IBM Intelligent Cluster portfolio expands with portfolio enhancements from Mellanox, Brocade, LSI, and NetApp

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At a glance

The Intelligent Cluster™ portfolio has been enhanced with new InfiniBand and Ethernet switches.

The Intelligent Cluster offering solutions are built on:

- Rack-optimized servers from IBM®
- Industry-leading interconnections
- IBM service options: three-year on-site¹ limited warranty²

They offer easy-to-order, robust factory-built configurations supported by IBM.

Overview

Intelligent Cluster solutions, based on leading-edge technology, deliver high performance with award-winning energy and space efficiencies.

These comprehensive solutions can help simplify and expedite deployment of a Linux™ or Microsoft™ Windows™ high-performance computing (HPC) cluster. IBM combines all hardware, software, services, and support into a single integrated product offering, providing the benefit of a single point of contact for the entire cluster and eliminating the need to deal with multiple vendors for individual components.

The Intelligent Cluster is an outstanding choice for any organization that recognizes the economic advantages of a reduced time to deployment of an HPC cluster but has concerns about the time and technical resources required for the end-to-end implementation.

New offerings for Intelligent Cluster portfolio

Mellanox

- Mellanox SX6518 324 Port FDR IB Switch (0724-030)
  The SX6518 switch system provides a fabric solution in a 16U form factor by delivering 36.3Tb/s of non-blocking bandwidth with 170 ns to 510 ns port latency with up to 56Gb/s full bi-directional bandwidth per port.

Brocade
• Brocade ICX 6610 Switch (0563-042 and -043)
  The Brocade ICX 6610 delivers wire-speed, non-blocking performance across all ports to support latency-sensitive applications such as real-time voice and video streaming and VDI. Brocade ICX 6610 Switches can be stacked using four full-duplex 40 Gbps stacking ports that provide 320 Gbps of backplane stacking bandwidth with full redundancy, eliminating inter-switch bottlenecks. Additionally, each switch can provide up to eight 10 Gigabit Ethernet (GbE) ports for high-speed connectivity to the aggregation or core layers.

LSI

• LSI SAS 9201-16e HCA 16 Port SAS Switch (00Y3535)
  The SAS 9201-16e is a 16-port 6Gb/s PCIe Host Bus Adapter. It is a full height adapter with four external mini-SAS connectors.

• LSI SAS 9206-16e HCA 16 Port SAS Switch (00Y3539)
  The LSI SAS 9206-16e is a quad-port PCI Express® 3.0 Host Bus Adapter. The LSI SAS 9206-16e provides 16 lanes of 6Gb/s SAS data transfer rates. It has four external HD mini-SAS connectors.

NetApp

• NetApp DE6600 SAS Disk Controller JBOD (0796-011, -012, -013, and -014)
  This 4U Disk Enclosure is available only as a component of a hardware GPFS™ solution released by Intelligent Clusters and sold only as part of the solution, not stand alone. There are four fully configured JBODs in this offering.
    - IBM System x® GPFS Storage Server (58x2TB) (0796-011)
    - IBM System x GPFS Storage Server (58x2TB+2x200GB SSD) (0796-012)
    - IBM System x GPFS Storage Server (58x3TB) (0796-013)
    - IBM System x GPFS Storage Server (58x3TB+2x200GB SSD) (0796-014)

Note: Some products may not be available in every country.
1 You may be asked certain diagnostic questions before a technician is sent.
2 For information on IBM's Statement of Limited Warranty, contact your IBM representative or reseller. Copies are available upon request.

Key prerequisites

• Device drivers, as required

Planned availability date

November 16, 2012

Description

IBM Intelligent Cluster description

Computing applications or environments often have more requirements than an individual computer or server can address. These requirements may be best addressed by several computers working together. A cluster is a group of interconnected individual computers, working together on a single problem, or consolidating workloads from multiple servers. Although these computers can operate individually, they are managed from a single point of control using cluster management software.
The Intelligent Cluster offering, a high-performance scalable cluster, is built on:

- Intel Xeon™ processors
- AMD Opteron processor-based, rack-optimized, and blade-based servers

The Intelligent Cluster supports Microsoft HPC Server 2008, SUSE Linux Enterprise Server (SLES) 11 (64-bit) service pack 2, and Red Hat Enterprise Linux 6.2. All hardware components are configured and integrated into racks in the factory prior to shipment. You must obtain the prerequisite version of the Linux operating system and device drivers as specified by IBM.

- Either you or a qualified IBM Business Partner can install the required software.
- You can use the optional installation services to have IBM install the operating system, device drivers, and General Parallel File System (GPFS).

For intensive storage applications, IBM provides a service for all cluster hardware components and IBM software during the applicable warranty period. The IBM Intelligent Cluster warranty support does not include support for the software. Software service and support can be purchased separately through an optional IBM Support Line service.

**System x iDataPlex description**

**Flex nodes**

Technology for flexible node configurations enables the servers for iDataPlex® to be configured in numerous ways. In addition to compute-oriented configurations, the iDataPlex solution offers a storage-rich configuration.

**System x iDataPlex 2U Flex Chassis**

- One or two server nodes
- Support for both high-performance SAS and low-cost, high-capacity SATA HDDs
- High-density storage offering
- Shared high-efficiency power supply
- Shared low-power-consuming fans
- Choice of SAS, Ethernet, or iSCSI host interface

**Additional enhancements**

For a listing of hardware components, refer to the **Overview** section.

The Intelligent Cluster offerings include an expanded array of hardware from other vendors, along with new features to help boost productivity for data centers.

**New offerings for Intelligent Cluster portfolio**

**Switch descriptions**

**Note:** A new switch description nomenclature is being introduced to help describe key information about the switch regarding airflow. PSE, oPSE, and SE are being added to the end of 1U switch descriptions.

- Port-side exhaust (PSE) airflow is typically installed in an enterprise rack such as the IBM 1410 rack family.
- Opposite port-side exhaust (oPSE) airflow is typically installed in an iDataPlex rack.
- Side exhaust (SE) is typically installed in an iDataPlex rack, but depending on the switch can also be installed in an Enterprise rack.
The suffixes do not necessarily determine rack support. Each switch is evaluated on its own merit for rack support.

**Mellanox portfolio**

- **Mellanox SX6518 324 Port FDR IB Switch (0724-030 FC A3FT)**

  The SX6518 switch offers the highest-performing fabric solution by delivering high bandwidth and low latency to EDCs and HPC. High-P Networks built with the SX6518 can carry converged traffic with the combination of assured bandwidth and granular quality of service. Built with the Mellanox fifth-generation SwitchX InfiniBand switch device, the SX6518 provides up to 56 Gb/s (FDR) full bisectional bandwidth per port. The SX6518 supports a superior scalable platform that increases as the number of nodes per cluster and number of cores per node increases. This modular chassis switch is an ideal choice for building medium- to large-size clusters or for use as a core switch for very large clusters.

  Features include:
  - 324 FDR (56 Gb/s) ports in a 16U switch chassis
  - 72.52 TB/s switching capacity
  - 170 ns to 510 ns switching latency
  - FDR/FDR10 support for FEC
  - IBTA Specification 1.3- and 1.2.1-compliant
  - QoS enforcement
  - Port mirroring
  - Adaptive routing
  - Congestion control
  - Reversible air flow
  - Redundant power supplies
  - Replaceable fan drawers

  **Management**
  - Integrated subnet manager agent (up to 324 nodes)
  - Fast and efficient fabric bring-up
  - Comprehensive chassis management
  - Mellanox API for third-party integration
  - Intuitive CLI and GUI for easy access
  - Optional Mellanox Unified Fabric Manager (UFM)
  - Temperature sensors and voltage monitors
  - Fan speed controlled by management software

**Brocade**

- **Brocade ICX 6610 Switch Chassis (0563-042 and -043)**

  Highlights:
  - Delivers chassis-level performance and availability, providing an optimal user experience for streaming video, VDI, UC, and other critical applications
  - Offers stacking performance with 320 Gbps of stacking bandwidth, eliminating inter-switch bottlenecks
  - Provides up to 1 Tbps of total switching capacity with up to 384 1 GbE and 64 10 GbE per stack for campus network edge and aggregation layers
  - Provides unmatched availability with four redundant 40 Gbps stacking ports per switch, hitless stacking failover, hot switch replacement, and dual hot-swappable power supplies and fans
- Simplifies network operations and protects investments with Brocade HyperEdge technology, enabling single-point network lifecycle management and advanced services sharing across a heterogeneous stack

Form factor: 1U

Dimensions and weight:
- Width: 429 mm (16.880 in.)
- Height: 44 mm (1.732 in.)
- Depth: 406.4 mm (16.00 in.)
- Weight: 6.78 kg (14.95 lb)

**LSI**
- **LSI SAS9201-16e Quad-port mini-SAS x8 PCIe 2.0 SAS HBA**
  
The LSI SAS 9201-16e, quad-port, host bus adapter provides connectivity and performance for external JBOD and external RAID enclosures. The LSI SAS 9201-16e provides 16 lanes of 6Gb/s SAS connectivity to 8 lanes of PCI Express 2.0. The HBA supports up to 512 SAS or SATA devices.

