeaver business warehouse accelerator (BWA) uses memory technologies to accelerate the query and report software solution for the enterprise data warehouse. SAP NetWeaver BWA is suitable for enterprise-level data warehouse applications but may not be suitable for small-scale data market applications. As a high-performance in-memory computing platform, SAP HANA efficiently solves these problems by combining BI or upper-layer service applications. For example, the SAP BusinessObjects tool copies data at the system layer in real time to SAP HANA. Then BI or the upper-layer application tool can provide real-time data analysis.

Figure 1-3 shows the SAP HANA data market application.

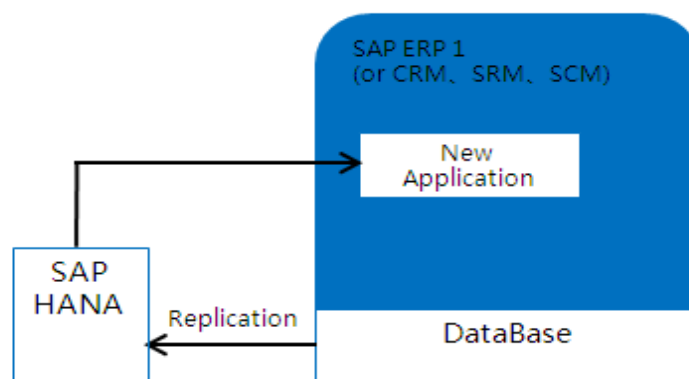
Figure 1-3 SAP HANA data market application



As shown in **Figure 1-4**, SAP HANA supports SAP's enterprise application systems and third-party enterprise application system. SAP provides the BI Consumer Services (BICS) interface for the SAP BusinessObjects tool and the SAP BusinessObjects Explorer rapid deployment based on SAP HANA. SAP HANA provide a platform for enterprise application systems, such as enterprise resource planning (ERP), customer relationship management (CRM), and supply chain management (SCM), improving the real-time analysis capabilities of original SAP enterprise application systems and accelerating the report displaying speed.

SAP HANA supports enterprise applications with the BI purpose. After data at the system layer is copied to SAP HANA, the upper-layer ERP system sends data query, categorization, and analysis requests to SAP HANA. Then the ERP system presents data analysis, content, and reports, which can be implemented by developing a new application on the ERP system or using the rapid modeling function of the SAP ERP system.

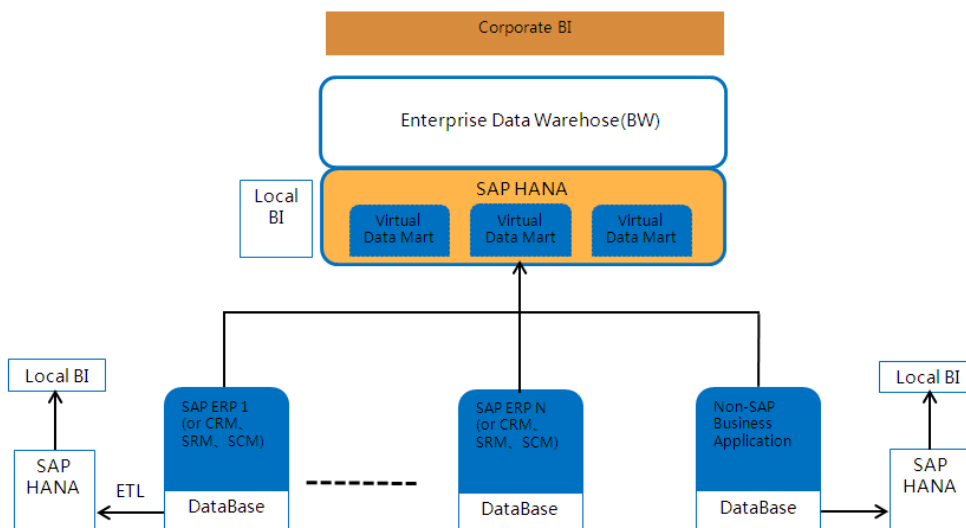
Figure 1-4 New application of SAP HANA



- SAP HANA high-performance database application

As a new-generation platform for the enterprise-level data warehouse, SAP HANA not only serves as a high-performance underlying in-memory database but also supports various application interfaces. For example, SAP NetWeaver BW is the most comprehensive and powerful data warehouse product that supports SAP Business Suite.

Figure 1-5 SAP HANA BW application



- **SAP HANA development platform**

In SAP's ecosystem, SAP HANA is an open platform that supports third-party BI or a new enterprise application system. As an analysis or high-performance database platform, SAP HANA supports various application scenarios that are not associated with SAP through data synchronization.

The service scenarios for SAP HANA as the development platform are as follows:

- Client-based applications: These applications can access the data models, such as database tables and views, in SAP HANA through open database connectivity (ODBC), Java database connectivity (JDBC), ODBO, SQL, or Native SQLScript.
- Web-based applications: The XS Engine in SAP HANA serves as the application server for running web applications. Clients use standard OData and XML for Analysis (XMLA) interfaces to access data in SAP HANA, use SAP ToolKit as the web development tool, and use Server-side, JavaScript, and Native SQLscript for storage.

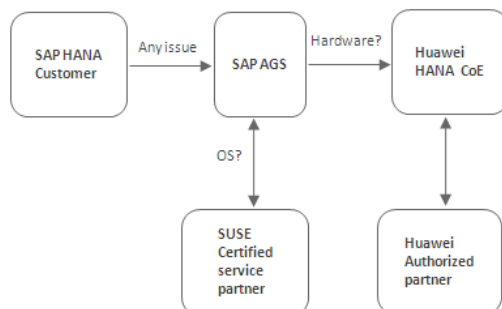
1.2.5 SAP HANA Delivery Mode

SAP HANA is delivered with integrated software and hardware. SAP HANA has configuration requirements for hardware platforms. All hardware vendors need to configure hardware based on SAP HANA's hardware configuration requirements. The hardware platforms must be certified by SAP HANA to ensure the required performance of SAP HANA. Only the certified hardware can be approved and maintained by SAP and hardware vendors.

As an important hardware partner of SAP, Huawei provides multiple servers approved by SAP HANA, including the 2288H V5, RH2288H V3, RH5885H V3, RH8100 V3, E9000 server. SLES, RHEL and SAP HANA are pre-installed on the Huawei SAP HANA appliance.

Figure 1-6 shows the maintenance process for the Huawei SAP HANA appliance. If customers encounter problems in SAP HANA, SAP's aftersales maintenance personnel locate and analyze the problems. If the problems lie in hardware, Huawei's aftersales maintenance personnel handle the problems. If the problems are SUSE problems, SUSE Linux's maintenance personnel handle the problems.

Figure 1-6 Maintenance process of Huawei SAP HANA appliance



1.3 SAP Business One on SAP HANA

SAP Business One provides two work modes to support the SAP HANA platform, as shown in **Figure 1-7**. In one mode, the SAP HANA platform is integrated into the original SAP Business One system. Then data of a relational database is copied to the SAP HANA in-memory database using the day copying agent. The SAP Business One system submits big-data analysis to the SAP HANA system for processing.

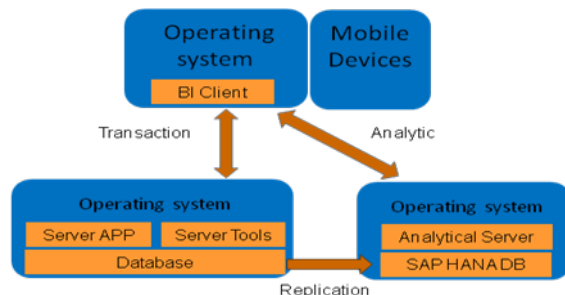
This mode provides the following benefits:

- Improves the real-time analysis capability of the original system.
- Increases the data processing speed.
- Improves text and data mining capabilities.

Provides flexible modeling.

The SAP HANA platform supports applications on the SAP Business One system, which optimizes data displaying for service reports and the dashboard. This offers better visual functions and implements unprecedented data insight.

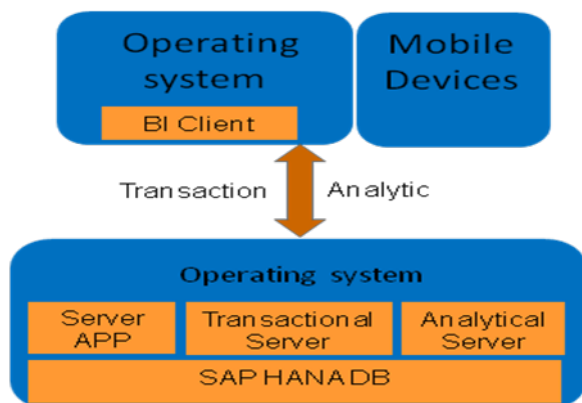
Figure 1-7 SAP Business One Analytics on HANA



In the other mode, the SAP HANA platform directly serves as the SAP Business One platform, as shown in **Figure 1-8**. This mode provides high performance and scalability. Data

analysis tasks of the SAP Business One system are submitted to the SAP HANA platform for processing. Relational database applications are supported by the high-performance SAP HANA in-memory database. As all data is managed by the SAP HANA platform, the SAP HANA system offers better data extraction and analysis functions. SAP HANA data runs in the host memory, and therefore data can be quickly accessed. This enables the system to support online analytical processing (OLAP) and online transaction processing (OLTP) database applications.

Figure 1-8 SAP Business One for HANA



1.4 SAP Business One

The cost-effective SAP Business One solution provides comprehensive functions, helping efficiently manage the enterprise in terms of finance, sales, customer relationship management (CRM), and operation. SAP Business One helps optimize operation and utilize real-time, complete information for decision making to accelerate revenue growth. Benefiting from 35-year experience in service management software, SAP Business One is a customized solution for growing enterprises. As a fully integrated application, SAP Business One reduces costs and complexity for integration between multiple independent applications. SAP Business One simplifies IT maintenance to the greatest extent by supporting easy-to-use user interfaces (UIs) and comprehensive configurations.

SAP Business One provides the following functions:

- **Accounting and finance**
 - General ledger and journal entry category recording
 - Cost accounting and monitoring of project costs
 - Budget management
 - Banking issues and bank statement processing
- Payment processing and account reconciliation
- Financial statements and reports
- Business tax and value added tax
- Multi-currency support

The SAP Business One solution helps customers manage general ledgers, journals, budgets, accounts payable (AP), and accounts receivable (AR). This solution helps implement all banking activities, including the processing of bank statements and

payments using checks, cash, and credit cards, and internal and external account reconciliation. Customers can create various financial statements, aging reports, and profit center reports.

