



i48 Technical White Paper

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1 Product Overview

The Inspur i48 is a modular high-density server based on Intel® Xeon® scalable processors, which is newly optimized for new high-density data centers and applications. It is the best infrastructure for all-scenario integrated solutions. The i48 chassis can be equipped with eight 2-socket NS5488M5 computing optimization nodes, four 2-socket NS5484M5 load balancer nodes, two 2-socket NS5482M5 storage optimization nodes, or one NS5482M5 node to achieve 72-disk deployment. The uniquely designed 4-slot storage expansion module NS5482JD can be used with any i48-based 2-socket node, allowing the connected node to increase an expansion capacity of 36x3.5" hard disks, and installing a maximum of 72x3.5" plus 2x2.5" hard disks on the entire system. The i48 allows the mixed deployment of different nodes in the same chassis. As an independent system, each node is connected to the chassis through the midplane. The power supply and fan modules of the chassis are designed to be shared, to further save space and energy consumption and perfectly feature the high density, high efficiency, high reliability and high intelligence in a limited space. Excellent product design makes it more suitable for infrastructure construction such as virtualization, high-performance computing, big data analysis, mass storage, CDN, hyper convergence, traffic analysis, and video surveillance.



Figure 1 i48 4U8 node view



Figure 2 i48 4U4 node view



Figure 3 i48 4U2 node view



Figure 4 i48 4U1 node view

2 Product Features

For different application scenarios, the i48 maintains the consistent high-quality and reliable performance of Inspur servers, applying the extreme design concept in high density, high-computing performance, high availability, high reliability, and maintainability.

Flexible Expansion and Ease of Management

- The i48 adopts a completely modular design and consists of multiple modules including chassis, node, front panel expansion, rear I/O box, management, and network modules. It allows the rapid customization of IT infrastructure with different modules as required. The unified architecture and resilient design enables smooth scaling of the data center from small to large, saving the initial investment in infrastructure platforms to the maximum extent possible.
- The NS5488M5/NS5484M5/NS5482M5 node supports three kinds of modular front panels. It allows configuring different expansion slots by replacing the front panel module.
- Flexible matching of computing and storage resources for various workloads allows different node configuration schemes to achieve the storage space of 12, 36, 48, 72 or more hard disks.
- The flexible PCIe expansion capability allows the modular front panel to achieve flexible matching of front hard disks and PCIe, perfectly supporting both multi-network scaling and high IOPS. The i48 chassis is equipped with the PCIe single-card hot-swappable expansion module to further improve performance.
- The i48 provides a flexible management scheme and the entire system supports a unified CMC management module, which is connected to the BMC of each node to realize a unified entrance for remote management and maintain shared units such as chassis fans and PSUs. The i48 supports the redundancy architecture of master/slave CMCs and network switching module of the entire system. This module is connected to a node onboard gigabit chip and converged into 2*10GbE optical port + 1GbE electrical port, achieving large-scale cluster application management and networking.

High Density and High-computing Performance

- High-density computing allows the entire system to be configured with eight computing nodes. In single-node air-cooled mode, it supports a maximum of two 165 W CPUs and four NVMe hard disks, as well as Intel® Virtual RAID on Chip (Intel® VROC) technology to realize NVMe RAID.
- The i48 provides high-density storage with a storage node and a hard disk storage box, supporting the configuration scheme of a maximum of 72+2+2 hard disks.
- A single node supports up to four standard PCIe slots, one OCP slot and one RAID card slot, providing various network interface options and allowing more flexible network architectures for applications.
- The hardware system of node is designed with NUMA-Balanced, which enables PCIe expansion devices to be evenly deployed under two CPU's to realize the extreme optimization of application performance.

Green, Energy Conservation and Quick Deployment

- The power supply and air cooled systems of the i48 are designed to be shared and redundant. Thus, it achieves the optimal operating environment and ensures the stable operation of the system with Inspur's unique intelligent control technology combined with the advanced air cooled system.
- The multi-node modular design allows the i48 to easily realize multi-node integration, which is suitable for the rapid delivery of large-scale data centers.

Ease of Maintenance and High Reliability

- The front-maintenance feature is adapted to the partition door of the hot and cold aisles of high-density data centers. O&M operations do not need to be performed in the hot aisles, greatly improving the operating comfort of maintenance personnel.
- The i48 adopts the unique hard disk drawer design and high-standard slide reinforcement technology, allowing hard disk maintenance by box. When the entire system is configured with 72 large-capacity hard disks, each 36 hard disks are deployed in an independent box, which is connected to the power supply and the hard disk controller through the cable carrier. When the box is independently drawn out, the business runs stably, realizing that the entire system does not need to be pulled out for hot-swap maintenance. This unique technology greatly simplifies maintenance, reduces the impact of disk resonance, and optimizes the heat dissipation effect of the entire system.

3 Logical Architecture

- S5488M5/NS5484M5/NS5482M5 supports 2 Intel® Xeon® scalable processors per node. A single node supports 16 DDR4 memory slots. It supports 2400Mhz/2666Mhz/2933Mhz memory, and a single node supports up to a memory capacity of 1.0TB (64GB in case of a single memory module).
- Two processors of a single node are interconnected with two UPI buses.
- The NS5488M5/NS5484M5/NS5482M5 node uses the IntelC62* chipset.
- A single NS5488M5 node can support up to six PCIe signals from three front PCIe slots, one rear hot-swappable PCIe module, as well as one front OCP card and one built-in RAID card slot.
- The hard disk box of the NS5484M5/NS5482M5 node is connected to the computing unit through the cable carrier, which allows independent maintenance of the hard disk box. It does not need to be powered off when pulled out for maintenance. The NS5482JD hard disk storage box is equipped with an independent RAID card, which is connected to the node through the backplane.

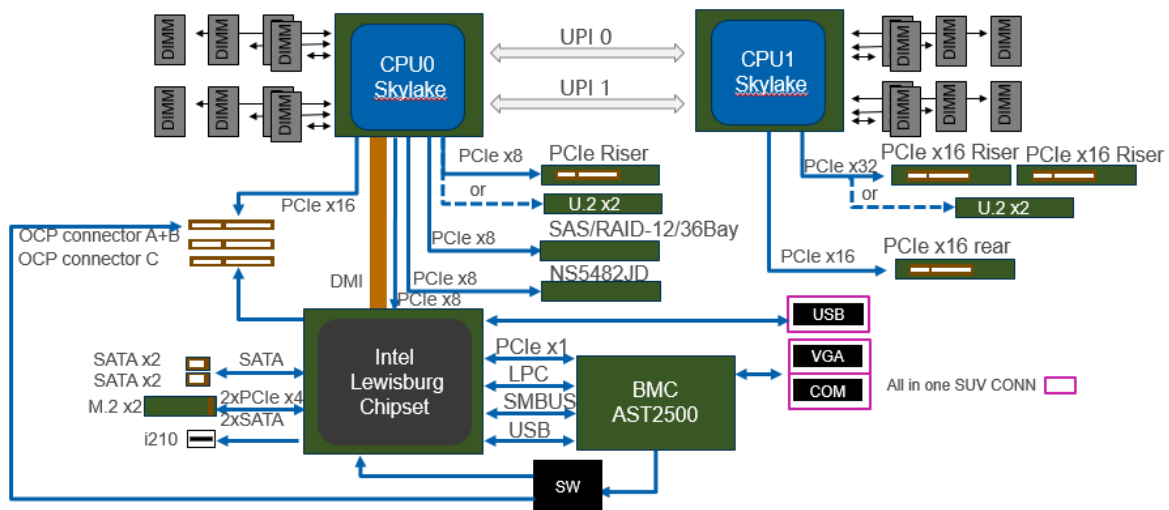


Figure 5 Logical block diagram of i48 NS5488M5/NS5484M5/NS5482M5 node

4 Product Introduction

4.1 Front View

4.1.1 Front Panel View of the 4SFF System on the NS5488M5 Node

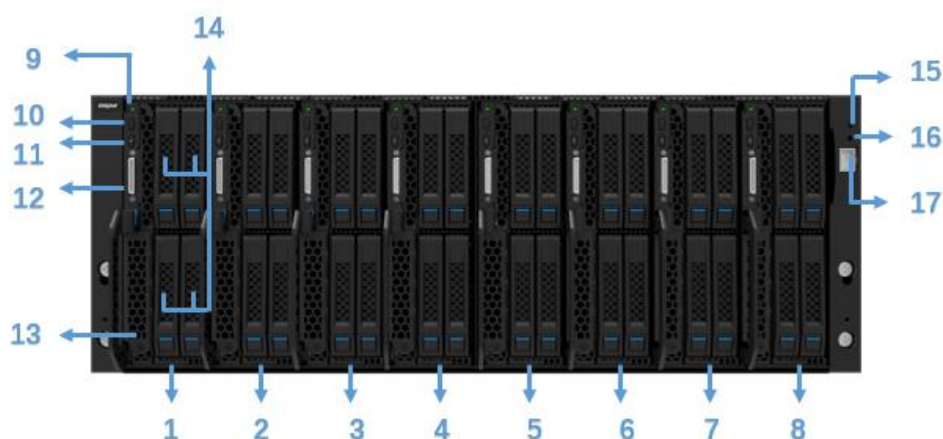


Table 6 Front panel of the 4SFF system on the NS5488M5 node

No.	Module Name	Remarks
1~8	Nodes 0 to 7	
9	Node health indicator	Is steady green if the node is normal. Is steady red if the node is faulty.
10	UID key	Is blue when the UID indicator is turned on. Is not lit when the UID indicator is turned off.
11	Power button	The power lamp is green when power on. The power lamp is orange when standby. Press 4s long to force shutdown.
12	High-density port	
13	OCP slot	Supports OCP or OCP PHY cards.
14	SAS/SATA/NVMe hard disk	SAS hard disks are connected to RAID/SAS cards. SATA hard disks are connected to RAID/SAS cards or onboard RAID controller. NVMe hard disks support VROC with RAID keys.
15	System health indicator	Is steady green if the node is normal. Is steady red if the node is faulty.
16	Chassis UID indicator	Is blue when the UID indicator is turned on. Is not lit when the UID indicator is turned off.
17	Front mounting ear RJ45 port	Is connected with the CMC module, easy for front maintenance.

