IBM BladeCenter JS23 and JS43 Express servers combine excellent processing power with the scalability, reliability, and configuration flexibility of the IBM BladeCenter architecture

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At a glance

The IBM® BladeCenter® JS23 and JS43 Express feature:

- Innovation with proven sixth-generation POWER^{tm} technology for enhanced performance, efficiency, and reliability features

- Leadership PowerVM^{tm} virtualization technology to help cut costs and consolidate workloads

- Innovative EnergyScale^{tm} technology to help save energy costs

- Up to 64 GB memory on a 4-core JS23 or 128 GB memory on an 8-core JS43

- One (JS23) or two (JS43) 73 GB, 146 GB, or 300 GB 2.5-inch SAS or 69 GB solid state disk drives

- Integrated:

  – Dual Gigabit Ethernet

  – SAS Controller

  – FSP1 Service Processor

  – Four USB ports and one Serial over LAN (SOL) via FSP

  – One PCI-E CIOv expansion card slot and one PCI-E CFFh high-speed expansion card slot on the JS23; two PCI-E CIOv expansion card slots and two PCI-E CFFh high-speed expansion card slots on the JS43

- Optional preinstall for IBM AIX/VIOS, IBM i, and SUSE Linux® Enterprise Server 10 Service Pack 2 for POWER operating systems

Overview

Built on the promise of the IBM BladeCenter family of products -- easy-to-use, integrated platforms with a high degree of deployment flexibility, scalability, and manageability -- the new BladeCenter JS23 and JS43 Express are the premier blades for 64-bit applications. They represent one of the most flexible and cost-efficient solutions for UNIX®, IBM i, and Linux deployments available in the market. Further enhanced by their ability to be installed in the same chassis with other BladeCenter servers, the JS23 and JS43 are designed to deliver the rapid return on investment that small businesses demand. Delivering on the promise of a truly dynamic Infrastructure, the BladeCenter JS23 and JS43 help in delivering superior

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business and IT services with agility and speed -- all in a simple-to-manage, highly efficient way.

The 4.2 GHz BladeCenter JS23 and JS43 use the POWER6+^{tm} version of the POWER6^{tm} processor.

The JS23 and JS43 Express blades have been preconfigured and tested by IBM and are based on proven technology. Utilizing a 4.2 GHz 64-bit POWER6 processor and available in a 4-core or 8-core configuration including a new 32 MB Level 3 cache for each core pair, and simultaneous multi-threading, they are designed to deliver outstanding performance and capabilities at compelling prices. With faster and more reliable double data rate 2 (DDR2) memory options and support for eight to sixteen memory DIMM slots along with a Serial Attached SCSI (SAS) disk subsystem, the BladeCenter JS23 and JS43 Express blades are designed for increased uptime and enhanced performance. Exploiting the newest in high-performance and energy-efficient solutions like solid state disk technology, the JS23 and JS43 offer remarkable performance for I/O-intensive applications. And for those that require fast and frequent data access, the JS23 and JS43 offer the utmost in easy-to-manage, tough-to-break solutions. Along with built-in support for PowerVM Editions for advanced virtualization features such as Live Partition Mobility and Active Memory^{tm} Sharing, the JS23 and JS43 Express offer an ideal blade server solution for driving your most demanding performance- and memory-intensive workloads, such as virtualization, databases, and high performance computing (HPC) applications. By consolidating and virtualizing on BladeCenter with the JS23 and JS43, you can increase the utilization of your hardware and decrease the number of physical assets you need to watch over. This translates into real dollar savings through better energy conservation and IT resource usage across the data center.

Meeting today's cost challenges while planning for tomorrow's growth can be difficult. When you demand more performance, these blade servers are ready to scale to four processors with the addition of a multi-processor expansion unit (MPE). Simply snap the MPE to the original blade and it becomes a four-processor, eight-core, 60-mm blade server with additional performance, additional memory, and twice the I/O expansion to deliver a flexible, resilient, and highly scalable IT infrastructure. Best of all, this expansion capability won't break the bank and provides the opportunity to standardize on a single blade platform for all your needs.

With IBM BladeCenter and IBM i, you can realize innovation with proven sixth-generation POWER technology for enhanced performance, efficiency, and reliability features; help cut costs and consolidate workloads with leadership virtualization as a built-in feature; go green with better energy management by using EnergyScale technology; and manage growth, complexity, and risk with the flexibility of IBM BladeCenter technology. With i support, small and medium clients can consolidate their IBM System i® and Intel® processor-based servers into a single chassis, leveraging the management, space, and power savings provided by IBM BladeCenter solutions. Large or small enterprises can now consolidate their IBM i applications into a centralized BladeCenter environment with a choice of BladeCenter chassis and blade configurations to fit their needs.

Key prerequisites

- A BladeCenter chassis
- When used with Serial over LAN Console support, a network switch module
- A rack (7014-B42 recommended)
- An operating system (IBM AIX®, IBM i operating system, Red Hat Linux, or Novell SUSE Linux)

Planned availability dates

- June 5, 2009 for feature numbers 8240 and 8242

- May 22, 2009 for all other features

Description

IBM BladeCenter JS23 and JS43

The IBM BladeCenter JS23 and JS43 Express are the latest high-density blade servers with POWER6 and EnergyScale technology.

The IBM BladeCenter JS23 is a one-wide BladeCenter with a 4-core 64-bit 4.2 GHz processor, eight DIMM slots which can contain up to a maximum of 64 GB of memory, and a bay for an optional single 73/146/300 GB SAS Small Form Factor (SFF) 2.5-inch or 69 GB solid-state drive.

By adding feature number 8446, the BladeCenter JS23 is converted into a two-wide BladeCenter JS43. Feature number 8446 delivers a second 4-core 64-bit 4.2 GHz processor, a second set of eight DIMM slots which increases the maximum memory to 128 GB, and a bay for an optional second 73/146/300 GB SAS SFF or 69 GB solid-state drive.

Integrated features common to both the JS23 and JS43 include:

- Dual Gigabit Ethernet
- SAS Controller
- FSP1 Service Processor
- Four USB ports and one Serial over LAN (SOL) via FSP
- One PCI-E CIOv daughter card slot and one PCI-E high-speed daughter card slot on the JS23; two PCI-E CIOv daughter card slots and two PCI-E high-speed daughter card slots on the JS43

As a heterogeneous infrastructure consolidation platform, the BladeCenter H, HT, and S Chassis also support running the JS23 and JS43 alongside your Intel processor-based HS blades, AMD Opteron processor-based LS blades, and Cell/B.E.^{tm} processor-based QS21 blades in the same chassis with independent monitoring, security, power, and systems management. With several Gigabit Ethernet, Fibre Channel, iSCSI, and InfiniBand high-performance expansion cards to choose from, the JS23 and JS43 can be tailored to the demands of your datacenter network and application workloads.

The BladeCenter S Chassis supports a maximum of six JS23 blades, or a mix of JS23 blades and other blades. For the BladeCenter H Chassis, the maximum number of JS23 blades is 14; for the BladeCenter HT Chassis, the maximum number of JS23 blades is 12.

IBM i supports the BladeCenter S chassis and BladeCenter H chassis only.

IBM i does not support the BladeCenter HT chassis.