  The LSI SAS 9201-16e has four (x4) external mini-SAS connectors (SFF8088) enabling a solution which provide SAS and SATA data transfer rates of 1.5, 3, and 6Gb/s per lane.

  Connector - x4 external mini-SAS

- **LSI SAS9206-16e quad-port x4 HD mini-SAS x8 PCIe 3.0 SAS HBA**
  
The LSI SAS 9206-16e, quad-port, host bus adapter provides high performance for high-end servers and storage applications. The LSI SAS 9206-16e provides 16 lanes of 6Gb/s SAS data transfer rates. The adapter complies with the latest PCI Express 3.0 specification with 8Gb/s per lane. The adapter is backward compatible with previous PCIe generations and provides SAS and SATA data transfer rates of 6 and 3Gb/s per lane through automatic speed negotiation. The LSI SAS 9206-16e has four (x4) external HD mini-SAS connectors (SFF8644) enabling a low-profile solution and can achieve over 1 million IOPs.

  Connector - x4 external HD mini-SAS

**NetApp**
- **NetApp DE6600 SAS Disk Controller JBOD (0796-011, -012, -013, and -014)**
  
  This 4U Disk Enclosure is available only as a component of a hardware GPFS solution released by Intelligent Clusters and sold only as part of the solution, not stand alone. There are four fully configured JBODs in this offering.

  - IBM System x GPFS Storage Server (58x2TB) (0796-011)
  - IBM System x GPFS Storage Server (58x2TB+2x200GB SSD) (0796-012)
  - IBM System x GPFS Storage Server (58x3TB) (0796-013)
  - IBM System x GPFS Storage Server (58x3TB+2x200GB SSD) (0796-014)

  This System x storage solution consists of fully populated JBODs, racked System x 3650 M4 servers, and a networking infrastructure integrated in 1410 racks. When deployed with GPFS, this design provides performance benefits for workloads such as Hadoop and Big Data.

**IBM Platform Computing**

Platform Computing simplifies and accelerates deployment and management of high-performance clusters, grids, and clouds. Platform Computing products can optimize the deployment of complex applications and workloads in many of the
Many organizations face the constant challenge of managing the cost and complexity associated with managing, maintaining, and analyzing massive amounts of data across multiple environments. Platform Computing can help simplify the setup, integration, and resource management of heterogeneous infrastructure while driving up server utilization, accelerating application performance, and helping to greatly improve time to results. Business value is delivered in days versus weeks or months.

Product portfolio

Platform Computing delivers a focused technical computing management software portfolio ideal for engineering, financial services, digital media, oil and gas, life sciences, government laboratories, and other research and development organizations in need of simplified, high-performance, and agile systems workload and resource management. This includes:

- **IBM Platform LSF® product family**: Enables powerful workload management for demanding, distributed, and mission-critical, high-performance technical computing environments. Compared to other solutions that lack key components and vendor support, Platform LSF includes a comprehensive set of intelligent, policy-driven scheduling features. It is designed to enable optimal utilization of all compute infrastructure resources while increasing application throughput, helping to ensure a high return on investment.

- **Platform HPC**: Its robust cluster and workload management capabilities are accessible using the latest design in web-based interfaces, making it powerful, yet easy to use. The result is shorter time to system readiness and productivity as well as optimal application throughput for reduced time to results. Backed by the industry's best customer support, Platform HPC incorporates nearly two decades of product and technology leadership.

- **Platform Symphony®**: Enables enterprise-class management for running distributed application services on a scalable, shared, heterogeneous grid. It accelerates a wide variety of compute and data-intensive applications, quickly computing results while making optimal use of available infrastructure. Unlike other solutions that perform poorly or lack dynamic resource sharing, Platform Symphony's efficient low-latency middleware and scheduling architecture is designed to deliver the performance and agility required to predictably meet and exceed throughput goals for the most demanding analytic workloads, including Hadoop MapReduce applications.

- **IBM Platform Cluster Manager**: Provisions, runs, manages, and monitors high-performance computing clusters. This first release, Platform Cluster Manager Advanced Edition, automates assembly of multiple high-performance technical computing environments on a shared compute infrastructure for use by multiple teams. It creates an agile environment for running technical computing and analysis workloads to consolidate disparate cluster infrastructure, resulting in increased hardware utilization and the ability to meet or exceed SLAs while lowering costs.

- **Platform MPI** is a high-performance, production-quality implementation of the Message Passing Interface (MPI). Platform MPI supports the broadest range of industry-standard platforms, interconnects, and operating systems, helping ensure that parallel applications can run anywhere.

- **Platform Analytics** is an advanced tool for visualizing and analyzing massive amounts of workload data. It enables managers, planners, and administrators to easily correlate job, resource, and license data from one or multiple clusters for data-driven decision making. With better insight into HPC data center environments, organizations can identify and quickly remove bottlenecks, spot emerging trends, and plan capacity more effectively.

Traditional business intelligence solutions require significant time and multiple steps to translate raw data into usable information. However, Platform Analytics incorporates innovative visualization tools that are built on top of a powerful analytics engine for quick and easy results. You can use the preconfigured dashboards or construct your own, quickly answer questions about your technical
computing infrastructure and applications, and use that information to optimize technical computing resource utilization.

IBM Racks

- Intelligent Cluster 42U 1100 mm Enterprise Rack (1410-PRB) and Expansion Rack (1410-ERB)

**42U 1100mm Enterprise V2 Dynamic Rack**

The IBM 42U 1100mm V2 Dynamic Rack is an industry-standard 19-inch rack that supports BladeCenter® and rack-mountable System x servers and options. This 42U rack conforms to the EIA-310-D industry standard for 19-inch, type A rack cabinets, and has outriggers (stabilizers), allowing for movement of even large loads.

Features include:

- Perforated front door that allows for airflow.
- Six side-wall compartments that support 1U-high power distribution units (DUs) and switches without taking up valuable rack space.
- Cable management slots that route Velcro strips around cables.
- Easy-to-install and remove side panels standard on the 4PX models.
- Front door that can be hinged on either side, providing flexibility to open in either direction.
- Rear door that improves access and serviceability.
- Front and rear doors and side panels that include locks and keys to help secure servers.
- Heavy duty casters with outriggers (stabilizers) that come with the 42U Dynamic Rack for added stability, allowing movement of even large loads.
- Tool-less 0U PDU rear channel mounting (1U PDU requires screws) that reduces installation time and increases accessibility.