- **Sales and customers**

- Sales opportunity and channel management
- Customer contact and activity management
- Quotation and order
- Invoice and credit
- Sales and channel prediction
- Service contract management
- Service call management and tracking

The SAP Business One solution helps track sales opportunities and activities throughout the sales process. The SAP Business One solution provides the following functions:

- Creates quotations.
- Inputs orders.
- Manages invoices, receipts, and goods return vouchers.
- Provides mail group sending template for promotion activities.
- Supports customer services, service contracts, and maintenance.

- **Purchase and operation**

- Purchase orders and delivery
- Goods receiving and returning
- AR invoices and credit notes

- Bill of material (BOM)

- Production orders

- Material prediction and planning

Each enterprise requires a system for managing the purchase process from creating orders to paying for suppliers. SAP Business One helps to manage a cycle from making orders to confirming payments, involving goods receiving, invoices, and goods returning. Customers can plan production material requirements, control BOMs, and replenish the stock. SAP Business One provides powerful report functions for accelerating analysis on suppliers' sales, and adjusting purchasing strategies.

- **Stock and distribution**

- Material management and query
- Goods receiving to and delivering from the stock and inventory transaction

- Material scheduling between warehouses

- Serial number management

- Inventory revaluation

- Customer and supplier catalogs

- Price lists and special offers

- Batch management

- Picking and packing

SAP Business One helps efficiently manage inventory and operation tasks, including goods picking, packing, delivery, and charging. This solution enables customers to do the following: Value inventory using standard costing, moving average (MA), and first in first out (FIFO). Monitor inventory. Track inventory updates of multiple warehouses. Check inventory and manage prices and special offers. Apply items such as quantity, cash, and discount to transactions between suppliers and customers.

- **Report and management**

- Integration with Crystal Reports
- Downward drilling, search help, and work flow-based alarm reporting

- Staff catalog and work time management

- Remote support platform

- Data migration work station and data archiving

- SAP Business One development tool package, including the data interface, application interface, and user interface, and solution package

Incorporating powerful analysis and report tools, SAP Business One helps you obtain key service information. Using SAP Business One integrated with Crystal Reports, customers can collect data from several sources and use key enterprise data about finance, sales, customers, inventory, services, production, and operation to generate accurate reports in real time. Crystal Reports is integrated with Microsoft Office, with the focus on data security, allowing customers to select proper formats and control access to displayed information. Customers can also use the interactive downward drilling function to mine multi-layer related data for obtaining comprehensive information in real time.

- **Configuration and customization functions**

SAP Business One provides powerful tools for customizing and querying tables, meeting certain service requirements. Customers can set exchange rates and authorization parameters, create internal mails and emails, and import and export data without any technical training.

- **System reliability and performance**

SAP provides a remote support platform for SAP Business One, helping customers to maintain software and preventing potential problems from affecting business operation. As an automatic monitoring tool, the remote support platform for SAP Business One collects system status information by enabling the SAP support service, and checks the system based on the known issues to detect system bottlenecks. The periodic sending for emails of system status information and automatic recovery prevents problems, reduces costs caused by system faults, and minimizes the IT maintenance time.

2 Huawei Solutions

- [2.1 2288H V5 SAP Business One on SAP HANA](#)
- [2.2 RH2288H V3 SAP Business One on SAP HANA](#)
- [2.3 RH5885H V3 SAP Business One on SAP HANA](#)
- [2.4 2288H V5 Server Hardware\[H1\]](#)
- [2.5 RH2288H V3 Server Hardware](#)
- [2.6 RH5885H V3 Server Hardware](#)

2.1 2288H V5 SAP Business One on SAP HANA

The Huawei SAP Business One on SAP HANA solution uses the 2288H V5 rack server, supporting the application scenarios of SAP Business One, Analytics Powered by SAP HANA and SAP Business One, version for SAP HANA. The 2288H V5 has been certified by SAP HANA.

The Huawei SAP Business One on SAP HANA solution supports six memory configurations from 64 GB to 3TB, as shown in [Figure 2-1](#). Using the high-performance Intel® Xeon™ Skylake series processors and DDR4 memory, the 2288H V5 supports direct upgrades. Customers can expand memory to upgrade the current HANA configuration version. Offering flexibility, the Huawei SAP Business One on SAP HANA solution maximizes the return on investment (ROI).

Figure 2-1 2288H V5 SAP Business One on SAP HANA configuration

B1oH			
Server Model	2288H V5	2288H V5	
CPU	2* Intel(R) Skylake CPU 4114		
Memory Sizing	96GB/192GB/384GB	96GB/192GB/384GB 576GB/768G/	1.5TB
Log Volume	512GB from 4*1.8T SAS HD RAID5.CacheCade		1TB from 6*1.8TB 10k 2.5" SAS HDD , RAID 5,CacheCade
Data Volume	3T from 4*1.8T SAS HD RAID5.CacheCade		4.5TB from 6*1.8TB 10k 2.5" SAS HDD , RAID 5,CacheCade
Shared Volume	1.5TB from 4*1.8T SAS HD RAID5.CacheCade		1.5TB from 6*1.8TB 10k 2.5" SAS HDD , RAID 5,CacheCade
File-system	XFS		
OS	SLES 12 SP2		

B1oH			
Server Model	2288H V5		
CPU	2* Intel(R) Skylake CPU 8176(M)/8180(M)		
Memory Sizing	96GB/192GB/ 384GB/576GB/768G/	1.5TB	3T
Log Volume	512GB from 4*1.8T SAS HD RAID5.CacheCade	1TB from 6*1.8TB 10k 2.5" SAS HDD , RAID 5,CacheCade	1TB from 9*1.8TB 10k 2.5" SAS HDD , RAID 5,CacheCade
Data Volume	3T from 4*1.8T SAS HD RAID5.CacheCade	4.5TB from 6*1.8TB 10k 2.5" SAS HDD , RAID 5,CacheCade	9TB from 9*1.8TB 10k 2.5" SAS HDD , RAID 5,CacheCade
Shared Volume	1.5TB from 4*1.8T SAS HD RAID5.CacheCade	1.5TB from 6*1.8TB 10k 2.5" SAS HDD , RAID 5,CacheCade	3TB from 9*1.8TB 10k 2.5" SAS HDD , RAID 5,CacheCade
File-system	XFS		
OS	SLES 12 SP2		

2.2 RH2288H V3 SAP Business One on SAP HANA

The Huawei SAP Business One on SAP HANA solution uses the RH2288H V3 rack server, supporting the application scenarios of SAP Business One, Analytics Powered by SAP HANA and SAP Business One, version for SAP HANA. The RH2288H V3 has been certified by SAP HANA.

The Huawei SAP Business One on SAP HANA solution supports six memory configurations from 64 GB to 1TB, as shown in [Figure 2-2](#) .Using the high-performance Intel® Xeon™ E5-2600 V4 series processors and DDR4 memory, the RH2288H V3 supports direct upgrades. Customers can expand memory to upgrade the current HANA configuration version. Offering flexibility, the Huawei SAP Business One on SAP HANA solution maximizes the return on investment (ROI).

Figure 2-2 RH2288H V3 SAP Business One on SAP HANA configuration

	SAP Business One on SAP HANA	
Server Model	RH2288H V3	RH2288H V3
CPU	2* Intel(R) Xeon(R) CPU E5-2630 v4 @ 2.20GHz	2* Intel(R) Xeon(R) CPU E5-2650 v4 @ 2.20GHz
Memory Sizing	64GB/128GB/256GB	64GB/128GB/256GB/ 384GB/512GB/768G/1TB
Log Volume	512GB from 4*1.8T SAS HD RAID5.CacheCade	
Data Volume	3T from 4*1.8T SAS HD RAID5.CacheCade	
Shared Volume	1.5TB from 4*1.8T SAS HD RAID5.CacheCade	
File-system	XFS	
OS	SLES 11 SP4	

2.3 RH5885H V3 SAP Business One on SAP HANA

The Huawei SAP Business One on SAP HANA solution uses the RH5885H V3 rack server, supporting the application scenarios of SAP Business One, Analytics Powered by SAP HANA and SAP Business One, version for SAP HANA. The RH5885H V3 has been certified by SAP HANA.

The Huawei SAP Business One on SAP HANA solution supports six memory configurations from 128 GB to 3TB, as shown in [Figure 2-3](#). Using the high-performance Intel® Xeon™ E7-8800/8890 V4 series processors and DDR4 memory, the RH5885H V3 supports direct upgrades. Customers can expand memory to upgrade the current HANA configuration version. Offering flexibility, the Huawei SAP Business One on SAP HANA solution maximizes the return on investment (ROI).

Figure 2-3 RH5885H V3 SAP Business One on SAP HANA configuration

	B1oH		
Server Model	RH5885H V3		
CPU	2* Intel(R) Xeon(R) CPU E7-8880/8890/8894 V4	4* Intel(R) Xeon(R) CPU E7-8880/8890/8894 V4	4* Intel(R) Xeon(R) CPU E7-8880/8890/8894 V4
Memory Sizing	128GB/256GB/ 384GB/512GB /768GB/1TB	1TB	1.5TB/2TB/3TB
Log Volume	1T from 5*1.8T SAS HD RAID5.CacheCade		1T from 14*1.8T SAS HD RAID50.CacheCade
Data Volume	3T from 5*1.8T SAS HD RAID5.CacheCade		12T from 14*1.8T SAS HD RAID50.CacheCade
Shared Volume	2.5TB from 5*1.8T SAS HD RAID5.CacheCade		6.7TB from 14*1.8T SAS HD RAID50.CacheCade
File-system	XFS		XFS
OS	SLES 11 SP4		SLES 11 SP4

2.4 2288H V5 Server Hardware[H1]

The Huawei 2288H V5 is a new-generation 2U 2-socket rack server. It uses the latest Intel® Xeon® Skylake series processors. With advanced memory technologies, large-capacity disks, 24 DIMM slots, the 2288H V5 meets enterprises' SAP HANA configuration requirements on storage, performance, density. The 2288H V5 supports redundant fan modules, PSUs, and hard disks, and intelligent server management unit. With advanced PSUs, fan modules, hard disks, processors, memory alarm reporting, and modular design, the 2288H V5 is easy to maintain.