The JS23 and JS43 have autonomic power and thermal controls designed to maintain operation in out-of-specification situations. If thermal or power conditions become unacceptable, it may reduce the processor or memory performance capability to maintain acceptable conditions. When the conditions are restored to an acceptable value, the blade will again automatically resume normal operation. Some applications may be sensitive to these capability changes. Contact your application vendors to determine any possible impacts.

Full keyboard, video, and mouse support can be used at installation instead of Serial over LAN (SOL), which requires a network switch module in the chassis. Multiple console connections are also supported by simultaneously using the BladeCenter keyboard, video, and mouse, and a SOL connection. The USB bus on the BladeCenter chassis is used for keyboard support on the JS23 and JS43. The Advanced Management Module (aMM) on the chassis controls the routing of keyboard inputs to one of up to 14 blade servers. An embedded video controller is

used to support 2D graphics on an SVGA video display. The JS23 and JS43 have four USB ports; two interface with keyboard and mouse through the aMM and two with a removable media tray also through the aMM.

As a robust blade solution for 64-bit UNIX applications, the JS23 and JS43 also deliver leadership single-instruction, multiple-data (SMID) capabilities with the Linux operating system for scientific research and HPC.

JS23 and JS43 features and benefits:

- Highly efficient and flexible design of IBM blade
  - Densely pack more servers into a smaller space
  - Tailor the system to meet varied business requirements with a choice of BladeCenter chassis
  - Lower acquisition cost and energy consumption versus traditional 1U or 2U rack servers
  - Integrate networking switch infrastructure for improved cabling and data center maintenance
  - Deploy in virtually any office environment for quiet, highly secure, and contaminant-protected operation
- Pioneering IBM EnergyScale technology and Systems Director Active Energy Manager software
  - Generate less heat by managing application utilization and server energy consumption
  - Use less energy to cool the system
- Industry-leading PowerVM virtualization technology
  - Reduce infrastructure costs by doing more with fewer servers
  - Simplify IT operations to leverage storage, network, and computing resources to control costs and be more responsive
- Innovative reliability features and systems management
  - Expedite hardware repairs and reduce service time
  - Enable scheduled maintenance with proactive monitoring of critical system components to help reduce unplanned failures
- Choice of IBM AIX, IBM i, or Linux operating environment
  - Standardize on a single platform that runs the large and varied portfolio of applications that support your business

PowerVM Editions (Advanced Power Virtualization) (Optional)

The JS23 and JS43 have support for PowerVM technology built into the microprocessor. The JS23 and JS43 are designed to make it more affordable to consolidate multiple independent applications on a single blade using the same proven virtualization technologies offered on IBM Power servers.

The JS23 and JS43 support two leading-edge virtualization technologies: PowerVM Standard Edition (#5429) and PowerVM Enterprise Edition (#5607):

- PowerVM Standard Edition makes the JS23 and JS43 an ideal platform for consolidation of AIX, Linux, and IBM i operating system applications, helping clients reduce infrastructure complexity and cost. Offering an intuitive, Web-based interface for managing virtualization within a single blade, the Integrated Virtualization Manager (IVM) component of Virtual I/O Server (VIOS) allows the small business IT manager to quickly and easily set up and manage logical partitions (LPARs). It also enables Virtual I/O and Virtual Ethernet so that storage and communications adapters can be shared among all the LPARs running on the JS23 and JS43. Ultimately, IBM Micro-Partitioning^{tm} technology allows each processor core to be subdivided into as many as 10 virtual servers. And since the JS23 and JS43 are built with POWER6 technology, other advanced virtualization functions such as Shared Dedicated Capacity may be exploited.

- PowerVM Enterprise Edition includes all the features of PowerVM Standard Edition plus a new capability called Live Partition Mobility. Live Partition Mobility allows for the movement of a running AIX or Linux partition from one POWER6 processor-based server to another with no application downtime, resulting in better system utilization, improved application availability, and potential energy savings. With Live Partition Mobility, planned application downtime due to regular server maintenance can be a thing of the past. Software Maintenance for Virtual I/O Server (577x-PVE) must be purchased with VIOS (5765-PVE). PowerVM Enterprise Edition must be purchased separately.

Note: PowerVM Standard Edition and PowerVM Enterprise Edition are optional when running AIX or Linux. Power VM Standard or Enterprise Edition is required when running IBM i operating system on the JS23 and JS43.

Systems Management and Administrative Tools

Integrated diagnostic and administrative tools like IBM Predictive Failure Analysis® and light path diagnostics are designed to simplify administration to help lower costs and improve control of the IT environment. Remote management capabilities allow automating IT networking tasks. Proven technology like VIOS allows the sharing of disk drives, communications, and Fibre Channel adapters.

Systems management tools for the JS23 and JS43:

- AIX 5.3 or AIX 6: IBM Director V5.2 and Cluster Systems Management (CSM) for AIX, V1.7
- SUSE Linux Enterprise Server 10 Service Pack 2 for POWER, or later, or SUSE Linux Enterprise Server for POWER, or later: IBM Director V5.2 and CSM for Linux on POWER, V1.7
- Red Hat Enterprise Linux 4.6, for POWER, or later, or Red Hat Enterprise Linux 4.7, for POWER, or later: IBM Director V5.2 and CSM for Linux on POWER, V1.7
- Red Hat Enterprise Linux 5.1, for POWER, or later, or Red Hat Enterprise Linux 5.2, for POWER, or later, or Red Hat Enterprise Linux 5.3, for POWER, or later: IBM Director V5.2 and CSM for Linux on POWER, V1.7
- IBM i 6.1, or later: IBM Director V5.2

IBM Director V5.1 must be downloaded from

http://www.ibm.com/systems/management/director/downloads.html

CSM for Linux on POWER, V1.7 (5765-G16) and CSM for AIX, V1.7 (5765-F67) provide a full suite of systems management software for the JS23 and JS43, including:

- Hardware control
- Installation and updating of software on nodes
- Distributed command execution
- File synchronization across a cluster
- Monitoring and automated response
- Automatic security configuration
- Management of node groups (static and dynamic)
- Diagnostics tools

More information on CSM can be found at

http://www.ibm.com/systems/clusters/software/

CSM/IBM Director Positioning

CSM is recommended for managing Linux or AIX clusters if you prefer a scripting interface to perform cluster management tasks. CSM provides full installation for Linux and a flexible command-line interface.

