



IBM Platform MPI V8.3 delivers high performance application parallelization

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At a glance

IBM® Platform MPI V8.3:

- Improves parallel application performance
- Increases developer and engineer productivity by reducing the number of qualitative tests
- Optimizes cluster utilization with bulletproof runtime execution and backwards compatibility
- Simplifies application installation by providing application availability and integration on the widest choice of platforms
- Delivers broader application applicability with full MPI-2 functionality
- Provides faster, more dependable response to issues, including superior support for public domain and other commercial MPI libraries

Overview

IBM Platform MPI V8.3 is a high-performance, production-quality implementation of the Message Passing Interface (MPI). It is widely used in the high performance computing (HPC) industry and is considered one of the standards for developing scalable, parallel applications.

Platform MPI maintains full backward compatibility with HP-MPI and applications supported by it. IBM Platform MPI incorporates advanced CPU affinity features, dynamic selection of interface libraries, superior workload manager integrations, and improved performance and scalability.

Platform MPI supports the broadest range of industry-standard platforms, interconnects, and operating systems helping ensure that parallel applications can run almost anywhere. It runs on a variety of hardware and operating environments including the latest generation of IBM System x® servers. By prequalifying and certifying these platforms, IBM helps clients take the risk out of mission-critical high performance technical computing deployments.

IBM Platform MPI can help clients:

- Obtain higher quality results faster
- Reduce development and support costs
- Improve engineer and developer productivity

Key prerequisites

IBM System x and non-IBM x86 and x64 servers

IBM Platform MPI V8.3 includes support for the following operating systems:

- Red Hat Enterprise Linux™ 4.6, 5.x, and 6.x
- SUSE Linux Enterprise Server 10 and 11
- CentOS 5.x
- Microsoft™ Windows™ XP/Vista, Server 2003/Server 2008
- HPC Server 2008, Windows 7

Planned availability date

June 15, 2012

Description

Focus on portability

IBM Platform MPI enables developers to build a single executable that transparently leverages the performance features of any type of interconnect, thereby providing applications with optimal latency and bandwidth for each protocol. This reduces development effort and enables applications to use the most current technologies on Linux or Microsoft Windows without the need to recompile and relink applications.

Platform MPI is optimized for both distributed (DMP) and shared memory (SMP) environments and provides a variety of flexible CPU binding strategies for processes and threads, enabling better performance on multicore environments. With this capability, memory and cache conflicts are managed by more intelligently distributing the load among multiple cores.

With support for Windows HPC Server 2008, Platform MPI allows developers targeting Windows platforms to enjoy the benefits of a standard portable MPI and avoid proprietary lock-in.

Network optimization

IBM Platform MPI supports a wide variety of networks and interconnects, enabling the development of applications that will run on more platforms and reducing testing, maintenance, and support costs. Along with the TCP interconnect, Platform MPI provides excellent MPI performance on InfiniBand by providing support for both QLogic Performance Scaled Messages (PSM) and Mellanox IB-Verbs (IBV) interconnects. In addition, Platform MPI supports Mellanox Fabric Collective Acceleration (FCA), which enables it to offload collectives to the InfiniBand fabric, dramatically improving MPI runtimes.

Through the use of a priority network list built from system configuration files, user environment variables, user command line options, and library hard-coded defaults, Platform MPI can dynamically select the optimal network connection between each node and each other node within a cluster at runtime. This maximizes network efficiency so that processes get the data they need quickly.

Key features and benefits

- **Simplicity**
 - Features:

- Fully complies with the MPI 2.2 standard, providing dynamic processes, one-sided communications, extended collectives, thread safety and updated ROMIO
- Provides comprehensive debugging, diagnostic, and profiling tools
- Features auto-detection of interconnects and dynamic loading of libraries
- Does not require relink for debugging and profiling
- Is supported by the largest dedicated HPC support organization
- Benefits:
 - Easily ports applications to other platforms
 - Protects ISV software investment
 - Reduces time-to-market
 - Increases robustness and quality of applications
 - Quickly and efficiently resolves technical problems
- **Performance**
 - Features:
 - Improved shared memory performance, incorporating code and methods from Platform MPI 5.6 (Scali MPI)
 - 75% reduction in job startup and shutdown at scale
 - Scalability up to 27,000+ ranks
 - RDMA message progression and coalescing enhancements
 - Flexible CPU binding options maximize cache effectiveness and balance applications to minimize latency
 - Automated benchmarking of collective operations
 - Benefits:
 - Takes maximum advantage of available hardware
 - Reduces latency for better performance
 - Improves performance without explicit developer action
 - Increases message throughput in streaming applications
 - Makes it easier to optimize application performance
- **Compatibility**
 - Features:
 - Common source-code base between Linux and Windows
 - Binary compatible with applications developed for HP-MPI
 - MPICH-2 compatibility mode
 - Linux Standard Bindings provides full compatibility across major Linux distributions
 - Scheduler agnostic with workload manager integrations for Windows HPC, Platform LSF, PBS Pro, SLURM, and other popular schedulers and resource managers
 - Benefits:
 - Eliminates the cost of separate releases for different platforms
 - Easily used with existing MPI applications
 - Common "mpirun" syntax between Linux and Windows
 - Helps clients avoid proprietary lock-in
 - Significantly reduces floating point issues causing inconsistent results
- **Flexibility**
 - Features:
 - Supports the widest variety of networks and interconnects
 - Allows for the selection of interconnects at runtime with no need to recompile

- Provides capability to write applications once and deploy across multiple OS and hardware topologies
- Includes CPU binding features that are well suited to GPU-aware applications
- Benefits:
 - Enables development of applications that will run on more platforms
 - Reduces testing, maintenance, and support costs
 - Creates strategic flexibility

Product capabilities

Multicore awareness - IBM Platform MPI provides three key methods to optimize performance on multicore systems:

- Direct shared memory implementation of MPI collective operations (SHMEM)
- Policy-based process-to-core affinity binding (including support for LSF syntax)
- Multicore-aware copying and encoders/decoders optimized for inter-core memory hierarchy

Comprehensive debugging and troubleshooting tools - Platform MPI incorporates an extensive set of tools including verification and test tools, application tracing and timing facilities and performance counters with message sizes and counts. These tools enable application developers and users to maximize application performance.

Tracing and monitoring - MPI-related monitoring presentation can be selected through environment variables to determine presentation of timing and trace information, with no recompilation or relinking of the application. As a result, there is no need for recompilation or relinking the application.

Multithread safe - Multithreaded applications can fully exploit Platform MPI and multiple threads can simultaneously request services and conduct communication.

Automatic selection of optimal network - Through the use of a priority network list built from system configuration files, user environment variables, user command line options, and library hard-coded defaults, Platform MPI can dynamically select the optimal network connection between each node and each other node within a cluster at runtime. This maximizes network efficiency so that processes get the data they need quickly.

Simplified application development - Platform MPI enables use of a single MPI implementation and a single executable to support a wide array of interconnects, with dynamic runtime selection of interconnect. With Platform MPI, you can run a single application across multiple architectures, Linux distributions and interconnects. It eliminates the need to recompile applications and MPI libraries, while providing full support for dynamically linked libraries. This means there is no need to recompile for every compiler/interconnect combination.

Linux command line replication - Command line arguments to the application are automatically provided to all MPI processes, avoiding tedious parsing and broadcasting of parameters to other MPI processes.

MIMD support - The Multiple Instruction - Multiple Data (MIMD) model is supported through provisions that launch different executables which constitute the whole MPI application.

Support for popular debuggers - Platform MPI fully supports Etnus TotalView analysis tools, Alinea's distributed debugging tool (DDT), and standard GNU gdb.

Accessibility by people with disabilities

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

Product positioning

IBM Platform MPI is part of the IBM Platform Computing family of products, which includes IBM Platform LSF and IBM Platform Symphony™ .

The IBM Platform LSF product family provides powerful workload management for demanding, distributed, and mission-critical high-performance technical computing environments. It includes a comprehensive set of workload management capabilities; all designed to work together to address high performance computing needs.

IBM Platform Symphony is an enterprise-class grid manager 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.