Figure 2-4 Front panel of a 2288H V5



2.4.1 2288H V5 Features

Performance and Scalability

The 2288H V5 provides the following performance and scalability features:

- Intel® Xeon® Scalable processors ensure high processing performance by providing up to 28 cores, 3.6 GHz frequency, 38.5 MB L3 cache, and two 10.4 GT/s Ultra Path Interconnect (UPI) links between processors.
 - Each 2288H V5 supports two processors with 56 cores and 112 threads, maximizing concurrent execution of multithreaded applications.
 - Intel® Xeon® Scalable processors support L2 cache. Each core exclusively uses 1 MB L2 cache and at least 1.375 MB L3 cache.
 - Intel® Turbo Boost Technology 2.0 enables processor cores to further increase speed during peak hours by temporarily exceeding the processor thermal design power (TDP).
 - Intel® Hyper-Threading Technology enables each processor core to run up to two threads, improving parallel computing.
 - Intel® Virtualization Technology integrates hardware-level virtualization functions, allowing OS vendors to better use hardware to address virtualization workload.
- Up to 24 DDR4 error checking and correcting (ECC) RDIMMs or load-reduced DIMMs (LRDIMMs) provide memory transfers of 2666 MT/s and memory capacity of 3,072 GB, ensuring high speed and availability. The maximum memory bandwidth is 249.9375 GB/s in theory.
- The 2288H V5 supports flexible drive configurations and provides elastic and scalable memory capacities to satisfy storage capacity and upgrade requirements.

- Intel® Advanced Vector Extensions 2.0 (AVX-512) improves floating-point computing performance for computing-intensive applications.
- The I/O performance of pure SSDs is higher than that of mixed configuration of SSDs and HDDs and 100 times that of pure HDDs.
- The 2288H V5 supports various LANs on motherboard (LOMs) and flexible NICs to provide rich network ports.
- The 2288H V5 supports up to eight Peripheral Component Interconnect Express (PCIe) 3.0 slots.
- The Intel® Xeon® Scalable processors incorporate the PCIe 3.0 controller using Intel® Integrated I/O. This significantly reduces I/O latency and enhances overall system performance.

Availability and Serviceability

The 2288H V5 provides the following availability and serviceability features:

- The 2288H V5 uses carrier-class components and follows the engineering process, significantly improving system reliability.
- The 2288H V5 uses hot-swappable SAS/SATA drives or NVMe SSDs. It supports redundant array of independent disks (RAID) 0, 1, 1E, 10, 5, 50, 6, and 60 and offers RAID cache. A supercapacitor is used to protect RAID cache data from power failure.
- SSDs offer better reliability than HDDs, prolonging system uptime.
- By looking at the panel, technical support personnel can quickly locate faulty components or identify fault risks by checking the UID and health indicators, and fault diagnostic LEDs. Furthermore, they can check the key component status displayed on the iBMC WebUI help page. These features simplify maintenance, shorten troubleshooting time, and improve system availability.
- The iBMC monitors system parameters in real time, triggers alarms, and performs recovery actions in case of failures, minimizing system downtime.
- Huawei provides a three-year warranty for parts replacement and limited onsite repair for the servers used in China. Huawei provides support 10 hours a day, 5 days a week. Service requests are handled the subsequent business day. Optional service upgrades are available.
- Huawei provides a three-year warranty for parts replacement and repair for the servers used outside China. Huawei provides support 9 hours a day, 5 days a week. Service requests are handled the subsequent business day. Huawei delivers the repaired or new parts within 45 calendar days of receiving the defective parts.

Manageability and Security

The 2288H V5 provides the following manageability and security features:

- The built-in iBMC module monitors server operating status and provides remote management.
- The Network Controller Sideband Interface (NC-SI) enables a network port to function as a management network port and a service port, which maximizes the return on investment (ROI) for customers. NC-SI is disabled by default. You can enable it on the iBMC WebUI or in the BIOS.
- The integrated industry-standard Unified Extensible Firmware Interface (UEFI) makes setup, configuration, update, and fault handling more efficient.

- The front bezel in the server chassis is locked to ensure local data security and reliability.
- Intel® Advanced Encryption Standard–New Instructions (AES NI) support faster and stronger encryption.
- Intel® Execute Disable Bit (EDB) prevents certain types of malicious buffer overflow attacks when working with a supported OS.
- Intel® Trusted Execution technology uses hardware to defend against malicious software attacks, allowing an application to run in isolation from all other applications running on the OS.

 **NOTE**

Service network ports supporting NC-SI have the following features:

- The service network port can be bound to a network port (host network port 1 by default) on a flexible or standard NIC.
- The service network port allows you to enable, disable, and configure a VLAN ID. A VLAN ID is disabled by default, and the default VLAN ID is 0.
- The service network port supports IPv4 and IPv6 addresses. You can set an IP address, subnet mask, default gateway, and IPv6 address prefix length for the service network port.

Energy Efficiency

The 2288H V5 offers the following energy-saving features:

- The 2288H V5 supports 80 Plus Platinum power supply units (PSUs). At 50% load, the PSUs provide 94% power efficiency.
- The 2288H V5 supports active-standby power supplies and high-voltage DC (HVDC), improving power supply efficiency.
- Efficient VRD PSUs reduce energy loss in DC/DC power conversion.
- The 2288H V5 supports area-based and intelligent fan speed adjustment, Proportional-Integral-Derivative (PID) speed adjustment, and intelligent processor frequency adjustment, reducing power consumption.
- The improved thermal design with energy-efficient fans ensures optimal heat dissipation and reduces system power consumption.
- The 2288H V5 supports power capping and power control.
- Drives are not powered on simultaneously, which reduces the server startup power consumption.
- The Intel® Intelligent Power Capability allows each processor to be powered on or off based on site requirements.
- Low-voltage Intel® Xeon® Scalable processors consume less energy, making them ideal for data centers and telecommunication environments with power and thermal limitations.
- SSDs consume 80% less power than HDDs.

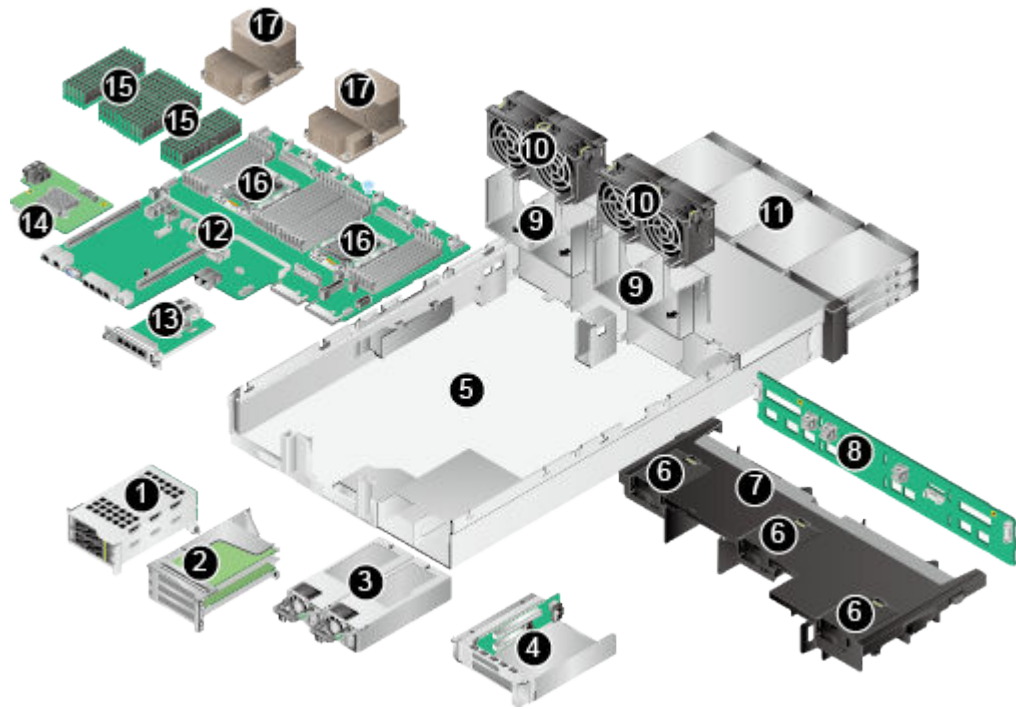
Support for Customization

The 2288H V5 is a Huawei proprietary server. Huawei also provides customized development in a timely manner.

2.4.2 2288H V5 Components

Components

Figure 2-5 2288H V5 components



1	I/O module 1	2	I/O module 2
3	PSU	4	I/O module 3
5	Chassis	6	Supercapacitor tray
7	Air duct	8	Front drive backplane
9	Fan module bracket	10	Fan module
11	Front drive	12	Mainboard
13	Flexible NIC	14	RAID controller card
15	DIMM	16	CPU
17	Heat sink	-	-

2.4.3 2288H V5 Server Management

The server uses Huawei's proprietary iBMC to implement remote server management. The iBMC complies with IPMI 2.0 and provides highly reliable hardware monitoring and management.

The iBMC supports the following features and protocols:

- KVM and text console redirection

- Remote virtual media
- IPMI
- SNMP
- Redfish 1.0
- Browser-based login

Table 2-1 describes the features of the iBMC.

Table 2-1 iBMC features

Feature	Description
Management interface	Integrates with any standard management system through the following interfaces or protocols: <ul style="list-style-type: none"> ● IPMI ● CLI ● HTTPS ● SNMP ● Redfish
Fault detection	Detects and accurately locates faults in hardware, for example, an FRU.
Alarm management	Supports alarm management and reports alarms using the SNMP trap, Simple Mail Transfer Protocol (SMTP), and syslog service to ensure 24/7 operating.
Integrated virtual KVM	Provides remote maintenance measures for troubleshooting.
Integrated virtual media	Virtualizes local media devices, images, USB keys, and folders into media devices on a remote server, simplifying OS installation. (The virtual DVD-ROM drive supports a maximum transmission rate of 8 MB/s.)
WebUI	Provides a user-friendly graphical user interface (GUI), simplifying users' configuration and query operations.
Fault reproduction	Reproduces faults to help diagnose them quickly.
Screen snapshots and screen videos	Views screenshots and videos without login, facilitating routine preventive maintenance inspection (PMI).
Domain Name Service (DNS)/ Active Directory (AD)	Supports DNS and AD, simplifying network and configuration management.
Dual-image backup	If software fails, it starts again from a backup image.

Feature	Description
Asset management	Supports intelligent asset management.
Intelligent power management	Uses power capping to increase deployment density, and uses dynamic energy saving to reduce operating expenditure.
IPv6	Supports IPv6 to ensure sufficient IP addresses.
Network Controller Sideband Interface (NC-SI)	Supports NC-SI, allowing you to access the iBMC through the service network port.

2.4.4 2288H V5 Certifications

Table 2-2 lists the certifications passed by the 2288H V5 and the standards to which the RH2288H V5 conforms.

