



IBM Blue Gene/Q supercomputer delivers petascale computing for high-performance computing applications

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At a glance

The Blue Gene/Q is designed to deliver the next-generation supercomputing system with:

- Up to 16,384 cores and 16 TB of memory in a Blue Gene/Q compute rack
- Four-way, hyperthreaded, 64-bit PowerPC® A2 chip technology
- Fiberoptic torus interconnect network
- Water cooling for thermal efficiency
- Air-cooled I/O drawers that contain eight compute cards and eight PCIe slots
- Optional Quad Data Rate InfiniBand or 10 Gigabit Ethernet networking

Overview

The Blue Gene/Q supercomputer is the latest in the generation of the Blue Gene® product family, designed to perform in the petascale range. The system has:

- A 10x power efficiency improvement over Blue Gene/P™
- Increased memory for a total of 16 GB per compute card

The massively parallel supercomputer is designed to handle the most demanding data-intensive applications in the scientific areas of simulations, modeling, data mining, and business intelligence. The Blue Gene/Q supercomputer utilizes a 4-way hyperthreaded, 64-bit PowerPC A2 chip on a compute card with 16-GB memory. Thirty-two compute cards are installed onto a Q32 assembly (node board). Sixteen Q32 assemblies (node boards) are plugged into a mid-plane, and a compute rack can have up to two mid-planes.

The The Blue Gene/Q system is comprised of compute racks and I/O racks. Compute racks contain up to 32 water-cooled node boards for a total of 1024 compute cards, 16,384 cores, and 16 TB of memory per rack. Air-cooled I/O drawers contain eight compute cards and eight PCIe slots for Quad Data Rate InfiniBand or 10 Gigabit Ethernet networking. I/O drawers can be integrated into the compute racks or they can be installed into I/O racks. The system is enabled by a fiberoptic torus interconnect network.

Planned availability date

March 30, 2012

There may be long lead times between order placement and delivery of the system.

Description

The Blue Gene/Q supercomputer is designed to deliver high-performance computing solutions that require massive amounts of compute power, scaling into the petascale range. This is accomplished by clustering together multiple Blue Gene/Q compute racks, each with their 16,384 cores, into a foundation that is matched to the customer's needs. These compute racks are integrated into a system with the fiberoptic torus interconnect cables. The Blue Gene/Q compute racks are uniquely water-cooled for thermal efficiency. The system clock function is controlled and distributed through a network of clock cards and clock cables. Blue Gene/Q I/O racks may also be included as part of the cluster to group together I/O drawers that provide Quad Data Rate InfiniBand or 10 Gigabit Ethernet networking. The system is managed by the service nodes, which are dedicated Power Systems™ servers. The service nodes are connected to the Blue Gene/Q racks through an ethernet network.

Accessibility by people with disabilities

A US Section 508 Voluntary Product Accessibility Template (VPAT) containing details on accessibility compliance can be requested at

http://www.ibm.com/able/product_accessibility/index.html

Section 508 of the US Rehabilitation Act

Blue Gene/Q supercomputer is capable as of March 30, 2012, when used in accordance with associated IBM® documentation, of satisfying the applicable requirements of Section 508 of the Rehabilitation Act, provided that any assistive technology used with the product properly interoperates with it. A US Section 508 Voluntary Product Accessibility Template (VPAT) can be requested via the IBM website

http://www-03.ibm.com/able/product_accessibility/index.html

Product number

The following are newly announced features on the specific models of the Power Systems 0207 machine type.

Description	MT	Model	Feature
Blue Gene/Q	0207	200	
10 meter 10Gb ethernet optical cable	0207	200	0023
20 meter 10Gb ethernet optical cable	0207	200	0024
40 meter 10Gb ethernet optical cable	0207	200	0025
One CSC Billing Unit	0207	200	0100
Ten CSC Billing Units	0207	200	0110
16 Q32 Asm, 4 I/O drawer enabled board	0207	200	0205
16 Q32 Asm, 16 I/O drawer enabled board	0207	200	0206
Blue Gene/Q Compute rack with two mid-planes and associated power	0207	200	0207
I/O Enclosure for Compute Rack	0207	200	0208
I/O Drawer Asm, 8 compute cards, 16GB Mem	0207	200	0209
Blue Gene/Q compute rack with one mid-plane and associated power	0207	200	0210
Line cord - 480 VAC, 3 phase, 6AWG/5-wire, 14' with 60A plug	0207	200	0212