Product number

The following are newly announced features on the specific models of the
IBM BladeCenter 7778 machine type:

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Description                                       MT   Model Feature

IBM 7778-23X                                      7778  23X


AIX Partition Specify                             7778  23X   0265
Linux Partition Specify                           7778  23X   0266
IBM i Operating System Partition Specify          7778  23X   0267
IBM i 6.1 Specify Code                            7778  23X   0534
US TAA Compliance Indicator                       7778  23X   0983

Primary OS - IBM i                                7778  23X   2145
Primary OS - AIX                                  7778  23X   2146
Primary OS - Linux                                7778  23X   2147
Integrate Blade Server in Chassis (BP)            7778  23X   4645
Integrate Blade Server in Chassis                 7778  23X   4646
Rack Indicator- Not Factory Integrated            7778  23X   4650
Rack Indicator, Rack #1                           7778  23X   4651
Rack Indicator, Rack #2                           7778  23X   4652
Rack Indicator, Rack #3                           7778  23X   4653
Rack Indicator, Rack #4                           7778  23X   4654
Rack Indicator, Rack #5                           7778  23X   4655
Rack Indicator, Rack #6                           7778  23X   4656
Rack Indicator, Rack #7                           7778  23X   4657
Rack Indicator, Rack #8                           7778  23X   4658
Rack Indicator, Rack #9                           7778  23X   4659
Rack Indicator, Rack #10                          7778  23X   4660
Rack Indicator, Rack #11                          7778  23X   4661
Rack Indicator, Rack #12                          7778  23X   4662
Rack Indicator, Rack #13                          7778  23X   4663
Rack Indicator, Rack #14                          7778  23X   4664
Rack Indicator, Rack #15                          7778  23X   4665
Rack Indicator, Rack #16                          7778  23X   4666
Chassis indicator-Not Factory Integrated          7778  23X   4680
BladeCenter chassis specify, Chassis #1           7778  23X   4681
BladeCenter chassis specify, Chassis #2           7778  23X   4682
BladeCenter chassis specify, Chassis #3           7778  23X   4683
BladeCenter chassis specify, Chassis #4           7778  23X   4684
BladeCenter chassis specify, Chassis #5           7778  23X   4685
BladeCenter chassis specify, Chassis #6           7778  23X   4686
BladeCenter chassis specify, Chassis #7           7778  23X   4687
BladeCenter chassis specify, Chassis #8           7778  23X   4688
BladeCenter chassis specify, Chassis #9           7778  23X   4689

Software Preinstall                               7778  23X   5005


PowerVM Standard Edition                          7778  23X   5429
PowerVM Enterprise Edition                        7778  23X   5607


IBM i Software Preinstall                         7778  23X   8141
Linux Software Preinstall                         7778  23X   8143
Linux Software Preinstall (SDIs)                  7778  23X   8144
Software Preinstall                               7778  23X   8146
4GB (2 x 2 GB) DDR2 667MHz DIMMs                  7778  23X   8229
IBM 146GB SAS 10K SFF HDD                         7778  23X   8236
IBM 73GB SAS 10K SFF HDD                          7778  23X   8237
8GB (2 x 4 GB) DDR2 667MHz DIMMs                  7778  23X   8239
Emulex 8Gb Fibre Channel Expansion Card (CIOv)
for IBM BladeCenter                               7778  23X   8240
QLogic 4 Gb Fibre Channel Expansion Card (CIOv)
for IBM BladeCenter                               7778  23X   8241
QLogic 8Gb Fibre Channel Expansion Card (CIOv)
for IBM BladeCenter                               7778  23X   8242
16GB (2 x 8 GB) DDR2 400 MHz DIMMs                7778  23X   8245
3 Gb SAS Passthrough Expansion Card (CIOv) for
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IBM BladeCenter	7778	23X	8246
QLogic Ethernet and 4 Gb Fibre Channel Expansion Card (CFFh)	7778	23X	8252
4X InfiniBand DDR Expansion Card (CFFh) for IBM BladeCenter	7778	23X	8258
QLogic 8 Gb Fibre Channel Expansion Card (CFFh)	7778	23X	8271
69GB SFF SAS Solid State Drive-Power Blade	7778	23X	8273
IBM 300GB SAS 10K RPM SAS HDD	7778	23X	8274
Voltaire 4x InfiniBand DDR Expansion Card (CFFh) for IBM BladeCenter	7778	23X	8298
Zero-priced Processor Entitlement for IBM BladeCenter JS23/JS43	7778	23X	8393
One Processor Entitlement for the IBM BladeCenter JS23/JS43	7778	23X	8395
1-Wide Add-on SMP Chassis	7778	23X	8446
IBM BladeCenter JS23/JS43 Installation/Users Guide (Brazilian Portuguese)	7778	23X	8766
IBM BladeCenter JS23/JS43 Installation/Users Guide (English)	7778	23X	8767
IBM BladeCenter JS23/JS43 Installation/Users Guide (French)	7778	23X	8768
IBM BladeCenter JS23/JS43 Installation/Users Guide (German)	7778	23X	8769
IBM BladeCenter JS23/JS43 Installation/Users Guide (Italian)	7778	23X	8770
IBM BladeCenter JS23/JS43 Installation/Users Guide (Japanese English)	7778	23X	8771
IBM BladeCenter JS23/JS43 Installation/Users Guide (Japanese)	7778	23X	8772
IBM BladeCenter JS23/JS43 Installation/Users Guide (Korean)	7778	23X	8773
IBM BladeCenter JS23/JS43 Installation/Users Guide (Simplified Chinese)	7778	23X	8774
IBM BladeCenter JS23/JS43 Installation/Users Guide (Spanish)	7778	23X	8775
IBM BladeCenter JS23/JS43 Installation/Users Guide (Traditional Chinese)	7778	23X	8776
IBM BladeCenter JS23/JS43 Installation/Users Guide (UK English)	7778	23X	8777
IBM BladeCenter JS23/JS43 Service/Warranty CDs (Multi-language)	7778	23X	8778
Order Routing Indicator- System Plant	7778	23X	9169
Month Indicator	7778	23X	9461
Day Indicator	7778	23X	9462
Hour Indicator	7778	23X	9463
Minute Indicator	7778	23X	9464
Qty Indicator	7778	23X	9465
Countable Member Indicator	7778	23X	9466

The following are newly announced features on the specific models of the IBM BladeCenter 7779, 7989, and 7998 machine types:

Description	MT	Model	Feature
BladeCenter Chassis content specify - 7778-23X	7779	BCS	0312
	7989	BCH	
BladeCenter Chassis content specify - 7778-23X with Feature #8446	7779	BCS	0313
	7989	BCH	
Widescreen LCD Monitor	7779	BCS	3632
	7989	BCH	
SAS RAID Controller Switch Module and BBU	7779	BCS	3734
Linux Software Preinstall	7998	60X	8143
		61X	
Linux Software Preinstall (SDIs)	7998	60X	8144
		61X	
4GB (2 x 2 GB) DDR2 667MHz, 1GB DIMMs	7998	61X	8270
QLogic 8 Gb Fibre Channel Expansion Card (CFFh)	7998	60X	8271
		61X	
IBM 300GB SAS 10K RPM SAS HDD	7998	60X	8274
		61X	

Feature conversions

The existing components being replaced during a model or feature conversion become the property of IBM and must be returned.

Feature conversions are always implemented on a "quantity of one for quantity of one" basis. Multiple existing features may not be converted to a single new feature. Single existing features may not be converted to multiple new features.

The following conversions are available to customers:

Feature conversions for 7778-23X virtualization engine features:

From FC:	To FC:	Return parts
5429 – PowerVM Standard Edition	5607 – PowerVM Enterprise Edition	No

IBM BladeCenter JS23 and JS43 Express System At a Glance

- Form factor

  The JS23 is a one-wide blade server and the JS43 is a two-wide blade server for BladeCenter S, BladeCenter H, or BladeCenter HT Chassis.

- Processor cores

  The JS23 contains two 2-core 64-bit 4.2 GHz POWER6 processors and the JS43 contains four 2-core 64-bit 4.2 GHz processors. Processors are not features. Processors contain AltiVec SIMD and Hardware Decimal Floating-Point acceleration.