Table 2-2 Certifications and standards

Country/Region	Certification	Standards
Europe	WEEE	2002/96/EC, 2012/19/EU
Europe	RoHS	2002/95/EC, 2011/65/EU, EN 50581: 2012
Europe	REACH	EC NO. 1907/2006
Europe	CE	Safety: EN 60950-1:2006+A11:2009+A1:2010+A12:2011 EMC: <ul style="list-style-type: none"> ● EN 55022:2010 ● CISPR 22:2008 ● EN 55024:2010 ● CISPR 24:2010 ● ETSI EN 300 386 V1.6.1:2012 ● ETSI ES 201 468 V1.3.1:2005
China	CCC	GB4943.1-2011 GB9254-2008(Class A) GB17625.1-2012

Country/ Region	Certification	Standards
China	RoHS	SJ/T-11363-20006 SJ/T-11364-20006 GB/T 26572-2011
Australia	C-tick	AS/NZS CISPR22: 2009
America	FCC	FCC Part 15 (Class A)
America	NTRL-UL	UL 60950-1, 2nd Edition, 2011-12-19 (Information Technology Equipment - Safety - Part 1: General Requirements) CSA C22.2 No.60950-1-07, 2nd Edition, 2011-12 (Information Technology Equipment-Safety-Part 1:General Requirements)
Canada	IC	ICES-003 Class A
Canada	NRTL-UL	UL 60950-1, 2 nd Edition, 2011-12-19 (Information Technology Equipment-Safety-Part 1: General Requirements)
Nigeria	SONCAP	IEC 60950-1: 2005 (2nd Edition) + A1:2009 EN 60950-1:2006+A11:2009+A1:2010 + A12:2011
Kingdom of Saudi Arabia (KSA)	SASO	IEC 60950-1: 2005 (2nd Edition) + A1:2009 EN 60950-1:2006+A11:2009+A1:2010 + A12:2011
Global	CB	IEC 60950-1
Japan	VCCI	VCCI V-4:2012
Saudi, Nigeria, Tanzania, Uganda, Kuwait, Algeria, Botswana, Qatar, Egypt	Multi-country_certificate	IEC 60950-1: 2005 (2nd Edition) + A1:2009 EN 60950-1:2006+A11:2009+A1:2010 + A12:2011

2.5 RH2288H V3 Server Hardware

The RH2288H V3 is a new-generation 2U rack server. It uses the latest Intel® Xeon™ E5-2600 V4 series processors. The RH2288H V3 supports advanced memory technologies,

uses large-capacity hard disks, and provides 24 DIMM slots, meeting enterprises' requirements on storage, performance, density. The RH2288H V3 supports the redundant fan modules, power supply units (PSUs), and hard disks, and intelligent server management unit. With advanced PSUs, fan modules, hard disks, processors, memory alarm reporting, and modular design, the RH2288H V3 is easy to maintain.

Figure 2-6 RH2288H V3 front view



2.5.1 RH2288H V3 Features

Performance and Scalability

An RH2288H V3 supports up to two Intel® Xeon® E5-2600 v3 processors, 36 cores, and 72 threads, or two Intel® Xeon® E5-2600 v4 processors, 44 cores, and 72 threads, which maximizes the concurrent execution of multithreaded applications.

- Each Intel® Xeon® E5-2600 v3 processor has up to 18 cores, 3.5 GHz frequency, one L3 cache of 45 MB, and two 9.6 GT/s QuickPath Interconnect (QPI) link pairs between processors.
- Each Intel® Xeon® E5-2600 v4 processor has up to 22 cores, 3.5 GHz frequency, one L3 cache of 55 MB, and two 9.6 GT/s QuickPath Interconnect (QPI) link pairs between processors.
- Intel Hyper-Threading technology enables each processor core to run up to two threads, improving parallel computing performance.
- Intel Turbo Boost Technology 2.0 allows processor cores to run faster than the frequency specified in the Thermal Design Power (TDP) configuration if they are operating below power, current, and temperature specification limits.
- The RH2288H V3 supports Peripheral Component Interconnect Express (PCIe) 3.0 to provide 60% higher I/O bandwidth (8 Gbit/s) than PCIe 2.0 (5 Gbit/s).
- Intel integrated I/O enables the PCIe 3.0 controller to be integrated into the Intel® Xeon® E5 series processors. This shortens I/O latency and improves overall system performance.

The RH2288H V3 provides flexible memory and hard disk configurations to meet storage and upgrade requirements.

- The RH2288H V3 supports double data rate 4 (DDR4) registered DIMMs (RDIMMs) and load-reduced DIMMs (LRDIMMs). An RH2288H V3 fully configured with twenty-

four 2400MT/s RDIMMs or LRDIMMs provides 1536 GB of memory space. The maximum theoretical memory bandwidth is 136.5 GB/s. In addition, error checking and correcting (ECC) technology ensures high DIMM availability.

- The RH2288H V3 supports hard disk drive (HDD) and solid state drive (SSD) disks. An SSD supports up to 100 times more I/O operations per second (IOPS) than a typical HDD. The use of all SSDs provides higher I/O performance than the use of all HDDs or a combination of HDDs and SSDs.

The RH2288H V3 supports a built-in or plug-in NIC, which provides a variety of network ports.

Hardware-assisted Intel® Virtualization Technology (Intel® VT) allows operating system (OS) vendors to better use hardware to address virtualization workloads.

Intel Advanced Vector Extensions 2.0 (AVX 2.0) improves floating-point computing performance for computing-intensive applications.

Availability and Serviceability

The following features make the RH2288H V3 more available and serviceable:

- Manufactured using carrier-class components.
- Hot-swappable SATA HDDs, SAS HDDs, or SSDs. The SSDs are more reliable than HDDs, ensuring uninterrupted system performance.
- Support for RAID 0, 1, 1E, 10, 5, 50, 6, and 60, and a RAID cache. A supercapacitor protects cache data from power failures.
- Huawei proprietary intelligent baseboard management system (iBMC) monitors system parameters in real time, triggers alarms, and performs failure recovery, minimizing system downtime.
- Simplified O&M and efficient troubleshooting through:
 - UID and HLY indicators on the front panel
 - Fault diagnosis LED
 - Touch LCD diagnosis panel
 - iBMC web user interface (WebUI)

Manageability and Security

The following features make the RH2288H V3 more manageable and secure:

- Built-in iBMC monitors server operating status and allows remote management.
- Integrated Unified Extensible Firmware Interface (UEFI) improves setup, configuration, and update efficiency and simplifies fault handling.
- Optional Trusted Platform Module (TPM) provides advanced encryption functions, including digital signatures and remote authentication.
- Advanced Encryption Standard–New Instruction (AES NI) allows faster and stronger encryption.
- Lockable server chassis panel ensures security of local data.
- Chassis opening events are logged for security purposes.
- Intel Execute Disable Bit function to prevent certain types of malicious buffer overflow attacks when working with a supported OS.

- Intel Trusted Execution Technology enhances security using hardware-based defense against malicious software attacks, allowing applications to run independently.
- Network Controller Sideband Interface (NC-SI) gives a network port both management and service port functions for maximized customer return on investment (ROI).

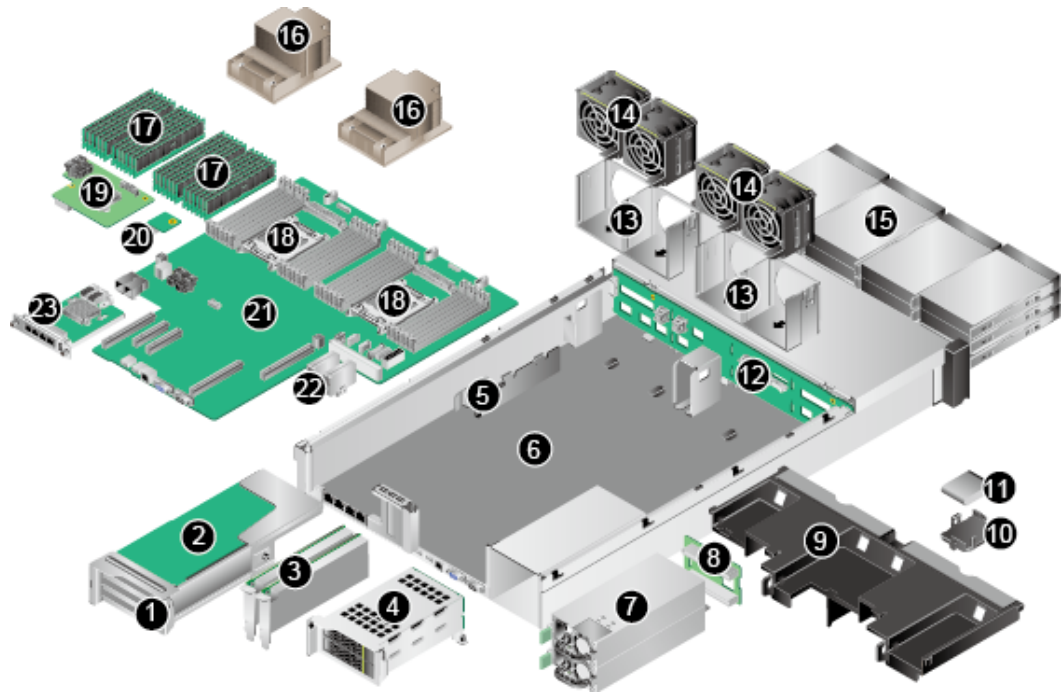
Energy Efficiency

The following features make the RH2288H V3 conserve more energy:

- 80 Plus Platinum power supply units (PSUs) of multiple power ratings provide 94% power efficiency at 50% load.
- Voltage regulator-down (VRD) power supplies for boards minimize energy loss from DC/DC power conversion.
- Improved thermal design, area-based and Proportional-Integral-Derivative (PID) intelligent fan speed adjustment, and intelligent CPU frequency adjustment optimize heat dissipation and reduce overall system power consumption.
- Intel® Intelligent Power Capability allows a processor to be powered on or off based on service requirements.
- Power capping and power control functions.
- Use of innovative components:
 - Intel® Xeon® E5-2600 v3 processors and Intel® Xeon® E5-2600 v4 processors perform better than the previous-generation Intel® Xeon® processors while fitting into the same TDP. Low-voltage Intel® Xeon processors consume less energy, ideally suited for data centers and telecommunications environments constrained by power and thermal limitations.
 - SSDs consume 80% less power than HDDs. In addition, hard disks can be powered on at different times to reduce startup power consumption.
 - 1.2 V DDR4 RDIMMs consume 20% less energy than 1.5 V DDR3 RDIMMs.

2.5.2 RH2288H V3 Components

Figure 2-7 RH2288H V3 components



1	I/O module 1	2	PCIe card on a riser card
3	PCIe card on the mainboard	4	I/O module 2
5	Internal cable guide	6	Chassis
7	PSU	8	PSU backplane
9	Air duct	10	Supercapacitor tray
11	Supercapacitor	12	Hard disk backplane
13	Fan bracket	14	Fan module
15	Hard disk	16	Heat sink
17	DIMM	18	CPU
19	RAID controller card	20	TPM (optional)
21	Mainboard	22	SATADOM
23	LOM	-	-

The RH2288H V3 components describes in [Table 2-3](#).