Line Cord - 380 - 415 VAC, 3 phase, 6AWG/5-wire, 14' with 63A plug	0207	200	0213
Coolant Supply/Return Hoses, 14'	0207	200	0214
I/O 19 inch rack with bulk power	0207	200	0215
Clock Card	0207	200	0217
Clock Cable, Master Clock	0207	200	0218
Clock Distribution Cable	0207	200	0219
Power Cord, I/O Drawer, short	0207	200	0220
Power Cord, I/O Drawer, long	0207	200	0221
48 Fiber Cable, 2.2 meters, violet	0207	200	0222
48 Fiber Cable Bundle, 8.4 meters, blue	0207	200	0223
48 Fiber Cable Bundle, 10.4 meters, green	0207	200	0224
48 Fiber Cable Bundle, 12.9 meters, yellow	0207	200	0225
48 Fiber Cable Bundle, 17.7 meters, orange	0207	200	0226
12 Fiber Cable Bundle, 4.3 meters, brown	0207	200	0227
12 Fiber Cable, 26.6 meters, grey	0207	200	0229
12 Fiber Cable, 10.3 meters, orange	0207	200	0232
12 Fiber Cable, 18.7 meters, red	0207	200	0233
12 Fiber Cable Bundle, 4.9 meters, blue	0207	200	0234
10 meter Quad Data Rate InfiniBand Optical Cable, QSFP/QSFP	0207	200	0235
20 meter Quad Data Rate InfiniBand Optical Cable, QSFP/QSFP	0207	200	0236
40 meter Quad Data Rate InfiniBand Optical Cable, QSFP/QSFP	0207	200	0237
Compute rack covers, first rack in a row	0207	200	0238
Compute rack covers, additional racks in a row	0207	200	0239
Single-Port 4X Quad Data Rate InfiniBand Adapter	0207	200	0240
Dual port 10Gb ENET PCIe2	0207	200	0241
Combo 4x QSFP IB, 10Gb ethernet	0207	200	0242
10/100 Copper ethernet cable, 15 foot, grey	0207	200	0243
Ethernet cable 30 ft. grey	0207	200	0244
Ethernet cable 45 ft. grey	0207	200	0245
Ethernet cable 60 ft. grey	0207	200	0246
Ethernet cable 85 ft. grey	0207	200	0247
Ethernet cable 110 ft. grey	0207	200	0248
Clock Power® Cable, short	0207	200	0249
Clock Power Cable, long	0207	200	0250
Lift Tool and ladders, Blue Gene/Q, US	0207	200	0251
Lift Tool and ladders, Blue Gene/Q, World Trade	0207	200	0252
48 Fiber Cable Bundle, 22.7 m r	0207	200	0253

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 0207-200 rack related features

From feature conversion	To feature conversion	Returned parts
0210 - Blue Gene/Q Compute rack with one mid-plane and associated power	0207 - Blue Gene/Q Compute rack with two mid-planes and associated power	No

Supplemental information

Reliability, availability, and serviceability (RAS)

The reliability of the Blue Gene/Q supercomputer starts with components, devices, and subsystems that are designed to be fault-tolerant. Blue Gene/Q uses lower voltage technology in the processor SCMs that improves reliability stacked latches to reduce soft error (SER) susceptibility. During the design and development process, subsystems go through rigorous verification and integration testing processes. During system manufacturing, systems go through a thorough testing process to help ensure high product quality levels.

The processor and memory subsystem contains a number of features designed to avoid or correct environmentally induced, single-bit, intermittent failures as well as handle solid faults in components, including selective redundancy to tolerate certain faults without requiring an outage or parts replacement.

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

Blue Gene/Q (0207-200) system racks:

Maximum compute rack configuration

Height 2095.5 mm (82.5 inches)

Width 1219.2 mm (48 inches)

Depth 1321 mm (52 inches)

Weight 2159 kg (4750 lbs)

Maximum I/O rack configuration

Height 2015 mm (79.3 inches)
Width 644 mm (25.4 inches)
Depth 1098 mm (43.4 inches)
Weight 789 kg (1739 lbs)

Operating environment

- Temperature: 15 to 32 degrees C (59 to 89.6 degrees F)
- Relative humidity: Noncondensing 20% to 80%
- Maximum dew point: 17 degrees C (62.6 F)

Power requirements

- Operating voltage (3-phase V ac at 50/60 Hz): 380 to 415 V; 480 V
- Rated current

Compute rack configuration:

380 to 415 v ac 41 A

480 v ac 32 A

I/O rack configuration:

380 to 415 v ac 25 A

480 v ac 20 A

EMC conformance classification

This equipment is subject to FCC rules and shall comply with the appropriate FCC rules before final delivery to the buyer or centers of distribution.

