

IBM BladeCenter HX5

IBM BladeCenter at-a-glance guide

The IBM® BladeCenter® HX5 server is a blade server based on the fifth generation of the Enterprise X-Architecture®, delivering innovation with enhanced scalability, reliability, and availability features to enable optimal performance for databases, enterprise applications, and virtualized environments.

The IBM BladeCenter HX5 supports up to two processors, either the latest generation of Intel Xeon E7-4800 and E7-2800 series processors or the Intel Xeon 7500 and 6500 series processors. Two HX5 servers can be connected together for a high-performance single image with four processors and up to 512 GB of RAM in a blade form factor. For applications that need to maximize available memory but that do not need four processors, a single HX5 server can be attached to a MAX5 memory expansion blade to form a single image with two processors and up to 640 GB of RAM. This level of processing and memory capacity is ideal for large-scale database or virtualization requirements.

Figure 1 shows the IBM BladeCenter HX5 in the three scalable configurations.



Figure 1. IBM BladeCenter HX5

Did you know

The new models of the HX5 now support up to twice the memory, up to 40% better performance and support for energy-efficient low-power DIMMs.

Locations of key components

Figure 2 shows the inside of the server and indicates key components.

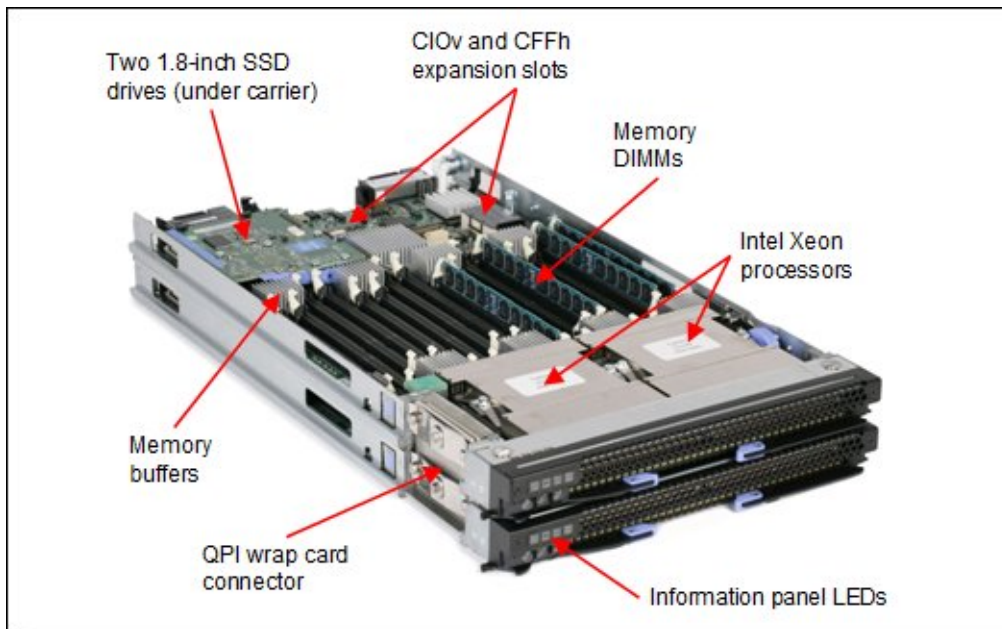


Figure 2. IBM BladeCenter HX5 (two nodes shown)

Figure 3 shows the internals of the MAX5 memory expansion blade. The MAX5 memory expansion blade is a device with the same dimensions as the HX5. When attached it adds an additional 24 DIMM sockets to the blade server.

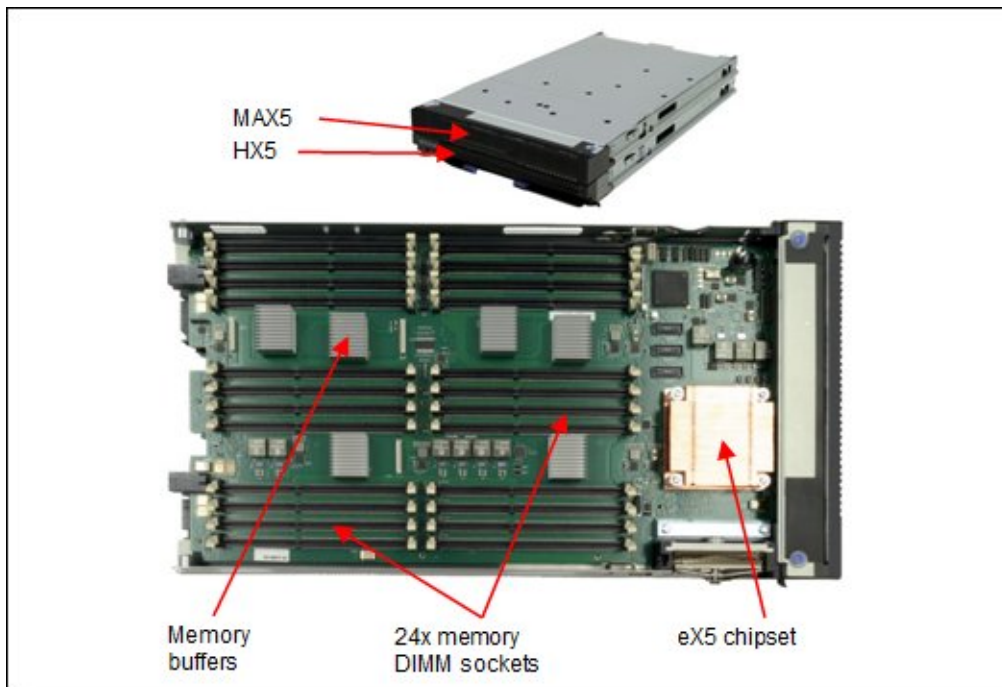


Figure 3. MAX5 memory expansion blade

Standard specifications

Table 1 lists the standard specifications.