Table 2-3 RH2288H V3 component description

No.	Component	Description
1	I/O module 1	<p>I/O module 1 supports the following configurations:</p> <ul style="list-style-type: none"> ● One standard full-height full-length PCIe 3.0 x16 slot, one standard full-height full-length PCIe 3.0x8 slot, and one standard full-height half-length PCIe 3.0 x8 slot (bandwidth of the three slots: PCIe 3.0 x8) ● Two standard full-height full-length PCIe 3.0 x16 slots (bandwidth of one of them: PCIe 3.0 x8) ● Two 2.5-inch hard disk slots and one standard full-height half-length PCIe 3.0 x16 slot (bandwidth: PCIe3.0 x8) ● Two 3.5-inch hard disk slots
2	PCIe card on a riser card	<p>The RH2288H V3 supports two types of riser cards:</p> <ul style="list-style-type: none"> ● Riser card 1 with three PCIe3.0 x8 slots for the following devices: <ul style="list-style-type: none"> ● One full-height full-length PCIe 3.0 x16 card (bandwidth: PCIe 3.0x8) ● One full-height full-length PCIe 3.0 x8 card ● One full-height half-length PCIe 3.0 x8 card ● Riser card 2 with two PCIe3.0 x16 slots for the following devices: <ul style="list-style-type: none"> ● One full-height full-length PCIe 3.0 x16 card ● One full-height full-length PCIe 3.0 x16 card (bandwidth: PCIe 3.0x8) <p>The two types of riser cards can be installed on both I/O modules 1 and 2.</p>
3	PCIe card on the mainboard	<p>The RH2288H V3 provides two half-height half-length PCIe 3.0 x8 slots for standard PCIe cards.</p>
4	I/O module 2	<p>I/O module 2 supports the following configurations:</p> <ul style="list-style-type: none"> ● One standard full-height full-length PCIe 3.0 x16 slot, one standard full-height full-length PCIe 3.0x8 slot, and one standard full-height half-length PCIe 3.0 x8 slot (bandwidth of the three slots: PCIe 3.0 x8) ● Two standard full-height full-length PCIe 3.0 x16 slots (bandwidth of one of them: PCIe 3.0 x8) ● Two 2.5-inch hard disk slots and one standard full-height half-length PCIe 3.0 x16 slot (bandwidth: PCIe3.0 x8) ● Two 3.5-inch hard disk slots
5	Internal cable guide	<p>The cable guide enables neat cabling.</p>
6	Chassis	<p>A chassis houses all components.</p>

No.	Component	Description
7	PSU	<p>The RH2288H V3 uses two hot-swappable PSUs in 1+1 redundancy mode. You can choose the following types of PSUs based on the input power:</p> <ul style="list-style-type: none"> ● AC PSUs: 100 V to 240 V AC ● DC PSUs: - 48 V to - 60 V DC ● 240 V high voltage direct current (HVDC) PSUs: 192 V to 288 V DC ● 380 V HVDC PSUs: 260 V to 400V DC <p>NOTE The PSUs provide short-circuit protection. The PSUs that support dual input live wires provide double-pole fuses.</p>
8	PSU backplane	The backplane connects PSUs to the mainboard.
9	Air duct	It is a ventilation duct in a chassis, and supports the chassis cover.
10	Supercapacitor tray	This tray secures a supercapacitor for a RAID controller card.
11	Supercapacitor	A supercapacitor is required to protect RAID cache data from power failures if the RH2288H V3 uses the LSI SAS2208, LSI SAS3108 or SP435 (PM8060) controller card.
12	Hard disk backplane	<p>Supplies power to hard disks and provides data transmission channels.</p> <p>The RH2288H V3 supports hard disk backplanes for connecting to 8 x 2.5-inch, 8 x 3.5-inch, 12, 12 (including four NVMe PCIe SSDs), 12 (including twelve NVMe PCIe SSDs), 24, 25 hard disks respectively.</p>
13	Fan bracket	A fan bracket secures a fan module.
14	Fan module	Fan modules dissipate server heat and support hot swaps. If fan modules are in full configuration, the server tolerates the failure of a single fan module and supports fan speed adjustment by area, maintaining optimal heat dissipation.

No.	Component	Description
15	Hard disk	<p>The RH2288H V3 uses hot-swappable hard disks to store data. It supports the following hard disk configurations:</p> <ul style="list-style-type: none"> ● 8-disk configuration: up to 8 x 2.5-inch SSDs or SAS/SATA HDDs ● 8-disk configuration: up to 8 x 3.5-inch SAS/SATA HDDs ● 12-disk configuration: up to 12 x x 3.5-inch SAS/SATA HDDs ● 12-disk configuration: up to 8 x 3.5-inch SAS/SATA HDDs and 4 NVMe PCIe SSDs ● 12-disk configuration: up to 8 to 12 x 3.5-inch NVMe PCIe SSDs ● 24-disk configuration: up to 24 x 2.5-inch SSDs or SAS/SATA HDDs ● 25-disk configuration: up to 25 x 2.5-inch SSDs or SAS/SATA HDDs <p>NOTE The server where hard disks are connected through the Intel chipset (PCH) supports SATA disks only, an optional softRAID license, and softRAID 0, 1, and 5. The server with softRAID configuration does not support installation of a virtualization operating system (OS).</p>
16	Heat sink	<p>The heat sinks dissipate heat from CPUs. Each CPU is configured with one heat sink.</p>
17	DIMM	<ul style="list-style-type: none"> ● Maximum number of DDR4 registered dual-line memory modules (RDIMMs) or load-reduced DIMMs (LRDIMMs): 24 ● Maximum memory capacity: 1536GB ● Capacity per DIMM: 8 GB, 16GB, 32 GB, or 64 GB ● Memory speed: DDR4 1866 MT/s, 2133 MT/s, or 2400 MT/s
18	CPU	<p>To provide powerful data processing functions, the RH2288H V3 has CPUs integrated with memory controllers and PCIe controllers. The server supports the following CPU configurations:</p> <ul style="list-style-type: none"> ● Intel® Haswell-EP®E5-2600 v3 4-core, 6-core, 8-core, 10-core, 12-core, 14-core, 16-core, and 18-core CPUs with a maximum Thermal Design Power (TDP) of 135 W ● Intel® Broadwell-EP®E5-2600 v4 4-core, 6-core, 8-core, 10-core, 12-core, 14-core, 16-core, 18-core, 20-core, and 22-core CPUs with a maximum Thermal Design Power (TDP) of 135 W <p>NOTE The RH2288H V3 supports a maximum of two E5-2600 v3 series CPUs or two E5-2600 v4 series CPUs.</p>

No.	Component	Description
19	RAID controller card	<p>The RH2288H V3 supports the following RAID controller cards:</p> <ul style="list-style-type: none"> ● SR320 or SR420: <ul style="list-style-type: none"> ● Uses the LSI SAS2208 chip. ● Supports RAID 0, 1, 10, 5, 50, 6, and 60. ● Supports a supercapacitor for power failure protection. ● SR120: <ul style="list-style-type: none"> ● Uses the LSI SAS2308 chip. ● Supports RAID 0, 1, 10, and 1E. ● Does not support power failure protection. ● SR130: <ul style="list-style-type: none"> ● Uses the LSI SAS3008 chip. ● Supports RAID 0, 1, 10, and 1E. ● Does not support power failure protection. ● SR430C: <ul style="list-style-type: none"> ● Uses the LSI SAS3108 chip. ● Supports RAID 0, 1, 10, 5, 50, 6, and 60. ● Supports a cache of 1 GB or 2 GB. ● Supports a supercapacitor for power failure protection. ● SR135: <ul style="list-style-type: none"> ● Uses the PM8068 chip. ● Supports RAID 0, 1, 10, and 5. ● Does not support power failure protection. <p>The RAID controller cards support RAID level migration and RAID configuration memory.</p> <p>NOTE For more information, see the Huawei Server Compatibility Checker.</p>
20	TPM (optional)	<p>The trusted platform module (TPM) complies with the Trusted Computing Group (TCG) standards and protects the platform from viruses or unauthorized operations.</p>
21	Mainboard	<p>The mainboard integrates basic components, including the BIOS chip, PCH chip, and PCIe slots, and provides CPU sockets and slots for DIMMs and other components.</p> <p>The system mainboard integrates the display chip and provides 32 MB display memory. The maximum resolution is 1920 x 1200 at 60 Hz with 16 M colors.</p>
22	SATADOM	<p>The SATA disk on module (SATADOM) is a SATA SSD or SATA DOM electrical hard disk. It is a quick memory storage media unit that features high energy efficiency and stability.</p> <p>NOTE SATADOMs support SoftRAID, which supports RAID 0 and RAID 1.</p>

No.	Component	Description
23	LOM	<ul style="list-style-type: none"> ● The RH2288H V3 supports one GE NIC with two or four GE ports, or supports one 10GE NIC with two 10GE electrical or optical ports. Both NICs support the Network Controller Sideband Interface (NC-SI). ● The RH2288H V3 supports a 56GE NIC with one or two 56GE IB optical ports. The NIC does not support NC-SI.

2.5.3 RH2288H V3 Server Management

The Huawei proprietary intelligent baseboard management system (iBMC) manages servers remotely. iBMC complies with IPMI V2.0 standards and provides reliable hardware monitoring and management.

iBMC has the following features:

- KVM and text console redirection
- Remote virtual media
- IPMI support
- Simple Network Management Protocol (SNMP) support
- Browser login

Table 2-4 describes iBMC specifications.