- Level 2 (L2) cache

  4 MB per processor core; 4-way set associative.

- Level 3 (L3) cache

  32 MB per processor socket.

- Memory (standard and maximum)

  Base offering: 4 GB (2 x 2 GB); Express offering: 4 GB (2 x 2 GB). Up to 64 GB maximum per JS23 in 8 DIMM slots and up to 128 GB maximum per JS43 blade in 16 DIMM slots. ECC and Chipkill^{tm}, redundant bit steering DDR2 SDRAM memory running at 667 MHz (2, 4 GB DIMMs) or 400 MHz (8 GB DIMMs).

- Internal SAS drive storage

  One optional 73, 146, or 300 GB 2.5-inch Serial Attached SCSI (SAS) 10,000 RPM non-hot-swappable disk drive or 69 GB 2.5-inch solid-state disk on the JS23 with an additional optional 73, 146, or 300 GB 2.5-inch SAS 10,000 RPM non-hot-swappable disk drive or 69 GB 2.5-inch solid-state disk with the JS43. Integrated RAID-0 or RAID-1 standard on blade server with support for disk mirroring.

- Networking

  Integrated Virtual Ethernet adapter (IVE) Dual-Gigabit and support for optional dual gigabit Ethernet daughter card.

- I/O upgrade

  JS23 has one PCI-E CIOv daughter card slot and one PCI-E high-speed daughter card slot. The JS43 has two PCI-E CIOv daughter card slots and two PCI-E high-speed daughter card slots.

- Optional connectivity

  1 Gbps Ethernet, 4 and 8 Gbps Fibre Channel, 4X InfiniBand SAS Expansion.

- PowerVM Standard Edition

  Virtual LAN, POWER Hypervisor^{tm}, Micro-partitioning, Virtual I/O Server with Integrated Virtualization Manager, Shared Dedicated Capacity, PowerVM Lx86.

- PowerVM Enterprise Edition

  All the features of PowerVM Standard Edition plus Live Partition Mobility and Active Memory Sharing.

- Systems management

  Integrated systems management processor, IBM Systems Director Active Energy Manager^{tm}, light path diagnostics, Predictive Failure Analysis, Cluster Systems Management (CSM), Serial Over LAN, IPMI-compliant.

- RAS features

  - IBM Chipkill ECC, bit-steering memory and cache Processor Instruction Retry
  - Service processor with fault monitoring
  - Hot-swappable disk bays (in BladeCenter S Chassis)
  - Hot-plug power supplies and cooling fans (on chassis)
  - Dynamic processor deallocation
  - Dynamic deallocation of logical partitions and PCI bus slots
  - Extended error handling on PCI-E slots
  - Redundant power supplies and cooling fans (on chassis)

- Operating environments:

  - AIX V5.3, or later
  - AIX V6.1, or later
  - IBM i 6.1, or later
  - Novell SUSE Linux Enterprise Server 10 Service Pack 2 for POWER, or later
  - Red Hat Enterprise Linux 4.6, for POWER, or later
  - Red Hat Enterprise Linux 5.1, for POWER, or later

    Note: Some of the IBM BladeCenter functions may not be supported by the IBM i operating system. These are identified at

      http://www.ibm.com/systems/power/hardware/blades/ibmi.html

- High availability

  IBM PowerHA family

Enhancements for IBM i 6.1

Enhanced support for BladeCenter

Support for BladeCenter JS23 and JS43 Express blades

IBM i 6.1 supports the scalable BladeCenter JS23 and BladeCenter JS43 Express blades. The BladeCenter JS23 blade is a 4-core, 4.2 GHz POWER6 processor-based blade with L3 cache which can be upgraded to the 8-core BladeCenter JS43. The JS23 blade supports up to 64 GB of memory and one disk drive and the BladeCenter JS43 supports up to 128 GB of memory and two disk drives. For IBM i, the BladeCenter JS23 and JS43 blades are supported in the BladeCenter S and BladeCenter H Chassis. These blades also support AIX and Linux operating systems.

IBM i uses the PowerVM VIOS partition for access to BladeCenter resources and storage devices. PowerVM Standard Edition is included with the BladeCenter JS23 and JS43 for no additional charge. The VIOS partition owns adapters on the blade and virtualizes the resources to the IBM i partition.

The BladeCenter JS23 and JS43 Express blades include:

- Dual Gigabit Ethernet
- SAS Controller
- FSP1 Service Processor
- Four USB ports and one Serial over LAN (SOL) via FSP
- One PCI-E CIOv daughter card slot and one PCI-E high-speed daughter card slot on the JS23
- Two PCI-E CIOv daughter card slots and two PCI-E high-speed daughter card slots on the JS43

IBM i supports the following I/O adapters and storage options on the BladeCenter JS23 and JS43:

- QLogic 8 Gb Fibre Channel Expansion Card (CIOv) for IBM BladeCenter (#8242)
- Emulex 8 Gb Fibre Channel Expansion Card (CIOv) for IBM BladeCenter (#8240)
- QLogic 4 Gb Fibre Channel Expansion Card (CIOv) for IBM BladeCenter (#8241)
- 3 Gb SAS Passthrough Expansion Card (CIOv) for IBM BladeCenter (#8246)
- QLogic Ethernet and 4 Gb Fibre Channel Expansion Card (CFFh) (#8252)
- 69 GB SFF SAS Solid State Drive-Blade P6+ (#8273)
- IBM 300 GB SAS 10K SFF HDD (#8274)
- IBM 146 GB SAS 10K SFF HDD (#8236)
- IBM 73 GB SAS 10K SFF HDD (#8237)

For use with IBM i, the blade can be deployed with one VIOS partition and one IBM i partition, with one VIOS partition and multiple IBM i partitions, or with one VIOS partition and a combination of IBM i, AIX, and Linux partitions. Integrated Virtualization Manager (IVM), a function of VIOS, is used to set up and manage the partitions.

IBM i 6.1 (5761-SS1) includes per processor core and per user entitlements for blade servers. When you select IBM i on a BladeCenter JS23 and JS43 blade, you must purchase at least one processor core entitlement and at least 10 user entitlements. You may purchase additional IBM i processor core entitlements up to a maximum of four on the JS23 and up to eight on the JS43 blade. Additional IBM i user entitlements can also be purchased in blocks of 10 users. You may also purchase unlimited user, external user, and unlimited collaboration user options. The BladeCenter JS23 and JS43 have a P10 Processor Group.

Support for virtual tape

IBM i 6.1 partitions on BladeCenter JS12, JS22, JS23, and JS43 blades support virtual tape, which simplifies backup and restore processing. IBM i can use native save/restore commands and BRMS to directly back up to a PowerVM VIOS attached LTO-4 tape drive, saving hardware costs and management time. This virtual tape support provides an effective backup solution for BladeCenter S configurations. It can also be used with BladeCenter H implementations. It simplifies migration to blades from tower/rack servers because an LTO-4 drive can read backup tapes from LTO-2, 3, and 4 drives. Virtual tape can be used with VIOS and IBM i on POWER6 processor-based servers. The virtual tape function supports the IBM Systems Storage SAS LTO-4 drive, specifically, the TS2240 for BladeCenter and Power Servers, 7214 Model 1U2 with #1404, and #5720 DVD/Tape SAS External Storage Unit with #5746 for Power servers.