Table 1. Standard specifications

Components	Specification
Form factor	Single node: 30 mm blade (single-wide) Two node: 60 mm blade (double-wide) Single node + MAX5: 60 mm blade (double-wide)
Processor (max)	Machine type 7873: Intel Xeon E7-8800, E7-4800, and E7-2800 families, up to 10 cores Machine type 7872: Intel Xeon 7500 and 6500 families, up to eight cores
Number of processors	Up to two processors per single-wide HX5; scalable to four processors
Cache (max)	Machine type 7873: Up to 30 MB per processor Machine type 7872: Up to 24 MB per processor
Memory DIMM sockets	Single node: 16 DIMM sockets Two nodes: 32 DIMM sockets total Single node + MAX5: 40 DIMM sockets total (MAX5 adds 24 sockets.)
Memory (max)	Machine type 7873 supports the use of 16 GB DIMMs: <ul style="list-style-type: none"> ● Single node: 256 GB ● Two nodes: 512 GB ● Single node + MAX5: 640 GB Machine type 7872 supports the use of 8 GB DIMMs: <ul style="list-style-type: none"> ● Single node: 128 GB ● Two nodes: 256 GB ● Single node + MAX5: 320 GB
I/O expansion slots	Single node: One CIOv connector (two ports) and one CFFh connector (four ports) Two nodes: Two CIOv connectors (two ports each) and two CFFh connectors (four ports each) Single node + MAX5: One CIOv connector and one CFFh connector (four ports)
Disk bays (total/hot swap)	Two non-hot-swap bays per single-wide HX5 - supporting solid-state drives
Maximum internal storage	Up to 100 GB of solid-state storage per single-wide HX5 (with 50 GB SSDs)
Network interface	Broadcom 5709S onboard NIC with dual Gigabit Ethernet ports with TOE Some models: Emulex Virtual Fabric 10Gb Expansion Card (CFFh)
RAID support	Optional RAID-0, -1, -1E
Systems management	Integrated systems management processor
OS support	Microsoft Windows, Red Hat Linux, SUSE Linux, VMware
Limited warranty	Three-year customer-replaceable unit and onsite limited warranty

The IBM BladeCenter HX5 is shipped with the following items:

- Documentation CD
- Statement of Limited Warranty
- Important Notices

Standard models

The HX5 are offered either as machine type 8783 with Intel Xeon E7 processors or as machine type 8782 with Intel Xeon 7500 and 6500 processors.

Models with with Intel Xeon E7 processors

As shown in Part 1 of the standard models table, some models optionally support the MAX5 memory expansion unit. If the MAX5 is attached you cannot also attach the two-node scalability kit to form a two-node configuration. The reverse is also true - forming a two-node configuration precludes the use of the MAX5. Models with E7-2800 series processors do not support forming a two-node configuration.

Table 2. Standard models - Machine type 7873 (Intel Xeon E7 processors) (Part 1)

Model	Processor (model, cores, core speed, L3 cache, mem speed) (2 max)	MAX5*	2-node scale kit*	Standard memory	Memory speed‡	Standard networking§	Storage	Drive bays
Models with optional MAX 5								
7873-91x	2x Xeon E7-2830 8C 2.13GHz 24MB 1066MHz	Opt	No support	16x 8GB	1066MHz	2x 1Gb+ 2x 10Gb (E2)	Optional	0 / 2
7873-92x	2x Xeon E7-2830 8C 2.13GHz 24MB 1066MHz	Opt	No support	16x 8GB	1066MHz	2x 1Gb + 2x 10Gb (Q)	Optional	0 / 2
7873-A4x	2x Xeon E7-2830 8C 2.13GHz 24MB 1066MHz	Opt	No support	8x 8 GB	1066MHz	2x 1Gb + 2x 10Gb (B)+ 2x 8Gb FC	2x 50GB MLC SSD†	2 / 2
7873-A5x	2x Xeon E7-2830 8C 2.13GHz 24MB 1066MHz	Opt	No support	16x 8 GB	1066MHz	2x 1Gb + 2x 10Gb (B)+ 2x 8Gb FC	2x 50GB MLC SSD†	2 / 2
7873-A6x	2x Xeon E7-2830 8C 2.13GHz 24MB 1066MHz	Opt	No support	8x 8 GB + 8x 16 GB	1066MHz	2x 1Gb + 2x 10Gb (B)+ 2x 8Gb FC	2x 50GB MLC SSD†	2 / 2
7873-A7x	2x Xeon E7-2830 8C 2.13GHz 24MB 1066MHz	Opt	No support	16x 16GB	1066MHz	2x 1Gb + 2x 10Gb (B)+ 2x 8Gb FC	2x 50GB MLC SSD†	2 / 2
7873-B1x	1x Xeon E7-4807 6C 1.86GHz 18MB 800MHz	Opt	Opt	2x 4GB	800MHz	2x 1Gb	Optional	0 / 2
7873-B2x	1x Xeon E7-4830 8C 2.13GHz 24MB 1066MHz	Opt	Opt	2x 4GB	1066MHz	2x 1Gb	Optional	0 / 2
7873-C1x	1x Xeon E7-8837 8C 2.67GHz 24MB 1066MHz	Opt	Opt	2x 4GB	978MHz	2x 1Gb	Optional	0 / 2
7873-D1x	1x Xeon E7-8867L 10C 2.13GHz 30MB 1066MHz	Opt	Opt	2x 4GB	1066MHz	2x 1Gb	Optional	0 / 2
7873-E1x	2x Xeon E7-4830 8C 2.13GHz 24MB 1066MHz	Opt	Opt	16x 8GB	1066MHz	2x 1Gb + 2x 10Gb (E1)	Optional	0 / 2
7873-E3x	2x Xeon E7-4830 8C 2.13GHz 24MB 1066MHz	Opt	Opt	16x 8GB	1066MHz	2x 1Gb + 2x 10Gb (E2)	Optional	0 / 2
7873-F1x	1x Xeon E7-4830 8C 2.13GHz 24MB 1066MHz	Opt	Opt	2x 4GB	1066MHz	2x 1Gb + 2x 10Gb (E1)	Optional	0 / 2
7873-F2x	1x Xeon E7-4870 10C 2.40GHz 30MB 1066MHz	Opt	Opt	2x 4GB	1066MHz	2x 1Gb + 2x 10Gb (E1)	Optional	0 / 2
7873-H1x	1x Xeon E7-4830 8C 2.13GHz 24MB 1066MHz	Opt	Opt	2x 4GB	1066MHz	2x 1Gb + 2x 10Gb (E2)	Optional	0 / 2

As shown in Part 2 of Table 2, some models include the MAX5 standard. These models do not support the two-node scalability kit to form a two-node system since adding a MAX5 and adding a second node are mutually exclusive.

Part 2 also shows models with standard IBM BladeCenter PCIe Gen 2 Expansion Blade. The models can also either have a MAX5 attached or can be joined to another HX5 to form a two node (but not both at the same time). See the I/O expansion options section in this document for details about the PCIe Gen 2 Expansion Blade.