Table 2-4 iBMC specifications

Feature	Specifications
Management interface	Standard management systems are integrated through: <ul style="list-style-type: none"> ● IPMI ● CLI ● HTTPS ● SNMP
Fault detection	iBMC detects faults and accurately locates faults in hardware, for example, an FRU.
Alarm management	Alarm reporting uses: <ul style="list-style-type: none"> ● SNMP trap ● Simple Mail Transfer Protocol (SMTP) ● Syslog service
Virtual KVM integration	<ul style="list-style-type: none"> ● Remote maintenance measures for system troubleshooting ● Maximum resolution: 1920 x 1200

Feature	Specifications
Virtual media integration	<ul style="list-style-type: none"> ● Local media devices, images, USB keys, and folders virtualized into media devices on a remote server simplify OS installation. ● Maximum transmission rate of virtual DVD-ROM drive: 8 Mbyte/s
WebUI	<ul style="list-style-type: none"> ● User-friendly GUI simplifies configuration and querying. ● Compatible OS, web browser, and JRE versions: <ul style="list-style-type: none"> ● Windows XP (32-bit); Internet Explorer 8.0 or later, Mozilla Firefox 9.0, or Google Chrome 13.0; JRE 1.6.0 U25 or later ● Windows 7 (32-bit); Internet Explorer 8.0 or later, Mozilla Firefox 9.0, or Google Chrome 13.0; JRE 1.6.0 U25 or later ● Red Hat Enterprise Linux 4.3 (64-bit); Mozilla Firefox 9.0; JRE 1.6.0 U25 or later ● Red Hat Enterprise Linux 6.0 (64-bit); Mozilla Firefox 9.0; JRE 1.6.0 U25 or later ● Mac; Safari or Mozilla Firefox 9.0; JRE 1.6.0 U25 or later
Fault reproduction	Facilitates fault diagnosis.
Screenshots and videos	View screenshots and videos without login for easy routine preventive maintenance inspection (PMI).
DNS and directory service	Further simplifies network and configuration management.
Dual-image backup	Startup from a backup image if the software fails.
Asset management	iBMC provides intelligent asset management.
Intelligent power management	Power capping technology increases deployment density. Dynamic energy saving lowers operating expenses.
IPv6	Ensures sufficient IP addresses.
NC-SI	System management is accessible through the service network port.

2.5.4 RH2288H V3 Certifications

Table 2-5 lists the certifications passed by the RH2288H V3 and the standards to which the RH2288H V3 conforms.

Table 2-5 Certifications and standards

No.	Country /Region	Certification	Standards
1	China	RoHS	SJ/T 11363-2006 SJ/T 11364-2006 GB/T 26572-2011
2	China	CCC	GB4943.1-2011 GB9254-2008 (Class A) GB17625.1-2012
3	Europe	CE	Safety: IEC 60950-1: 2005(2nd Edition)+A1: 2009 and/or EN 60950-1: 2006+A11: 2009+A1: 2010+ A12: 2011 EMC: EN 55022: 2010 CISPR 22: 2008 EN 55024: 2010 CISPR 24: 2010 ETSI EN 300 386 V1.6.1: 2012 ETSI ES 201 468 V1.3.1: 2005 IEC 61000-3-2: 2005+A1: 2008+A2: 2009/EN 61000-3-2: 2006+A1: 2009+A2: 2009 IEC 61000-3-3: 2008/EN 61000-3-3: 2008 IEC 61000-6-2: 2005/EN 61000-6-2: 2005 IEC 61000-6-4: 2006+A1: 2010/EN 61000-6-4: 2007+A1: 2011 RoHS: 2002/95/EC, 2011/65/EU, EN 50581: 2012 REACH: EC NO. 1907/2006 WEEE: 2002/96/EC, 2012/19/EU
4	USA	FCC	FCC CFR47 Part 15: 2005 Class A
5	USA	Energy Star	ENERGY STAR® Program Requirements for Computer Servers
6	Canada	IC	ICES-003: 2004 Class A
7	Australia	C-tick	AS/NZS CISPR 22: 2009
8	Japan	VCCI	VCCI V-3: 2012

No.	Country /Region	Certification	Standards
9	Saudi Arabia	SASO	IEC 60950-1: 2005 (2nd Edition) + A1: 2009 EN 60950-1: 2006+A11: 2009+A1: 2010 + A12: 2011
10	Nigeria	SONCAP	IEC 60950-1: 2005 (2nd Edition) + A1: 2009 EN 60950-1: 2006+A11: 2009+A1: 2010 + A12: 2011
11	Kuwait	Kucas	IEC 60950-1: 2005 (2nd Edition) + A1: 2009 EN 60950-1: 2006+A11: 2009+A1: 2010 + A12: 2011

2.6 RH5885H V3 Server Hardware

2.6.1 RH5885H V3 Structure

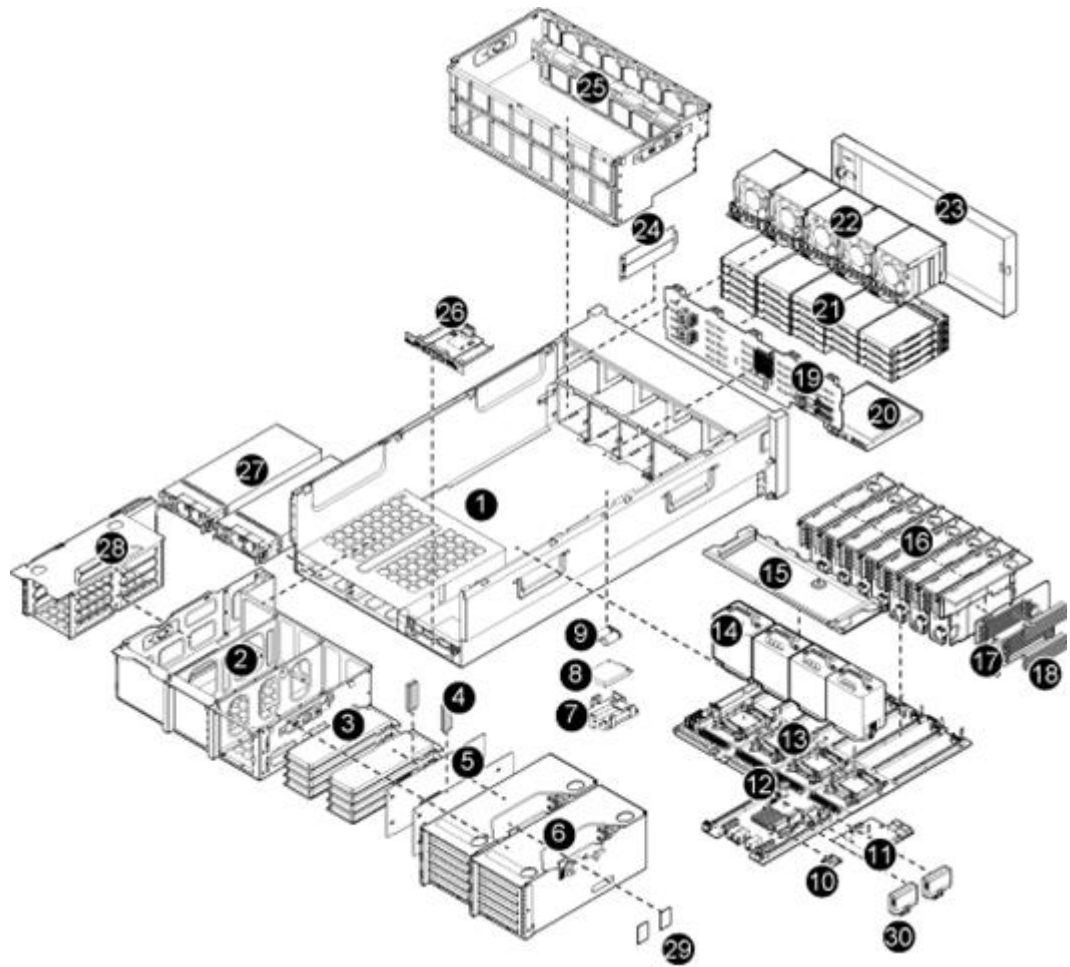
Building on Huawei's rich experience in servers, the RH5885H V3 is a high-performance enterprise-level server that uses the latest Intel processors. The RH5885H V3 is a standard 4U 4-socket rack server and supports new-generation Intel® Xeon™ E7-8800 V4 series processors. It provides 60 computing cores and a maximum memory capacity of 6 TB. Oriented at mission-critical applications, the RH5885H V3 applies to databases, ERP, BI analysis, and virtualization.

Figure 2-8 RH5885H V3 front view



This section describes the RH5885H V3 in terms of its components, mainboard layout, and mainboard connectors.

Figure 2-9 RH5885H V3 structure



1	Chassis	2	PCIe riser card fixing frame
3	PCIe card	4	USB flash drive
5	Standard PCIe riser card	6	PCIe riser card tray
7	iBBU tray	8	(Optional) iBBU
9	(Optional) Supercapacitor	10	TPM
11	Redundant array of independent disks (RAID) controller card	12	Mainboard
13	Processor	14	Heat sink
15	Chassis cover support	16	Memory riser tray
17	Memory riser	18	Dual in-line memory module (DIMM)
19	Hard disk backplane	20	DVD-ROM drive
21	Hard disk	22	Fan module

23	Front bezel	24	Customized label
25	Memory riser fixing frame	26	Network interface card (NIC)
27	Power supply unit (PSU)	28	Hot-swappable PCIe riser card
29	(Optional) Secure digital SD card	30	(Optional) SATA DOM

2.6.2 RH5885H V3 Features

RAS Features

The RH5885H V3 provides the following RAS features to ensure stable system operation, simplify serviceability, and prolong the system operation time:

- The eMCA mechanism automatically rectifies correctable errors to ensure normal system operation. For uncorrectable errors, you can isolate or replace the faulty component online, and configure the new component without a system restart. BIOS preferentially deals with correctable memory errors and locates the faulty DIMM.
- The RH5885H V3 provides chip-level fault tolerance (such as automatic recovery from processor, chip, and link hardware faults), minimizing system breakdown caused by hardware faults.
- The RH5885H V3 supports single device data correction (SDDC) and double device data correction (DDDC) to rectify memory soft errors.
- The RH5885H V3 provides memory mirroring and memory sparing functions to eliminate system downtime caused by uncorrectable memory hardware errors.
- The RH5885H V3 supports faulty DIMM indication on an offline memory riser, which allows faulty DIMMs to be identified on a removed memory riser.
- The RH5885H V3 supports full redundancy and hot-swap maintenance without opening the chassis cover for key components, such as PSUs, fan modules, and hard disks. These features enable quick replacement of faulty components without interrupting normal system operation.
- The RH5885H V3 supports hot swap of some PCIe cards without opening the chassis cover, which implements PCIe upgrades and replacement without interrupting system operating.
- The RH5885H V3 supports automatic disconnection from a faulty I/O device. When a fatal I/O device fault is detected, the system enters virus mode and disconnects the link to the faulty I/O device to prevent other devices from being affected.
- The RH5885H V3 supports hot-swappable drives to protect data and prolong normal system running time using RAID.
- The Huawei iMana software monitors system operating, triggers alarms, and performs recovery actions. This helps minimize system downtime.
- Inband and out-of-band fault management software implements PFA and fault management. The software traces components, sends a precaution before a system breakdown caused by a faulty component, runs self-diagnosis, self-correction, self-recovery, and provides maintenance tips about faulty components for maintenance personnel, including offline and online operations and component replacement. PFA can be performed on components, such as processors, DIMMs, fan modules, PSUs, and hard disks.

