DATA DRIVEN GLOBAL VISION CLOUD PLATFORM STRATE
ON POWERFUL RELEVANT PERFORMANCE SOLUTION CL
VIRTUAL BIG DATA SOLUTION ROI FLEXIBLE DATA DRIVEN

WHITE PAPER

Hitachi Compute Blade 2000

Executive Overview

By Hitachi Data Systems

November 2013

Table of Contents

Executive Summary

Hitachi Compute Blade 2000 (CB 2000) takes you beyond the typical capabilities of UNIX servers, competitive blade systems and rack servers from other vendors. It features unique Hitachi logical partitioning (LPAR) hardware-embedded virtualization technology. Its innovative "hybrid I/O" feature lets you consolidate systems with different I/O configurations, provides a balanced system architecture and pushes performance to new extremes. Hitachi Compute Blade presents a unique combination of built-in virtualization, massive I/O bandwidth, large memory capacity, browser-based point-and-click management, and unprecedented configuration flexibility. It allows you to extend the benefits of blade computing to new areas of the enterprise data center, including mission-critical application and database servers.

CB 2000 seamlessly integrates network, power and server resources into a single, space-efficient, flexible solution, and it also offers the very latest in power-saving features and capabilities. With sophisticated, built-in reliability, availability and serviceability (RAS) features, it reduces the risk of unplanned downtime for mission-critical applications. CB 2000 is one of the most flexible systems on the market today. Its hybrid I/O subsystem leverages both industry-standard PCIe slots and integrated switch modules. This leverage allows configurations to simultaneously share both a common switching infrastructure and unique I/O interfaces per blade, expanding workload options.

This white paper provides a high-level overview of the key features and capabilities that make Hitachi Compute Blade 2000 a preferred choice over any other blade or rack server platform on the market today. And it shows how CB 2000 delivers new opportunities for companies of all types and sizes.

UCP
Overview

DOWNLOAD

Introduction to Hitachi Compute Blade 2000

Hitachi Compute Blade 2000 is an enterprise-class blade server platform that extends the benefits of high-performance, high-density blade computing and virtualization to new areas of the data center (see Figure 1). This section describes how CB 2000 overcomes the constraints of previous-generation blade systems to deliver new capabilities and opportunities in an enterprise. Subsequent sections provide additional details about key features and functionality.

System Overview

Hitachi Compute Blade 2000 with logical partitioning combines all the benefits of virtualization with all the advantages of the blade server format: simplicity, flexibility, high compute density and power efficiency. These benefits allow organizations to consolidate more resources, extend the benefits of virtualization solutions (VMware, Microsoft® Hyper-V®, and so forth.) to more areas of the enterprise data center, and cut costs without sacrificing performance.

Figure 1. Powered by Intel Xeon processors, Hitachi Compute Blade 2000 packs up to 192 cores into a fully loaded system.

Hitachi chooses to power all the system's compute blade modules with Intel Xeon series processors and radically increase the I/O performance and memory capacity. In this way, Hitachi has made it possible to use virtualization to consolidate application and database servers for backbone systems. These are areas where effective consolidation was difficult in the past. And by removing performance and I/O bottlenecks, CB 2000 with logical partitioning reduces the administrative burden in the data center and opens up new opportunities for increasing efficiency and utilization rates.

The "hybrid I/O" capabilities of CB 2000 allow each blade to access a common shared switch network across all the blades while also allowing each blade to support unique I/O interfaces. This means you can standardize the switch interfaces across all blades, accommodate application-specific I/O interfaces per blade, or both, using the same system. To enable this I/O versatility, CB 2000 supports 3 pairs of redundant bays for internal switches and, uniquely for each server blade, up to 2 each (16 total) PCIe Generation 2 (8-lane) half-height slots for standard PCIe cards.

Built-in logical partitioning is a key feature of Compute Blade 2000. This logical partitioning is the industry's first embedded hardware-based and hardware-assisted virtualization solution, based on proven, mainframe-class technology. There is no complex installation process: it just runs, right out of the box. Unlike emulation solutions, it doesn't slow application performance down. And because no software hypervisor is required, your operating system and applications don't require special drivers or software. The identical software stack is used in a logical partition as on a blade without logical partitioning enabled, simplifying management and reducing costs of operation and administration.