Table 7 Front panel description of the 4SFF system on the NS5488M5 node

4.1.2 Front Panel View of the 2SFF 2LP System on the NS5488M5 Node



Figure 8 Front panel of the 2SFF 2LP system on the NS5488M5 node

No.	Module Name	Remarks
1	OCP slot	Supports OCP or OCP PHY cards.
2	SAS/SATA/NVMe hard disk	SAS hard disks are connected to RAID/SAS cards. SATA hard disks are connected to RAID/SAS cards or onboard RAID controller. NVMe hard disks support VROC with RAID keys.
3	PCIE expansion card	Two PCIe x16 cards

Table 9 Front panel description of the 2SFF 2LP system on the NS5488M5 node

4.1.3 Front Panel View of the 3LP System on the NS5488M5 Node



Figure 10 Front panel of the 3LP system on the NS5488M5 node

No.	Module Name	Remarks
1	OCP slot	Supports OCP or OCP PHY cards.
2	PCIe expansion card	One PCIe x8 card
3	PCIe expansion card	Two PCIe x16 cards

Table 11 Front panel description of the 3LP system on the NS5488M5 node

4.1.4 Front Panel View of the 2SFF System on the NS5484M5 Node



Figure 12 Front panel of the 2SFF system on the NS5484M5 node

No.	Module Name	Remarks
1	Node 0	
2	Node 2	
3	Node 4	
4	Node 6	
5	Node health indicator	Is steady green if the node is normal. Is steady red if the node is faulty.
6	UID key	Is blue when the UID indicator is turned on. Is not lit when the UID indicator is turned off.
7	Power button	The power lamp is green when power on. The power lamp is orange when standby. Press 4s long to force shutdown.
8	High-density port	
9	OCP slot	Supports OCP or OCP PHY cards.
10	Resource pool hard disk power indicator	Is steady green if the hard disk is normal. Is not lit if the hard disk is faulty.
11	Storage pool hard disk fault indicator	Is not lit if the hard disk is normal. Is steady red if the node is faulty.
12	SAS/SATA/NVMe hard disk	SAS hard disks are connected to RAID/SAS cards. SATA hard disks are connected to RAID/SAS cards or onboard RAID controller. NVMe hard disks support VROC with RAID keys.

13	System health indicator	Is steady green if the node is normal. Is steady red if the node is faulty.
14	Chassis UID indicator	Is blue when the UID indicator is turned on. Is not lit when the UID indicator is turned off.
15	Front mounting ear RJ45 port	Is connected with the CMC module, easy for front maintenance.

Table 13 Front panel description of the 2SFF system on the NS5484M5 node

4.1.5 Front Panel View of the 2SSD 1LP System on the NS5484M5 Node



Figure 14 Front panel of the 2SFF 1LP system on the NS5484M5 node

No.	Module Name	Remarks
1	OCP slot	Supports OCP or OCP PHY cards.
2	PCIE expansion card	One PCIeX16
3	SATA hard disk	Is connected to the onboard RAID controller and supports only 7 mm SATA SSDs (2.5" hard disks).

Table 15 Front panel description of the 2SSD 1LP system on the NS5484M5 node

4.1.6 Front Panel View of the 2LP System on the NS5484M5 Node



Figure 16 Front panel of the 2LP system on the NS5484M5 node

No.	Module Name	Remarks
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1	OCP card	Supports OCP or OCP PHY cards.
2	PCIe expansion card	One PCIeX16
3	PCIe expansion card	One PCIeX8

Table 17 Front panel description of the 2LP system on the NS5484M5 node

4.1.7 Front Panel View of the 2SFF System on the NS5482M5 Node

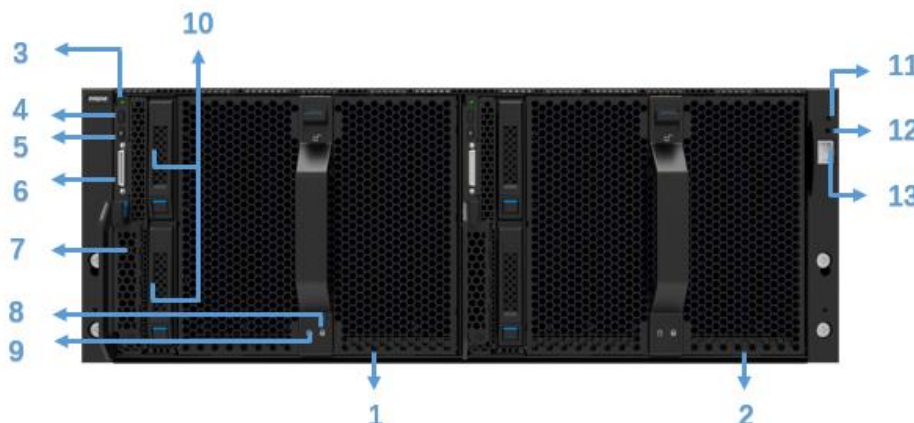


Figure 18 Front panel of the 2SFF system on the NS5482M5 node

No.	Module Name	Remarks
1	Node 0	
2	Node 4	
3	Node health indicator	Is steady green if the node is normal. Is steady red if the node is faulty.
4	UID key	Is blue when the UID indicator is turned on. Is not lit when the UID indicator is turned off.
5	Power button	The power lamp is green when power on. The power lamp is orange when standby. Press 4s long to force shutdown.
6	High-density port	
7	OCP slot	Supports OCP or OCP PHY cards.
8	Resource pool hard disk power indicator	Is steady green if the hard disk is normal. Is not lit if the hard disk is faulty.
9	Storage pool hard disk fault indicator	Is not lit if the hard disk is normal. Is steady red if the node is faulty.
10	SAS/SATA/NVMe hard disk	SAS hard disks are connected to RAID/SAS cards. SATA hard disks are connected to RAID/SAS cards or onboard RAID controller. NVMe hard disks support VROC with RAID keys.
11	System health indicator	Is steady green if the node is normal. Is steady red if the node is faulty.
12	Chassis UID indicator	Is blue when the UID indicator is turned on. Is not lit when the UID indicator is turned off.

13	Front mounting ear RJ45 port	Is connected with the CMC module, easy for front maintenance.
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Table 19 Front panel description of the 2SFF system on the NS5482M5 node

4.1.8 Front Panel View of the 2SSD 1LP System on the NS5482M5 Node



Figure 20 Front panel of the 2SSD 1LP system on the NS5482M5 node

No.	Module Name	Remarks
1	OCP slot	Supports OCP or OCP PHY cards.
2	PCIE expansion card	One PCIeX16
3	SATA hard disk	Is connected to the onboard RAID controller and supports only 7 mm SATA SSDs (2.5" hard disks).

Table 21 Front panel description of the 2SSD 1LP system on the NS5482M5 node

4.1.9 Front Panel View of the 2LP System on the NS5482M5 Node



Figure 22 Front panel of the 2LP system on the NS5482M5 node

No.	Module Name	Remarks
1	OCP slot	Supports OCP or OCP PHY cards.
2	PCIE expansion card	One PCIeX16
3	PCIE expansion card	One PCIeX8

Table 23 Front panel description of the 2LP system on the NS5482M5 node

4.1.10 Front Panel View of the NS5482JD Hard Disk Box and the Matched Node System

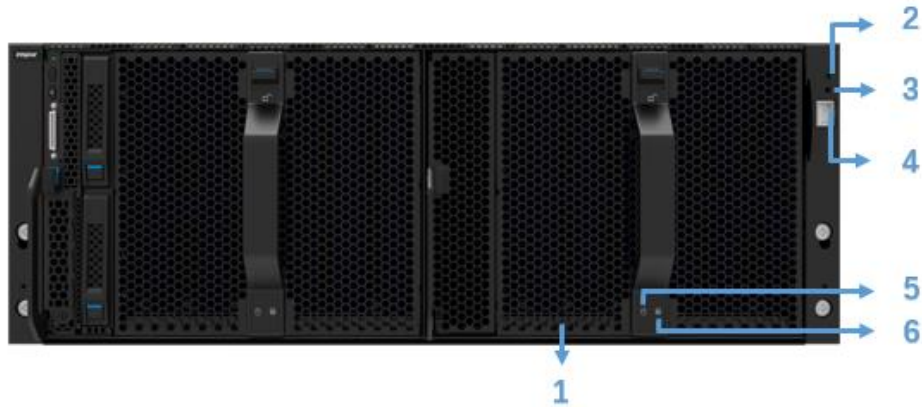


Figure 24 Front panel of the NS5482JD hard disk box and the matched node system

No.	Module Name	Remarks
1	36-disk cold storage box	Supports 3.5" and 2.5" hard disks.
2	System health indicator	Is steady green if the node is normal. Is steady red if the node is faulty.
3	Chassis UID indicator	Is blue when the UID indicator is turned on. Is not lit when the UID indicator is turned off.
4	Front mounting ear RJ45 port	Is connected with the CMC module, easy for front maintenance.
5	Storage pool hard disk fault indicator	Is not lit if the hard disk is normal. Is steady red if the node is faulty.
6	Resource pool hard disk power indicator	Is steady green if the hard disk is normal. Is not lit if the hard disk is faulty.