Table 2. Standard models - Machine type 7873 (Intel Xeon E7 processors) (Part 2)

Model	Processor (model, cores, core speed, L3 cache, mem speed) (2 max)	MAX5*	2-node scale kit*	Standard memory	Memory speed‡	Standard networking§	Storage	Drive bays
Models with standard MAX 5								
7873-93x	2x Xeon E7-8867L 10C 2.13GHz 30MB 1066MHz	Std	No support	HX5: 16x 8GB MAX5: 24x 8GB	1066MHz	2x 1Gb + 2x 10Gb (E2)	Optional	0 / 2
7873-94x	2x Xeon E7-8867L 10C 2.13GHz 30MB 1066MHz	Std	No support	HX5: 16x 8GB MAX5: 24x 8GB	1066MHz	2x 1Gb + 2x 10Gb (Q)	Optional	0 / 2
7873-A1x	2x Xeon E7-2830 8C 2.13GHz 24MB 1066MHz	Std	No support	HX5: 4x 4GB MAX5: None	1066MHz	2x 1Gb	Optional	0 / 2
7873-A2x	2x Xeon E7-2860 10C 2.26GHz 24MB 1066MHz	Std	No support	HX5: 4x 4GB MAX5: None	1066MHz	2x 1Gb	Optional	0 / 2
7873-A3x	2x Xeon E7-2870 10C 2.40GHz 30MB 1066MHz	Std	No support	HX5: 4x 4GB MAX5: None	1066MHz	2x 1Gb	Optional	0 / 2
7873-E2x	2x Xeon E7-2860 10C 2.26GHz 24MB 1066MHz	Std	No support	HX5: 16x 8GB MAX5: 8x 8GB	1066MHz	2x 1Gb + 2x 10Gb (E1)	Optional	0 / 2
7873-E4x	2x Xeon E7-2860 10C 2.26GHz 24MB 1066MHz	Std	No support	28x 8GB	1066MHz	2x 1Gb + 2x 10Gb (E2)	Optional	0 / 2
7873-F3x	2x Xeon E7-4807 6C 1.86GHz 18MB 800MHz	Std	No support	2x 4GB	1066MHz	2x 1Gb + 2x 10Gb (E1)	Optional	0 / 2
7873-G1x	2x Xeon E7-2830 8C 2.13GHz 24MB 1066MHz	Std	No support	HX5: 16x 8GB MAX5: 24x8GB	1066MHz	2x 1Gb + 2x 10Gb (E1)	Optional	0 / 2
7873-H2x	1x Xeon E7-4870 10C 2.40GHz 30MB 1066MHz	Std	No support	HX5: 2x 4GB MAX5: None	1066MHz	2x 1Gb + 2x 10Gb (E2)	Optional	0 / 2
7873-H3x	2x Xeon E7-4807 6C 1.86GHz 18MB 800MHz	Std	No support	HX5: 4x 4GB MAX5: None	800MHz	2x 1Gb + 2x 10Gb (E2)	Optional	0 / 2
Models with standard IBM BladeCenter PCIe Gen 2 Expansion Blade								
7873-G2x	2x Xeon E7-4830 8C 2.13GHz 24MB 1066MHz	Opt	Opt	8x 8GB	1066 MHz	2x 1Gb + 2x 10Gb (E1)	2x 320GB PCIe SSD**	0 / 2
7873-G4x	2x Xeon E7-4830 8C 2.13GHz 24MB 1066MHz	Opt	Opt	8x 8GB	1066 MHz	2x 1Gb + 2x 10Gb (E2)	2x 320GB PCIe SSD**	0 / 2

As shown in Part 3 of the standard models table, Table 3, some models are designed to be used in a two-node configuration. For these models, order one model with the two-node scalability kit and order one model with the same processor without the scalability kit. For example, order model 7873-BAx and 7873-BHx together. These models do not support the use of a MAX5.

Table 2. Standard models - Machine type 7873 (Intel Xeon E7 processors) (Part 3)

Model	Processor (model, cores, core speed, L3 cache, mem speed) (2 max)	MAX5*	2-node scale kit*	Standard memory	Memory speed‡	Standard networking§	Storage	Drive bays
Models for two-node configurations								
7873-BAx	1x Xeon E7-4807 6C 1.86GHz 18MB 800MHz	No support	Std	2x 4GB	800 MHz	2x 1Gb	Optional	0 / 2
7873-BHx	1x Xeon E7-4807 6C 1.86GHz 18MB 800MHz	No support	Connect to BAx	2x 4GB	800 MHz	2x 1Gb	Optional	0 / 2
7873-BBx	1x Xeon E7-4830 8C 2.13GHz 24MB 1066MHz	No support	Std	2x 4GB	1066 MHz	2x 1Gb	Optional	0 / 2
7873-BJx	1x Xeon E7-4830 8C 2.13GHz 24MB 1066MHz	No support	Connect to BBx	2x 4GB	1066 MHz	2x 1Gb	Optional	0 / 2
7873-CAx	1x Xeon E7-8837 8C 2.67GHz 24MB 1066MHz	No support	Std	2x 4GB	978 MHz	2x 1Gb	Optional	0 / 2
7873-CHx	1x Xeon E7-8837 8C 2.67GHz 24MB 1066MHz	No support	Connect to CAx	2x 4GB	978 MHz	2x 1Gb	Optional	0 / 2
7873-DAx	1x Xeon E7-8867L 10C 2.13GHz 30MB 1066MHz	No support	Std	2x 4GB	1066 MHz	2x 1Gb	Optional	0 / 2
7873-DHx	1x Xeon E7-8867L 10C 2.13GHz 30MB 1066MHz	No support	Connect to DAx	2x 4GB	1066 MHz	2x 1Gb	Optional	0 / 2
7873-FAx	1x Xeon E7-4830 8C 2.13GHz 24MB 1066MHz	No support	Std	2x 4GB	1066 MHz	2x 1Gb + 2x 10Gb (E1)	Optional	0 / 2
7873-FHx	1x Xeon E7-4830 8C 2.13GHz 24MB 1066MHz	No support	Connect to FAx	2x 4GB	1066 MHz	2x 1Gb + 2x 10Gb (E1)	Optional	0 / 2
7873-FBx	1x Xeon E7-4870 10C 2.40GHz 30MB 1066MHz	No support	Std	2x 4GB	1066 MHz	2x 1Gb + 2x 10Gb (E1)	Optional	0 / 2
7873-FJx	1x Xeon E7-4870 10C 2.40GHz 30MB 1066MHz	No support	Connect to FBx	2x 4GB	1066 MHz	2x 1Gb + 2x 10Gb (E1)	Optional	0 / 2