Logical partitioning complements existing software-based virtualization solutions and can be used in conjunction with VMware or Hyper-V. You can combine all 3 in a single chassis, providing the greatest virtualization flexibility in the industry.

CB 2000 also offers the very latest in power-saving features and capabilities. With an industry-leading 92% efficiency, the power supplies have been awarded the "80 Plus" Gold certificate and conform to the Climate Savers Computing Initiative Gold standard.

CB 2000 is not only powerful and efficient, but manageable and flexible, too. You can configure and administer CB 500 via a Web-based HTML browser that supports secure encrypted communications. Or, you can leverage the optional Compute Blade management suite to manage multiple chassis via a unified GUI-based interface.

You can deploy CB 2000 at the edge, application or database tiers, or all 3 at the same time. You don't need to choose between Microsoft Windows® or Linux: You can run both in the same chassis. And CB 500 integrates effortlessly into your network I/O infrastructure thanks to its adaptable and highly expandable I/O architecture.

Enterprise-Class Capabilities

Hitachi Compute Blade 2000 is a true enterprise-class blade server, and it is important to understand exactly what that term means. It is "enterprise class" in terms of performance, scalability, reliability and configuration flexibility, as outlined below:

Performance. CB 2000 offers blade options supporting Intel Xeon E7-8800, E5-2600 and E5-2600v2 series processors with up to 2 CPUs per blade. It meets the performance needs of large-scale systems that require extremely high compute power and I/O (via the hybrid I/O subsystem). In addition, CB 2000 supports multiblade SMP capabilities on high-performance X57A2 Intel Xeon processor E7-8800 series-based blades, allowing aggregation of up to 4 blades to create a single server environment.

Scalability. The robust, rack-mountable 10U chassis of CB 2000 houses up to 8 server blade modules. With the X57A2 high-performance blade, 4 blades supporting up to 2 processors can be aggregated together supporting up to 80 cores per environment. Memory is expandable up to 3TB, and the I/O subsystem supports up to 8 expansion mezzanine cards and 8 PCIe cards for a single environment. You can also scale up the virtualization capability: The LPAR feature supports configurations of up to 60 LPARs per environment (single blade or SMP blade combination).

Reliability. CB 2000 chassis is fully redundant and critical components are hot-swappable. High-availability features include: redundant switch and management modules, extremely reliable backplane and I/O subsystem, N +1 or fully redundant power supply modules, and N+M blade failover protection. This feature allows "M" backup (cold) blades to be configured for every "N" active server blade, which can automatically take over the function of a failed blade in the event of hardware failure. The system also automatically detects the fault and identifies the faulty module, allowing rapid-repair resolution.

Configuration Flexibility. CB 2000 supports both Windows and/or Linux operating systems, and a wide range of industry-standard virtualization solutions, as well as the native LPAR (logical partitioning), providing a high level of flexibility and investment protection. The system can easily be configured to the exact number of sockets, processor cores, I/O slots, memory and other components required to optimally support your application without bottlenecks. The chassis can be configured and managed via simple GUI HTML-based Web interface, which is seamlessly integrated with the Hitachi Command Suite tools used to manage Hitachi storage products.

Workload Flexibility. CB 2000 is designed from the ground up to support a wide range of enterprise-class activities. Workloads may range from I/O-intensive applications such as online transaction processing, to virtualized cloud computing environments or high-performance applications such as big data analytics or media processing. All have extremely high performance, reliability, manageability, scalability and flexibility. Because of this extreme flexibility, CB 2000 is the ideal platform to run mission-critical applications and consolidate systems at the edge, application or database tiers …or all 3.

Data Center Applications

Hitachi Compute Blade 2000 can be deployed in an array of data center scenarios, including those aimed towards:

Consolidation. CB 2000 is an excellent platform for server and application consolidation because it is capable of running a mix of 32-bit and 64-bit applications on Windows or Linux, with enterprise-class performance, reliability and scalability. LPAR provided in CB 2000 allows easy migration from legacy RISC environments to state-of-the-art x86.