Table 25 Front panel description of the NS5482JD hard disk box and the matched node system

4.1.11 View and indicators of the front hard disk

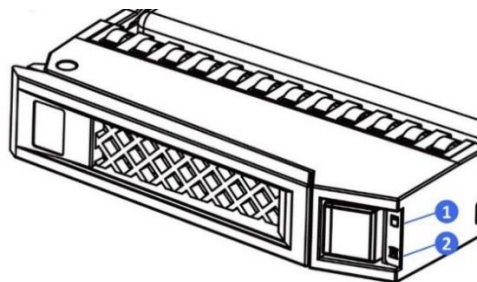


Figure 26 Hard disk view

No.	Module Name	Remarks
1	Hard disk fault indicator	Steady red: The hard disk is faulty. Steady blue: The hard disk is being located.

No.	Module Name	Remarks
		Blinking blue: The RAID is being located.
2	Hard disk status indicator	Steady green: The hard disk is normal. Blinking green: Data is being read from or written to the hard disk.

Table 27 Hard disk indicator description

4.2 Rear View

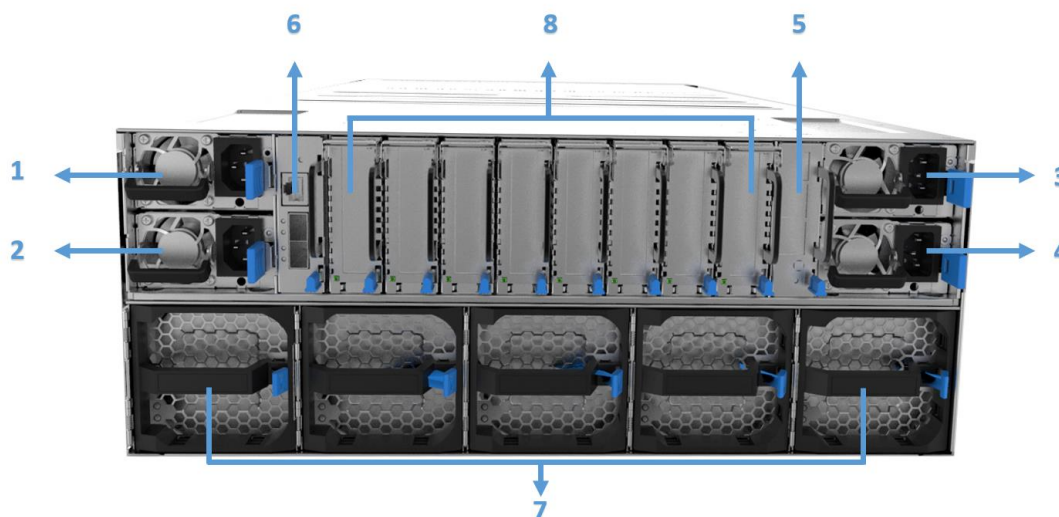


Figure 28 Chassis rear panel view

No.	Module Name	No.	Module Name
1~4	PSUs 0 to 3	7	Fans 0 to 4
5	Management module (when the management module is selected, this location is the main management module.)	8	PCIe0 to PCIe7 (the number of rear PCIe modules is different when the entire system is equipped with different nodes.)
6	Switching module (this location can be replaced with a management module.)		

Table 29 Chassis rear panel view description

There is a one-to-one correspondence between the rear PCIe modules and the nodes, and each node can be equipped with a maximum of one rear PCIe module and corresponding slots. Table 30 lists the methods for fully configuring the same kind of nodes. For other node configuration schemes, please consult Inspur technical engineers.

Node	Maximum Number of Configurable Rear PCIe Slots	Number of Available PCIe Slots	Remarks
Eight NS5488M5 nodes in full configuration	8	PCIe0-PCIe7	
Four NS5484M5 nodes in full	4	PCIe0, PCIe2,	

configuration		PCIe4, PCIe6	
Two NS5482M5 nodes in full configuration	2	PCIe0, PCIe4	

Table 30 Configuration description of the chassis rear PCIe

4.3 Node Mainboard View

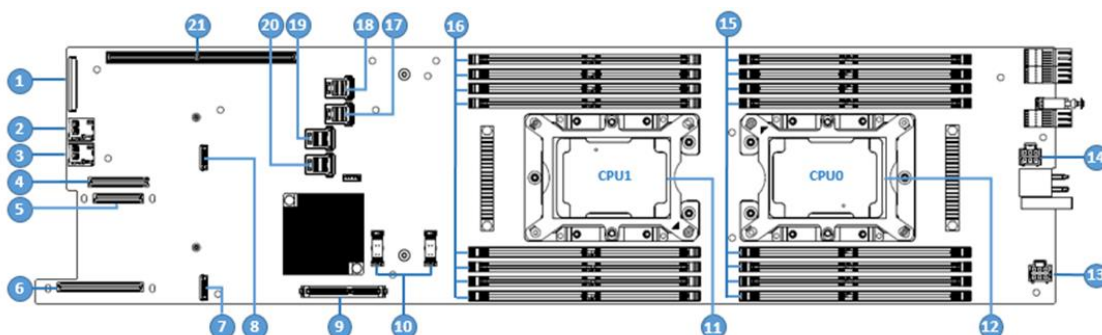


Figure 31 Node mainboard layout view

No.	Module Name	No.	Module Name
1	Front panel FFC port	13	12HDD and 36HDD hard disk backplane power ports
2	BMC_TF slot	14	36HDD hard disk backplane power port
3	SYS_TF slot	15	DIMM slots (CPU0)
4	OCP B port	16	DIMM slots (CPU1)
5	OCP-C port	17	MINI SASHD1 (SAS2.0)
6	OCP-A port	18	MINI SASHD2 (SAS2.0)
7	Right HDD backplane port	19	MINI SASHD4 (PCIe x4)
8	Left HDD backplane port	20	MINI SASHD3 (PCIe x4)
9	M.2 Riser interface	21	x32Riser interface
10	RAID card port		
11	CPU1		
12	CPU0		

Table 32 Node mainboard layout view description

4.4 Node Card

4.4.1 Front Panel Card of the 4SFF System on the NF5488M5 Node

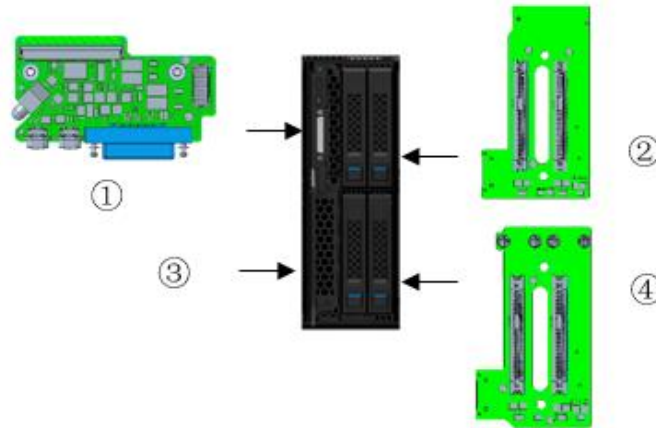


Figure 33 Front panel card view of the 4SFF system on the NF5488M5 node

No.	Module Name	No.	Module Name
1	Front I/O card	2	2*SATA/SAS/NVMe SFF hard disk backplane
3	Front OCP/PHY slot (when a 2-port OCP/PHY card is selected, one BMC port can be configured as the node front BMC interface.)	4	2*SATA/SAS/NVMe SFF hard disk backplane

Table 34 Front panel card description of the 4SFF system on the NF5488M5 node

4.4.2 Front Panel Card of the 2SFF 2LP System on the NF5488M5 Node

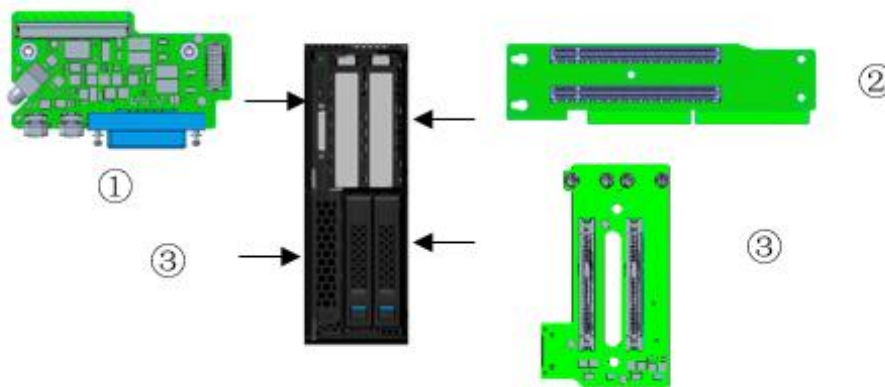


Figure 35 Front panel card view of the 2SFF 2LP system on the NF5488M5 node

No.	Module Name	No.	Module Name
1	Front I/O card	2	2*PCIe x16 riser card
3	Front OCP/PHY slot (when a 2-port OCP/PHY card is	4	2*SATA/SAS/NVMe SFF hard disk backplane

	selected, one BMC port can be configured as the node front BMC interface.)		
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Table 36 Front panel card description of the 2SFF 2PCIe system on the NF5488M5 node