Support for BladeCenter S SAS RAID Controller Module

The BladeCenter S SAS RAID Controller Module is supported with POWER6 processor-based blades in addition to x86 processor-based blades with the BladeCenter S Chassis. This controller module provides additional protection options for BladeCenter S storage, providing:

- Support for RAID 0, 1, 10, and 5

- Support for two disk storage modules with up to 12 SAS drives

- Support for an external SAS tape drive

- Support for #8250 CFFV SAS adapter for JS22 and JS12 blades and #8246 3 GB SAS

- Passthrough Expansion Card, CIOv, for JS23 and JS43 blades

- 1 GB of battery-backed write cache between the two modules

Two SAS RAID Controller Modules are required with the BladeCenter S. For environments with high performance demands, separate RAID sets are recommended for each IBM i partition and for x86 blades. The controller is supported with BladeCenter JS12, JS22, JS23, and JS43 blades running AIX, Linux, and VIOS partitions, including a VIOS partition that virtualizes I/O resources for IBM i 6.1 partitions.

Enhanced i Edition Express for BladeCenter S

The i Edition Express for BladeCenter S configuration has been updated to increase the minimum memory from 2 GB to 4 GB on the BladeCenter JS12 Express blade and to include a new Intelligent Copper Pass-Thru Module (feature #5452). IBM i and VIOS are pre-installed with the i Edition solution along with built-in support for virtual tape. Available as optional is the newly supported BladeCenter S SAS RAID Controller Module (feature #3734) along with large capacity hot swappable disks for the BladeCenter S (300 GB or 450 GB).

For more information see

http://www-03.ibm.com/systems/power/hardware/blades/index.html

Virtualization enhancements

PowerVM Active Memory Sharing

IBM i 6.1 supports PowerVM Active Memory Sharing. PowerVM Active Memory Sharing is an advanced memory virtualization technology which intelligently flows memory from one partition to another for increased utilization and flexibility of memory usage. With this memory virtualization enhancement for POWER6 processor-based servers, IBM i, AIX, and Linux partitions can share a pool of memory and have PowerVM dynamically allocate the memory based on each partition's workload demands. PowerVM Active Memory Sharing is designed for partitions with variable memory requirements, for partitions that serve workloads that peak at different times across the partitions, and for active/inactive environments.

PowerVM Active Memory Sharing is available with PowerVM Enterprise Edition. It supports AIX 6.1, i 6.1, and SUSE Linux Enterprise Server 11 operating systems. The partitions must use PowerVM VIOS to virtualize all the I/O adapter and they must use shared processors. For more information see

http://www-03.ibm.com/systems/power/software/virtualization/index.html

Publications

No publications are shipped with the announced product.

With the IBM Systems Information Center, users can use a single information center to access product documentation for IBM Systems hardware, operating systems, and server software. Through a consistent framework, users can efficiently find information and personalize their access to that information. The IBM Systems Information Center is at

http://publib14.boulder.ibm.com/infocenter/systems

Services

Global Technology Services

IBM services include business consulting, outsourcing, hosting services, applications, and other technology management.

These services help you learn about, plan, install, manage, or optimize your IT infrastructure to be an On Demand Business. They can help you integrate your high-speed networks, storage systems, application servers, wireless protocols, and an array of platforms, middleware, and communications software for IBM and many non-IBM offerings. IBM is your one-stop shop for IT support needs.

For details on available services, contact your IBM representative or visit

> http://www.ibm.com/services/

For details on available IBM Business Continuity and Recovery Services, contact your IBM representative or visit

> http://www.ibm.com/services/continuity

For details on education offerings related to specific products, visit

> http://www.ibm.com/services/learning/index.html

Select your country, and then select the product as the category.

Technical information

Specified operating environment

Physical specifications

- JS23
  - Height: 9.65 in (245 mm)
  - Width: 1.14 in (29 mm)
  - Depth: 17.55 in (445 mm)
  - Weight: 9.6 lb (4.35 kg)
- JS43
  - Height: 9.65 in (245 mm)
  - Width: 2.32 in (59 mm)
  - Depth: 17.55 in (445 mm)
  - Weight: 19.2 lb (8.7 kg)
- BladeCenter H chassis
  - Height: 15.75 in (400 mm)
  - Width: 17.5 in (444 mm)
  - Depth: 28.0 in (711 mm)
  - Weight: 350 lb (159 kg)
- BladeCenter S chassis
  - Height: 12.0 in (306 mm)
  - Width: 17.5 in (444 mm)
  - Depth: 28.3 in (733 mm)
  - Weight: 240 lb (108.9 kg)

To assure installability and serviceability in non-IBM industry-standard racks, review the installation planning information for any product-specific installation requirements.

Operating environment

- Temperature:
  - 10 to 35 degrees C (50 to 95 degrees F) at 0 to 914 m (0 to 3,000 ft)
  - 10 to 32 degrees C (50 to 90 degrees F) at 914 to 2,133 m (3,000 to 7,000 ft)
- Relative humidity: 8% to 80%
- Maximum altitude: 2,133 m (7,000 ft)
- Power consumption (@ +12 V supplied by BladeCenter chassis): 350 watts maximum

EMC conformance

- U.S.: FCC - Verified to comply with Part 15 of the FCC Rules Class A
- Canada: ICES-004, issue 3 Class A
- EMEA: EN55022: 2006 Class A
- Australia and New Zealand: CISPR 22, Class A

Safety certifications

- U.S.: (UL Mark) UL 60950-1 1st Edition
- CAN: (cUL Mark) CAN/CSA22.2 No.60950-1 1st Edition
- Europe: (CE Mark) EN60950-1, 1st Edition
- CB: IEC60950-1, 1st Edition
- Russia: (GOST Mark) IEC60950-1

Hardware requirements

Standard JS23/JS43 blade configuration:

```
7778-23X  Processor       L2   Memory Ethernet  HDD
                          Cache
Base      Dual core,      4 MB/ 4 GB-  Dual      One optional
(JS23)    dual socket.    core  64 GB  Gigabit   SFF or SSD
                                                 drive
With      Dual core,      4 MB/ 4 GB-  Dual      Two optional
#8446     4 sockets       core  128 GB Gigabit   SFF or SSD
                                                 drive
(JS43)
          Both 4.2 GHz
          POWER6
```

Serial over LAN (SOL) function routes the console data stream over the standard two, 1 Gb Ethernet ports to the chassis aMM.

Minimum system configuration

Each 7778-23X configuration must contain a minimum of:

- One - Memory DIMMs (at least one of these):
  - 4 GB (2 x 2 GB DIMMs) DDR2 667 MHz (#8229)
  - 8 GB (2 x 4 GB DIMMs) DDR2 667 MHz (#8239)
  - 16 GB (2 x 8 GB DIMMs) DDR2 400 MHz (#8245)
- Four or eight Processor Entitlements (one of these):
  - 4 x #8395, or 2 x #8395 and 2 x #8393 for the JS23
  - 8 x #8395, or 4 x #8395 and 4 x #8393 with #8446 for the JS43

Note: Feature #8393 is part of Express Product Offerings.

Note: The following PowerVM features will be included in the base configuration but may be removed from the order:

– 4 x #5429 (Standard Edition) or 4 x #5607 (Enterprise Edition) for the JS23

– 8 x #5429 (Standard Edition) or 8 x #5607 (Enterprise Edition) with #8446 for the JS43

Note: For IBM i operating system on the JS23/JS43, one SAS Expansion Card (#8246) is required.