* The HX5 supports either a MAX5 or the ability to expand to two nodes via the two-node scalability kit, however both of these are not supported at the same time. Some models have the MAX5 standard (88Y6128) and some models have the two-node scalability kit standard (46M6975)

‡ With Xeon E7 processors, the memory speed in the HX5 and the MAX5 are the same

§ All models contain an onboard 2-port Gigabit Ethernet controller. Some models also include an additional 10Gb Expansion Card installed in the CFFh expansion slot, as follows:

- (B) Broadcom 10Gb Gen2 2-port Ethernet Exp Card (CFFh)
- (E1) Emulex 10GbE Virtual Fabric Adapter Advanced
- (E2) Emulex 10GbE Virtual Fabric Adapter Advanced II
- (Q) QLogic 2-pt 10Gb Converged Network Adapter(CFFh)
- Models 7873-A4x, A5x, A6x and A7x also include a QLogic 8Gb Fibre Channel Expansion Card (CIOv)

** Model 7873-G2x and G3x include the 30 mm IBM BladeCenter PCIe Gen 2 Expansion Blade. The combined server is 60 mm wide (double-wide) and occupies two blade bays in the chassis. The Expansion Blade contains two IBM 320GB High IOPS SD Class SSD PCIe Adapters.

† Models 7873-A4x, A5x, A6x and A7x include two IBM 50GB SATA 1.8" MLC solid-state drives (SSDs) plus the SSD Expansion Card for IBM BladeCenter HX5

Models with Intel Xeon 7500 and 6500 processors

Table 3. Standard models - Machine type 7872 (Intel Xeon 7500 and 6500 processors)

Model	Processor* (2 max)	MAX5	Standard memory	HX5/MAX5 memory speed	Std Eth†	I/O slots	Disk	Drive bays
Models with standard IBM BladeCenter PCIe Gen 2 Expansion Blade								
7872-66x	2x Xeon E7540 6C 2.00GHz 18MB 978MHz	Opt	8x 4 GB	978MHz / 1066MHz	2x1Gb	CIOv, CFFh, 2x PCIe‡	1x 320GB PCIe SSD	0 / 2
Models with standard MAX 5								
7872-63x	2x Xeon E6540 6C 2.00GHz 18MB 978MHz	Std	HX5: 4x 4GB MAX5: None	978MHz / 1066MHz	2x1Gb	CIOv, CFFh	None	0 / 2
7872-68x (V)	2x Xeon E6540 6C 2.00GHz 18MB 105w	Std	HX5: 16x 4GB MAX5: 24x4GB	978MHz / 1066MHz	2x1Gb+ 2x10Gb	CIOv, CFFh	None	0 / 2
7872-6Dx (D)	2x Xeon E6540 6C 2.00GHz 18MB 978MHz	Std	HX5: 4x 4GB MAX5: None	978MHz / 1066MHz	2x1Gb+ 2x10Gb	CIOv, CFFh	None	0 / 2
7872-83x	2x Xeon X6550 8C 2.00GHz 18MB 978MHz	Std	HX5: 4x 4GB MAX5: None	978MHz / 1066MHz	2x1Gb	CIOv, CFFh	None	0 / 2
7872-84x	2x Xeon X7560 8C 2.26GHz 24MB 978MHz	Std	HX5: 4x 4GB MAX5: None	978MHz / 1066MHz	2x1Gb	CIOv, CFFh	None	0 / 2
Models with optional MAX 5								
7872-86x	1x Xeon X7560 8C 2.26GHz 24MB 978MHz	Opt	2x 4 GB	978MHz / 1066MHz	2x1Gb+ 2x10Gb	CIOv, CFFh	None	0 / 2
7872-42x	1x Xeon E7520 4C 1.86GHz 18MB 800MHz	Opt	2x 4 GB	800 MHz / 800 MHz	2x1Gb	CIOv, CFFh	None	0 / 2
7872-61x	1x Xeon E7530 6C 1.86GHz 12MB 978MHz	Opt	2x 4 GB	978 MHz / 978 MHz	2x1Gb	CIOv CFFh	None	0 / 2
7872-64x	1x Xeon E7540 6C 2.00GHz 18MB 978MHz	Opt	2x 4 GB	978MHz / 1066MHz	2x1Gb	CIOv, CFFh	None	0 / 2
7872-65x	1x Xeon E7540 6C 2.00GHz 18MB 978MHz	Opt	2x 4 GB	978MHz / 1066MHz	2x1Gb+ 2x10Gb	CIOv, CFFh	None	0 / 2
7872-82x	1x Xeon L7555 8C 1.86GHz 24MB 978MHz	Opt	2x 4 GB	978 MHz / 978 MHz	2x1Gb	CIOv, CFFh	None	0 / 2

* Processor detail: Model, cores, core speed, L3 cache, memory speed.

† All models contain an onboard 2-port Gigabit Ethernet controller. Some models also include the 2-port Emulex Virtual Fabric 10Gb Expansion Card installed in the CFFh expansion slot.

‡ Model 7872-66x includes the 30 mm IBM BladeCenter PCIe Gen 2 Expansion Blade. The combined server is 60 mm wide (double-wide) and occupies two blade bays in the chassis.

(D) This is designated as a database workload-optimized model.

(V) This is designated as a virtualization workload-optimized model.

Refer to the Standard Specifications section for information about the standard features of the server.

Two-node and MAX5 scaling

The HX5 supports the following scalable configurations:

- A single HX5 server with two processor sockets. This configuration is sometimes referred to as a single-node server. In this configuration, install the IBM HX5 1-Node Speed Burst Card, 59Y5889, for maximum performance.
- A single HX5 server with a single MAX5 memory expansion blade attached. This configuration is sometimes referred to as a memory-expanded server. The server and MAX5 are connected together using the IBM HX5 MAX5 1-node Scalability Kit, 59Y5877.
- Two HX5 servers connected together to form a single image four-socket server. This configuration is sometimes referred to as a two-node server. The two servers are connected together using the IBM HX5 2-Node Scalability Kit, 46M6975.

There are two MAX5 models, one for the HX5 7872 and one for the HX5 7873. The following table lists the models.

Table 4. Options needed for MAX5 scaling

Part number	Description	HX5 7873	HX5 7872	Maximum quantity supported
46M6973	IBM MAX5 for BladeCenter	Supported	Supported	1
88Y6128	IBM MAX5 V2 for BladeCenter	Supported	No	1
59Y5877	IBM HX5 MAX5 1-node Scalability Kit. Used to connect the HX5 to a MAX5.	Supported	Supported	1

The following table lists the two-node scalability options. These options are mutually exclusive. You cannot have a two-node configuration with MAX5 also attached.