4.4.3 Front Panel Card of the 3LP System on the NF5488M5 Node

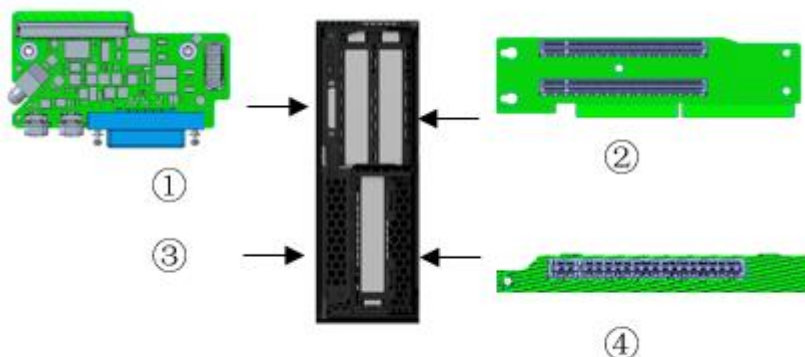


Figure 37 Front panel card view of the 3LP system on the NF5488M5 node

No.	Module Name	No.	Module Name
1	Front I/O card	2	2*PCIe x16 riser card
3	Front OCP/PHY slot (when a 2-port OCP/PHY card is selected, one BMC port can be configured as the node front BMC interface.)	4	1*PCIe x8 adapter cable

Table 38 Front panel card description of the 3LP system on the NF5488M5 node

4.4.4 Front Panel Card of the 2SFF System on the NF5484M5 Node

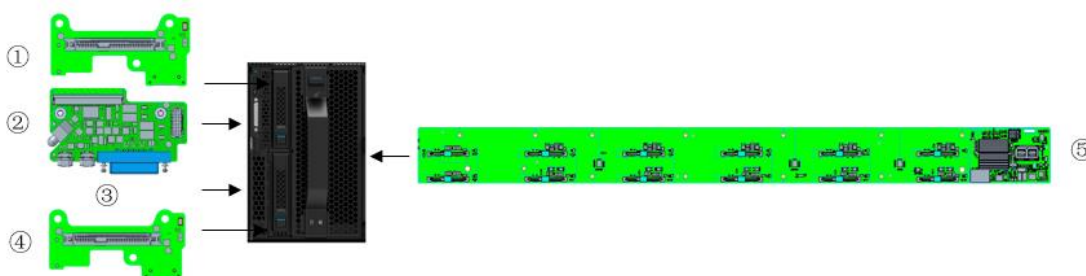


Figure 39 Front panel card view of the 2SFF system on the NF5484M5 node

No.	Module Name	No.	Module Name
1	1*SATA/SAS/NVMe SFF hard disk backplane	4	1*SATA/SAS/NVMe SFF hard disk backplane
2	Front I/O card	5	12*SATA/SAS LFF hard disk backplane
3	Front OCP/PHY slot (when a 2-port OCP/PHY card is selected, one BMC port can be configured as the node front BMC interface.)		

Table 40 Front panel card description of the 2SFF system on the NF5484M5 node

4.4.5 Front Panel Card of the 2SFF 1LP System on the NF5484M5 Node



Figure 41 Front panel card view of the 2SFF 1LP system on the NF5484M5 node

No.	Module Name	No.	Module Name
1	PCIe x16 riser card	4	2*SATA SSD backplane
2	Front I/O card	5	12*SATA/SAS LFF hard disk backplane
3	Front OCP/PHY slot (when a 2-port OCP/PHY card is selected, one BMC port can be configured as the node front BMC interface.)		

Table 42 Front panel card description of the 2SFF 1LP system on the NF5484M5 node

4.4.6 Front Panel Card of the 2LP System on the NF5484M5 Node

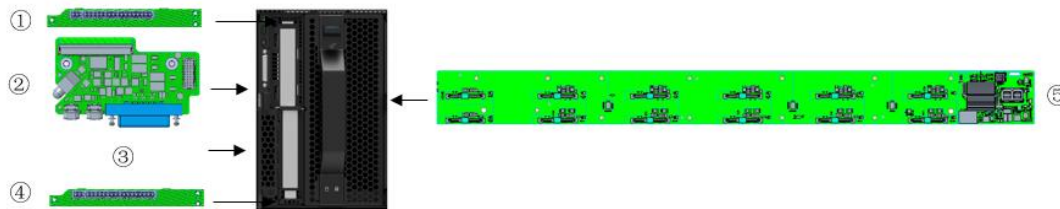


Figure 43 Front panel card view of the 2LP system on the NF5484M5 node

No.	Module Name	No.	Module Name
1	PCIe x16 riser card	4	PCIe x8 adapter cable
2	Front I/O card	5	12*SATA/SAS hard disk backplane (compatible with 3.5" and 2.5" hard disks)
3	Front OCP/PHY slot (when a 2-port OCP/PHY card is selected, one BMC port can be configured as the node front BMC interface.)		

Table 44 Front panel card description of the 2LP system on the NF5484M5 node

4.4.7 Front Panel Card of the 2SFF System on the NF5482M5 Node

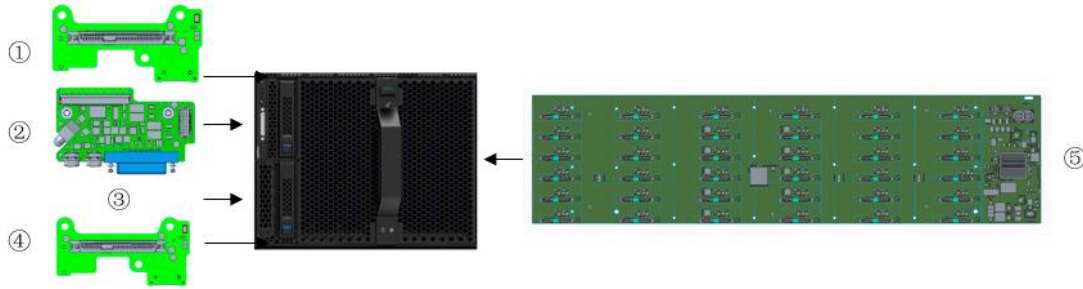


Figure 45 Front panel card view of the 2SFF system on the NF5482M5 node

No.	Module Name	No.	Module Name
1	1*SATA/SAS/NVMe SFF hard disk backplane	4	1*SATA/SAS/NVMe SFF hard disk backplane
2	Front I/O card	5	36*SATA/SAS hard disk backplane (compatible with 3.5" and 2.5" hard disks)
3	Front OCP/PHY slot (when a 2-port OCP/PHY card is selected, one BMC port can be configured as the node front BMC interface.)		

Table 46 Front panel card description of the 2SFF system on the NF5482M5 node

4.4.8 Front Panel Card of the 2SFF 1LP System on the NF5482M5 Node

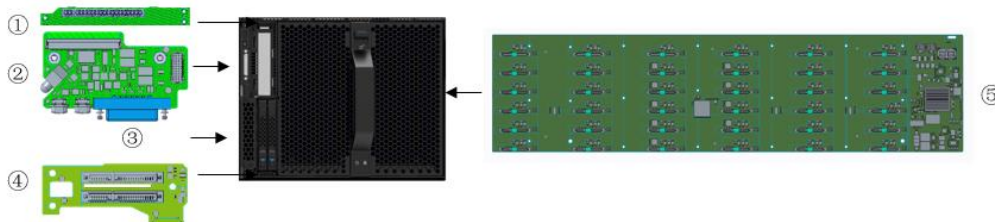


Figure 47 Front panel card view of the 2SFF 1LP system on the NF5482M5 node

No.	Module Name	No.	Module Name
1	1*PCIe x16 riser card	4	2*SATA SSD backplane
2	Front I/O card	5	36*SATA/SAS hard disk backplane (compatible with 3.5" and 2.5" hard disks)
3	Front OCP/PHY slot (when a 2-port OCP/PHY card is selected, one BMC port can be configured as the node front BMC interface.)		

Table 48 Front panel card description of the 2SFF 1LP system on the NF5482M5 node

4.4.9 Front Panel Card of the 2LP System on the NF5482M5 Node

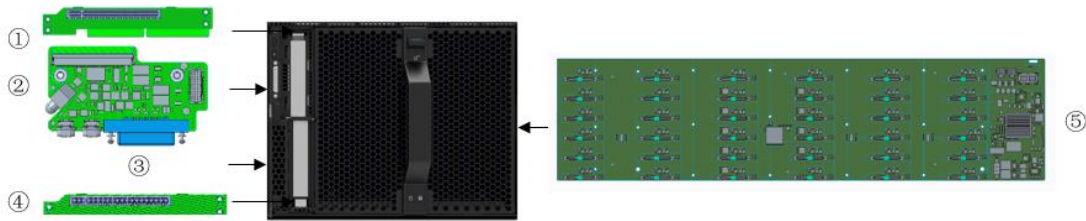


Figure 49 Front panel card view of the 2LP system on the NF5482M5 node

No.	Module Name	No.	Module Name
1	1*PCIe x16 riser card	4	1*PCIe x8 adapter cable
2	Front I/O card	5	36*SATA/SAS hard disk backplane (compatible with 3.5" and 2.5" hard disks)
3	Front OCP/PHY slot (when a 2-port OCP/PHY card is selected, one BMC port can be configured as the node front BMC interface.)		