- US: FCC CFR, Title 47, Part 15, EMI Class A
- EEA, Turkey: EU Council Directive 2004/108/EC, EMI Class A
- Japan: VCCI Council, EMI Class A
- China (PRC): CPCS, EMI Class A
- Australia and \New Zealand: ACMA, EMI Class A
- Canada: ICES-003, EMI Class A
- Russia: GOST R, EMI Class A
- Saudi Arabia: MoCI, EMI Class A

Product safety/Country testing/Certification

- UL 60950-1:2007 (2nd Edition) Information Technology Equipment - Safety
- CAN/CSA-22.2 No. 60950-1-07 (2nd Edition)
- IEC 60950-1:2005+A1:2009 + all Group and National Differences
- EN 60950-1:2006+A11+A1+A12 (evaluation only)

General requirements

The product is in compliance with IBM Corporate Bulletin C-B 0-2594-000 Statement of Conformity of IBM Product to External Standard (Suppliers Declaration).

Hardware requirements

Minimum system configuration

The minimum configuration for a Blue Gene/Q (0207-200) Compute rack includes the following items. Features identified with an asterisk allow alternate features to be selected for minimum configuration requirements.

- 1X - Blue Gene/Q (0207-200)
- 1X - BG/Q Compute rack, 1 mid-plane (#0210) *
- 1X - Compute rack covers, 1st rack (#0238) *
- 1X - 16 Q32, 4 I/O dwr bd (#0205) *
- 1X - Coolant Supply/Return Hoses (#0214)
- 2X - Line Cord - 480 VAC, 14' (#0212) *

The minimum configuration for a Blue Gene/Q (0207-200) I/O rack includes the following items. Features identified with an asterisk allow alternate features to be selected for minimum configuration requirements.

- 1X - Blue Gene/Q (0207-200)
- 1X - I/O 19 inch rack with power (#0215)
- 1X - I/O Drawer Asm 16GB Mem (#0209)
- 1X - Power Cord, I/O Drawer, short (#0220)
- 8X - Dual port 10Gb ENET PCIe2 (#0241) *
- 1X - Line Cord - 480 VAC, 14' (#0212) *

When an order of a machine type/model 0207-200 is created, the validation rules are based upon the rack feature code on the order. There are two feature codes for compute rack configurations. Feature #0210 BG/Q Compute rack with one mid-plane and power, or #0207 BG/Q compute rack with two mid-planes and power. There is one feature code #0215 for the I/O rack configuration.

The IBM Deep Computing Sales team will work with the customer requirements to design the component content for the implementation of the Blue Gene/Q system, including compute racks, I/O racks, interconnect cables, the system service node servers, physical planning details including water-cooling requirements for the compute racks.

Planning information

Cable orders

No additional cables are required.

Security, auditability, and control

This product uses the security and auditability features of host software and application software.

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

Terms and conditions

Volume orders: Contact your IBM representative.

IBM Global Financing

Yes

Warranty period

One year. An IBM part or feature installed during the initial installation of an IBM machine is subject to a full warranty effective on the date of installation of the machine. An IBM part or feature that replaces a previously installed part or feature assumes the remainder of the warranty period for the replaced part or feature. An IBM part or feature added to a machine without replacing a previously installed part or feature is subject to a full warranty effective on its date of installation. Unless specified otherwise, the warranty period, type of warranty service, and service level of a part or feature are the same as those for the machine in which it is installed.

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.

Service level is 9 hours per day, Monday through Friday, excluding holidays, next business day response. Calls must be received by 5:00 p.m. local time in order to qualify for next-business-day response.

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.

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 website. 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. The specified level of maintenance service may not be available in all worldwide locations. Additional charges may apply outside normal IBM service area. Contact your local IBM representative or your reseller for country- and location-specific information. The following service selections are available as maintenance options for your machine type.

Onsite 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.

Non-IBM parts service

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

This service includes hardware problem determination (PD) on the non-IBM parts (for example, adapter cards, PCMCIA cards, disk drives, and memory) installed within IBM machines 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.

Warranty service upgrades

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

Installation is performed by IBM. IBM will install the machine in accordance with the IBM installation procedures for the machine. In the United States, contact IBM at 800-IBM-SERV (426-7378) and in other countries contact the local IBM office.

The Machine Installation Guide specifies site preparation, physical requirements and installation (operating) environment and any cabling included in the installation along with the approximate installation time in hours. Customer requests for installation of items not covered in the installation guide may be performed at IBM's hourly service rate designated for the machine.

Graduated program license charges apply

Yes. The applicable processor tier is medium.

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 by contacting your IBM representative or visiting

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

Machine using LMC: Type Model 0207-200

IBM may release changes to the machine code. IBM plans to make the machine code changes available for download from the IBM technical support website

<http://www-933.ibm.com/support/fixcentral/>

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.