Workload Optimization. CB 2000 has the configurability and flexibility to run a wide range of compute-intensive workloads within a single chassis, on a mix of Windows or Linux. These features make it possible to balance the overall data center workload quickly and without disruption or downtime.

Resource Optimization. The unique ability of CB 2000 to support a wide range of virtualization technologies enables IT organizations to maximize utilization rates for expensive hardware resources. The ability makes it possible to fine-tune capacity planning, and to delay or eliminate unnecessary hardware purchases.

Cost Cutting, Risk and Complexity. Compared to traditional enterprise-class UNIX servers, the CB 2000 offers lower acquisition costs, the ability to scale up on demand in fine-grained increments, and reduced risk of downtime thanks to its sophisticated RAS features. Industry-standard operating systems and virtualization software, support of the latest Intel technology, and commitment to integration with Hitachi storage and leading application software decrease the risk of technology obsolescence and protect previous investments.

Balanced, Modular Architecture

Hitachi Compute Blade 2000 features a very modular design to maximize flexibility (see Figure 2). All core system elements are redundant and hot-swappable, so the system can be easily expanded without downtime or unnecessary disruption to service levels.
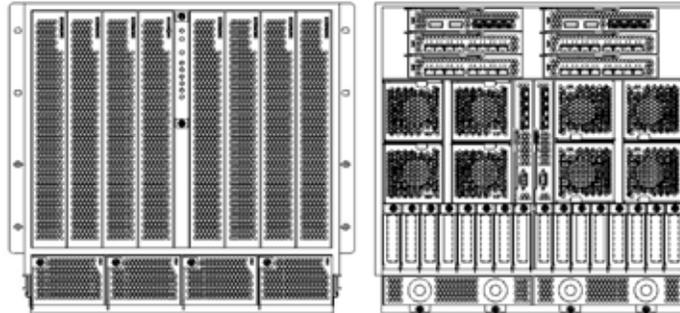
Figure 2. All Hitachi Compute Blade 2000 modules are redundant and hot-swappable, providing high reliability and uptime.
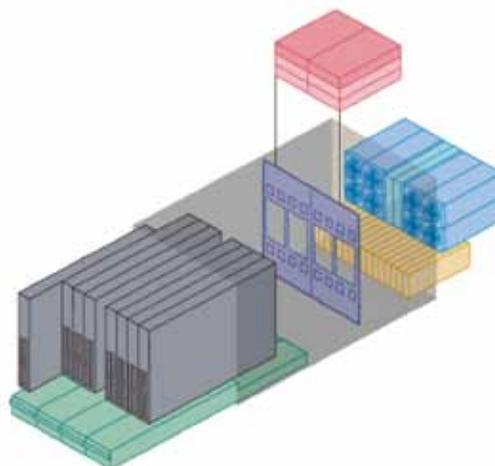
Chassis Design

With a 10U chassis that is 19-inch rack compatible, Hitachi Compute Blade 2000 accommodates up to 8 server modules or blades which are populated with Intel Xeon processors (E7-8800 series, E5-2600 or E5-2600v2 series) (see Figure 3). Each server blade module supports up to 2 processors.

Figure 3. Hitachi Compute Blade 2000 chassis layout allows for 19-inch rack compatibility: front (left) and rear (right).

Server Blades

The 8-slot Hitachi Compute Blade 2000 accommodates a total of up to 8 dual-socket-based server modules (see Figure 4). Four models of server blades are supported.

The AX55R3 and AX55S3 blades each support up to 2 physical sockets powered Intel Xeon E5-2600 series processors with 8 cores per socket. For the ultimate in performance, the AX55R4 blade supports up to 2 Intel Xeon E5-2600v2 series processors with up to 12 cores per socket. All these blades feature 24 memory slots, allowing memory capacities up to 768GB to be supported when 32GB DIMMs are utilized. [The AX55R4 can support up to 1.5TB using 64GB load reduced (LR) DIMMs.] They also support 2 I/O expansion mezzanine slots and 2 PCIe ports connected to PCIe slots in the CB 2000 chassis. The AX55R3 blade supports up to 6 hot-plug SAS or SSD drives, supported by a hardware RAID controller with RAID cache backup.