Note: A minimum of one copy of the *Service Warranty Publications* (#8737) and one copy of the *JS23/JS43 Installation and User's Guide* (#8766-8778) is required at each customer installation.

Express Product Offerings

If you order a JS23 or JS43 server Express Product Offering, as defined here, you may qualify for a processor entitlement at no additional charge. A minimum of 4 GB of memory and one SAS 10 K SFF disk drive or one solid-state drive on the JS23 and a minimum of 8 GB of memory and one SAS 10 K SFF disk drive or one solid state drive on the JS43 is required to determine if you are entitled to a processor entitlement at no additional charge.

You can make changes to the standard features as needed and still qualify for processor entitlements at no additional charge. However, selection of total memory smaller than the totals defined as the minimums disqualifies the order as an Express Product Offering.

You must purchase PowerVM Standard Edition (#5429) or PowerVM Enterprise Edition (#5407) for each Express Product Offering.

BladeCenter JS23

- Minimum 4 GB memory -- one of these:
  – One - 4 GB (2 x 2 GB DIMMs) DDR2 667 MHz (#8229)
  – One - 8 GB (2 x 4 GB DIMMs) DDR2 667 MHz (#8239)
  – One - 16 GB (2 x 8 GB DIMMs) DDR2 400 MHz (#8245)
    Note: Additional memory DIMMs of any size may be added.

- One of these:
  – Four - PowerVM Standard Edition (#5429)
  – Four - PowerVM Enterprise Edition (#5407)
- One of these:
  – One - 73 GB SAS 10K SFF HDD (#8237)
  – One - 146 GB SAS 10K SFF HDD (#8236)
  – One - 300 GB SAS 10K SFF HDD (#8274)
  – One - 69 GB SFF SSD (#8273)
- Two - Processor Entitlement (#8395)
- Two - Zero-priced Processor Entitlement (#8393); receive two processor entitlements (#8393) at no additional charge. Four processors are entitled.

BladeCenter JS43

- Minimum 8 GB memory -- one of these:
  – One - 8 GB (2 x 4 GB DIMMs) DDR2 667 MHz (#8239)
  – One - 16 GB (2 x 8 GB DIMMs) DDR2 400 MHz (#8245)

Note: Additional memory DIMMs of any size may be added.

- One of these:
  - Eight - PowerVM Standard Edition (#5429)
  - Eight - PowerVM Enterprise Edition (#5407)
- One of these:
  - One - 73 GB SAS 10K SFF HDD (#8237)
  - One - 146 GB SAS 10K SFF HDD (#8236)
  - One - 300 GB SAS 10K SFF HDD (#8274)
  - One - 69 GB SFF SSD (#8273)
- Four - Processor Entitlement (#8395)
- Four - Zero-priced Processor Entitlement (#8393); receive four processor entitlements (#8393) at no additional charge. Eight processors are entitled.

Note: A minimum of one copy of the *Service Warranty Publications* (#8778) and one copy of the *JS23/JS43 Installation and User's Guide* (#8766-8777) is required at each customer installation.

Optional and additional features

- Up to 64 GB of system memory on the JS23; up to 128 GB of system memory on the JS43
  - The JS23 system board contains eight RDIMM memory connections and the JS43 system board contains an additional eight RDIMM memory connections.
  - Memory must be installed in matched pairs with a minimum of 4 GB and maximum of 64 GB on the JS23 and 128 GB on the JS43.
  - Memory sizes can be mixed.
  - JS23/JS43 supports Memory Scrubbing, ECC, Chipkill, and Bit Steering.
  - 4 GB (2 x 2 GB DIMMs) and 8 GB (2 x 4 GB DIMMs) memory features operate at 667 MHz while the 16 GB (2 x 8 GB DIMMs) memory feature operates at 400 MHz.
- SAS Controller, supporting up to 146 GB
  - Internal disk drive, SFF (2.5-inch) 73 GB SAS (#8237) integrated on JS23 planar
  - Second internal disk drive, SFF (2.5-inch) 73 GB SAS (#8237) integrated on JS43 planar

Expansion cards

The JS23 has one PCI-e CIOv daughter card slot and one PCI-e high-speed daughter card slot (SFFh, CFFh). The JS43 has two PCI-e CIOv daughter card slots and two PCI-e high-speed daughter card slots (SFFh, CFFh).

CFFh expansion cards include:

- QLogic Ethernet and 4 GB Fibre Channel Expansion Card (CFFh) (#8252)

  Note: Not supported in the BladeCenter S Chassis (7779-BCS)

- 4X InfiniBand DDR Expansion Card (CFFh) for IBM BladeCenter (#8258)
- QLogic 8 Gb Fibre Channel Expansion Card (CFFh) (#8271)
- Voltaire 4X InfiniBand DDR Expansion Card (CFFh) for IBM BladeCenter (#8298)

CIOv expansion cards include:

- Emulex 8Gb Fibre Channel Expansion Card (CIOv) (#8240)
- QLogic 4Gb Fibre Channel Expansion Card (CIOv) for IBM BladeCenter (#8241)
- QLogic 8Gb Fibre Channel Expansion Card (CIOv) (#8242)
- 3 Gb SAS Passthrough Expansion Card (CIOv) for IBM BladeCenter (#8246)

Note: 4X IB Dual Port DDR CFF/PCIe daughter card is not supported on AIX V5.3 with the 5300-07 Technology Level.

Note: IBM i does not support Fibre Channel adapters (feature numbers 8252, 8240, 8241, and 8242) when used in the BladeCenter S chassis.

Software requirements

The JS23 and JS43 servers support the AIX, Linux, and IBM i operating systems, providing the flexibility of using applications written for any one of the three. IBM has qualified two popular Linux distributions for use with the JS23 and JS43 servers:

- Red Hat Enterprise Linux for POWER
- Novell SUSE Linux Enterprise Server for POWER Systems

One or more of the following operating systems is required for an operational JS23/JS43:

If installing the AIX operating system (one of these):

- The following AIX Technology Levels are available on hardware availability date:
  - AIX 5.3 with the 5300-10 Technology Level, or later
  - AIX 6.1 with the 6100-03 Technology Level, or later
- The following AIX Technology Levels are available within 90 days of this announcement:
  - AIX 5.3 with the 5300-07 Technology Level and Service Pack 9, or later
  - AIX 5.3 with the 5300-08 Technology Level and Service Pack 7, or later
  - AIX 5.3 with the 5300-09 Technology Level and Service Pack 4, or later
  - AIX 6.1 with the 6100-00 Technology Level and Service Pack 9, or later
  - AIX 6.1 with the 6100-01 Technology Level and Service Pack 5, or later
  - AIX 6.1 with the 6100-02 Technology Level and Service Pack 4, or later

If installing the Linux operating system (one of these):

- SUSE Linux Enterprise Server 10 Service Pack 2 for POWER Systems, or later
- SUSE Linux Enterprise Server 11 for POWER Systems, or later
- Red Hat Enterprise Linux 4.6 for POWER
- Red Hat Enterprise Linux 4.7 for POWER, or later
- Red Hat Enterprise Linux 5.1 for POWER
- Red Hat Enterprise Linux 5.2 for POWER
- Red Hat Enterprise Linux 5.3 for POWER, or later

If installing the IBM i operating system:

- IBM i 6.1, or later

Note: IBM i 6.1 support for feature numbers 8236, 8237, 8240, 8241, 8242, 8246, 8252, 8273 and 8274 is via VIOS 2.1.1, or later.