Description

- IBM 42U 1100mm Enterprise V2 Dynamic Rack

This rack includes everything needed to set up a high-powered IT solution with rack solutions that are ready to deploy. This Dynamic Rack features:

- Additional space for front cable management
- 600 mm standard width to complement current raised-floor data center designs
- Increased depth to 1100 mm from 1000 mm to improve cable management
- Increased door perforation to maximize airflow
- Support for tool-less 0U PDU mounting; 1U PDU requires screws
- Front-to-back cable raceways
- Dynamic rack that supports shipping fully integrated solutions
- Lockable doors and side panels that all use the same key
- Thermal optimization for sustained performance
- Heavy-duty casters that help to safely move large loads in the rack
- Rear door for easy access for serviceability

**IBM Intelligent Cluster ecosystem**

Intelligent Cluster 42U 1200 mm Deep Primary and Expansion Racks

IBM 42U 1200 mm Deep Rack offerings are industry-standard 19-inch server cabinets that are designed for high-availability System x and BladeCenter environments. They are optimized to help maximize floor space, expedite installation, simplify cable management, and increase accessibility for improved
serviceability. With a depth of 1200 mm (approximately 47 inches), these racks offer expansive rear channels with tool-less button mounts for virtually effortless installation of up to six IBM 0U vertical rack strip power distribution units (PDUs) or can easily accommodate vertical cable organizers or mounting of other equipment.

IBM Dynamic Racks enable you to receive your System x and BladeCenter solutions fully integrated in the rack and ready to instantly deploy into your data center. Dynamic Racks are designed to affordably, safely, and securely handle shipping fully loaded configurations up to 950 kg (2,100 lb), which can help to increase your efficiency by reducing the time and cost that is associated with typical server deployments. However, if you do not need to ship the rack fully loaded, IBM offers cost-effective static offerings that are ideal when doing on-site integration.

The racks contain the following items:

- One rack
- Rear and front doors
- Side panels (except expansion racks ship without side panels)
- Shipping pallet and ramp
- Removable outriggers
- Keys for the rack doors and side panels
- One front stabilizer bracket
- Two bolt-down brackets/side stabilizers
- Hardware kit containing miscellaneous rack components
- Hardware kit for attaching the expansion rack to a rack suite (expansion racks only)

Features include

42U 600 mm x 1200 mm designs

- Cost-effective 42U static (non-ship loadable) and dynamic (fully ship loadable) static models
- Designed for high-availability System x and BladeCenter environments
- 600 mm standard single floor tile width to complement current raised-floor data center designs
- 1200 mm depth for improved cable management and air circulation
- Compliance with the EIA-310-D industry standard for 19-inch, type A rack cabinets

Rear cable management:

- Features expansive rear channels with tool-less button mounts for virtually effortless installation of up to six IBM 0U vertical rack strip PDUs, or can easily accommodate vertical cable organizers or mounting of other equipment.
- Zero U mounting design conserves valuable EIA space for IT equipment, simplifies cable management, reduces installation time, and increases accessibility.

Side pockets: Six sidewall compartments support installation of 1U PDUs and switches without unnecessarily taking up valuable rack space.

Overhead cable access: Front cable access portals and a large rear adjustable opening provide improved overhead cable management.

Standard stabilizers: Standard front and side stabilizers enable static rack stability when equipment is routinely installed, removed, or accessed.

Adjustable leveling pads: Four easily adjustable leveling pads ensure stability and prevent rolling on casters.
U markings: Clear U markings on mounting rails aid in space planning and installation.

42U cabinets are less than 2 m (6.56 ft) in height on casters. Fixed front and rear swivel heavy duty casters can easily accommodate the maximum load capacity, while still being less than 2 m (6.56 ft) in height to allow the 42U rack models to fit under most doorways.

Perforated doors: Perforated front and rear doors enable maximum airflow.

Split rear door: Split rear door design improves access and serviceability.

Secure doors and panels: Lockable doors and side panels provide a more secure environment for equipment and data.

Quick release hinges: Quick release hinge design allows the front door to easily be mounted on either side of the cabinet. This provides for flexible placement alternatives by allowing the door to open in either direction.

42U dynamic ship load offerings:

- Affordable 42U dynamic rack models that support shipping ready for instant deployment fully integrated solutions up to 952.54 kg (2,100 lb)
- Robust frame, mounting rails, and shock reusable packaging to help protect the heaviest loads in transit
- Integrated outriggers for dynamic tilt stability and safety at maximum loads

Expansion cabinets: All the primary IBM 1200 mm Deep Rack offerings have corresponding expansion cabinets. These models ship without side panels and include baying kits for seamless creation of a suite of racks.

**42U Enterprise Rack (1410-4RX)**

This specially designed 42U rack is one of two racks that can be used in Intelligent Cluster configurations.

This rack features base stabilizers to enable shipment from the factory with Intelligent Cluster components such as power units, nodes, switches, cables, and consoles mounted in position and with intrarack cabling installed according to applicable Intelligent Cluster racking rules.

Expansion cabinets: All the primary IBM 1200 mm Deep Rack offerings have corresponding expansion cabinets. These models ship without side panels and include baying kits for seamless creation of a suite of racks.

**42U Enterprise Rack (1410-4RX)**

This specially designed 42U rack is one of two racks that can be used in IBM Intelligent Cluster configurations.

This rack features base stabilizers to enable shipment from the factory with IBM Intelligent Cluster components, such as power units, nodes, switches, cables, and consoles, mounted in position and with intrarack cabling installed according to applicable IBM Intelligent Cluster racking rules.

The Enterprise Rack is designated as IBM-installed for easy on-site installation. This designation, coupled with the factory integration services and optional on-site installation and verification of software, results in a ready-to-run cluster system. The cost of the hardware installation is included in the price of the rack. The cost of software installation by IBM or a qualified IBM Business Partner is not included.

**25U Standard Rack (1410-2RX)**

This 25U rack addresses the requirements of smaller departmental cluster configurations.
It is shipped from the factory with IBM Intelligent Cluster components such as power units, nodes, switches, cables, and consoles mounted in position and with intrarack cabling installed according to applicable Intelligent Cluster racking rules.

The 1410-2RX rack is designated as IBM-installed for easy on-site installation. This designation, coupled with the factory integration services and optional on-site installation and verification of software, results in a ready-to-run cluster system. The cost of the hardware installation is included in the price of the rack. The cost of software installation by IBM or a qualified IBM Business Partner is not included.

**Power and cooling advantages for IBM Intelligent Cluster**

The IBM energy management portfolio tackles the challenge to increase power and thermal efficiency and help reduce costs on many levels. Inside the system, all System x and BladeCenter servers start with Calibrated Vectored Cooling™ technology. This feature allows dual paths of air to each component, helping to improve uptime and longevity, and reducing wasteful air movement and heat generation. It can be coupled with more energy-efficient power supplies.

For clusters within a rack, System x servers are designed to work at full density in a well-planned rack solution. They can also operate at extended temperature ranges to keep the system up and running, even in some cases in extreme temperature and many potential failure conditions. IBM rack-based cluster solutions are engineered to optimize air flow and prevent undesirable recirculation within the rack, so that servers can run in optimal temperature conditions.

IBM blade-based clusters enable you to pack more processors into the same power and cooling envelope, as well as better utilize floor space and right-size data center design. With BladeCenter servers, less power per processor means more processing capacity per kilowatt. The BladeCenter runs cooler to deliver greater reliability.

For dense data center environments, IBM delivers smart rack-level heat solutions, such as the super-efficient IBM Rear Door Heat eXchanger. The water-cooled door can dissipate heat generated from the back of the rack to reduce the overall room temperature. With this combination of benefits at the server and data center level, IBM systems can offer strong power and cooling benefits to IBM Intelligent Cluster clients.

**IBM Rear Door Heat eXchanger (32R0712)**

The Rear Door Heat eXchanger for IBM Enterprise Racks helps keep your growing data center at a safer temperature without adding air conditioning units. This unobtrusive solution brings more cooling capacity to areas where the heat is greatest, around racks of servers with multiple, more powerful processors.

**Design simplicity delivers efficient cooling**

The size and appearance of the Rear Door Heat eXchanger are similar to those of a standard rack acoustical 66 cm (26 in) wide door. It adds a mere 10 cm (4 in) to the depth of a rack, yet a single door may remove up to 50,000 Btu of heat (or approximately 15 kW). The door is designed to attach to a 42U-high IBM Enterprise Rack and swings wide to provide unrestricted access to electrical components. Sealed coils, filled with above-dewpoint, chilled water, passively remove a significant amount of the heat generated in a fully populated rack. This cooling efficiency may help eliminate the need for additional ac power and the associated construction cost.