The AX57A2 blade allows you to leverage unique Hitachi multiblade SMP interconnect technology. This model of high-performance blades features dual Intel E7-8800 processors with up to 10 cores and 32 DIMM slots per blade. Up to 4 AX57A2 blades may be combined to achieve a single 8-socket SMP system with up to 80 cores and 128 memory slots. You can also scale to more than 3TB of memory per SMP environment using 32GB DIMMs. And, as you scale CPU and memory, the IO interconnect and throughput scales with you.

Figure 4. AX55S3, AX55R3, AX55R4 and AX57A2 server modules (blades) each support up to 2 physical sockets.

With support for the Microsoft Windows operating system (OS) and multiple distributions of Linux, Hitachi Compute Blade 2000 gives you the option of running multiple OSs at the same time and in the same chassis for multiple applications. For example, in a virtualized environment using LPAR on a single active server module, you can allocate 50% of CPU resources to Windows and 50% to Linux applications. And you can change the allocation dynamically as workload requirements shift. This provides flexibility for accommodating spikes in demand for specific application services. In addition, the system can be configured to dynamically reassign unused CPU resources from one partition to other partitions where CPU resources are under stress, and back again on demand.

In addition, software virtualization software, such as VMware, Microsoft Hyper-V and Red Hat KVM are also supported.

Hybrid I/O

Hitachi Compute Blade 2000 server modules have the ability to support both shared I/O switch modules and direct PCIe I/O interfaces, allowing each blade to be configured differently. Each blade can access a common, unified, shared-switch network across all the blades while also supporting unique I/O interfaces. This capability allows you to standardize the switch interface, accommodate workload-specific I/O interfaces, or both, using the same system. PCIe slots may also be used for server-based PCIe flash memory cards for application acceleration and requirements for ultra high-speed data access.

Mezzanine Cards and PCIe Slots

For additional I/O versatility, Hitachi Compute Blade 2000 provides 2 slots for optional mezzanine I/O expansion cards (see Figure 5). Also, uniquely for a blade server, it provides up to 2 slots of standard half-height PCIe 2.0 cards (8 lanes) per blade for a total of up to 162Gb/sec throughput per blade. The server allows plenty of bandwidth for the most demanding I/O-intensive applications, such as online transaction processing, high-performance computing, simulations and modeling, or batch jobs with heavy transactional loads.

Figure 5. Hitachi Compute Blade 2000 architecture provides I/O versatility.
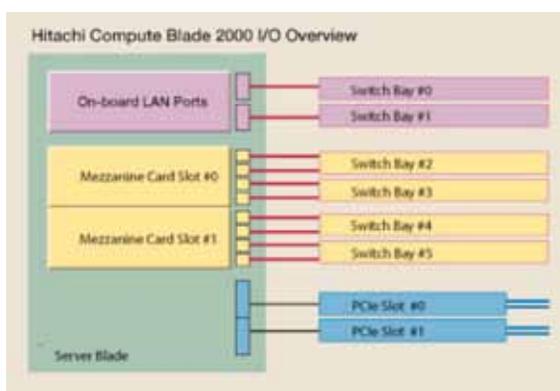
Quad-port Gigabit Ethernet (GigE) Mezzanine option cards are supported, allowing an additional 8 GigE NIC ports per blade and totaling 10 ports without even using the PCIe slot cards. Combined with optional dual-port NIC PCIe network cards, a single blade can have a total of up to 14 GigE ports per blade-enough to tackle any virtualized workload environment.

L3 Gigabit Ethernet Switch

Hitachi Compute Blade embedded GigE switch is a managed, standards-based layer-3 switch that provides gigabit networking required in today's enterprise data centers. The switch provides 12 (single) or 24 (redundant) 10/100/1000Mb/

sec ports for connecting CB 2000 server modules to other networked resources within the corporate networking struc-ture. The switch provides up to 24Gb/sec total throughput performance and the ability to relay packets at 1,488,000 packets/sec. In addition, a 1:10 GigE switch module is also available for 10 GigE uplink capabilities.