- The RH5885H V3 provides a touched diagnostic LCD diagnosis panel to facilitate fault location, which greatly shortens the system recovery time.
- The optimized heat dissipation system supports long-term stable operation at 40°C (104°F) when no GPU is configured and 35°C (95°F) when a GPU is configured.
- The advanced fault tolerance, fault recovery, and key component redundancy enable system availability of 99.999%.
- Huawei provides a three-year warranty for parts replacement and onsite limited repair for the RH5885H V3 used in China. Huawei provides 9 x 5 (a 9-hour-a-day, 5-day-a-week) next business day (NBD) support. Optional service upgrades are available.

Performance and Scalability

The RH5885H V3 supports the following features to ensure high performance and scalability while reducing the total cost of ownership (TCO):

- An Intel® Xeon® E7 v4 processor supports a maximum of 24 cores, 60 MB L3 cache, and three QPI links. These features provide outstanding system performance.
- The RH5885H V3 supports a maximum of four processors E7 v4 CPU, which maximizes concurrent execution of multithreaded applications.
- Intel® Turbo Boost Technology allows processor cores to run faster than the Thermal Design Power (TDP) configuration specified frequency if the processor cores are operating below power, current, and temperature specification limits.
- Intel Hyper-Threading Technology enables each processor core to run up to two threads, improving parallel computation capability.
- The hardware-assisted Intel® Virtualization Technology (Intel® VT) allows operating system (OS) vendors to better use hardware to address virtualization workloads.
- The RH5885H V3 can be configured with a maximum of 96 DDR3 or DDR4 DIMMs, providing 3 TB memory capacity (with 32 GB DIMMs) and thirty-two 1866 MHz memory channels. These features offer high memory bandwidth, addressing in-memory computing.
- The RH5885H V3 provides 16 standard PCIe slots for installing four dual-slot, full-height, full-length GPUs. The RH5885H V3 provides one plug-in NIC without occupying a standard PCIe slot, allowing flexible configurations of four GE ports or two 10GE ports.
- The RH5885H V3 supports four dual-slot GPUs, meeting demands for graphics processing, high-performance computing, and virtual desktop.
- The RH5885H V3 supports PCIe 3.0, which increases the maximum I/O bandwidth by 60% (8 GT/s per link) compared with PCIe 2.0.

Manageability and Security

The RH5885H V3 provides the following features to simplify local and remote server management:

- The RH5885H V3 supports Intelligent Platform Management Interface (IPMI) 2.0. The built-in iMana monitors server operating status and implements remote management.
- An integrated industry-standard Unified Extensible Firmware Interface (UEFI) increases setup, configuration, and update efficiency, and simplifies fault handling.
- The Intel Advanced Encryption Standard New Instructions (AES NI) implement faster and stronger encryption.

- The Intel Execute Disable Bit (EDB) function works with the supported OS to prevent certain types of malicious buffer overflow attacks.
- The Intel Trusted Execution technology provides enhanced security by using hardware-based defense against malicious software attacks, allowing an application to run in an isolated space from all other applications running on the OS.

Energy Efficiency

The RH5885H V3 provides the following features to reduce energy consumption and operating expense (OPEX) and increase energy efficiency:

- The latest Intel® Xeon® E7-8800/8890 v4 processors provide better performance than the previous-generation processors while fitting into the same TDP limits.
- The Intel Intelligent Power Capability allows a processor to be powered on or off based on site requirements to reduce power consumption.
- Low-voltage Intel® Xeon® processors consume less energy and apply to data centers and telecommunication environments that have power and thermal limitations.
- The latest E7 v4 processors support 1.2 V DDR4 DIMMs, which consume approximately 20% less power with the same memory capacity and improve the operating frequency of the memory bus by around 15%.
- Solid state drives (SSDs) consume 80% less power than traditional 2.5-inch HDDs.
- AC and 240 V high-voltage DC power supplies are supported.
- Platinum PSUs are used, achieving power conversion efficiency of 94%.

2.6.3 RH5885H V3 Advantages

The RH5885H V3 provides the following advantages:

High RAS to Improve Stability and Enable Quick Recovery

- The RH5885H V3 transplants advanced RAS features from Intel Itanium (midrange computers) and implements up to 53 hardware RAS features. For details, see 1.7 RAS.
- The fan modules of the RH5885H V3 are hot-swappable and can be maintained without opening the chassis cover.
- Some PCIe devices used by the RH5885H V3 are hot-swappable and can be maintained without opening the chassis cover.
- The RH5885H V3 comes with a touched diagnostic LCD, which offers quicker fault location and better user experience than the traditional LED panels.
- The RH5885H V3 supports long-term stable operating at 40°C, while most servers support operating only at 35°C.
- SDM provides the black box and KVM video recording functions, facilitating fault location for OS breakdowns.

Table 2-6 RH5885H V3 RAS features

No.	Module	Feature Name	Description
1	Processor	Corrected Machine Check Interrupt (CMCI)	This feature corrects error-triggered interrupts.

No.	Module	Feature Name	Description
2	DIMM	Failed DIMM Isolation	This feature identifies the faulty DIMM, which helps isolate the faulty DIMM from others and replace it.
3		Memory Thermal Throttling	This feature automatically adjusts DIMM temperature to avoid DIMM damage due to overheat.
4		Rank Sparing	This feature uses some memory ranks as backup ranks to prevent the system from crashing due to uncorrectable errors.
5		Memory Address Parity Protection	This feature detects memory command and address errors.
6		Memory Demand and Patrol Scrubbing	This feature provides the memory patrol function for promptly correcting correctable errors upon detection. If these errors are not corrected promptly, uncorrectable errors may occur.
7		Memory Mirroring	This feature improves system reliability.
8		Memory Board Hot swap	This feature enables hot-swappable memory risers to be supported by the HSW-EX platform.
9		Intel SMI lane failover	This feature provides an SMI2 interface self-recovery capability to improve system availability.
10		Intel SMI Packet Retry	This feature provides an SMI2 interface retry mechanism upon errors to improve system reliability and availability.
11		SDDC	This feature provides a single-device, multi-bit error correction capability to improve memory reliability.
12		DDDC	This feature enables the memory to have the SDDC function after one faulty device is replaced with a backup device to improve memory reliability and the self-recovery capability.
13		SDDC+1	This feature enables the memory to correct 1-bit errors after one SDDC to improve memory reliability and availability.
14		DDDC+1	This feature enables the memory to correct 1-bit errors after one DDDC to improve memory reliability and availability.

No.	Module	Feature Name	Description
15		Device Tagging	This feature degrades and rectifies DIMM device faults to improve DIMM availability.
16		Data Scrambling	This feature optimizes data stream distribution and reduces the error possibility to improve the reliability of data streams in the memory and the capability to detect address errors.
17	PCIe	PCIe Advanced Error Reporting	This feature improves server serviceability.
18		Live Error Recovery (LER)	This feature provides a PCIe device self-recovery capability to improve server reliability.
19		PCI Express Hot Plug	This feature improves PCIe device flexibility and server usability.
20	QPI	Intel QPI Clock Fail Over	This feature provides a QuickPath Interconnect (QPI) clock link self-recovery mechanism to improve system reliability.
21		Intel QPI Dynamic link retraining and recovery on link failure	This feature improves QPI link reliability.
22		Intel QPI Link Level Retry	This feature provides a retry mechanism upon errors to improve QPI reliability.
23		Intel QPI Self-healing	This feature provides a QPI data link self-recovery mechanism to improve system reliability.
24		Intel QPI Protocol Protection via CRC	This feature provides cyclic redundancy check (CRC) protection for QPI packets to improve system reliability.
25		Intel QPI Viral Mode	This feature provides a QPI viral mode to prevent the spreading of error data and improve system security.
26	System	Core Disable For Fault Resilient Boot (FRB)	This feature isolates the faulty processor during startup to improve system reliability and availability.
27		Corrupt Data Containment Mode	This feature identifies the memory storage unit that contains corrupted data to minimize the impact on the running programs and improve system reliability.

No.	Module	Feature Name	Description
28		Socket disable for FRB	This feature isolates the faulty socket during startup to improve system reliability.
29		Architected Error Records	With the eMCA feature, the BIOS collects error information recorded in hardware registers in compliance with UEFI specifications, sends the error information to the OS over the APEI of the Advanced Configuration and Power Interface (ACPI), and locates the error unit, improving system availability.
30		Error Injection Support	This feature injects errors to verify various RAS features.
31		MCA	This feature provides software recovery for uncorrectable errors, which improves system availability.
32		eMCA:Gen1	This feature improves system availability.
33		MCA recovery-IO	This feature integrates input/output (I/O) error reports into the MCA to allow users to process I/O device errors in a unified manner and improve system serviceability.
34		OOB access to MCA registers	The out-of-band system accesses MCA registers by using the Platform Environment Control Interface (PECI). If a fatal error occurs in the system, the out-of-band system collects onsite data to facilitate fault analysis and locating and improve system serviceability.
35		BIOS Abstraction Layer for Error Handling	The BIOS processes errors and reports the error information to the OS and iMana in compliance with specifications to improve system serviceability.
36		BIOS-based Predictive Failure Analysis (PFA)	The BIOS provides physical unit information for DIMM errors, and the OS traces and predicts errors, and isolates error memory pages.
37		Touched Diagnostic LCD	The touched diagnostic LCD simplifies onsite maintenance operations and improves onsite maintenance efficiency.
38		Redundant Fans	The fan modules work in N+1 redundancy mode.
39		Hot-swap Fans	The fan modules are hot-swappable and support maintenance without the need for opening the chassis cover.

No.	Module	Feature Name	Description	
40		Redundant PSUs	The PSUs work in 1+1 redundancy mode.	
41		Hot-swap PSUs	The PSUs are hot-swappable.	
42		Failed DIMM Identification	Memory risers no matter they are in online or offline state support failed DIMM identification by using indicators.	
43		Failed FAN Identification	This feature supports faulty fan identification.	
44		Failed HDD Identification	This feature enables faulty hard disk identification.	
45		Failed PSU Identification	This feature enables enable faulty PSU identification.	
46		HDD Hot Swap	The hard disks are hot-swappable.	
47		Memory PFA	This feature enables precaution for memory faults.	
48		HDD PFA	This feature enables precaution for hard disk faults.	
49		40°C Ambiance Temperature	The RH5885H V3 supports long-term stable operation at 40°C (104°F) when no GPGPU is configured. When a GPGPU is configured, the server supports long-term stable operation at 35°C (95°F).	
50		Software	Black Box	Server Device Management (SDM) provides the black box function, facilitating cause analysis for OS breakdowns.
51			KVM Recording	SDM provides the KVM video recording function, facilitating cause analysis for system breakdowns.
52			The Last Screen	SDM provides the last screen function, facilitating cause analysis for system breakdowns.
53			Backup image for iMana	The integrated management (iMana) software supports dual-image backup. If one image fails, the other image can be started to ensure normal software operation.