**Cluster Enablement Consulting for IBM Intelligent Cluster**

Cluster Enablement Consulting is available at a flat-rate price per day that includes resource, travel, and expenses for predefined engagements.

The fee covers expenses for cluster enablement engagements of the following type:
- Staging and integration of cluster hardware and software components at the manufacturing site or another location
- Cluster integration into an existing cluster or cluster upgrades
- Customer acceptance testing
- Software installation and integration, including operating system, management software, file system, compilers, or customer applications
- Instructor-led on-site training

Factory integration -- product customization services for IBM Intelligent Cluster

The Intelligent Cluster features several hardware validation and test services collectively referred to as product customization services. These services include the integration of hardware and software on AMD and System x servers in innovative manufacturing facilities. You can deploy systems in almost any IT environment. This means your IT resources can be better used elsewhere.

This statement is especially true for Linux cluster solutions. Given the complexity of a Linux cluster, you want the confidence that the solution arrives properly configured and ready to integrate in your data center. These options are integrated into the servers. The System x platform also offers a Blade Integration Service, which, for a flat fee, includes installation of:

- Hardware options on the blades
- Options in the BladeCenter chassis
- Blades in the chassis

IBM can install the chassis in an Enterprise Rack and have it shipped to you. Performing the same services on-site would take hours or even days.

In addition, Intelligent Cluster manufacturing offers specific services for the IBM Intelligent Cluster called Cluster Systems Validation and Test to confirm that all system settings are enabled and tested to enable smooth on-site deployment:

- Enable BIOS management
- Configure BIOS on each node
- Set up ASM and RSA
- Create disk partitioning
- Configure network, firewall, language, and time zone
- Configure services
- Set up storage
- Install terminal server
- Set up DNS
- Test, debug, and confirm that cluster is ready for operation

IBM has the skills and technology to offer this type of service. The Intelligent Cluster manufacturing product customization portfolio offers a tremendous value, especially for clients interested in complex offerings such as Linux cluster.

Installation and deployment services

The Intelligent Cluster solutions deployed in the 1410-4RX and 1410-2RX rack enclosures include on-site hardware installation and basic installation planning services for announced content.

System x iDataPlex ecosystem

IBM System x iDataPlex Rack (7825)
This specially designed rack is used in iDataPlex configurations.

The iDataPlex Rack is designated as IBM-installed for easy on-site installation. This designation, coupled with the factory integration services and optional on-site installation and verification of software, results in a ready-to-run cluster system.

The iDataPlex solution offers increased density in a holistic rack design. For ease of serviceability, all hard drive, planar, and I/O access is from the front of the rack.

**Power and cooling advantages**

iDataPlex servers help pack more processors into the same power and cooling envelope, better utilize floor space, and "right size" data center design. With the iDataPlex solution, less power per processor means more processing capacity per kilowatt. The iDataPlex can run cooler to deliver greater reliability.

**System x iDataPlex Rear Door Heat eXchanger (43V6048)**

For dense data center environments, IBM offers smart rack-level heat management solutions like the super-efficient Rear Door Heat eXchanger. The water-cooled door is designed to dissipate heat generated from the back of the rack to help reduce the overall room temperature. With this combination of benefits at the server and data center level, IBM systems deliver strong power and cooling benefits to iDataPlex clients.

The iDataPlex Rear Door Heat eXchanger for iDataPlex racks helps reduce the air temperature in your growing data center to approximately the same air temperature as that entering the rack, alleviating the need to add air conditioning units. This unobtrusive solution brings more cooling capacity to areas where the heat is greatest, around racks of servers with multiple, more powerful processors.

Design simplicity delivers cooling efficiency that can help alleviate or even eliminate the need for additional air conditioning power and the associated construction cost.

**IBM High Density Plus PDU**

The new PDUs make it quick and simple to deploy, protect, and manage your high-density System x iDataPlex rack environment. iDataPlex Enterprise PDU+ models combine receptacle density with advanced intelligent power management capabilities that seamlessly integrate with IBM Systems Director Active Energy Manager™.

**Solution Enablement Consulting**

Solution Enablement Consulting is available at a flat-rate price per day that includes resource, travel, and expenses for predefined engagements.

The fee covers expenses for solution enablement engagements of the following type:

- Staging and integration of hardware and software components at the manufacture site or another location
- Solution integration into an existing cluster or cluster upgrades
- Solution acceptance testing
- Software installation and integration, including operating system, management software, file system, compilers, or customer applications
- Instructor-led on-site training

**Factory integration -- product customization services**

The iDataPlex offering features several hardware validation and test services collectively referred to as product customization services. These services include the integration of hardware and software on Intel™ processor-based System x servers in
technologically advanced manufacturing facilities. You can deploy systems in almost any IT environment. This means your IT resources can be better used elsewhere.

These options are integrated into the servers. IBM can install the chassis in an iDataPlex Rack and have it shipped to you. Performing the same services on-site could take hours or even days.

In addition, iDataPlex manufacturing offers specific services for the iDataPlex called Cluster Systems Validation and Test to confirm that all system settings are enabled and tested to enable smooth on-site deployment:

- Enable BIOS management
- Configure BIOS on each node
- Set up ASM and RSA
- Create disk partitioning
- Configure network, firewall, language, and time zone
- Configure services
- Set up storage
- Install terminal server
- Set up DNS
- Test, debug, and confirm that cluster is ready for operation

IBM has the skills and technology to offer this type of service. The iDataPlex product customization portfolio delivers tremendous value, especially for clients interested in complex offerings such as Linux cluster.

**Services**

**Installation and deployment services**

The System x iDataPlex solutions deployed in the iDataPlex rack enclosures include on-site installation of hardware.

Additional optional on-site software installation and customization services include Linux and Windows customization and skills transfer for system administration personnel.

**Lab services**

**iDataPlex installation planning**

Features:

- Assess client's air conditioning and air distribution in support of iDataPlex systems
- Evaluate the need for any Rear Door Heat eXchanger installations and offer necessary guidance
- Review the iDataPlex power specifications based on the client's hardware configurations and offer necessary guidance

Typical benefits:

- Offers accurate environmental information as required for supporting iDataPlex systems most reliably
- Identifies the most efficient approach to the iDataPlex system cooling and ventilation needs
- Reduces potential installation shortfalls with open and ongoing communication with the client surrounding their specific iDataPlex system requirements

**On-site post installation services**
Cluster setup and configuration:

- Configure and verify console switches
- Configure management node:
  - Verify and update BIOS
  - Verify and configure RAID
  - Install and configure operating system
  - Install and configure cluster manager
- Configure and verify Ethernet networking equipment:
  - Configure switch
  - Test and validate Gb Ethernet network operation
- Configure storage subsystem
- Verify and configure storage node RAID
- Load and validate operating system on compute nodes and storage nodes
- Check and update node BIOS and firmware
- Configure and verify InfiniBand networking equipment (depending on configuration)
  - Configure InfiniBand switch
  - Test and validate InfiniBand network
- Implement and verify:
  - File system
  - Default configurations of resource manager, scheduler resource manager, and scheduler
  - Miscellaneous cluster software and functions, including compilers, MPI, and SSH

Test and validate cluster operation:

- Perform power-down and power-up test
- Perform testing (stream, ping-pong) to place load on the cluster
- Analyze results for anomalies and address problems

Skills transfer

**Quarterly health check**

One-year support agreement includes:

- **8 x 5 support** (except weekends and holidays) with 24-hour response time
- **Remote monitoring and alerting** of the systems and monitoring the operating system
- **Maintaining patch and firmware releases** (Red Hat, SUSE Linux, and Storage Manager) as validated by IBM on ongoing basis
- **Four site visits per year** (one per quarter):
  - Health check assessment
  - Software update (firmware, device drivers, and patches for other software if applicable)
  - Skills transfer on best practices, such as TREX administration and updates and Storage Manager (if applicable)
  - Performance tuning (if applicable)

For more information on these services, visit

http://www-03.ibm.com/systems/services/
iDataPlex systems management

The System x iDataPlex product family offers systems management support for large scale-out compute environments via standards-based, scriptable interfaces. This support starts with the embedded Intelligent Platform Management Interface (IPMI) baseboard management controller (BMC).