Hitachi Compute Blade embedded GigE switch can be configured for high availability and fault tolerance when a 2nd re-dundant switch module is added. A single switch interconnects 1 (of 2) GigE connection from each blade server module (up to 8 total).

10GbE Data Center Bridging (DCB) Switch Module

The CB 2000 10GbE DCB switch is a state-of-the-art 10Gb embedded switch with 16 internal ports and 8 external ports with wire-speed throughput and nonblocking cut-through architecture, providing industry-leading performance and ultra-low latency. It enables CB 2000 to support flexible connectivity options for cloud architectures, including lossless Ethernet fabrics. The switch provides CB 2000 administrators with the ability to enhance their hierarchical network architectures, deploy flatter scale-out fabrics, or converge networks when deploying virtualization and cloud IT infrastructures.

Its rich set of Layer 2 features can be deployed into classic 1Gb and 10Gb architectures, preserving existing net-work designs and cabling. Dual speed (1Gb/sec or 10Gb/sec) capable external ports are well suited for data centers migrating to next-generation 10Gb/sec high-performance architectures and are supported by both 1Gb/sec RJ-45 connectors and 10Gb/sec twinax copper or optical connectors for ultimate flexibility.

Data center bridging and multihop Fibre Channel over Ethernet (FCoE) capabilities enable lossless unified storage connectivity, and convergence of storage and LAN traffic to reduce connectivity costs. Its automatic migration of port profiles (AMPP) feature simplifies virtualized server management by enabling seamless virtual machine (VM) mobility, further simplifying management and reducing operational costs.

Naturally, the DCB switch is integrated with Hitachi chassis management software, enabling end-to end management of CB 2000.

Eco-Efficient Power and Cooling

Hitachi Compute Blade 2000 accommodates up to 4 power supplies in the chassis and can be configured with mirrored power supplies (or N+1 power supplies), providing backup on each side of the chassis and higher total reliability. Cooling is provided by efficient, variable-speed, redundant fan modules. Each fan module includes 3 fans to tolerate fan failures within a module; and even if an entire module fails, the other fan modules will continue to support the cooling requirements of the chassis.

In addition, CB 2000 can provide real time monitoring and historical data of power consumption in the server chassis. The visualized information enables improved facility planning for equipment installation and expansion.

Hitachi Compute Blade Management

Management of the Hitachi Compute Blade 2000 chassis is implemented via a dedicated hardware-management module. Two modules are supported to provide redundancy and each module is hot-swappable and supports live firmware updates without the need for shutting down the blades. Each module also supports an independent man-agement LAN interface from the data network for remote and secure management of the chassis and all blades. The management console may be accessed via a serial CLI or a Web interface and all functionality is integrated into the included Hitachi Compute Systems Manager (HCSM) management tool, which is itself part of Hitachi Command Suite software. It provides a simple unified interface to manage all Hitachi storage and server products in one place. As well as allowing integration into enterprise-wide frameworks, the management modules directly support SNMP and email alert notification.

HTML-Based Web Interface

Basic chassis and blade operations are managed via Hitachi Compute Systems Manager a secure HTML Web interface. HCSM allows seamless integration with Hitachi Command Suite, simplifying management of converged solutions with Hitachi storage (see Figure 6). This graphical interface simplifies system configuration and supports secure and encrypted communications, ensuring that only authorized users can access resources and only authorized resources can be accessed.

Figure 6. Hitachi Compute Systems Manager provides an HTML-based Web interface.

Remote management of the blades is supported via IP with either a client-based interface, which can be installed onto a remote computer, or via the Java-based web interface, which is accessible from any standard Web browser. The tools also support power control as well as virtual media capabilities, allowing local drives to be connected directly to the server.