Leading Computing Performance

- The RH5885H V3 uses the latest Intel® Xeon® Broadwell-EX® E7-8800 v4 processors with high performance.

- A Broadwell-EX processor supports a maximum of 96 DIMMs. Both the number of DIMMs and the memory capacity increase by 50% compared with the Westmere-EX processor, enabling the RH5885H V3 to support large databases and more VMs.
- Compared with a Westmere-EX processor, a Broadwell-EX processor increases the overall performance by 200% and offers 340% higher performance for certain applications.

2.6.4 RH5885H V3 Technical Specifications

Table 2-7 describes the RH5885H V3 technical specifications.

Table 2-7 RH5885H V3 technical specifications

Item	Specifications
Form factor/height	4U rack server, supporting hold rails and cable management assemblies
Processor	<ul style="list-style-type: none"> ● A maximum of four Intel® Xeon® E7-8800 v4 (Broadwell-EX) processors, with up to 24 cores and 60 MB L3 cache per processor
Chipset	Intel Patsburg PCH
Number of DIMMs	96 slots for installing DDR3 or DDR4 DIMMs There are 8 memory risers in total. Each processor supports two memory risers, and each memory riser supports 8 or 12 DIMMs.
Maximum memory capacity	3 TB (32 GB DIMMs)
Number of hard disks	Eight or twenty-three 2.5-inch hot-swappable SAS/SATA HDDs or SSDs
Maximum local storage capacity	<ul style="list-style-type: none"> ● Eight hard disks: 8 x 1.2 TB = 9.6 TB ● 23 hard disks: 23 x 1.2 TB = 27.6 TB <p>NOTE The RH5885H V3 supports eight or twenty-three hard disks.</p>
RAID support	<p>A RAID controller card supports either of the following:</p> <ul style="list-style-type: none"> ● RAID 0, 1, 10, and 1E ● RAID 0, 1, 10, 5, 50, 6, and 60, a maximum cache capacity of 2 GB, and a supercapacitor for power-off protection
Network port	<p>The onboard NIC can be flexibly configured to provide either of the following ports:</p> <ul style="list-style-type: none"> ● Four integrated GE 1000BASE-T ports ● Two 10GE optical ports ● Two GE BASE-T ports

Item	Specifications
Expansion slot	<p>Various PCIe risers can be used to provide several PCIe specifications:</p> <p>16 standard PCIe slots</p> <ul style="list-style-type: none"> ● Four PCIe 3.0 x8 slots for installing full-height full-length cards, supporting hot swap without opening the chassis cover ● Eight PCIe 3.0 x8 slots for installing full-height full-length cards ● Two PCIe 3.0 x4 slots for installing full-height full-length cards ● Two PCIe 2.0 x4 slots for installing full-height full-length cards <p>12 standard PCIe slots</p> <ul style="list-style-type: none"> ● Four PCIe 3.0 x8 slots for installing full-height full-length cards, supporting hot swap without opening the chassis cover ● Four PCIe 3.0 x16 slots for installing full-height full-length cards ● Two PCIe 3.0 x4 slots for installing full-height full-length cards ● Two PCIe 2.0 x4 slots for installing full-height full-length cards <p>14 standard PCIe slots</p> <ul style="list-style-type: none"> ● Four PCIe 3.0 x8 slots for installing full-height full-length cards, supporting hot swap without opening the chassis cover ● Four PCIe 3.0 x8 slots for installing full-height full-length cards ● Two PCIe 3.0 x16 slots for installing full-height full-length cards ● Two PCIe 3.0 x4 slots for installing full-height full-length cards ● Two PCIe 2.0 x4 slots for installing full-height full-length cards
External port	<ul style="list-style-type: none"> ● Front panel: two USB 2.0 ports, one power button, one UID button, one video graphics array (VGA) port, and one touched diagnostic LCD ● Rear panel: two USB 2.0 ports, one VGA port, one serial port, one 100M management port, one UID indicator, and one plug-in NIC
DVD-ROM drive	One

Item	Specifications
PSU	The PSUs can be configured as follows: <ul style="list-style-type: none"> ● Two 3000 W AC PSUs in 1+1 redundancy mode ● Two 2000 W AC PSUs in 1+1 redundancy mode ● Two 2500 W DC PSUs in 1+1 redundancy mode ● Four 800 W AC PSUs in 2+2 redundancy mode
System management	IPMI 2.0
Security feature	Power-on password and administrator password Front bezel
Video card	The system mainboard integrates the display chip and provides 16 MB display memory. The maximum resolution is 1024 x 768.
Operating systems supported	Check the latest compatibility list.
Warranty	Three-year customer replaceable unit and onsite limited warranty, 9 x 5 NBD, and optional service upgrades
Dimensions (H x W x D)	175 mm x 447 mm x 790 mm (6.89 in. x 17.60 in. x 31.10 in.)
Maximum weight	<ul style="list-style-type: none"> ● Packaging materials: 7 kg (15.44 lb) ● Server with 23 disks (excluding the package): 56 kg (123.48 lb) ● Server with 8 disks (excluding the package): 52 kg (114.66 lb) NOTE When four CPUs are installed and DIMMs and hard disks are fully configured, the server is highest in weight. The weight of PCIe cards is not included and can be calculated as follows: <ul style="list-style-type: none"> ● HHL PCIe card: 0.3 kg (0.66 lb) ● FHHL PCIe card: 0.4 kg (0.88 lb) ● FHFL dual-slot PCIe card (GPU): 1 kg (2.205 lb).
Physical environment	<ul style="list-style-type: none"> ● Operating environment ● Ambient temperature: 5°C to 40°C (41°F to 104°F) NOTE The maximum operating temperature is 35°C (95°F) if an PCIe SSD or a GPU is configured. <ul style="list-style-type: none"> ● Ambient humidity: 10% RH to 90% RH (twmax = 29°C) ● Storage environment ● Ambient temperature: - 40°C to 65°C (- 40°F to +149°F) ● Ambient humidity: 5% RH to 95% RH (twmax = 38°C) ● Altitude: ≤ 3000 m (9842.4 ft) NOTE When the altitude is higher than 900 m (2952.72 ft), the operating temperature decreases by 1°C (1.8°F) per 300 m (984.24 ft).

Item	Specifications
Acoustic noise	<p>The data listed in the following is the declared A-weighted sound power levels (LWAd) and declared average bystander position A-weighted sound pressure levels (LpAm) when the server is operating in a 23°C (73.4°F) ambient environment. Noise emissions are measured in accordance with ISO 7999 (ECMA 74) and declared in accordance with ISO 9296 (ECMA 109).</p> <ul style="list-style-type: none"> ● Idle: ● LWAd: 7.1 Bels ● LpAm: 58.8 dBA ● Operating: ● LWAd: 7.1 Bels ● LpAm: 58.8 dBA <p>NOTE The actual sound levels generated during server operating vary depending on the server configuration, load, and ambient temperature.</p>

2.6.5 RH5885H V3 Server Management

The RH5885H V3 uses Huawei proprietary iMana 200 integrated management system to implement remote server management. iMana 200 complies with IPMI 2.0 specifications and provides reliable hardware monitoring and management. iMana 200 seamlessly communicates with management modules in a chassis and manages the compute nodes in the chassis through the management modules.

iMana 200 supports the following features:

- Keyboard, video, and mouse (KVM) and text console redirection
- Remote virtual media
- IPMI V2.0
- Simple Network Management Protocol Version 3 (SNMPv3)
- Common information model (CIM)
- Web-based logins

Table 2-8 describes iMana 200 specifications.

Table 2-8 iMana 200 specifications

Item	Specifications
Management interface	iMana 200 supports a variety of management interfaces to implement system integration. iMana 200 can integrate with any standard management system over the following interfaces: <ul style="list-style-type: none"> ● IPMI V2.0 ● CLI ● HTTPS ● SNMPv3
Fault detection	Detects faults and accurately locates hardware faults.
System watchdog	Supports BIOS power on self-test (POST), OS watchdog, and automatic system reset for timeout. You can enable or disable these functions on iMana 200.
Boot device configuration	Supports out-of-band configuration for boot devices.
Alarm management	Supports alarm management and reports alarms in various ways, such as the SNMP trap, Simple Mail Transfer Protocol (SMTP) , and syslog service, to ensure uninterrupted system operation.
Integrated KVM	Provides remote maintenance measures, such as KVM and KVM over IP, for troubleshooting. Support a maximum resolution of 1280 x 1024.
Integrated virtual media	Virtualizes local media devices or images to the media devices for remote compute nodes, which simplifies OS installation. The virtual DVD-ROM drive supports a transmission rate of up to 8 MB/s.
Web-based user interface (UI)	Provides a visual WebUI for quick configuration and information queries. Supports the following web browsers: <ul style="list-style-type: none"> ● Internet Explorer 8.0 ● Firefox 9.0 ● Chrome 13.0 ● Safari 5.1
Fault reproduction	Reproduces faults to facilitate fault diagnosis.
Screenshots and videos	Allows you to view screenshots and videos without login, which facilitates preventive maintenance inspection (PMI).
DNS/LDAP	Supports domain management and directory services, which significantly simplifies network configuration and management.
Dual-image backup	Starts software from an image backup if the software fails.

Item	Specifications
Asset management	Provides intelligent asset management.
Intelligent power management	Uses the power capping technology to increase deployment density and the dynamic energy saving technology to lower the OPEX.
IPv6	Supports IPv6 to ensure sufficient IP addresses.
Network Controller Sideband Interface (NC-SI)	Supports NC-SI, which allows you to access iMana 200 over a service network port.

3 Summary

SAP HANA is a universal, high-performance platform, applying to various industries and enterprises of different scales. Each enterprise can customize applications based on service requirements. SAP HANA is also a high-performance in-memory database for real-time analysis and supports the application modes of SAP Business One, Analytics Powered by SAP HANA and SAP Business One, version for SAP HANA.

The Huawei SAP Business One on SAP HANA solution provides a platform for real-time, in-memory computing analysis and big data analysis targeted at SMEs.

Using Intel new-generation processors and memory technologies, the 2288H V5/RH2288H V3/Rh5885H V3 provides a high-performance, stable, easy-to-manage hardware platform for SAP HANA. Compared with traditional relational database platforms, the Huawei SAP Business One on SAP HANA solution provides accelerated and real-time data analysis for SMEs. In addition, this solution provides key reports for big-data analysis, facilitating marketing decision making and generating more revenue.