For rapid diagnosis of problems, iDataPlex supports IBM Dynamic System Analysis (DSA) preboot diagnostics as well as online data collection for problem determination in supported Windows and Linux environments. Refer to the Dynamic System Analysis product documentation for additional detail on DSA features.

iDataPlex compute nodes support IBM Systems Director with limited function. Refer to IBM Systems Director product documentation for specific details on supported functions on iDataPlex hardware.

The compute nodes have been tested with the Extreme Cloud Administration Toolkit (xCAT), an open source community-based cluster administration tool set tailored to scale-out compute environments. You can download xCAT from SourceForge at

http://sourceforge.net/projects/xcat/

For additional information on xCAT, contact your IBM Sales and Support Team, or visit

http://www.xcat.org/

System x iDataPlex - Product customization services

The following product customization services are included with iDataPlex.

For information, refer to the following and contact your IBM representative.

<table>
<thead>
<tr>
<th>Description</th>
<th>Part number</th>
</tr>
</thead>
<tbody>
<tr>
<td>iDataPlex Rack Assembly (100U)</td>
<td>44R9980</td>
</tr>
<tr>
<td>Rack Installation of 1U Component in iDataPlex</td>
<td>44R9981</td>
</tr>
<tr>
<td>Rack Installation greater than 1U Component in iDataPlex</td>
<td>44R9982</td>
</tr>
<tr>
<td>iDataPlex Hardware / Configuration Verification</td>
<td>44R9983</td>
</tr>
<tr>
<td>Cluster Enablement Consulting - 1 Day</td>
<td>49Y3780</td>
</tr>
</tbody>
</table>

Applicable quantities are configuration-dependent and will be determined in the configuration process.

IBM Intelligent Cluster - Product customization services

The following product customization services are included with IBM Intelligent Cluster.

For information, refer to the following and contact your IBM representative.

<table>
<thead>
<tr>
<th>Description</th>
<th>Part number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rack Assembly - 25U Rack</td>
<td>41Y4570</td>
</tr>
<tr>
<td>Rack Assembly - 42U Rack</td>
<td>25R4167</td>
</tr>
<tr>
<td>Rack Installation of 1U Component</td>
<td>25R4168</td>
</tr>
<tr>
<td>Rack Installation greater than 1U Component</td>
<td>25R4169</td>
</tr>
<tr>
<td>BladeCenter Chassis Configuration</td>
<td>58P8676</td>
</tr>
<tr>
<td>Cluster Hardware and Fabric Verification - 42U Rack</td>
<td>25R4170</td>
</tr>
<tr>
<td>Cluster Hardware and Fabric Verification - 25U Rack</td>
<td>40K9802</td>
</tr>
<tr>
<td>Cluster Enablement Consulting - 1 Day</td>
<td>26K7785</td>
</tr>
</tbody>
</table>

Applicable quantities are configuration-dependent and will be determined in the configuration process.
Product positioning

IBM Intelligent Cluster

The Intelligent Cluster is positioned within the IBM System x family of offerings as the platform of choice for high-value and high-performance scalable Linux cluster solutions.

System x iDataPlex

IBM delivers innovations that meet your specific needs. The right choice depends on your business requirements, target applications, and operating environment. iDataPlex focuses on:

- Price/performance per watt
- Fast, large scale-out deployments
- Compute density
- Customization
- Targeted workloads
- Data center model for rip-and-replace IT resources

The iDataPlex hardware platform is positioned for cost-conscious large enterprises that rely on recovery-oriented architecture that enables redundancy through the software layer instead of redundant hardware.

Reference information

Refer to Software Announcement ZP08-0383, dated September 09, 2008, IBM Support for xCAT V2.

Product number

Note: The following are available only on the IBM Intelligent Cluster and System x iDataPlex.

<table>
<thead>
<tr>
<th>Description</th>
<th>Machine Type</th>
<th>Model</th>
<th>Part number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brocade ICX 6610 Switch (PSE)</td>
<td>0563</td>
<td>042</td>
<td>0563042</td>
</tr>
<tr>
<td>Brocade ICX 6610 Switch (oPSE)</td>
<td>0563</td>
<td>043</td>
<td>0563043</td>
</tr>
<tr>
<td>Brocade MLXe 24-port SFP+ 10GbE (DM) Module</td>
<td>0563</td>
<td>044</td>
<td>0563044</td>
</tr>
<tr>
<td>IBM System x GPFS Storage Server JBOD (58x2TB)</td>
<td>0796</td>
<td>011</td>
<td>0796011</td>
</tr>
<tr>
<td>IBM System x GPFS Storage Server JBOD (58x2TB+2x200GB SSD)</td>
<td>0796</td>
<td>012</td>
<td>0796012</td>
</tr>
<tr>
<td>IBM System x GPFS Storage Server JBOD (58x3TB)</td>
<td>0796</td>
<td>013</td>
<td>0796013</td>
</tr>
<tr>
<td>IBM System x GPFS Storage Server JBOD (58x3TB+2x200GB SSD)</td>
<td>0796</td>
<td>014</td>
<td>0796014</td>
</tr>
<tr>
<td>Mellanox SX6518 FDR14 InfiniBand Switch</td>
<td>0724</td>
<td>030</td>
<td>0724030</td>
</tr>
</tbody>
</table>

Note: A new switch description nomenclature is being introduced to help provide key information about the switch regarding airflow. PSE, oPSE, and SE are being added to the end of 1U switch descriptions.

- Port-side exhaust (PSE) airflow is typically installed in an enterprise rack such as the IBM 1410 rack family.
- Opposite port-side exhaust (oPSE) airflow is typically installed in an iDataPlex rack.
- Side exhaust (SE) is typically installed in an iDataPlex rack but depending on the switch may also be installed in an Enterprise rack.
The suffixes do not necessarily determine rack support. Each switch is evaluated on its own merit for rack support.

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
<th>part number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brocade 1860 Single-port SFP+ 10GbE Fabric Adapter</td>
<td>00Y7026</td>
<td></td>
</tr>
<tr>
<td>Brocade 1860 Dual-port SFP+ 10GbE Fabric Adapter</td>
<td>00Y7006</td>
<td></td>
</tr>
<tr>
<td>Brocade RPS15-I 250w Power Supply (PSE)</td>
<td>00Y7010</td>
<td></td>
</tr>
<tr>
<td>Brocade RPS15-E 250w Power Supply (oPSE)</td>
<td>00Y7012</td>
<td></td>
</tr>
<tr>
<td>Brocade ICX6610-FAN-I Fan Module (PSE)</td>
<td>00Y7014</td>
<td></td>
</tr>
<tr>
<td>Brocade ICX6610-FAN-E Fan Module (oPSE)</td>
<td>00Y7016</td>
<td></td>
</tr>
<tr>
<td>Brocade ICX6610-RMK Enterprise Rack Mount Kit</td>
<td>00Y7018</td>
<td></td>
</tr>
<tr>
<td>Brocade ICX6610 iDPx Rack Mount Kit</td>
<td>00Y7022</td>
<td></td>
</tr>
<tr>
<td>6m DDN HD-miniSAS to miniSAS Cable</td>
<td>00Y7045</td>
<td></td>
</tr>
<tr>
<td>0.6m IBM HD-miniSAS to miniSAS SAS Cable</td>
<td>0005222</td>
<td></td>
</tr>
<tr>
<td>1.5m IBM HD-miniSAS to miniSAS SAS Cable</td>
<td>0005224</td>
<td></td>
</tr>
<tr>
<td>3m IBM HD-miniSAS to miniSAS SAS Cable</td>
<td>0005226</td>
<td></td>
</tr>
<tr>
<td>6m IBM HD-miniSAS to miniSAS SAS Cable</td>
<td>0005228</td>
<td></td>
</tr>
<tr>
<td>1m IBM miniSAS to miniSAS SAS Cable</td>
<td>0005230</td>
<td></td>
</tr>
<tr>
<td>3m IBM miniSAS to miniSAS SAS Cable</td>
<td>0005234</td>
<td></td>
</tr>
<tr>
<td>6m IBM miniSAS to miniSAS SAS Cable</td>
<td>0005239</td>
<td></td>
</tr>
<tr>
<td>LSI SAS9201-16e 4 port miniSAS x8 PCIe 2.0 SAS HBA</td>
<td>00Y3535</td>
<td></td>
</tr>
<tr>
<td>LSI SAS9206-16e 4 port x4 HD-miniSAS PCIe 3.0 SAS HBA</td>
<td>00Y3539</td>
<td></td>
</tr>
</tbody>
</table>