Table 5. Options needed for two-node scaling

Part number	Description	Maximum quantity supported
59Y5889	IBM HX5 1-Node Speed Burst Card. Used when the server is not in a two-node or MAX5 configuration.	1
46M6975	IBM HX5 2-Node Scalability Kit: Used to connect two HX5 servers together (without MAX5 units).	1

Chassis support

The HX5 is supported in BladeCenter chassis S, H, and HT (Table 6).

Table 6. Chassis support

Description	BC-E (8677)	BC-S (8886)	BC-H (8852)	BC-HT AC (8750)	BC-HT DC (8740)
HX5 server (1 node and 2 nodes)	No	Yes	Yes*	Yes	No†
HX5+MAX5 server	No	Yes	Yes*	Yes	No†

* HX5 configurations with 130 W processors require that the BladeCenter H has Enhanced Cooling Modules installed (Table 6).

† Support for the BC-HT DC model can be granted for specific configurations via the SPORE process.

The number of HX5 servers supported in each chassis depends on the thermal design power of the processors used in the HX5 servers (Table 7), which uses the following conventions:

- A green square in a cell means that the chassis can be filled with HX5 blade servers up to the maximum number of blade bays in the chassis (for example, 14 blades in the BladeCenter H).
- A yellow square in a cell means that the maximum number of HX5 blades that the chassis can hold is fewer than the total available blade bays (for example, 12 in a BladeCenter H). *All other bays must remain empty.* Empty bays must be distributed evenly between the two power domains of the chassis (for BladeCenter H, bays 1 - 6 and bays 7 - 14).

Table 7. Chassis support (detailed)

Server	Thermal design power (TDP) of the CPUs	Maximum number of servers supported in each chassis						
		BC-S (8886) (6 bays)	BC-H (models other than 4Tx) (14 bays)				BC-H (-4Tx) (14 bays)	BC-HT AC (8750) (12 bays)
			2900 W supplies		2980 W supplies*		2980W	
			Standard blowers	Enhanced blowers†	Standard blowers	Enhanced blowers†	Enhanced blowers†	
HX5 1-node (30 mm)	95 W, 105 W	5	14	14	14	14	14	10
	130 W	4	None‡	10	None‡	12	12	8
HX5 2-node (60 mm)	95 W, 105 W	2	7	7	7	7	7	5
	130 W	2	None‡	5	None‡	6	6	4
HX5 1-node + MAX5 (60mm)	95 W, 105 W	2	7	7	7	7	7	5
	130 W	2	6	6	7	7	7	5
HX5 1-node + 1x BPE4 (60mm)	95 W, 105 W	None‡	7	7	7	7	7	6
	130 W	None‡	7	7	7	7	7	6

* IBM BladeCenter H 2980W AC Power Modules, 68Y6601 (standard in 4Tx, optional with all other BC-H chassis models)

† IBM BladeCenter H Enhanced Cooling Modules, 68Y6650 (standard in 4Tx, optional with all other BC-H chassis models)

‡ Not supported

Processor options

The HX5 supports the processor options listed in the following tables. The server supports one or two processors. It is supported to have one processor in a single-node + MAX5 configuration. It is also supported to have one processor in each node of a two-node system. You will, however, get better memory performance if both processor sockets are populated in each HX5.

Note that not all processors can scale to two nodes. These are indicated in the tables. In addition, the E7-2820 and the E7-2803 also do not support the attachment of the MAX5. This is a technical limitation of these particular processors.

Table 8. Processor options for machine type 7873 (Intel Xeon E7 series processors)

Part number	Intel Xeon processor description	Can scale to two-node	Models where used
88Y6124	Xeon E7-8867L 10C 2.13 GHz 30 MB 1066 MHz 105w	Yes	7873-D1x
88Y6112	Xeon E7-8837 8C 2.67 GHz 24 MB 1066 MHz 130w	Yes	7873-C1x
88Y6160	Xeon E7-4870 10C 2.40 GHz 30 MB 1066 MHz 130w	Yes	7873-F2x
88Y6102	Xeon E7-4860 10C 2.26 GHz 24 MB 1066 MHz 130w	Yes	-
88Y6092	Xeon E7-4850 10C 2.00 GHz 24 MB 1066 MHz 130w	Yes	-
88Y6082	Xeon E7-4830 8C 2.13 GHz 24 MB 1066 MHz 105w	Yes	7873-B2x, F1x, G2x
88Y6076	Xeon E7-4820 8C 2.00 GHz 18 MB 978 MHz 105w	Yes	-
88Y6070	Xeon E7-4807 6C 1.86 GHz 18 MB 800 MHz 95w	Yes	7873-B1x, F3x
88Y6150	Xeon E7-2870 10C 2.40 GHz 30 MB 1066 MHz 130w	No	7873-A3x
69Y3094	Xeon E7-2860 10C 2.26 GHz 24 MB 1066 MHz 130w	No	7873-A2x
69Y3084	Xeon E7-2850 10C 2.00 GHz 24 MB 1066 MHz 130w	No	-
69Y3074	Xeon E7-2830 8C 2.13 GHz 24 MB 1066 MHz 105w	No	7873-A1x
69Y3068	Xeon E7-2820 8C 2.00 GHz 18 MB 978 MHz 105w	No	-
69Y3062	Xeon E7-2803 6C 1.73 GHz 18 MB 800 MHz 105w	No	-

Table 9. Processor options for machine type 7872 (Intel Xeon 7500 and 6500 series processors)

Part number	Intel Xeon processor description	Can scale to two-node	Models where used
46M6960	Xeon X7560 8C 2.26 GHz 24 MB 978 MHz 130w	Yes	7872-84x, 86x
46M6995	Xeon X6550 8C 2.00 GHz 18 MB 978 MHz 130w	No	7872-83x
46M6873	Xeon L7555 8C 1.86 GHz 24 MB 978 MHz 95w	Yes	7872-82x
59Y5859	Xeon E7540 6C 2.00 GHz 18 MB 978 MHz 105w	Yes	7872-66x, 64x, 65x
59Y5899	Xeon E7530 6C 1.86 GHz 12 MB 978 MHz 105w	Yes	7872-61x
46M6863	Xeon E7520 4C 1.86 GHz 18 MB 800 MHz 95w	Yes	7872-42x
46M6955	Xeon E6540 6C 2.00 GHz 18 MB 978 MHz 105w	No	7872-63x, 6Dx, 68x

Memory options

The BladeCenter HX5 and the MAX5 memory expansion blade support DDR3 memory. The server has 16 DIMM sockets and the MAX5 has 24 DIMM sockets. When only one processor is installed, only eight of the 16 DIMM sockets in the server are active (all sockets in the MAX5 are active, however).