Table 50 Front panel card description of the 2LP system on the NF5482M5 node

4.4.10 OCP/PHY Card Schematic Diagram

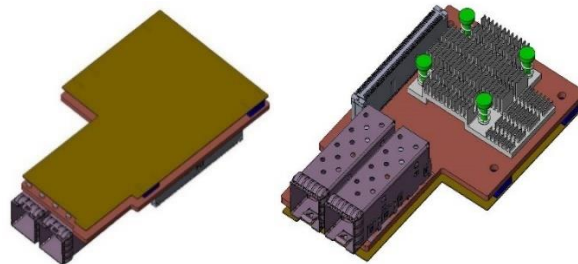
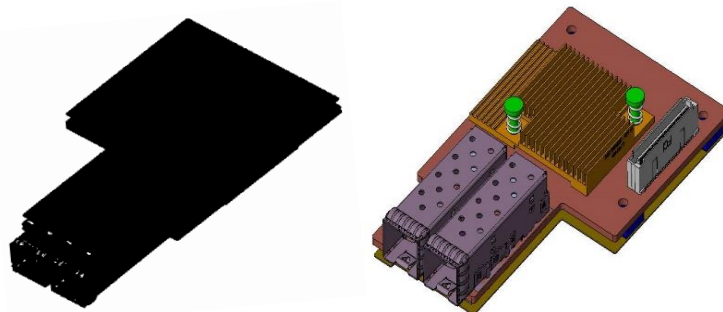


Figure 51 OCP card schematic diagram



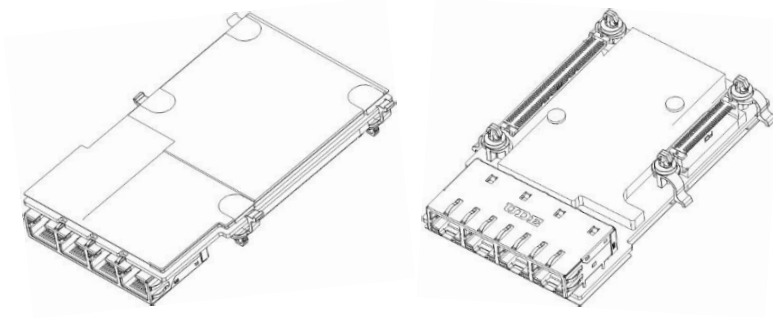


Figure 52 PHY card schematic diagram

5 System Specifications

Parameters of the 2-socket NS5488M5 Computing Node	
Processor	Two Intel® Xeon® scalable processors support up to TDP 165W CPU.
Chipset	Intel C621/C624
Memory	Support up to 16 DDR4 2400/2666/2933 MT/s RAMs Each CPU supports 8 DIMMs, and two CPUs support 16 DIMMs Supports RDIMMs/LRDIMMs/AEP DIMMs.
I/O interface	Can be expanded to one USB 3.0 port, two USB 2.0 ports, one VGA port, and one DB9 serial port through SUV.
Optical drive	Supports external USB flash drives.
Display controller	Is integrated in the Aspeed2500 chip and supports a video RAM up to 64 M and resolution up to 1920*1200 32 bpp@60 Hz.
RAID controller	The mainboard is integrated with the SATA controller. The INSPUR RAID SLI3108 daughter card supports the supercapacitor, RAID 0/1/5/6/10/50, and a cache of 2G/4G.
Network controller card	Supports OCP standard cards or PHY cards, and PCIe plug-in cards. Supports onboard gigabit chips and needs to be used with the TSW module of the chassis.
Management chip	BMC Aspeed2500 chip
PCIe and storage expansion	Supports up to six PCIe expansion slots (four PCIe standard cards, one network daughter card, and one storage daughter card). Front: The NS5488M5 adopts the modular front panel design and provides three different configurations. Front panel 1: two hot-swappable SATA/SAS/NVMe SSDs, two PCIe x16 cards, and one PCIe OCP network daughter card. Front panel 2: four hot-swappable SATA/SAS/NVMe SSDs and one PCIe OCP network daughter card. Front panel 3: two PCIe x16 cards, one PCIe x8 card, and one PCIe OCP network daughter card. Built-in: one PCIe SAS/RAID daughter card. Rear: one PCIe x16 card (The I/O module at the rear of the chassis provides one PCIe x16 expansion slot for each node, supporting single-card hot swapping.)
Built-in storage	Two PCIe/SATA M.2 SSDs and two TF cards
Slot occupied	One slot
Parameters of the 2-socket NS5484M5 Load Balancer Node	
Processor	Two Intel® Xeon® scalable processors support up to TDP 165W CPU.
Chipset	Intel C621/C624
Memory	Support up to 16 DDR4 2400/2666/2933 MT/s RAMs Each CPU supports 8 DIMMs, and two CPUs support 16 DIMMs Supports RDIMMs/LRDIMMs/AEP DIMMs.
I/O interface	Can be expanded to one USB 3.0 port, two USB 2.0 ports, one VGA port, and one DB9 serial port through SUV.

Optical drive	Supports external USB flash drives.
Display controller	Is integrated in the Aspeed2500 chip and supports a video RAM up to 64 M and resolution up to 1920*1200 32 bpp@60 Hz.
RAID controller	The mainboard is integrated with the SATA controller. The INSPUR RAID SLI3108 daughter card supports the supercapacitor, RAID0/1/1E/5/6/10/50, and a cache of 2G/4G.
Network controller card	Supports OCP standard cards or PHY cards, and PCIe plug-in cards. Supports onboard gigabit chips and needs to be used with the TSW module of the chassis.
Management chip	BMC Aspeed2500 chip
PCIe and storage expansion	Supports up to five PCIe expansion slots (three PCIe standard cards, one network daughter card, and one storage daughter card). Front: The NS5484M5 adopts the modular front panel design and provides three different configurations. Front panel 1: two hot-swappable SATA SSDs, one PCIe x16 card, and one PCIe OCP network daughter card. Front panel 2: two hot-swappable SATA/SAS/NVMe SSDs and one PCIe OCP network daughter card. Front panel 3: one PCIe x16 card, one PCIe x8 card, and one PCIe OCP network daughter card. Built-in: one PCIe SAS/RAID daughter card. Rear: one PCIe x16 card (The I/O module at the rear of the chassis provides one PCIe x16 expansion slot for each node, supporting single-card hot swapping.) Hard disk drawer: 12x3.5" hot-swappable SATA/SAS SSDs (2.5" hard disks supported).
Built-in storage	Two PCIe/SATA M.2 SSDs and two TF cards
Slot occupied	Two slots
Parameters of the 2-socket NS5482M5 Storage Node	
Processor	Supports a maximum of two Intel® Xeon® scalable processor families. Supports a TDP up to 165 W.
Chipset	Intel C621/C624
Memory	Support up to 16 DDR4 2400/2666/2933 MT/s RAMs Each CPU supports 8 DIMMs, and two CPUs support 16 DIMMs Supports RDIMMs/LRDIMMs/AEP DIMMs.
I/O interface	Can be expanded to one USB 3.0 port, two USB 2.0 ports, one VGA port, and one DB9 serial port through SUV.
Optical drive	Supports external USB flash drives.
Display controller	Is integrated in the Aspeed2500 chip and supports a video RAM up to 64 M and resolution up to 1920*1200 32 bpp@60 Hz.
RAID controller	The mainboard is integrated with the SATA controller. The INSPUR RAID SLI3108 daughter card supports the supercapacitor, RAID 0/1/1E/5/6/10/50, and a cache of 2G/4G.
Network controller card	Supports OCP standard cards or PHY cards, and PCIe plug-in cards. Supports onboard gigabit chips and needs to be used with the TSW module of the chassis.
Management chip	BMC Aspeed2500 chip
PCIe and storage	Supports up to five PCIe expansion slots (three PCIe standard cards, one network

expansion	daughter card, and one storage daughter card). Front: The NS5484M5 adopts the modular front panel design and provides three different configurations. Front panel 1: two hot-swappable SATA SSDs, one PCIe x16 card, and one PCIe OCP network daughter card. Front panel 2: two hot-swappable SATA/SAS/NVMe SSDs and one PCIe OCP network daughter card: Front panel 3: one PCIe x16 card, one PCIe x8 card, and one PCIe OCP network daughter card. Built-in: one PCIe SAS/RAID daughter card. Rear: one PCIe x16 card (The I/O module at the rear of the chassis provides one PCIe x16 expansion slot for each node, supporting single-card hot swapping.) Hard disk drawer: 36x3.5" hot-swappable SATA/SAS SSDs (2.5" hard disks supported).
Built-in storage	Two PCIe/SATA M.2 SSDs and two TF cards
Slot occupied	Four slots
Parameters of the NS5482JD Storage Expansion Module	
RAID controller	The INSPUR RAID SLI3108 daughter card supports the supercapacitor, RAID 0/1/1E/5/6/10/50, and a cache of 2G/4G.
PCIe and storage expansion	Built-in: one PCIe SAS/RAID daughter card (connected to the PCIe x8 link under CPU0 of the expanded node through the midplane). Hard disk drawer: 36x3.5" hot-swappable SATA/SAS SSDs (2.5" hard disks supported).
Collocation	With the NS5488M5, it can realize the 2-socket computing node with 36x3.5" + 4x2.5" hard disks. With the NS5484M5, it can realize the 2-socket computing node with 48x3.5" + 2x2.5" hard disks. With the NS5482M5, it can realize the 2-socket computing node with 72x3.5" + 2x2.5" hard disks. Note: The configuration of a single CPU allows mounting NS5482JD expansion modules.
Slot occupied	Four slots
Entire-system Parameters	
Mode	4U8 node slots
System management	The entire-system CMC management module provides two RJ45 ports externally and supports the CMC module in 1+1 configuration. Node onboard BMC management chip Supports management of IPMI, SOL, KVM over IP, and virtual media, as well as SSD life detection.
Gigabit switching module	Supports the TSW network switching module, which is connected to the gigabit network chip on the mainboard of each node through the backplane, so that the entire system can provide one 1G electrical port + two 10G network optical ports externally.
Power supply	Supports power supplies in 2+2/3+1 configuration, 1300 W/1600 W/2000 W, 100–240 V AC, and 240 V HVDC platinum power supplies.
Fan	Five fan modules in N+1 configuration designed with the back-flow preventer.
Host size	448 mm (width) x 175.5 mm (height) x 895.5 mm (depth)
Product weight	Chassis weight: 30 kg Total weight:

	<p>78 kg: The entire system is fully configured with eight NS5488M5 nodes. 98 kg: The entire system is fully configured with four NS5484M5 nodes. 120 kg: The entire system is fully configured with two NS5482M5 nodes. 120 kg: The entire system is fully configured with one NS5482M5 node and one NS5482JD storage box.</p>
Temperature	<p>Storage temperature (with the packaging): -40°C~+70°C Storage temperature (without the packaging): -40°C~+55°C Operating temperature: 5°C~40°C The operating temperature is different in extreme configurations or environments. For details, please contact Inspur technical engineers.</p>
Humidity	<p>Working humidity: 10%~90% R.H. Storage humidity (with packaging): 10%~93%R.H. Storage humidity (without packaging): 10%~93%R.H.</p>
Noise	<p>Idle LWAd: 5.71B in N1 configuration; 5.63 B in N2 configuration compatible with N3 configuration. LpAm: 58.4 dBA in N1 configuration and 57.2 dBA in N2 configuration compatible with N3 configuration. Operating LWAd: 6.48B in N1 configuration and 6.62 B in N2 configuration compatible with N3 configuration. LpAm: 65.6 dBA in N1 configuration and 66.7 dBA in N2 configuration compatible with N3 configuration.</p>

Model	Maximum Operating Temperature: 30°C	Maximum Operating Temperature: 35°C	Maximum Operating Temperature 40°C	Maximum Operating Temperature 45°C
Mixed configuration of the NS5488M5 and NS5482M5 nodes as well as 72 disks	√	√	X	X
Configuration of the NS5484M5 node with CPUs lower than 125 W	√	√	√	X

Safety	IEC 60950-1:2005 (Second Edition); Am1:2009 + Am2:2013 IEC 60950-1:2005 EN 60950-1:2006+A11:2009+A1:2010+A12:2011+A2:2013 GB4943.1-2011 UL 60950-1 and CAN/CSA C22.2 No. 60950-1-07 Standard for Information Technology Equipment-Safety-Part 1: General Requirements IS 13252 (PART 1): 2010/IEC 60950-1: 2005
EMC	GB/T9254-2008 (idt CISPR 22: 2006) GB17625.1-2012 (idt IEC 61000-3-2: 2009) EN 55032:2015 EN 61000-3-2:2014 EN 61000-3-3:2013 EN 55024:2010+A1:2015 EN 55035:2017 AS/NZS CISPR 32:2015 CFR 47 FCC Part 15 subpart B, 2018 ICES-003 ISSUE 6:2016 KN32 KN35

Table 53 Safety & EMC

ACPI 6.1 Compliant
PCI-E 3.0 Compliant
SMBIOS 3.1
UEFI 2.6
Redfish API
IPMI 2.0
Microsoft® Logo certifications
PXE Support
Advanced Encryption Standard (AES)
SNMP v3
TLS 1.2
ACtive Directory v1.0

Table 54 Industry standard compliance

6 Compatibility List

※The compatibility list was updated in June 2020. For details about the latest compatibility status and the product component models not shown in this manual, please consult technical engineers of Inspur's Solution Department.

6.1 Processor

i48 supports 2 Intel® Xeon® scalable processors per node.

Model	Cores	Threads	Basic Frequency	Maximum Turbo	Cache	TDP
8160	24	48	2.1GHz	3.7GHz	33MB	150W
8153	16	32	2.0GHz	2.8GHz	22MB	125W
6150	18	36	2.7GHz	3.7GHz	24.75MB	165W
6132	14	28	2.6GHz	3.7GHz	19.25MB	140W
6130	16	32	2.1GHz	3.7GHz	22MB	125W
6126	12	24	2.6GHz	3.7GHz	19.25MB	125W
5118	12	24	2.3GHz	3.2GHz	16.5MB	105W
5122	4	8	3.0GHz	3.7GHz	16.5MB	105W
4116	12	24	2.1GHz	3.0GHz	16.5MB	85W
8260	24	48	2.4GHZ	3.9GHZ	35.75MB	165W
8276	28	56	2.2GHZ	4.0GHZ	38.5MB	165W
6240	18	36	2.6GHZ	3.9GHZ	24.75MB	150W
6252	24	48	2.1GHZ	3.7GHZ	35.75MB	150W
6230	20	40	2.1GHZ	3.9GHZ	27.5MB	125W
5220	18	36	2.5GHZ	3.9GHZ	24.75MB	125W
4210	10	20	2.2GHZ	3.2GHZ	13.75W	85W
4208	8	16	2.1GHZ	3.2GHZ	11MB	85W
4214	12	24	2.2GHZ	3.2GHZ	16.5MB	85W
3206R	8	8	1.9GHZ	1.9GHZ	11M	85W
4210R	10	20	2.4GHZ	3.2 GHz	13.75M	100W
4214R	12	24	2.4GHZ	3.5 GHZ	16.5M	100W
4215R	8	16	3.2GHZ	4.0GHZ	11M	130W
5218R	20	40	2.1GHZ	4.0GHZ	27.5M	125W
5220R	24	48	2.2GHZ	4.0GHZ	35.75M	150W
6226R	16	32	2.9GHZ	3.9 GHZ	22M	150W
6230R	26	52	2.1GHZ	4.0GHZ	35.75M	150W

6238R	28	56	2.2GHZ	4.0GHZ	38.5W	165W
6240R	24	48	2.4GHZ	4.0GHZ	35.75M	165W

Table 55 CPU compatibility list

6.2 Memory

Each CPU of the NS5488M5/NS5484M5/NS5482M5 node supports eight DIMMs; two CPUs support a maximum of 16 DIMMs. Supports RDIMMs/LRDIMMs/AEP DIMMs. The system supports the following memory protection technologies:

- Error checking and correcting (ECC);
- Memory mirroring;
- Memory rank sparing

Category	Capacity	Rate	Data Width	Organization
RDIMM	16GB	2666	x72	1R×4
RDIMM	16GB	2666	x72	2R×8
RDIMM	32GB	2666	x72	2R×4
RDIMM	16GB	2933	x72	1R×4
RDIMM	16GB	2933	x72	2R×8
RDIMM	32GB	2933	x72	2R×4

Table 56 Memory compatibility list

It is allowed to mix memories on the same node, but it is not allowed to mix memories of different models (RDIMM and LRDIMM) and different specifications (capacity, bit width, rank, height and other specifications) on the same node. The maximum memory capacity is achieved when two processors are installed. The maximum memory capacity of a single processor is half of that of two processors.

Table 57 lists the amount of configurable memory slots and memory installation positions when different numbers of processors are installed.

Memory Slots Supported by Each CPU		Amount of Configured Memory Modules and Memory Installation Positions								
		1	2	4	6	8	10	12	14	16
Memory slots supported by CPU0	CPU0_C0D0	●	●	●	●	●	●	●	●	●
	CPU0_C0D1								●	●
	CPU0_C1D0				●	●	●	●	●	●
	CPU0_C2D0				●		●	●	●	●
	CPU0_C3D0			●		●	●	●	●	●
	CPU0_C3D1									●
	CPU0_C4D0					●	●	●	●	●
	CPU0_C5D0							●	●	●
Memory slots supported by CPU1	CPU1_C0D0		●	●	●	●	●	●	●	●
	CPU1_C0D1								●	●
	CPU1_C1D0				●	●	●	●	●	●

	CPU1_C2D0				•		•	•	•	•
	CPU1_C3D0			•		•	•	•	•	•
	CPU1_C3D1									•
	CPU1_C4D0					•	•	•	•	•
	CPU1_C5D0							•	•	•

Table 57 Dual-CPU DIMM configuration

Memory Slots Supported by Each CPU		Amount of Configured Memory Modules and Memory Installation Positions							
		1	2	3	4	5	6	7	8
Memory slots supported by CPU0	CPU0_C0D0	•	•	•	•	•	•	•	•
	CPU0_C0D1							•	•
	CPU0_C1D0			•	•	•	•	•	•
	CPU0_C2D0			•		•	•	•	•
	CPU0_C3D0		•		•	•	•	•	•
	CPU0_C3D1								•
	CPU0_C4D0				•	•	•	•	•
	CPU0_C5D0							•	•

Table 58 Single-CPU DIMM configuration

When AEP DIMMs are installed, the installation positions of AEP DIMMs corresponding to different numbers of CPUs are shown below.

Memory Slots Supported by Each CPU		Amount of Configured Memory Modules and Memory Installation Positions		
		1	2	4
Memory slots supported by CPU0	CPU0_C0D0			
	CPU0_C0D1	•	•	•
	CPU0_C1D0			
	CPU0_C2D0			
	CPU0_C3D0			
	CPU0_C3D1			•
	CPU0_C4D0			
	CPU0_C5D0			
Memory slots supported by CPU1	CPU1_C0D0			
	CPU1_C0D1		•	•
	CPU1_C1D0			
	CPU1_C2D0			
	CPU1_C3D0			
	CPU1_C3D1			•

	CPU1_C4D0		
	CPU1_C5D0		

Table 59 Dual-CPU AEP DIMM configuration

Memory Slots Supported by Each CPU		Amount of Configured Memory Modules and Memory Installation Positions	
		1	2
Memory slots supported by CPU0	CPU0_C0D0		
	CPU0_C0D1	•	•
	CPU0_C1D0		
	CPU0_C2D0		
	CPU0_C3D0		
	CPU0_C3D1		•
	CPU0_C4D0		
	CPU0_C5D0		

Table 60 Single-CPU AEP DIMM configuration

Figure 61 shows the layout of the memory slots on the node motherboard.