Additional part numbers previously announced are also supported by the Intelligent Cluster and iDataPlex. They are listed in the Options section. These parts, along with the newly announced parts, are supported only with the Intelligent Cluster and iDataPlex and are not validated or supported in other configurations unless specifically announced with those solutions. The only exception to this is the 0563-022. These parts are not to be sold outside of the Intelligent Cluster and iDataplex Solution

**Important**

The Intelligent Cluster is a highly customized solution that tests a best recipe of supported hardware and software components and code levels. In order to maintain full support of your Intelligent Cluster, it is important that the solution Hardware and Software levels remain at the best recipe level. Unless specifically directed to do so by the IBM Support team, do not apply any firmware or BIOS upgrades on your system or modify the Software OS. In addition, do not add content to your cluster that is not part of the tested recipe and without contacting your sales team for an expert review of the content changes you would like to make.

You can review the supported code levels and hardware components for the Intelligent Cluster by visiting the support URL and choosing Intelligent Cluster.

For information on the supported versions visit

http://www-947.ibm.com/support/entry/portal/overview

Select downloads, and select the release of best recipe that is associated to the ship date of your Intelligent Cluster.

**Pseudo part numbers**

**Note:** The following pseudo part numbers cannot be ordered as stand-alone parts and can be ordered via configurator.

<table>
<thead>
<tr>
<th>Pseudo part number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>81Y8151</td>
<td>Intelligent Cluster OEM Pub Group</td>
</tr>
<tr>
<td>46W0470</td>
<td>Digital Analytics on Premise for Netezza</td>
</tr>
</tbody>
</table>
Education support

Online training for Intelligent Cluster is available at


Publications

No national language support documents will be available for this product.

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


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

Technical information

Specified operating environment

Physical specifications

Physical specifications for the 1410-PRB Enterprise Rack

Approximate external dimensions

IBM 42U 1100mm Enterprise V2 Dynamic Rack

- Height: 2009 mm (79.1 in)
- Width: 604 mm (23.8 in)
- Depth: 1100 mm (43.3 in)
- Weight: 169 kg (372 lb), including outriggers

IBM Rear Door Heat eXchanger V2 for 9363 Rack - 1756-42X
• Height: 1950 mm (76.8 in)
• Width: 600 mm (23.6 in)
• Depth: 129 mm (5.0 in)
• Weight: 39 kg (85 lb)

**EMC compliance strategy**

Typical configurations of the Linux cluster will be tested under the Class A requirement plus jurisdictional regulations for offer of sale in all markets.

- Title 47 CFR Part 15 Subpart B: US
- EN 55022; EN 55024: Europe
- AS/NZS CISPR 22: Australia/New Zealand
- VCCI: Japan
- ICES-003: Canada
- GB9254-2008: China
- MIC Notice No. 2000-79 and MIC Notice No. 200-80: Korea
- CISPR 22
- CISPR 24
- CNS 13438: Taiwan
- GOST: Russia

**Product safety regulatory compliance strategy**

The Intelligent Cluster will meet the jurisdictional regulations for offer of sale in all traditional and targeted markets.

- Canada: Certification to CSA C22.2 No. 60950-1-07, 2nd Edition, 2007-03
- UK, Germany, France, Australia, New Zealand, Japan, Italy, Spain, Switzerland, Austria, Netherlands, Sweden, Norway, Belgium, and Korea: Certification to EN 60950-1:2006 + A11:2009
- Eastern Europe: CB scheme report and certification to EN 60950-1:2006 + A11:2009
- Russia and the CIS: GOST certification

Linux will also meet the NEC and regional code requirements identified in N-B2-4700-037, Power Systems™ National Requirements.

**Operating environment**

- Temperature: 16° to 32°C (60.8° to 89.6°F)
- Relative humidity: 8% to 80%
- Maximum wet bulb: 23°C
- Sound power: 7.5 bels LwAd (operating)\(^3\), Category 1A (with four BladeCenters and an acoustics module) (for more configurations, refer to the BladeCenter Planning and Installation Guide)
- Sound pressure: No operator position
- Maximum altitude: 2,133.6 m (7,000 ft)

\(^3\) If Option machine type 4671-001 is selected, sound power is 8.3 bels.

**Power requirements (per rack)**

- Operating voltage: 200 - 240 V at 50/60 Hz
- Electrical output: 36 kW (maximum)
- Power source loading: 22 kVA (maximum)
• Thermal output: 20.9 kJ/s (71,400 Btu/hr) (maximum configuration)

When deploying the following network switches:

• Mellanox IS5100 0724-014
• Mellanox IS5300 0724-015
• Mellanox SX6512 FDR14 InfiniBand Switch 0724-024
• Mellanox SX6518 FDR14 InfiniBand Switch 0724-030
• Mellanox SX6536 FDR14 InfiniBand Switch 0724-025
• Brocade MLXe-8 Switch 0563-034
• Brocade MLXe-16 Switch 0563-035

The following Noise Hazard Notice notification applies:

**Note:** Government regulations (such as those prescribed by OSHA or European Community Directives) may govern noise level exposure in the workplace and may apply to you and your server installation. This IBM system is available with an optional acoustical door feature that can help reduce the sound emitted from this system. The actual sound pressure levels in your installation depend upon a variety of factors, including the number of racks in the installation, the size, materials, and configuration of the room, the noise levels from other equipment, the room ambient temperature, and employees’ location in relation to the equipment. Further, compliance with such government regulations also depends upon a variety of additional factors, including the duration of employees' exposure and whether employees wear hearing protection. IBM recommends that you consult with qualified experts in this field to determine whether you are in compliance with the applicable regulations.

**Hardware requirements**

For attended installation of an operating system, this server requires a compatible:

• USB keyboard
• USB mouse
• HDD
• Display

Unattended or remote installation may be performed without requiring some or all of these components. Review your unattended software installation program information for specific hardware configuration requirements.

For service, the server requires a compatible:

• USB keyboard
• USB mouse
• HDD
• Display

When having the unit serviced, plan to have these components attached to your server either directly or indirectly via a console.

**Lift specifications**

The following require a lift tool.

• Mellanox
  - 0724-014, -015, -018, -024, -025, -026, -030
  - 0724-HC7, -HC8, -HCB, -HCH, -HCH, -HCK, -HCP
• Brocade
  - 0563-034, -035
- 0563-HCU, -HCV
- Data Direct Networks
- 0750-014
- 0750-HC4

**Note:** Any chassis above 54.89 kg (121 lb) requires a lift tool.

For high-weight switches, plan to provide a lift for installation, removal, and replacement services. Lift specifications should meet the following:

<table>
<thead>
<tr>
<th>Height</th>
<th>Stowed</th>
<th>5 ft 7.5 in</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Maximum forks down</td>
<td>8 ft 3 in</td>
</tr>
<tr>
<td></td>
<td>Maximum forks up</td>
<td>10 ft .5 in</td>
</tr>
<tr>
<td></td>
<td>Minimum forks down</td>
<td>3.5 in</td>
</tr>
</tbody>
</table>

Load capacity
up to 400 lb

**Note:** Due to the weights of these devices, parts may be delayed in shipment.

**Software requirements**

**Supported operating systems**

**GPFS Multiplatform and GPFS for POWER**

GPFS is a high-performance cluster file system for AIX®, Linux®, and mixed clusters that gives users shared access to files spanning multiple disk drives. By dividing individual files into blocks and reading/writing these blocks in parallel across multiple disks, GPFS enables very high bandwidth. In addition, multiple data paths can also help eliminate single points of failure, making GPFS highly available for mission-critical applications.