Logical Partitioning Embedded Virtualization Technology

The Hitachi implementation of logical partitioning sets a new standard for server consolidation and on-demand infrastructure provisioning. As the industry's first hardware-embedded virtualization technology for blade computing, LPAR delivers new capabilities that other popular virtualization solutions do not provide. At the same time, LPAR works well in conjunction with VMware and Microsoft Hyper-V within a single system to increase configuration flexibility.

Overview and Key Benefits

Logical partitioning delivers high performance, extreme reliability, security and transparent virtualization for the Intel Xeon processor E5-2600 series server modules on Hitachi Compute Blade 2000. It supports numerous guest OSs, including Red Hat Linux and Windows, and it does not intrude at the OS level, maximizing security, performance and simplicity. It keeps the data center agile and responsive to fast-changing business requirements. Whether the environment is running on a bare-metal server or on LPAR, there is no need for additional drivers or changes to applications.

Because logical partitioning is built into the blade firmware, there is no installation and setup required, reducing total acquisition costs and simplifying the move to a partitioned environment. You can activate logical partitioning or de-activate it quickly and easily via the management console.

Logical partitioning allows you to create multiple independent logical partitions (LPARs), which run on specific hardware resources uniquely allocated to that partition by the administrator. Each logical partition appears to its operating system to be an independent physical server.

The ability to create up to 4 LPARs per blade is included at no additional cost. Support of additional LPARs (up to 60 LPARs per environment) requires an additional license.

Because LPAR is firmware based, guest OSs can be directly executed without host intervention, special drivers or code changes. There is no need for exclusive and costly file management, migration and/or backup tools for virtualization platforms.

Logical partitioning is fast to install, configure and deploy since there is no need to install each blade with virtualization software: It is part of the blade firmware. It also means fast performance, since no overhead is required for filesystem format conversions or driver emulations to consume precious CPU cycles. OS installation is the same for either standard or partitioned environments, adding to management simplicity.

Performance and Security Features

Based on many years of Hitachi experience developing virtualization technology for the mainframe world, logical partitioning brings true enterprise-class performance and security to virtualization for the first time in an x86 blade-computing environment.

This technology can securely partition physical server resources by constructing multiple LPARs, which are physically isolated, with each environment running independently. A different operating system can run on each logical partition within a single physical server.

Logical partitioning also inherits the concept of "direct execution" from the mainframe world. This means that user-level application code and OS requests are directly executed on the processor, which increases performance. Moreover, logical partitioning is tuned specifically for Hitachi Compute Blade 2000 and has been extensively tested in enterprise production environments.

For highest security, "dedicated mode" requires each logical partition to have dedicated physical memory, and does not allow access to the memory of other partitions. This ensures that no unauthorized access to a given device or memory is possible. Files are stored in their native formats and assigned to a separate storage logical unit (LUN). Each can be assigned with different security settings. This is a more secure approach than using a single file to contain all virtual machine data.

Unlike software-based virtualization solutions, a separate management interface for LPAR is built into the hardware. This resides on a different physical network than OS traffic, ensuring that user data is completely isolated from any management traffic, and adds yet another dimension of protection and security.

Hitachi Compute Systems Manager

Hitachi Compute Systems Manager is a standalone set of optional management tools designed for data center management of multiple chassis via a graphical intuitive interface that provides point-and-click simplicity. At the system level, this software provides centralized management and monitoring of extended systems containing multiple chassis and racks.

Unified Dashboard

Hitachi Compute Systems Manager allows the various CB 2000 system components to be managed through a unified interface, which is seamlessly integrated with Hitachi Command Suite (see Figure 8). When rack management is used, an overview of all Hitachi Compute Blade racks, including which servers, storage and network devices are installed, can be quickly and easily obtained. In the event of any system malfunction, the faulty part can be located at a glance.

In addition, HCSM software provides the ability to define and manage the logical system configuration of each element to be managed by using the service name. With traditional blade servers, management of both the logical system and the system's physical resources is required. When definitions are made with service names (such as sales or stock) within Hitachi Compute Blade management suite, there is no longer any need for administrators to concern themselves with the management of physical resources.

HCSM provides centralized system management and control of all server, network and storage resources. This includes the ability to set up and configure servers, monitor server resources, integrate with enterprise management software (SNMP), phone home and manage server assets.