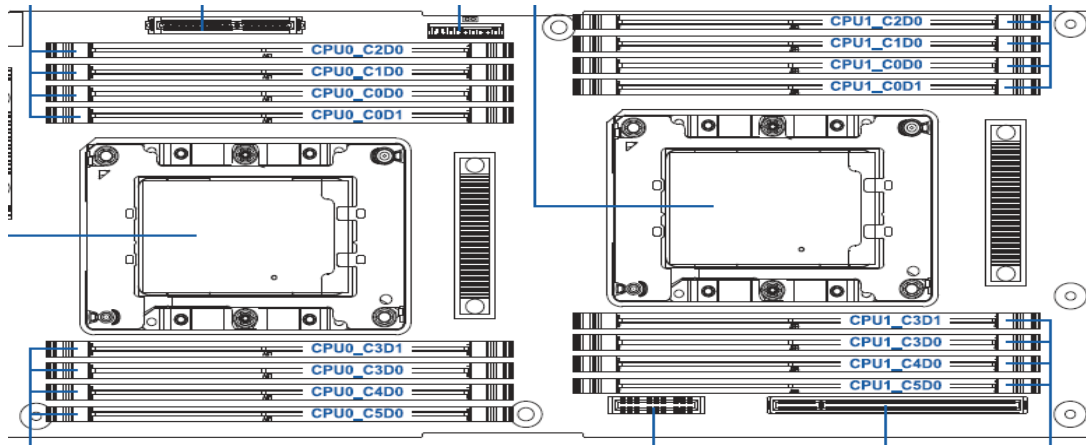


Figure 61 Memory slot layout

6.3 Storage

6.3.1 SATA/SAS HDD

The compatibility list of SATA/SAS HDD components is as follows:

Category	Hard Disk RPM	Capacity
2.5SAS	10K	300G/600G/900G/1.2T/1.8T/2.4T
2.5SATA	7.2K	500G/250G/1T/2T
3.5SAS	7.2K	6T/8T
3.5SATA	7.2K	2T/3T/4T/5T/6T/8T/10T

Table 62 SATA/SAS HDD compatibility list

6.3.2 2.5" SATA SSD

The compatibility list of 2.5" SATA SSD components is as follows:

Category	Capacity
SATA SSD	150G
SATA SSD	240G
SATA SSD	480G
SATA SSD	960G
SATA SSD	1.92T

Table 63 2.5" SATA SSD compatibility list

6.3.3 2.5" NVME SSD

The compatibility list of 2.5" NVME SATA SSD components is as follows:

Category	Capacity
NVME SSD	1TB
NVME SSD	2TB
NVME SSD	4TB

Table 64 2.5" NVME SSD compatibility list

6.3.4 M.2 SATA SSD

The compatibility list of M.2 SATA SSD components is as follows:

Category	Capacity
M.2 SSD	240GB
M.2 SSD	480GB
M.2 SSD	760GB
M.2 SSD	960GB

Table 65 M.2 SSD compatibility list

6.4 RAID/SAS

The RAID/SAS card compatibility list is as follows:

Category	Model & Description	SAS Rate	Cache	Supercapacitor
RAID	RAID card_INSPUR_SAS3108_2GB_SAS12G_PCI-E3	12Gbps	2G	Optional
	RAID card_INSPUR_SAS3108_4GB_SAS12G_PCI-E3	12Gbps	4G	Optional

Table 66 Compatibility list of RAID/SAS card

6.5 I/O Expansion

6.5.1 Network adapter

The single NS5488M5/NS5484M5/NS5482M5 node has a built-in standard OCP card slot, which can support OCP and PHY cards. The compatibility list is as follows:

Type	Model & Description	Rate	Number of Interfaces
PHY card	Network adapter_Inspur_5280M5_10G_2	10G	2
	Network adapter_Inspur_5280M5_1G_RJ_4_PHY	1G	4
	Network adapter_Inspur_5280M5_CS4223_10G_4	10G	4
OCP	Network adapter_M_25G_MCX4411A-ACQN_LC_PCIEx8_XR_OCP	25G	1
	Network adapter_Inspur_OCP25G_CX4LX_25G_LC_PCIEx8_2	25G	2

Table 67 Compatibility list of OCP and PHY cards

The compatibility list of PCIe external network adapters is as follows:

Rate	Model & Description	Port Type	Number of Interfaces
1G	Network adapter_Intel_W_I350-T2V2_RJ_PCIE4X_1KM_1G dual electrical port RJ45	RJ45	2
	Network adapter_SND_W_I350-AM2_RJ_PCIE4X_1KM_SiNEAD_1G dual electrical port RJ45	RJ45	2
	Network adapter_SND_W_I350-AM4_RJ_PCIE4X_1KM_1G four electrical port RJ45	RJ45	4
	Network adapter_I_1G_I350F2_LC_PCIEx4_2_MM,INTEL 1G dual optical port (1G dual-port SFP)	SFP	2
	Network adapter_SND_W_I350-AM2_LC_PCIE4X_1G_XR_dual (1G dual-port SFP)	SFP	2
	Network adapter_SC_W_I350_LC_PCIE4X_1000M_XR_4G optical port (1G four-port SFP)	SFP	4
	Network adapter_Intel_W_I350-T2V2_RJ_PCIE4X_1KM_1G dual electrical port RJ45	RJ45	2
10G	Network adapter_Intel_W_X540-T2_RJ45_PCIE-E8X_10G_10G dual electric ports (10G dual-port RJ45)	RJ45	2
	Network adapter_Intel_W_82599ES_LC_PCIE-E8X_10G_10G single optical port (10G single-port SFP+)	SFP+	1
	Network adapter_Intel_W_82599ES_LC_PCIE-E8X_10G_10G dual optical ports (10G dual-port SFP+)	SFP+	2
	Network adapter_I_10G_X710DA2_LC_PCIEx8_2_XR_10G optical port (10G dual-port SFP+)	SFP+	2
	Network adapter_SC_10G_X710_LC_PCIEx8_2_XR	SFP+	2
	Network adapter_INSPUR_82599EN_10G_LC_PCIEX8_single_XR_daughter card_10G optical port (10G single-port SFP+)	SFP+	1
	Network adapter_INSPUR_82599ES_10G_LC_PCIEX8_dual_XR	SPF+	2
	Network adapter_INSPUR_10G self-developed network adapter_CX3PRO_10G_LC_S_10G single optical port (10G single-port SFP+)	SPF+	1
	Network adapter_INSPUR_82599ES_10G_LC_PCIEX8_dual_XRFL0M	SPF+	2
	Network adapter_INSPUR_XL710_10G_LC_PCIEX8_dual_XR_daughter card_10G optical port (10G dual-port SFP+)	SFP+	2

Table 68 Compatibility list of the external PCIe network adapter

6.5.2 FC HBA Card

The compatibility list of HBA card components is as follows:

Type	Model & Description	Rate	Number of Interfaces
HBA Card	HBA card_QL_4R1_QLE2690-ISR-BK_FC16G_PCIE	16G/s	1
	HBA 卡_E_0R2_LPE16002B_LC16G_PCIE	16G/s	1
	HBA card_QL_4R2_QLE2692-ISR-BK_FC16G_PCIE	16G/s	1

Table 69 FC HBA card compatibility list

6.5.3 HCA Card

The compatibility list of HCA card components is as follows:

Type	Model & Description	Rate	Number of Interfaces
HCA Card	HCA card_M_1-QSFP_MCX555A-ECAT_PCIE	100Gbps	1

Table 70 HCA card compatibility list

For more information about HCA specifications, please visit the following website:

http://www.mellanox.com/page/infiniband_cards_overview

<http://ark.intel.com/products/family/92003/Intel-Omni-Path-Host-Fabric-Interface-Products>

6.6 Power supply

The power supply adopts Intel's standard CRPS, and general electrical and structural design, and supports hot swap, N+N/N+1 configuration, and toolless disassembly and assembly. The CRPS power supply meets 80PLUS platinum efficiency and provides a variety of output power. Users can choose power supplies of different power rates according to specific configurations.