Note: For systems ordered with the Linux operating system, IBM ships the most current versions available from the distributor. If your hardware requires a different version of a Linux OS than that shipped by IBM, you must obtain it via download from the Linux distributor's Web site. Information concerning access to a distributor's Web site is located on the product registration card delivered to you as part of your Linux OS order.

Disclaimer: Some information in this announcement addresses anticipated future capabilities and may be subject to change.

Planning information

Cable orders

No cables are required.

Security, auditability, and control

Security and auditability features include:

- A power-on password function provides control of who has access to the data and server setup program on the server.
- A selectable boot sequence can be used to prevent unauthorized installation of software or removal of data from the diskette drive.

Limitations: The BladeCenter and JS23 and JS43 blades blade have no security-intrusion detection.

The customer is responsible for evaluation, selection, and implementation of security features, administrative procedures, and appropriate controls in application systems and communications facilities.

Global Technology Services

Contact your IBM representative for the list of selected services available in your country, either as standard or customized offerings, for the efficient installation, implementation, and/or integration of this product.

IBM Electronic Services

IBM has transformed its delivery of hardware and software support services to help you achieve higher system availability. Electronic Services is a Web-enabled solution that offers an exclusive, no-additional-charge enhancement to the service and support available for IBM servers. These services are designed to provide the opportunity for greater system availability with faster problem resolution and preemptive monitoring. Electronic Services comprises two separate, but complementary, elements: Electronic Services news page and Electronic Services Agent.

The Electronic Services news page is a single Internet entry point that replaces the multiple entry points traditionally used to access IBM Internet services and support. The news page enables you to gain easier access to IBM resources for assistance in resolving technical problems.

The Electronic Service Agent^{tm} is no-additional-charge software that resides on your server. It monitors events and transmits system inventory information to IBM on a periodic, client-defined timetable. The Electronic Service Agent automatically reports hardware problems to IBM. Early knowledge about potential problems enables IBM to deliver proactive service that may result in higher system availability and performance. In addition, information collected through the Service Agent is made available to IBM service support representatives when they help answer your questions or diagnose problems. Installation and use of IBM Electronic Service Agent for problem reporting enables IBM to provide better support and service for your IBM server.

To learn how Electronic Services can work for you, visit

http://www.ibm.com/support/electronic

Terms and conditions

Volume orders: Contact your IBM representative.

Warranty period

Three years

Warranty service

If required, IBM provides repair or exchange service depending on the types of warranty service specified for the machine. IBM will attempt to resolve your problem over the telephone, or electronically via an IBM Web site. You must follow the problem determination and resolution procedures that IBM specifies. Scheduling of service will depend upon the time of your call and is subject to parts availability. If applicable to your product, parts considered Customer Replaceable Units (CRUs) will be provided as part of the machine's standard warranty service.

Service levels are response-time objectives and are not guaranteed. The specified level of warranty service may not be available in all worldwide locations. Additional charges may apply outside IBM's normal service area. Contact your local IBM representative or your reseller for country- and location-specific information.

CRU Service

IBM provides replacement CRUs to you for you to install. CRU information and replacement instructions are shipped with your machine and are available from IBM upon your request. CRUs are designated as being either a Tier 1 or a Tier 2 CRU.

Tier 1 CRU

Installation of Tier 1 CRUs is your responsibility. If IBM installs a Tier 1 CRU at your request, you will be charged for the installation.

Tier 2 CRU

You may install a Tier 2 CRU yourself or request IBM to install it, at no additional charge.

Based upon availability, CRUs will be shipped for next business day (NBD) delivery. IBM specifies, in the materials shipped with a replacement CRU, whether a defective CRU must be returned to IBM. When return is required, return instructions and a container are shipped with the replacement CRU, you may be charged for the replacement CRU if IBM does not receive the defective CRU within 15 days of your receipt of the replacement.

The following parts have been designated as Tier 1 CRUs:

- Hard disk drive
- Optical drive
- Fan
- I/O adapters
- Operator panel
- PCI adapters
- Power cord
- Power supply
- Processor power regulator
- Service processor

On-site Service

IBM will repair the failing machine at your location and verify its operation. You must provide a suitable working area to allow disassembly and reassembly of the IBM machine. The area must be clean, well lit, and suitable for the purpose.

The service level is

- IBM On-site Repair Limited, 9 hours per day, Monday through Friday, excluding public or national holidays, next-business-day response, Latest Call Registration 15:00

Additional reference for Europe

For additional info, refer to the European HW Operations Guide and Service Level Description Table available at

http://www-5.ibm.com/services/europe/maintenance/

Machine Exchange Service

IBM will initiate shipment of a replacement machine to your location. You are responsible for its installation and verification of operation. You must pack the failed machine into the shipping container that contained the replacement machine and return the failed machine to IBM. Transportation charges, both ways, are paid by IBM. You may be charged for the replacement machine if IBM does not receive the failed machine within 15 days of your receipt of the replacement.

Non-IBM parts service

Warranty service

IBM is now shipping machines with selected non-IBM parts that contain an IBM field replaceable unit (FRU) part number label. These parts are to be serviced during the IBM machine warranty period. IBM is covering the service on these selected non-IBM parts as an accommodation to their customers, and normal warranty service procedures for the IBM machine apply.

International Warranty Service

International Warranty Service (IWS) is available in selected countries or regions.

The warranty service type and the service level provided in the servicing country may be different from that provided in the country in which the machine was purchased.

Under IWS, warranty service will be provided with the prevailing warranty service type and service level available for the IWS-eligible machine type in the servicing country, and the warranty period observed will be that of the country in which the machine was purchased.

To determine the eligibility of your machine and to view a list of countries where service is available, visit

http://www-304.ibm.com/jct01004c/systems/support/supportsite.wss/warrantyform?brandind=5000008

For more information on IWS, refer to Services Announcement ZS01-0168, dated September 25, 2001.

Programs included with this product are licensed under the terms and conditions of the License Agreements that are shipped with the system.

Warranty service upgrades and maintenance service options

Warranty service upgrades:

During the warranty period, a warranty service upgrade provides an enhanced level of On-site Service for an additional charge. A warranty service upgrade must be purchased during the warranty period and is for a fixed term (duration). It is not refundable or transferable and may not be prorated. If required, IBM will provide the warranty service upgrade enhanced level of On-site Service acquired by the customer. Service levels are response-time objectives and are not guaranteed. See the Warranty services section for additional details.

IBM will attempt to resolve your problem over the telephone or electronically by access to an IBM Web site. You must follow the problem determination and resolution procedures that IBM specifies. Scheduling of service will depend upon the time of your call and is subject to parts availability.

CRUs will be provided as part of the machine's standard warranty CRU Service except that you may install a Tier 1 CRU yourself or request IBM installation, at no additional charge, under one of the On-site Service levels specified below.