The following tables lists memory options available for the HX5 server and for the MAX5 memory expansion unit. Memory must be installed in pairs of two identical DIMMs per processors installed. Although the DIMM pairs installed can be of different sizes, the pairs must be of the same speed. For machine type 7872, the MAX5 supports only a subset of the memory DIMMs listed in Table 8.

Table 10. Memory options for machine type 7873 (Intel Xeon E7 series processors)

Part number	Description	Supported in HX5 7873	Supported in MAX5 V2 88Y6128	Supported in MAX5 V1 46M6973	Maximum quantity supported	Standard models where used
46C0560	2 GB (1x2 GB, 1Rx8, 1.35V) PC3-10600 CL9 ECC DDR3 1333	Yes	Yes	No	16 (+MAX5: 40)	-
46C0564	4 GB (1x4 GB, 2Rx8, 1.35V) PC3-10600 CL9 ECC DDR3 1333	Yes	Yes	No	16 (+MAX5: 40)	All other
46C0570	8 GB (1x8 GB, 4Rx8, 1.35V) PC3-8500 CL7 ECC DDR3 1066	Yes	Yes	No	16 (+MAX5: 40)	7873-G2x
46C0599	16 GB (1x16 GB, 4Rx8, 1.35V) PC3-10600 CL9 ECC DDR3 1066	Yes	Yes	No	16 (+MAX5: 40)	-
44T1596	4GB (1x4GB) 2Rx8 2Gbit PC3-10600 DDR3-1333	No	No	Yes	24 (MAX5 only)	-
46C7499	8GB (1x8GB) 4Rx8 2Gbit PC3-8500 DDR3-1066	No	No	Yes	24 (MAX5 only)	-

Table 11. Memory options for machine type 7872 (Intel Xeon 7500 and 6500 series processors)

Part number	Description	Supported in HX5 7872	Supported in MAX5 46M6973	Maximum quantity supported	Standard models where used
44T1486	2 GB (1x 2 GB) 2Rx8 PC3-10600 CL9 ECC DDR3 1333 MHz VLP RDIMM	Yes	No	16 (MAX5: 40)	-
44T1596	4 GB (1x 4 GB, 2Rx8, 1.5 V) PC3-10600 CL9 ECC DDR3 1333 MHz VLP RDIMM	Yes	Yes	16 (MAX5: 40)	All 7872 models
49Y1555	8 GB (1x 8 GB, 2Rx4, 1.5 V) PC3-10600 CL9 ECC DDR3 1333 MHz VLP RDIMM	Yes	Yes*	16 (MAX5: 40)	-
46C7499	8 GB (1x 8 GB, 4Rx8, 1.5 V) PC3-8500 CL7 ECC DDR3 1066 MHz VLP RDIMM	Yes	Yes	16 (MAX5: 40)	-

* Redundant Bit Steering is supported in the MAX5 when this DIMM is installed exclusively.

The following memory protection technologies are supported:

- ECC
- ChipKill
- Memory Mirroring
- Memory Sparing
- Redundant Bit Steering (MAX5 or servers with E7 processors only, x4 DIMMs only)

Internal disk storage options

The storage system on the HX5 blade is based on the use of the optional SSD Expansion Card for IBM BladeCenter HX5, which contains an LSI 1064E SAS Controller and two 1.8-inch micro SATA drive connectors. The SSD Expansion Card allows the attachment of two 1.8-inch solid state drives (SSDs). If two SSDs are installed, the HX5 supports RAID-0 or RAID-1 capability. The SSD Expansion Card is installed in a dedicated slot (Figure 2) and does not block either the CFFh or the CIOv slot.

Installation of the SSDs in the HX5 requires the SSD Expansion Card for IBM BladeCenter HX5, as listed in the following table. Only one SSD Expansion Card is needed for either one or two SSDs.

Table 12. SSD Expansion Card

Part number	Name	Maximum quantity supported
46M6908	SSD Expansion Card for IBM BladeCenter HX5	1

The following tables list the hard drive options available for internal storage.

Table 13. Disk drive options for internal disk storage for machine type 7873 (Intel Xeon E7 series processors)

Part number	Description	Maximum quantity supported
43W7734	IBM 50 GB SATA 1.8" NHS SSD	2
43W7726	IBM 50 GB SATA 1.8" MLC SSD	2
43W7746	IBM 200 GB SATA 1.8" MLC SSD	2

Table 14. Disk drive options for internal disk storage for machine type 7872 (Intel Xeon 7500 and 6500 series processors)

Part number	Description	Maximum quantity supported
43W7734	IBM 50 GB SATA 1.8" NHS SSD	2

Internal tape drives

The server does not support an internal tape drive option.

Optical drives

The server does not support an optical drive option. However, it does interface to the optical drive installed in the BladeCenter chassis media tray if one is installed there.

External disk storage expansion

The server does not support external storage expansion.

External tape backup

The server supports the external tape attachment options listed in the following table.

Table 15. External tape options

Part number	Description
Tape libraries	
3572-Sxx	IBM System Storage® TS2900 Tape Autoloader
3573-xxx	IBM System Storage TS3100/TS3200 Tape Library (all models)
3576-xxx	IBM System Storage TS3310 Modular Tape Library (all models)
3580-S3x	IBM System Storage TS2230 Tape Drive Express Model
3580-S4x	IBM System Storage TS2240 Tape Drive Model S4E
3584-xxx	IBM System Storage TS3500 Tape Library (all models)

I/O expansion options

The HX5 server offers the following PCI Express 2.0 slots. Neither are hot-swap.

- CIOv expansion slot
- CFFh expansion slot

The CIOv I/O expansion connector provides I/O connections through the midplane of the chassis to modules located in bays 3 and 4 of a supported BladeCenter chassis. It is a PCIe 2.0 x8 slot.

The CFFh I/O expansion connector provides I/O connections to high-speed switch modules that are located in bays 7, 8, 9, and 10 of a BladeCenter H or BladeCenter HT chassis, or to switch bay 2 in a BladeCenter S chassis. The CFFh slot is a PCIe x16 slot.

The MAX5 does not include any I/O expansion slots.