Model & Description	Maximum Quantity
Power module_G_M_CRPS2000W_2000W_1U_P	4
Power module_G_M_GW-CRPS1300D_1300W_1U_P-IC	4
Power module_LO_M_PS-2132-1L1_1300W_1U_P	4
Power module_G_M_GW-CRPS1600D_1600W_1U_P-IC	4
Power module_DELTA_M_DPS-1600AB-13K_1600W_1U_P	4

Table 71 Compatibility list of power supply

6.7 Operating system

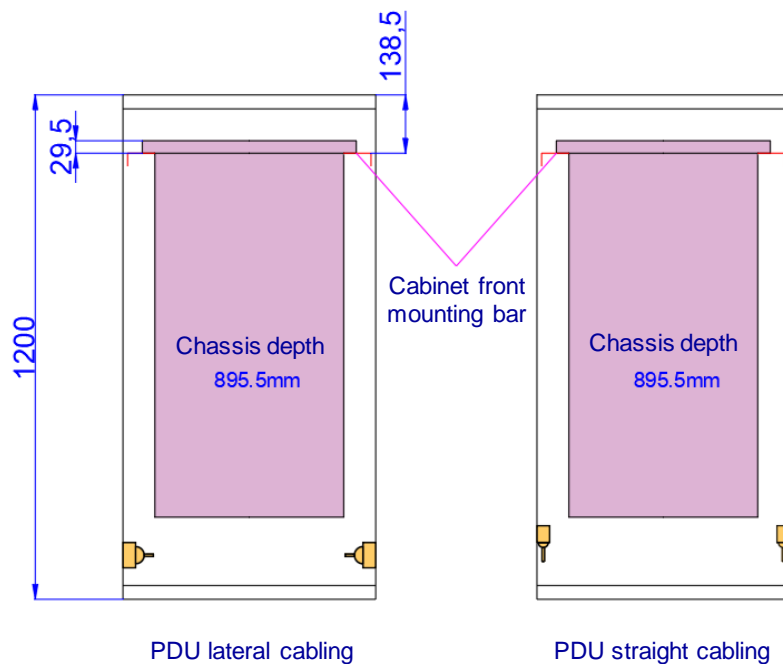
OS Manufacturer	OS Version
Windows	WindowsServer2012R2
Windows	Windows2019
Windows	WindowsServer2016
RedHat	RedHatEnterprise6.10
	RedHatEnterprise7.3
	RedHatEnterprise7.4
	RedHatEnterprise7.5
	RedHatEnterprise7.6
SUSE	SUSE 12.3
Centos	Centos_7.6

Note: The Cascade lake CPU supports Windows 2016, Windows 2019 and versions later than redhat7.5; the Skylake CPU supports all the above-mentioned OSs. Due to the large number of configurations, you need to consult technical support for the specific configuration of the supported OS.

Table 72 Compatibility list

7 Configuration Attentions

- Three kinds of front panels can be selected for each node based on different configuration needs.
- Each node is configured with a maximum of one rear PCIe slot, and the position is fixed.
- When two CMC management modules are configured, they cannot be connected to the same switch. It is not recommended that the two network ports of the same CMC be connected to the same switch.
- The cabinet requirements and installation recommendations of the i48 server are as follows:



- 1) The chassis depth of the equipment room is required to be 1200 mm and above.
- 2) In the case of front-access cabling, the mounting bar at the front of the cabinet is required to be 138.5 mm away from the front door of the cabinet. In case of only rear-access cabling, the distance can be smaller.
- 3) It is recommended to route the PDU straight backward to avoid interference with the chassis; if the PDU must be routed laterally, it is recommended to keep the distance between the PDU and the back of the cabinet less than 135 mm.
- 4) The above data can be adjusted according to the bending radius of the cable, provided that the principles of safety and non-interference of front-access cabling are met.

8 System Management

i48 integrates a new generation of BMC intelligent management system. It is independently developed by Inspur, and is compatible with IPMI2.0, the management benchmark in the server industry, and features highly reliable and more intelligent hardware monitoring and management. The mainboard of each i48 node is integrated with the BMC chip, which is connected to the CMC management module of the entire system through the backplane. The node has no IPMI interface by default. If you need to configure an IPMI management interface on each i48 node, you can select the node IPMI interface for node BMC management when the dual-port OCP card is configured.

The Inspur BMC supports the followings:

- Support Intelligent Platform Management Interface (IPMI)
- Support redirection of keyboard, mouse, video and text console
- Support remote virtual media
- Support Redfish protocol
- Support simple network management protocol (SNMP)
- Web-based browser login
- The main specifications of the intelligent management system are shown in the following table.

Specifications of BMC intelligent management system:

Specifications	Description
Management interface	The BMC supports various management interfaces to implement system integration. The BMC can integrate with any standard management systems over the following interfaces: IPMI CLI SNMP HTTPS Redfish
Fault detection	Provide rich fault detection functions to accurately locate hardware faults
Alarm management	Support alarm management and multiple formats of alarm reporting including SNMP Trap (v1/v2c/v3), Email Alert, and syslog service to ensure 7/24 highly reliable operation.
Virtual KVM	Provide convenient remote maintenance measures, and no on-site operation is required even when the system fails.
Virtual media	Support to virtualize local media devices or mirrors, USB devices, and folders into media devices of remote servers, simplify the complexity of operating system installation.
Web UI	Support visual image interface, in which one can quickly complete setting and query tasks with a simple click on the interface.
Screen shot	View the screen shot without log-in, making regular patrol inspection convenient.
Software dual-image backup	When the software completely running currently crashes, it can be started from the backup image.
Support intelligent power management	Power capping technology helps you easily increase deployment density, while dynamic energy saving technology helps you effectively reduce operating costs.

IPv6	Support IPv6 functions to facilitate the construction of a full IPv6 environment and provide you with abundant IP address resources.
NC-SI function	The BMC supports the Network Controller Sideband Interface (NC-SI) function, which allows you to easily access the BMC system through the service network interface.
Hardware watchdog timer	The control fan enters full speed protection mode when the BMC does not respond beyond the safe setting time.
Power control	on/off/cycle/status
UID remote control	The BMC allows manually turning on the UID indicator of a single machine to facilitate the search for equipment in the equipment room, and turn on the KVM. The UID indicator will blink during firmware upgrade.
Firmware upgrade	BMC/BIOS can be upgraded
Serial port redirection	Serial port I/O in the system can be redirected by IP-based IPMI sessions.
Storage information viewing	The BMC displays RAID logic arrays and the corresponding physical disks under them.

Table 73 BMC specifications

The i48 supports the entire-system CMC management. The i48 is configured with one CMC management module by default, which can read the BMC information of each node through the backplane. The rear CMC management module is integrated with a dual-port IPMI management interface. The front panel of the entire system is configured with a single-port IPMI management interface by default, and you can choose pre-management or post-management maintenance as required. The i48 supports the configuration of master/slave CMC modules. When the entire system is not equipped with the TSW network switching module, you can configure master/slave CMC management modules.

Specifications of CMC intelligent management system:

Function Subclass	Description	Function Details
Chassis information	Chassis name, location, and type	Includes FRU information and version information.
	Chassis view (front and rear views, module health status and alarm display). You can directly enter the management interface of each module by clicking the module on the page.	Includes node, fan, and power modules.
Power & Heat dissipation	Power information	Includes the power status, I/O power consumption, temperature, current, voltage, rated/current power, and version information.
Entire-system power consumption	Entire-system power consumption	Displays the real-time power consumption of the entire system.
SMTP	SMTP alarm	Covers the chassis and allows setting related parameters.
	Alarm monitoring for each component of the chassis	Includes chassis component monitor information such as the temperature, voltage, and status.
	SMTP settings	Set the LAN used by SMTP. Set the mail address for sending a mail.

		Set the name for sending a mail. Set the IP address of the mail server. Set the mailbox user name. Set the mailbox password.
Network settings	Node BMC IP address settings	Set the IP address of a single node or multiple nodes.
	Chassis IP address and DNS parameter settings	Chassis IP address and DNS parameter settings
Log information	System log	Includes alarm log information such as the temperature and voltage of the chassis and important alarm log information of the node, and allows clearing system log information.
	User log	Includes operation logs and user login logs, and allows clearing user logs.
	Alarm log	Allows clearing alarm logs.
	Log description	Is required to be intuitive and understandable. For example, an intuitive Chinese description of the specific sensor name and type is required.
User management	User group, user adding, user deletion, and user permission modification	User group, user adding, user deletion, and user permission modification
	Login user record	Records the login user and time.
	LDAP	Enables status, protocol and group configurations.
Time management	Settings of CMC time, time zone, NTP and clock source	Involves the use of a clock source between the CMC and BMC.
	BMC time synchronization	Realizes time synchronization between the CMC and BMC of each node.
CMC and BMC	CMC restart and factory reset	CMC restart and factory reset
	Node BMC restart and factory reset	Provides the node BMC independent restart and factory reset functions.
	Node BMC restart and factory reset	Provides the unified restart of the BMC on each node and batch factory reset functions.

Table 74 CMC specifications

9 Certification

※The certification information will be updated from time to time. For the latest certification information, please consult the technical personnel of Inspur Solutions Department. As of July 2020, i48M5 has obtained the following certifications:








Region	Certification Item	Certification Logo	Mandatory/Voluntary	Description
China	Environment label		Voluntary	
International mutual recognition	CB		Voluntary	
EU	CE		Mandatory	
USA	FCC		Mandatory	
	UL		Voluntary	
Russia	CU Certification		Mandatory	
	Information security	N/A	Mandatory	
Korea	KC Certification		Mandatory	

Table 75 Certifications

10 Support and Service

Global service hotline:

- 1-844-860-0011 (toll free)
- 1-646-517-4966 (Direct line)
- Service E-mail: serversupport@inspur.com

Information required from customers:

- Name
- Tel
- Email address
- Product model
- Product service SN
- Problem description

11 Description of New Technologies

11.1 Intel Scalable Architecture

Intel® Xeon® scalable processors adopt the new mesh interconnection mode in substitution to the traditional ring interconnection mode in terms of chip design architecture, aiming to improve the CPU access delay and meet requirements for higher memory frequency bandwidth. Meanwhile, the Skylake features low power consumption, which allows it to work at a low speed on lower processors and in environment with relatively low voltage, so as to provide better performance improvement, as well as higher energy efficiency. Compared with the last generation of Intel® Xeon® scalable processors, this generation improves the overall performance 1.65 times and the OLTP library load 5 times.

11.2 Intel VROC Technology

Intel VROC technology represents Virtual RAID on CPU and is specially designed for enterprise RAID solutions based on NVME SSD. The biggest advantage is that it can directly manage connections to Intel's scalable PCIe channels without using a dedicated RAID HBA.

12 Relevant Documents

For more information, click the following link:

<http://en.inspur.com>

The website provides some resources to help customers solve problems and learn our products, including product manual, drivers and firmware.

13 Trademark

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