On-site Service:

IBM will repair the failing machine at your location and verify its operation. You must provide a suitable working area to allow disassembly and reassembly of the IBM machine. The area must be clean, well lit, and suitable for the purpose.

The service level is

- IBM On-site Repair, Same Business Day Onsite Response Time, Latest Call Registration 12:00, 9 hours per day, Monday through Friday, excluding public or national holidays
- IBM On-site Repair, Same Business Day 6 hours average Onsite Response Time, 24 hours per day, Monday through Sunday, 365 days a year

Maintenance services

If required, IBM provides repair or exchange service depending on the types of maintenance service specified for the machine. IBM will attempt to resolve your problem over the telephone or electronically, via an IBM Web site. You must follow the problem determination and resolution procedures that IBM specifies. Scheduling of service will depend upon the time of your call and is subject to parts availability. Service levels are response-time objectives and are not guaranteed.

CRU Service

If your problem can be resolved with a CRU (for example, keyboard, mouse, speaker, memory, or hard disk drive), IBM will ship the CRU to you for you to install. CRU information and replacement instructions are shipped with your machine and are available from IBM at any time on your request.

IBM specifies in the materials shipped with a replacement CRU whether a defective CRU must be returned to IBM. When return is required, return instructions and a container are shipped with the replacement CRU, and you may be charged for the replacement CRU if IBM does not receive the defective CRU within 15 days of your receipt of the replacement.

On-site Service

IBM will repair the failing machine at your location and verify its operation. You must provide a suitable working area to allow disassembly and reassembly of the IBM machine. The area must be clean, well lit, and suitable for the purpose.

The service level is

- IBM On-site Repair Limited, Next Business Day Onsite Response Time, Latest Call Registration 15:00, 9 hours per day, Monday through Friday, excluding public or national holidays
- IBM Onsite Repair, Next Business Day Onsite Response Time, 9 hours per day, Latest Call Registration 15:00, Monday through Friday, excluding public or national holidays
- IBM On-site Repair, Same Business Day Onsite Response Time, Latest Call Registration 12:00, 9 hours per day, Monday through Friday, excluding public or national holidays
- IBM On-site Repair, Same Business Day 6 hours average Onsite Response Time, 24 hours per day, Monday through Sunday, 365 days a year

Maintenance service (ICA)

Maintenance services are available for ICA legacy contracts.

Alternative service (warranty service upgrades)

During the warranty period, a warranty service upgrade provides an enhanced level of On-site Service for an additional charge. A warranty service upgrade must be purchased during the warranty period and is for a fixed term (duration). It is not refundable or transferable and may not be prorated. If required, IBM will provide the warranty service upgrade enhanced level of On-site Service acquired by the customer. Service levels are response-time objectives and are not guaranteed.

IBM will attempt to resolve your problem over the telephone or electronically by access to an IBM Web site. You must follow the problem determination and resolution procedures that IBM specifies. Scheduling of service will depend upon the time of your call and is subject to parts availability.

A CRU will be provided as part of the machine's standard warranty CRU Service except that you may install a Tier 1 CRU yourself or request IBM to install it, at no additional charge, under the type of warranty service specified below, On-site Service.

IBM will repair the failing machine at your location and verify its operation. You must provide a suitable working area to allow disassembly and reassembly of the IBM machine. The area must be clean, well lit, and suitable for the purpose.

See the Pricing section for specific offerings.

Maintenance service

If required, IBM provides repair or exchange service depending on the type of maintenance service specified below for the machine. IBM will attempt to resolve your problem over the telephone or electronically by access to an IBM Web site. You must follow the problem determination and resolution procedures that IBM specifies. Scheduling of service will depend upon the time of your call and is subject to parts availability. Service levels are response-time objectives and are not guaranteed.

Customer Replaceable Unit (CRU) Service

If your problem can be resolved with a CRU (for example, keyboard, mouse, speaker, memory, or hard disk drive). IBM will ship the CRU to you for you to install. CRU information and replacement instructions are shipped with your machine and are available from IBM upon your request.

Based upon availability, CRUs will be shipped for next business day delivery. IBM specifies, in the materials shipped with a replacement CRU, whether a defective CRU must be returned to IBM. When return is required, 1) return instructions and a container are shipped with the replacement CRU and 2) you may be charged for the replacement CRU if IBM does not receive the defective CRU within 15 days of your receipt of the replacement.

See the Pricing section for specific offerings.

Non-IBM parts support

Warranty service

IBM is now shipping machines with selected non-IBM parts that contain an IBM field replaceable unit (FRU) part number label. These parts are to be serviced during the IBM machine warranty period. IBM is covering the service on these selected non-IBM parts as an accommodation to their customers, and normal warranty service procedures for the IBM machine apply.

Warranty service upgrades and maintenance services

Under certain conditions, IBM Integrated Technology Services repairs selected non-IBM parts at no additional charge for machines that are covered under warranty service upgrades or maintenance services.

IBM Service provides hardware problem determination on non-IBM parts (for example, adapter cards, PCMCIA cards, disk drives, or memory) installed within IBM machines covered under warranty service upgrades or maintenance services and provides the labor to replace the failing parts at no additional charge.

If IBM has a Technical Service Agreement with the manufacturer of the failing part, or if the failing part is an accommodations part (a part with an IBM FRU label), IBM may also source and replace the failing part at no additional charge. For all other non-IBM parts, customers are responsible for sourcing the parts. Installation labor is provided at no additional charge, if the machine is covered under a warranty service upgrade or a maintenance service.

Usage plan machine

No

IBM hourly service rate classification

Two

When a type of service involves the exchange of a machine part, the replacement may not be new, but will be in good working order.

Field-installable features

Yes

Model conversions

No

Machine installation

Customer setup. Customers are responsible for installation according to the instructions IBM provides with the machine.

Graduated program license charges apply

Yes

The applicable processor group is C5.

Licensed machine code

IBM Machine Code is licensed for use by a customer on the IBM machine for which it was provided by IBM under the terms and conditions of the IBM License Agreement for Machine Code, to enable the machine to function in accordance with its specifications, and only for the capacity authorized by IBM and acquired by the

customer. You can obtain the agreement or by contacting your IBM representative or visiting

http://www-1.ibm.com/servers/support/machine_warranties/ machine_code.html

Machine using LMC Type Model 7778-23X

IBM may release changes to the Machine Code. IBM plans to make the Machine Code changes available for download from the IBM technical support Web site

http://www-304.ibm.com/jct01004c/systems/support/ supportsite.wss/ docdisplay?lndocid=MIGR- 5069766&brandind=5000020

If the machine does not function as warranted and your problem can be resolved through your application of downloadable Machine Code, you are responsible for downloading and installing these designated Machine Code changes as IBM specifies. If you would prefer, you may request IBM to install downloadable Machine Code changes; however, you may be charged for that service.

Europe Business Partner terms and conditions

For more information, Business Partners should refer to the relevant product exhibits on

https://www.developer.ibm.com/partnerworld/mem/pat/pat_sas.html

Pricing

For all local charges, contact your IBM representative.

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http://www.ibm.com/financing

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Announcement countries

All European, Middle Eastern and African Countries.

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Corrections

(Corrected on June 2, 2009)
A feature name was corrected.

(Corrected on May 13, 2009)
The software requirements were revised.

(Corrected on April 30, 2009)
Information on International Warranty Service (IWS) was added.