Some models include the IBM BladeCenter PCIe Gen 2 Expansion Blade as standard. This expansion blade is optional on others. The expansion blade provides the capability to attach selected PCI Express cards to the HX5. This capability is ideal for many applications that require special telecommunications network interfaces or hardware acceleration using a PCI Express card.

The expansion blade provides one full-height and full-length PCI Express slot and one full-height and half-length PCI Express slot with a maximum power usage of 75 watts for each slot. It integrates PCI Express card support capability into the BladeCenter architecture. Up to three expansion blades can be attached to a single-node HX5. Up to two expansion blades can be attached to a two-node HX5. The following table lists the external SAS cable for external storage expansion enclosures.

Table 16. External SAS cable for external storage expansion enclosures

Part number	Description	Maximum quantity supported
46M6730	IBM BladeCenter PCI Express Gen 2 Expansion Blade	Single-node HX5: 3 Two-node HX5: 2

For details, see the *IBM BladeCenter PCI Express Gen 2 Expansion Blade at-a-glance guide*, TIPS0783, available at: <http://www.redbooks.ibm.com/abstracts/tips0783.html?Open>

Network adapters

The HX5 offers two integrated Gigabit Ethernet ports, based on the Broadcom BCM5709S controller:

- Failover, adapter fault tolerance
- PXE 2.0 Boot Agent
- Wake on LAN
- Load balancing or teaming

Some models also have an Emulex Virtual Fabric 10Gb Expansion Card installed as standard in the CFFh slot. See Tables 2 and 3 for specific details. For technical details about this card, see the IBM Redbooks® at-a-glance guide *Emulex 10GbE Virtual Fabric Adapter and Virtual Fabric Adapter Advanced for IBM BladeCenter*, TIPS0748, available at <http://www.redbooks.ibm.com/abstracts/tips0748.html?Open>

The following table lists additional supported network adapters.

Table 17. Network adapters

Part number	Description	Slots supported	Maximum supported
10 Gb Ethernet			
42C1830	QLogic 2-pt 10Gb Converged Network Adapter (CFFh)	CFFh	1
46M6164	Broadcom 10Gb Gen2 4-port Ethernet Expansion Card (CFFh)	CFFh	1
46M6168	Broadcom 10Gb Gen2 2-port Ethernet Expansion Card (CFFh)	CFFh	1
49Y4235	Emulex 10GbE Virtual Fabric Adapter`	CFFh	1
49Y4275	Emulex 10GbE Virtual Fabric Adapter Advanced for IBM BladeCenter	CFFh	1
49Y4265	Emulex 10GbE Virtual Fabric Advanced Upgrade for IBM BladeCenter	(license only)	1
1 Gb Ethernet			
44W4475	Ethernet Expansion Card (CIOv)	CIOv	1
44W4479	2/4 Port Ethernet Expansion Card (CFFh)	CFFh	1
Combination Ethernet and Fibre Channel			
44X1940	QLogic Eth and 8Gb Fibre Channel Exp Card (CFFh)	CFFh	1

Storage host bus adapters

The following table lists storage HBAs supported by the HX5 server.

Table 18. Storage adapters

Part number	Description	Slots supported	Maximum quantity supported
Combination Ethernet and Fibre Channel			
44X1940	QLogic Eth and 8Gb Fibre Channel Exp Card (CFFh)	CFFh	1
Fibre Channel			
44X1945	Qlogic 8Gb Fibre Channel Expansion Card (CIOv)	CIOv	1
46M6065	QLogic 4Gb Fibre Channel Expansion Card (CIOv)	CIOv	1
46M6140	Emulex 8Gb Fibre Channel Expansion Card (CIOv)	CIOv	1
InfiniBand			
46M6001	2-port 40Gb InfiniBand Expansion Card (CFFh)	CFFh	1
SAS			
43W4068	SAS Connectivity Card (CIOv)*	CIOv	1
Converged Network Adapters (CNAs)			
42C1830	QLogic 2-pt 10Gb Converged Network Adapter(CFFh)	CFFh	1

* The SSD Expansion Card (46M6908) is required to support the SAS Connectivity Card (CIOv).

PCIe SSD adapters

The server supports the High IOPS SSD adapters listed in the following table. The adapters must be installed in an IBM BladeCenter PCI Express Gen 2 Expansion Blade.

Table 19. SSD adapters

Part number	Description	Slots supported	Max quantity
46M0878	IBM 320GB High IOPS SD Class SSD PCIe Adapter	PCIe Gen 2 Expansion Blade	2

For information about this adapter, see the *IBM High IOPS SSD PCIe Adapters at-a-glance* guide, TIPS0729: <http://www.redbooks.ibm.com/abstracts/tips0729.html?Open>

Power supplies

Server power is derived from the power supplies installed in the BladeCenter chassis. There are no server options regarding power supplies.

Integrated virtualization

The server supports VMware ESXi installed on a USB memory key. The key is installed in a USB socket inside the server. The following table lists the virtualization options. The use of the MAX5 requires that VMware ESXi 4.1 or later be used. Similarly, the HX5 with Xeon E7 processors (machine type 7873) requires VMware ESXi 4.1 and does not support ESXi 4.0.

Table 20. Virtualization options

Part number	Description	Maximum quantity supported
41Y8278	IBM USB Memory Key for VMware Hypervisor ESXi 4.0 (machine type 7872 only)	1
41Y8287	IBM USB Memory Key for VMware ESXi 4.1 (required for MAX5)	1

Remote management

The server contains an IBM Integrated Management Module (IMM), which interfaces with the advanced management module in the BladeCenter chassis. The combination of these two provides advanced service-processor control, monitoring, and an alerting function. If an environmental condition exceeds a threshold or if a system component fails, LEDs on the system board are lit to help you diagnose the problem, records the error in the event log, and alerts you to the problem. A virtual presence capability is also available for remote server management capabilities.

Remote server management is provided through industry-standard interfaces:

- Intelligent Platform Management Interface (IPMI) Version 2.0
- Simple Network Management Protocol (SNMP) Version 3
- Common Information Model (CIM)
- Web browser

The server also supports virtual media and remote control features that provide the following functions:

- Remotely viewing video with graphics resolutions up to 1600x1200 at 75 Hz, regardless of the system state
- Remotely accessing the server using the keyboard and mouse from a remote client
- Mapping the CD or DVD drive, diskette drive, and USB flash drive on a remote client, and mapping ISO and diskette image files as virtual drives that are available for use by the server
- Uploading a diskette image to the IMM memory and mapping it to the server as a virtual drive
- Capture blue-screen errors

Warranty options

The BladeCenter HX5 has a 3-year onsite warranty with 9x5/next-business-day terms. IBM offers the warranty service upgrades through IBM ServicePacs®, discussed in this section. The IBM ServicePac is a series of prepackaged warranty maintenance upgrades and post-warranty maintenance agreements with a well-defined scope of services, including service hours, response time, term of service, and service agreement terms and conditions.