Educational allowance

A reduced charge is available to qualified education customers. The educational allowance may not be added to any other discount or allowance.

The educational allowance is 5% for the products in this announcement.

Pricing

For additional information and current prices, contact your local IBM representative.

Product charges

The following are newly announced features on the specific models of the Power Systems 0207 machine type.

Description	Model Number	Feature Numbers	Initial MES/Both/Support	CSU	RP MES
0207-200					
10 meter 10G optical cable	200			No	
20 meter 10G optical cable	200	0023	Both	No	No
40 meter 10G optical cable	200	0024	Both	No	No
One CSC Billing Unit	200	0025	Both	No	No
Ten CSC Billing Units	200	0100	Both	No	No
16 Q32, 4 I/O dwr bd	200	0110	Both	No	No
16 Q32, 16 I/O dwr bd	200	0205	Both	No	No
BG/Q Compute rack, 2 mid-planes	200	0206	Both	No	No
I/O Enclosure for Compute rack	200	0207	Initial	No	No
I/O Drawer Assembly	200	0208	Both	No	No
BG/Q Compute rack, 1 mid-plane	200	0209	Both	No	No
Line Cord - 480 VAC, 14'	200	0210	Initial	No	No
Line Cord - 380-415 VAC, 14'	200	0212	Both	No	No
Coolant Supply/Return Hoses	200	0213	Both	No	No
I/O 19 inch rack with power	200	0214	Both	No	No
Clock Card	200	0215	Initial	No	No
Clock Cable, Master Clock	200	0217	Both	No	No
Clock Distribution Cable	200	0218	Both	No	No
Power Cord, I/O Drawer, short	200	0219	Both	No	No
Power Cord, I/O Drawer, long	200	0220	Both	No	No
48 Fiber Cable, 2.2 m	200	0221	Both	No	No
48 Fiber Cable Bundle, 8.4 m	200	0222	Both	No	No
	200	0223	Both	No	No

48 Fiber Cable Bundle, 10.4 m	200	0224	Both	No	No
48 Fiber Cable Bundle, 12.9 m	200	0225	Both	No	No
48 Fiber Cable Bundle, 17.7 m	200	0226	Both	No	No
12 Fiber Cable Bundle, 4.3 m	200	0227	Both	No	No
12 Fiber Cable 26.6 m	200	0229	Both	No	No
12 Fiber Cable 10.3 m	200	0232	Both	No	No
12 Fiber Cable 18.7 m	200	0233	Both	No	No
12 Fiber Cable Bundle, 4.9 m	200	0234	Both	No	No
10 m QDR IB Cable QSFP/QSFP	200	0235	Both	No	No
20 m QDR IB Cable QSFP/QSFP	200	0236	Both	No	No
40 m QDR IB Cable QSFP/QSFP	200	0237	Both	No	No
Compute rack covers, 1st rack	200	0238	Both	No	No
Compute rack covers, add'l	200	0239	Both	No	No
4X QDR IB Adapter	200	0240	Both	No	No
Dual port 10Gb ENET PCIe2	200	0241	Both	No	No
Combo 4x QSFP IB, 10Gb enet	200	0242	Both	No	No
Ethernet cable 15 ft grey	200	0243	Both	No	No
Ethernet cable 30 ft. grey	200	0244	Both	No	No
Ethernet cable 45 ft. grey	200	0245	Both	No	No
Ethernet cable 60 ft. grey	200	0246	Both	No	No
Ethernet cable 85 ft. grey	200	0247	Both	No	No
Ethernet cable 110 ft. grey	200	0248	Both	No	No
Clock Power Cable, short	200	0249	Both	No	No
Clock Power Cable, long	200	0250	Both	No	No
Lift Tool, ladders, BG/Q, US	200	0251	Both	No	No
Lift Tool, ladders, BG/Q, WT	200	0252	Both	No	No
48 Fiber Cable Bundle, 22.7 m	200	0253	Both	No	No

Feature conversions

Feature conversions for 0207-200 rack related features

From feature conversion	To feature conversion	Parts Returned
0210 - Blue Gene/Q Compute rack with one mid-plane and associated power	0207 - Blue Gene/Q Compute rack with two mid-planes and associated power	No

ServicePac prices

For ServiceElect (ESA) maintenance service charges, contact IBM Global Services at 888-IBM-4343 (426-4343).

IBM Global Financing

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<http://www.ibm.com/financing>

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<http://www.ibm.com/planetwide/us/>

Corrections

(Corrected on May 7, 2012)

The Technical information section was revised.