Figure 7. Hitachi Compute Systems Manager offers a unified view of platform management with Hitachi Command Suite.
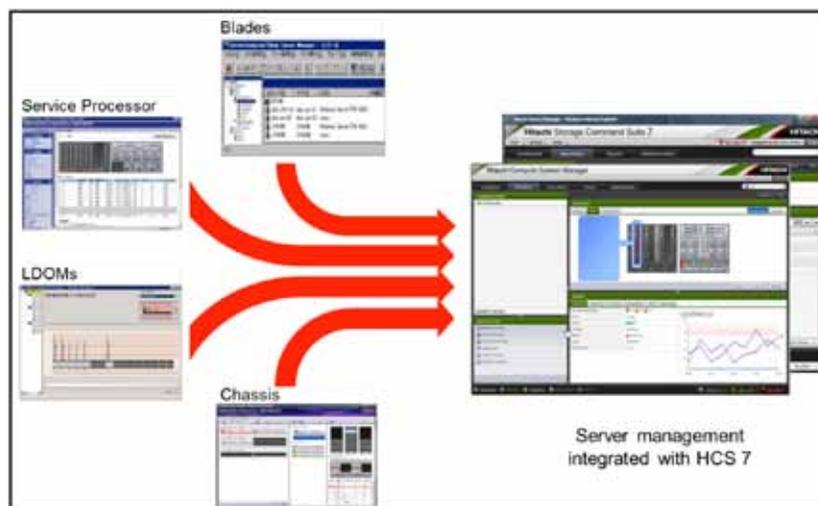
LDOMs = logical domains

Deployment Manager

Deployment manager allows the mass deployment of system images, patches and hot-fix updates for fast, effective server installation and patch management. You can deploy system images and updates across multiple chassis in multiple locations. In addition, Hitachi also offers backup capabilities with the deployment feature.

N+1 or N+M Cold Standby Failover

Hitachi Compute Blade maintains high uptime levels through sophisticated failover mechanisms. The N+1 cold standby function enables multiple servers to share a standby server, increasing system availability while decreasing the need for multiple standby servers or costly software-based high-availability servers. It enables the system to detect a fault in a server blade and switch to the standby server, manually or automatically. The hardware switching is executed even in the absence of the administrator, enabling the system to return to normal operations within a short time.

With the N+M cold standby function, "M" backup (cold) blades can be configured for every "N" active server blade. The management module detects any failure and automatically transfers the function of the failed blade to a standby blade. This function includes the entire "personality," including worldwide name, IP address and operating system. The standby blades may be in a different chassis, a different rack or even a different data center. This approach can be used in combination with other high-availability approaches, such as clustering, to reduce the overall cost of maintaining a highly available data center.

Hitachi Compute Blade 2000 Specifications

TABLE 1. HITACHI COMPUTE BLADE 2000 CHASSIS SPECIFICATIONS

Chassis	
Size	10U (rack mountable)
Dimensions (W x D x H)	447mm x 820mm x 441mm
Operating Temperature	5°C ~ 35°C
Humidity	20% - 80%
Server Blade Modules	Up to 8 server blade modules
Management Modules	1 standard, 2 maximum (redundant)
Management LAN Interface	2 100Base-TX/10Base-T ports
Maintenance LAN Interface	1 100Base-TX/10Base-T ports
Maintenance Serial Interface	1 serial interface
Cooling Fans	8 standard
Switch Modules	2 standard, 6 maximum
Hitachi 1Gb LAN Switch Module	
Internal Ports	20 1000Base-SerDes ports
External Ports	Four 1000Base-T/100Base-TX/10Base-T ports
Hitachi 1Gb or 10Gb LAN Switch Module	
Internal Ports	Twenty 1000Base-SerDes ports
External Ports	Four 1000Base-T/100Base-TX/10Base-T ports
	Two 10GBASE-LR/SR (XFP) ports
PCIe I/O Modules	Up to 16 modules
AC Input Module	1 standard, 2 maximum
Power Supplies	Up to 4 power supply modules (N+1/fully redundant)
Input Voltage	200 - 240VAC, Single Phase
Frequency	50-60Hz
Maximum Power Consumption	9.6kW