IBM ServicePac offerings are country-specific. That is, each country might have its own service types, service levels, response times, and terms and conditions. Not all covered types of ServicePacs might be available in a particular country. For more information about IBM ServicePac offerings available in your country, see the IBM ServicePac Product Selector at

<https://www.ibm.com/sales/gss/spst/servicepac/extProductSelectorWWW.do>.

The following table explains warranty service definitions in more detail.

Table 21. Warranty service definitions

Term	Description
IBM onsite repair (IOR)	A service technician will come to the server's location for equipment repair.
24x7x2 hour	A service technician is scheduled to arrive at your customer's location within two hours after remote problem determination is completed. We provide service around the clock, every day, including IBM holidays.
24x7x4 hour	A service technician is scheduled to arrive at your customer's location within four hours after remote problem determination is completed. We provide service around the clock, every day, including IBM holidays.
9x5x4 hour	A service technician is scheduled to arrive at your customer's location within four business hours after remote problem determination is completed. We provide service from 8:00 a.m. to 5:00 p.m. in the customer's local time zone, Monday through Friday, excluding IBM holidays. If after 1:00 p.m. it is determined that onsite service is required, the customer can expect the service technician to arrive the morning of the following business day. For noncritical service requests, a service technician will arrive by the end of the following business day.
9x5 next business day	A service technician is scheduled to arrive at your customer's location on the business day after we receive your call, following remote problem determination. We provide service from 8:00 a.m. to 5:00 p.m. in the customer's local time zone, Monday through Friday, excluding IBM holidays.

In general, the types of IBM ServicePacs are:

- Warranty and maintenance service upgrades
 - One, 2, 3, 4, or 5 years of 9x5 or 24x7 service coverage
 - Onsite repair from next business day to 4 or 2 hours
 - One or two years of warranty extension
- Remote technical support services
 - One or three years with 24x7 coverage (severity 1) or 9x5/next business day for all severities
 - Installation and startup support for System x® servers
 - Remote technical support for System x servers
 - Software support - Support Line
 - Microsoft or Linux software
 - VMWare
 - IBM Director

Physical specifications

Dimensions:

- Height: 245 mm (9.7 in)
- Depth: 446 mm (17.6 in)
- Width: 58 mm (2.28 in)

Maximum weight: 9.5 kg (21 lb) (depending on the configuration when options are added)

Regulatory compliance

The server conforms to the following international standards:

- Australia and New Zealand C-Tick Mark, Class A
- CE Mark (EN55022:1998 Class A, EN60950, EN55024:1998, EN61000-3-2 and EN61000-3-3)
- CISPR 22, Class A
- CSA C22.2 No.60950 Safety of Information Technology Equipment 60950
- Canada ICES-003, issue 3, Class A
- China GB 9254-1998, GB17625.1-1998, GB17625.2-1999
- FCC - Verified to comply with Part 15 of the FCC Rules (Class A) prior to product delivery
- FCC - Verified to comply with Part 15 of the FCC Rules, Class A
- IEC 60950 CB Certificate and CB Test Report indicating compliance to Group Differences
- IEC-60950 (CB Certificate and CB Test Report)
- Japan VCCI, Class A
- Korea MIC
- NOM-019 Seguridad de Equipo de Procesamiento de Datos within 30 days of planned availability
- TUV-GS (EN60950/ISO 9241-3/ISO 9241-8)
- Taiwan BSMI CNS13438, Class A
- UL 60950 Safety of Information Technology Equipment

Supported operating systems

The server supports the following operating systems:

- Microsoft Windows Server 2008 HPC Edition
- Microsoft Windows Server 2008 R2
- Microsoft Windows Server 2008, Datacenter x64 Edition
- Microsoft Windows Server 2008, Enterprise x64 Edition
- Microsoft Windows Server 2008, Standard x64 Edition
- Microsoft Windows Server 2008, Web x64 Edition
- Red Hat Enterprise Linux 5 Server with Xen x64 Edition
- Red Hat Enterprise Linux 5 Server x64 Edition
- Red Hat Enterprise Linux 6 Server x64 Edition
- Red Hat Enterprise MRG 1.0 Realtime (x64)
- Solaris 10 Operating System
- SUSE LINUX Enterprise Real Time 10 AMD64/EM64T
- SUSE LINUX Enterprise Server 10 for AMD64/EM64T
- SUSE LINUX Enterprise Server 10 with Xen for AMD64/EM64T
- SUSE LINUX Enterprise Server 11 for AMD64/EM64T
- SUSE LINUX Enterprise Server 11 with Xen for AMD64/EM64T
- VMware ESX 4.0
- VMware ESX 4.1
- VMware ESXi 4.0
- VMware ESXi 4.1

See the IBM ServerProven® website for the latest information about the specific versions and service levels supported and any other prerequisites:

<http://www.ibm.com/systems/info/x86servers/serverproven/compat/us/nos/matrix.shtml>

Related publications and links

For more information see the following resources:

- IBM BladeCenter HX5 product page
<http://ibm.com/systems/bladecenter/hardware/servers/hx5>
- IBM BladeCenter Information Center
<http://publib.boulder.ibm.com/infocenter/bladectr/documentation>
- Installation and User's Guide - IBM BladeCenter HX5
<http://www.ibm.com/support/docview.wss?uid=psg1MIGR-5084612>
- Problem Determination and Service Guide - IBM BladeCenter HX5
<http://www.ibm.com/support/docview.wss?uid=psg1MIGR-5084529>
- ServerProven hardware compatibility page for the HX5
<http://ibm.com/systems/info/x86servers/serverproven/compat/us/blade/7872.html>
- ServerProven compatibility page for operating system support
<http://ibm.com/systems/info/x86servers/serverproven/compat/us/nos/ematrix.shtml>
- *BladeCenter Interoperability Guide*
<http://www.ibm.com/support/docview.wss?uid=psg1MIGR-5073016>
- At-a-glance guides for IBM BladeCenter servers and options
<http://www.redbooks.ibm.com/portals/bladecenter?Open&page=atagance>
- *Configuration and Option Guide*
<http://www.ibm.com/systems/xbc/cog/>
- xRef - IBM System x Reference Sheets
<http://www.redbooks.ibm.com/xref>
- IBM System x Support Portal
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