GPFS is based on a shared disk model, enabling lower overhead access to disks not directly attached to the application nodes. It uses a distributed protocol data coherence for access from any node. GPFS also incorporates a powerful ILM policy engine. This engine allows complex, policy-based placement and file-based migration (without path changes) between multiple tiers of storage, including tape, which can scale to billions of files and multiple petabytes of data. Additionally, GPFS includes hardware-neutral snapshots and mirroring functions, enabling users to better virtualize storage hardware.

GPFS is ideal for several different roles in clustered computing and shared storage:

- A multicluster file system for parallel processing on compute clusters, featuring extreme scalability and throughput optimized for streaming workloads such as those common in Web 2.0, digital media, scientific, and engineering applications.
- An information lifecycle management file system that enables multiple tiers of storage, including tape, with powerful policy-driven file placement, migration, archival, and deletion. The unique GPFS policy engine delivers file migration scalable to billions of files and multiple petabytes of data.
- A scalable, shared storage file system for storage consolidation and virtualization. This includes clustered NFS support and a scalable, shared namespace that enables horizontally scalable file serving. Additionally, GPFS includes many data and SAN management features, including storage hardware-neutral snapshots and mirroring.
- A high availability file system for any business application or database that can benefit from very rapid failover of a consistent application data environment.
- A distributed file system that offers a global, cross-platform, coherent namespace across an enterprise for around-the-world, around-the-clock operations.

GPFS delivers fast, reliable data access from all nodes in a homogeneous or heterogeneous cluster of servers running the Linux operating system. GPFS allows applications simultaneous access to a set of files (even a single file) from any node that has the GPFS file system mounted, while providing a high level of control over
all file system operations. Additionally, GPFS offers extreme scaling across numerous metrics, including I/O performance, file or file system size, numbers of files, number of nodes, and execution of complex ILM policies.

For more information on GPFS, and supported servers and operating system levels, visit the GPFS web page at


GPFS frequently asked questions at


GPFS documentation at


Software

The following IBM software is provided through the IBM Passport Advantage® program and shipped directly to you. For information about Passport Advantage, visit


For information about Passport Advantage enrollment, visit

http://www.lotus.com/services/passport.nsf/WebDocs/Passport_Advantage_Home

For information about Passport Advantage by country, visit

http://www.lotus.com/lotus/country.nsf/wdocs/homepage

Software description                                        number
IBM General Parallel File System for Linux                  BH031EN
Multiplatform V3.3 English CD Media Pack
IBM General Parallel File System for Windows                BH03KEN
V3.2.1 English Media Pack
GPFS Server 10 Processor Value Unit Lic + Software Service and support 12 Mo D091MLL
GPFS Server 10 Processor Value Unit Annual Software Service and support RnwL E06VULL
GPFS Server 10 Processor Value Unit Software Service and support Reinstate 12 Mo D091NLL
IBM General Parallel File System Server Proc Day OOCoD Temp Use Chrg D091ULL
GPFS Client 10 Processor Value Unit Lic + Software Service and support 12 Mo D091RLL
GPFS Client 10 Processor Value Unit Annual Software Service and support RnwL E06VWLL
GPFS Client 10 Processor Value Unit Software Service and support Reinstate 12 Mo D091SLL
IBM General Parallel File System Client Proc Day OOCoD Temp Use Chrg D091TLL
IBM General Parallel File System V3.3 Linux Media Pack BH03REN
IBM General Parallel File System V3.3 Windows Media Pack BH03QEN

Additionally, the following GPFS Part Numbers have been released into the System x ordering systems:
Feature
Software description                                     code
Server: per 10 PVU w/ 1yr Service and Support 5641-N94:          0112, 6005
Server: qty 250 per 10 PVU w/ 1yr Service and Support 5641-N94: 0113, 6005
Client: per 10 PVU w/ 1yr Service and Support 5641-N94:          0110, 6004
Client: qty 250 per 10 PVU w/ 1yr Service and Support 5641-N94: 0111, 6004

Service is required for GPFS and is available from


xCat for IBM Intelligent Cluster

xCAT is a scalable distributed computing management and provisioning tool that provides a unified interface for hardware control, discovery, and OS diskful or diskfree deployment. xCAT has been deploying and managing large Linux systems for a number of years. xCAT is an open source management tool available from SourceForge.net that offers a powerful customizable architecture licensed under the Eclipse Public License, one of the more flexible licenses available for open source software.

IBM Support for xCAT provides world-class technical support for Extreme Cloud Administration Toolkit (xCAT) 2, the open source cluster management tool available from SourceForge. IBM Support for xCAT delivers the technical support clients need to confidently manage their large systems. IBM Support for xCAT enables you to optimize the value you get from the open source community and IBM, through unparalleled choice on software and choice on support. IBM Support for xCAT offers two tiers of IBM support:

- IBM Enhanced Support for xCAT
- IBM Elite Support for xCAT

IBM Support for xCAT offers clients who are interested in using pure open source technology the comfort of having IBM support available when they need it.

Passport Advantage

<table>
<thead>
<tr>
<th>Program number</th>
<th>VRM</th>
<th>Program name/Description</th>
<th>Part number</th>
</tr>
</thead>
<tbody>
<tr>
<td>5724-V63</td>
<td>2.0.0</td>
<td>IBM Enhanced Support for xCAT Server 2 Contacts</td>
<td>D04X5LL</td>
</tr>
<tr>
<td>5724-V64</td>
<td>2.0.0</td>
<td>IBM Elite Support for xCAT Server Unlimited Contacts</td>
<td>D04X6LL</td>
</tr>
</tbody>
</table>

Compatibility

All components of the IBM Intelligent Cluster are compatible when purchased as a supported IBM Intelligent Cluster solution.

Limitations

IBM Intelligent Cluster

- IBM Intelligent Cluster options are supported only when deployed in an IBM Intelligent Cluster solution. They will not be supported when installed outside a 1410 Rack.
• Use of the 1410-4RX or 1410-2RX Linux Cluster Rack outside of the IBM Intelligent Cluster offering is prohibited.

• When the heat exchange door is part of the IBM Intelligent Cluster Solution, IBM will attach the door to the rack. You are responsible for filling the heat exchange door with fluid and hooking up all plumbing connections. You are also responsible for draining the heat exchange door and disconnecting all plumbing connections prior to an IBM servicer's arrival on-site for replacement of the door assembly. After the servicer has replaced the heat exchange door assembly on the rack, it is your responsibility to refill the heat exchange door and reconnect all plumbing connections. All preventative maintenance on the rack is the sole responsibility of the client.

  – Due to the weight of some switch chassis, the client may have to provide lifts for installation and repair if switches are installed in the upper portion of the rack.

  – The LG-Ericsson ES-5048XG Switch (PSE) (4668-020 and -HC9) is only supported in the 1410 enterprise racks because of length of the switch.

• The IBM 0563-034 HVEC, 0563-HCU XCC FC A308 (Brocade MLXe 8) and IBM 0563-035 HVEC, 0563-HCV XCC FC A309 (Brocade MLXe 16) will not be supported in configurations in conjunction with the IBM Acoustic Door Kit for Enterprise Rack option (part number 40K9627 feature code 4852), the IBM Rear Door Heat eXchanger Option (part number 32R0712 feature code 4392), and the IBM Dynamic Rack and Rear Door Heat eXchanger V2 1756-42X HVEC, 1756-HC1 XCC (feature code A2FP). This is due to air pressurization that occurs in the rack rear as a result of the added impedance of acoustic and cooling doors. This pressurization could result in hot air recirculation through the rack cold aisle opening created by the switch port location on the rack front cold aisle side.