	Item	**Description**		
		AX57A2 Server Blade (x1)	**AX57A2 Server Blade (x2 SMP)**	**AX57A2 Server Blade (x4 SMP)**
CPU	CPU	Intel Xeon E7-8800	Intel Xeon E7-8800	Intel Xeon E7-8800
	Number of sockets	2	4	8
	Number of cores	20	40	80

Memory	DIMM type	Registered ECC DDR3	Registered ECC DDR3	Registered ECC DDR3
	Number of slots	24	48	96
	Maximum memory capacity	384GB (16GB DIMM)	768GB (16GB DIMM)	1536GB (16GB DIMM)
Management Interface	BMC/rKVM	SH core-based	SH core-based	SH core-based
	Management LAN	1Gbit Ethernet	1Gbit Ethernet	1Gbit Ethernet
PCIe I/O	NIC	2x I/O expansion ports	4x I/O expansion ports	8x I/O expansion ports
Mezzanine	Number of slots	2x mezzanine card slots	4x mezzanine card slots	8x mezzanine card slots
Operating System		Microsoft® Windows Server® 2012, Red Hat Enterprise Linux 6.2, VMware ESX 5.1	Microsoft Windows Server 2012, Red Hat Enterprise Linux 6.2, VMware ESX 5.1	Microsoft Windows Server 2012, Red Hat Enterprise Linux 6.2, VMware ESX 5.1
		Hitachi Compute Blade logical partitioning feature	Hitachi Compute Blade logical partitioning feature	Hitachi Compute Blade logical partitioning feature

TABLE 3. HITACHI COMPUTE BLADE 2000 HIGH PERFORMANCE X55 SERVER BLADE SPECIFICATIONS

	Item	**Description**		
		AX55S3 Server Blade	AX55R3 Server Blade	AX55R4 Server Blade
CPU	CPU	Intel Xeon E5-2600	Intel Xeon E5-2600	Intel Xeon E5-2600v2
	Number of sockets	2	2	2
Memory	DIMM type	Registered ECC DDR3	Registered ECC DDR3	Registered ECC DDR3
	Number of slots	24	24	24
	Maximum memory capacity	768GB (32GB DIMM)	768GB (32GB DIMM)	768GB (32GB DIMM) 1536GB (64GB LRDIMM)
Management Interface	BMC/rKVM	SH core-based	SH core-based	SH core-based
	Management LAN	1Gbit Ethernet	1Gbit Ethernet	1Gbit Ethernet
PCIe I/O	NIC	2x I/O expansion ports	2x I/O expansion ports	2x I/O expansion ports

Mezzanine	Host bus	PCIe (Gen. 3.0) x8	PCIe (Gen. 3.0) x8	PCIe (Gen. 3.0) x8
	Number of slots	2x mezzanine card slots	2x mezzanine card slots	4x mezzanine card slots
Hard Disk Drive	RAID	N/A	Hardware RAID	Hardware RAID
	HDD bay	N/A	Hot-swappable 6x 2.5" SAS HDD/SSD	Hot-swappable 6x 2.5" SAS HDD/SSD
Operating System		Microsoft® Windows Server® 2012 R2, Red Hat Enterprise Linux 6.4, VMware ESX 5.5	Microsoft Windows Server 2012R2, Red Hat Enterprise Linux 6.4, VMware ESX 5.5	Microsoft Windows Server 2012R2, Red Hat Enterprise Linux 6.4, VMware ESX 5.5
		Hitachi Compute Blade logical partitioning feature	Hitachi Compute Blade logical partitioning feature	Hitachi Compute Blade logical partitioning feature

For More Information

Additional information about Hitachi Compute Blade products, technologies and services can be found at www.hds.com/products/compute-blade. Pricing information is available through authorized resellers. For a demonstration of the capabilities of Hitachi Compute Blade 2000, please contact serversales@hds.com.

◎Hitachi Data Systems