System x iDataPlex

  – System x iDataPlex options are supported only when ordered and deployed in an iDataPlex solution. They will not be supported when ordered without a corresponding order for an iDataPlex Rack configuration.

  – The 1410 Rack Management Appliance is supported only when deployed in an iDataPlex configuration and with iDataPlex-supported BOM content.

  – Rear Door Heat eXchanger:

    -- The Rear Door Heat eXchanger is shipped separately from the iDataPlex rack for delivery and installation to the rack by an IBM authorized supplier.

    -- When the Rear Door Heat eXchanger is part of the iDataPlex solution, an IBM authorized supplier will attach the door to the rack. (Refer to the Rear Door Heat eXchanger service pamphlet shipped with Rear Door Heat eXchanger for warranty service information.) The client is responsible for filling the heat exchange door with fluid and hooking up all plumbing connections. The client is also responsible for draining the heat exchange door and disconnecting all plumbing connections prior to an IBM authorized supplier's arrival on-site for replacement of the door assembly. After the servicer has replaced the heat exchange door assembly on the rack, it is the servicer's responsibility to refill the heat exchange door and reconnect all plumbing connections. All preventative maintenance on the rack is the sole responsibility of the client.

    -- Use of the iDataPlex Rack outside of the iDataPlex offering is not supported.

  – The Cisco 4948E Switch (oPSE) (4670-050 and -HD1) is supported only in iDataPlex due to airflow.

• Components not specifically released and announced for the Intelligent Cluster may not receive full support.

Note: Regarding the use of SSD drives, solid-state memory cells have an intrinsic, finite number of write cycles each cell can incur. As a result, each solid-state device has a maximum amount of write cycles it can be subjected to, documented as total bytes written (TBD). IBM is not responsible for replacement of hardware that has reached the maximum guaranteed number of write cycles. This limit may be revealed as the device failing to respond to system-generated commands or becoming incapable of being written to. Additional information is available at

http://www-03.ibm.com/systems/x/options/storage/solidstate/index.html
Planning information

Customer responsibilities

Installation of hardware components is provided by IBM on the 1410 and 7825 machine types. Installation of hardware options within specific server nodes is a customer responsibility if not purchased as part of a manufacturing install service. Customers are responsible for preparing their site for installation.

IBM offers warranty support or service for the IBM and non-IBM products and options announced as part of the offering. To obtain solution-level support, contact IBM using the solution rack machine type and serial. IBM machine types supported as part of the IBM Intelligent Cluster solution carry their own warranty terms for on-site and CRU.

You must obtain the prerequisite version of the Linux operating system and device drivers as specified by IBM. You can install the required Linux operating system, device drivers, GPFS, and CSM software, use optional Linux cluster installation services to have IBM install it, or have a qualified IBM Business Partner perform the service.

You are expected to review the Installation Planning Guide before the delivery of your IBM Intelligent Cluster. The customer’s responsibilities must be verified as complete before scheduling an IBM installer to come on-site.

Visit http://publib.boulder.ibm.com/cluster/

Important

The Intelligent Cluster is a highly customized solution that tests a best recipe of supported hardware and software components and code levels. In order to maintain full support of your Intelligent Cluster, it is important that the solution hardware and software levels remain at the best recipe level. Unless specifically directed to do so by the IBM Support team, do not apply any firmware or BIOS upgrades on your system or modify the software OS. In addition, do not add content to your cluster that is not part of the tested recipe and without contacting your sales team for an expert review of the content changes you would like to make.

You can review the supported code levels and hardware components for the Intelligent Cluster by visiting the support website and choosing Intelligent Cluster.

For information on the supported versions visit http://www-947.ibm.com/support/entry/portal/overview

Select downloads, and select the release of best recipe that is associated to the ship date of your Intelligent Cluster.

Cable orders

All cables are supplied with the IBM Intelligent Cluster. Depending on the applications, the cables may be fully installed, partially installed (plugged at one end and packaged for shipping), or included as part of a shipment group.

Installability

Setup and installation of the IBM Intelligent Cluster hardware are provided by IBM on the 1410 machine type.

When the heat exchange door is part of the IBM Intelligent Cluster Solution, IBM will only attach the door to the rack.

Packaging
IBM Intelligent Cluster Shipping Contents

CD/Pubs Pack
- IBM Intelligent Cluster information
- IBM International License Agreement for Non-Warranted Programs
- IBM Statement of Limited Warranty
- IBM Warranty Information Sheet for IBM Intelligent Cluster
- IBM International Program License Agreement
- Poly bag - generic
- Installation Information Flyer
- Safety manual

**Supplies**

None

**Security, auditability, and control**

This offering uses the security and auditability features from standard IBM offerings and supported Linux distributions.

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™ 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

To obtain copies of the IBM Statement of Limited Warranty, contact your reseller or IBM.

**Warranty period**

- Machine type 0724 - Three years
- Machine type 0796 - Three years
- Machine type 0563 - Three years
- Optional features - One year

**Note:** For configurations that support the RAID battery, the RAID battery will be warranted for one year effective on its "Date of Installation". All other product warranty terms for the machine remain unchanged.

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.

The following have been designated as consumables, supply items, or structural parts and therefore not covered by this warranty:

- Rack Front Door
- Rack Filler Plate
- DDN Battery
- Mellanox Blanks
- Brocade Blanks

**Warranty service**

If required, IBM provides repair or exchange service, depending on the type of warranty service specified below for the machine. IBM will attempt to resolve your problem over the telephone or electronically by access to an IBM website. Certain machines contain remote support capabilities for direct problem reporting, remote problem determination, and resolution with IBM. You must follow the problem determination and resolution procedures that IBM specifies. Following problem determination, if IBM determines On-site Service is required, scheduling of service will depend upon the time of your call, machine technology and redundancy, and availability of parts. 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.

The type of service is Customer Replaceable Unit (for example, keyboard, mouse, speaker, memory, or hard disk drive) Service and On-site Service.

**Customer Replaceable Unit (CRU) Service**

IBM provides a replacement 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. A CRU is designated as being either a Tier 1 (mandatory) or a Tier 2 (optional) CRU. Installation of Tier 1 CRUs, as specified in this announcement, is your responsibility. If IBM installs a Tier 1 CRU at your
request, you will be charged for the installation. You may install a Tier 2 CRU yourself or request IBM to install it, at no additional charge, under the type of warranty service designated for your machine.

Based upon availability, a CRU 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, 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.

The following parts or features have been designated as Tier 1 CRUs:

- CMOS batteries
- Hard disk drives
- Hot-swap fan
- Hot-swap AC power supply
- Memory DIMM
- Optical drive
- PCI adapter
- Power cord
- Service label
- System label
- Hypervisor USB key
- PCI riser
- RAID card without battery
- Tape drive
- Ethernet daughter card

**On-site Service**

At IBM’s discretion you will receive CRU service or IBM or your reseller will repair the failing machine at your location and verify its operation. If required, On-site Repair is provided, 9 hours per day, Monday through Friday excluding holidays, NBD response. 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. On-site Service is not available in all countries, and some countries have kilometer or mileage limitations from an IBM service center. In those locations where On-site Service is not available, the normal in-country service delivery is used.

**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

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

**Licensing**

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**

**IBM hourly service rate classification**

Two

**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.

**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


IBM may release changes to the Machine Code. IBM plans to make the Machine Code changes available for download from the IBM System x technical support website

http://www-304.ibm.com/systems/support/

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.

Access to IBM Flex System™ fix downloads will be granted upon entitlement validation. The terms and conditions for fixes will be covered under the License Agreement for Machine Code, International Program License Agreement, International License Agreement for Non-Warranted Programs and/or other terms provided with the fix, as applicable.

**Pricing**

For all local charges, contact your IBM representative.
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http://www.ibm.com/financing

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Financing solutions from IBM Global Financing can help you stretch your budget and affordably acquire the new product. But beyond the initial acquisition, our end-to-end approach to IT management can also help keep your technologies current, reduce costs, minimize risk, and preserve your ability to make flexible equipment decisions throughout the entire technology lifecycle.

Announcement countries

All European, Middle Eastern, and African countries.

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