IBM Platform MPI primarily competes with the following open source and commercial MPIs:

- MPICH2
- MVAPICH2
- Intel™ MPI
- MS MPI (Microsoft)
- OpenMPI

Relative to other MPI offerings, IBM Platform MPI delivers the following unique advantages:

- **Portability:** Platform MPI supports a multitude of different interconnects (TCP, MX, InfiniBand, and 10GiGE), Linux and Windows operating systems, and FCA and GPU/GPU-Direct 2.0 functionality. Developers therefore do not need to build their MPI applications using different MPI to support a specific interconnect or other performance feature. A single MPI application built with Platform MPI is all that is necessary to use these features. And upgrading MPI versions is as simple as pointing MPI_ROOT to a different location. This results in fewer qualification runs and increases engineer productivity.
- **Robustness:** Platform MPI includes production quality resource cleanup including support for signal propagation to all ranks and stdio processing. This enables production quality execution and version to version compatibility.
- **Performance:** Other MPIs are designed to highlight specific technologies (for example, MVAPICH and InfiniBand, IntelMPI and Intel's CPUs, MS-MPI and WindowsHPC). However, Platform MPI demonstrates consistently high performance across multiple platforms. It also includes a robust set of runtime tools to help profile applications and tune them for optimal performance.
- **Application support:** Platform Computing works closely with our ISV partners to ensure that our technology is tightly integrated. Platform MPI is widely distributed as part of the ISV application, making it easier for the ISV and application developer to debug and support their software.

Reference information

Refer to Preview Announcement [212-211](#), dated June 04, 2012 and Software Announcement [212-200](#), dated June 04, 2012 .

Program number

Program number	VRM	Program name
5725-G83	8.3.0	IBM Platform MPI

Offering Information

Product information is available via the Offering Information website

<http://www.ibm.com/common/ssi>

Also, visit the Passport Advantage® website

<http://www.ibm.com/software/passportadvantage>

Publications

The following technical documents will be available for IBM Platform MPI V8.3:

- IBM Platform MPI User Guide
- Release Notes for IBM Platform MPI: Linux
- Release Notes for IBM Platform MPI: Windows

The IBM Publications Center

<http://www.ibm.com/shop/publications/order>

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Technical information

Specified operating environment

Hardware requirements

IBM Platform MPI V8.3 is supported on IBM System x iDataPlex® and other rack-based servers and is also supported on non-IBM x86 and x64 servers.

Supported interconnect and protocols include:

- GigE (Linux): RDMA, uDAPL, TCP/IP
- GigE (Windows) TCP/IP on x86-64
- 10GigE (Linux): TCP, uDAPL, iWarp and RDMA, including RoCE
- Myrinet (Linux): GM and MX on X86-64
- InfiniBand (Windows): WinOF 2.x, IBAL, WSD, SDR, DDR QDR and FDR
- InfiniBand (Linux): OFED1.1, 1.2, 1.3, 1.4 and 1.5, PSM, uDAPL on X86-64, and SDR, DDR, QDR and FDR Mellanox FCAs

In addition, Platform MPI supports GPU-Direct 2.0 support on Linux .

Software requirements

Platform MPI V8.3 includes support for the following operating systems:

- Red Hat Enterprise Linux 4.6, 5.x, and 6.x
- SUSE Linux Enterprise Server 10 and 11
- CentOS 5.x
- Microsoft Windows XP/Vista, Server 2003/Server 2008
- HPC Server 2008, Windows 7

For building an MPI application, you will need:

- GNU 3.2, 3.4, 4.1 (with glibc 2.3, 2.4, 2.5, 2.6, 2.7, 2.8, 2.9, 2.10, 2.11)
- Intel 9.x, 10.x, 11.x
- PathScale 2.3, 2.4, 2.5, 3.1, 3.2
- Portland Group 7.x, 8.x, 9.x

The program's specifications and specified operating environment information may be found in documentation accompanying the program, if available, such as a readme file, or other information published by IBM, such as an announcement letter. Documentation and other program content may be supplied only in the English language.

Companion products

The following products and services available from IBM complement Platform MPI V8.3:

- The IBM Platform LSF product family provides powerful workload management for demanding, distributed, and mission-critical high performance technical computing environments. It includes a comprehensive set of workload management capabilities; all designed to work together to address high performance computing needs.
- Clusters consisting of IBM System x servers are an ideal hardware platform for Platform MPI. Platform MPI is certified to run on the M4 generation of IBM System x iDataPlex and other rack-based servers.
- Depending on the nature of the client requirement, IBM Platform MPI deployments can involve software development and integration services. With its breadth of services capabilities, IBM is uniquely positioned to help clients integrate applications and be up and running quickly to get maximum value from their grid computing investment.

Compatibility

IBM Platform MPI V8.3 is functionally the same as Platform MPI V8.2.

Limitations

Refer to the **IBM Platform MPI release notes** included in the documentation.

Performance considerations

IBM Platform MPI performance is dependent on a number of factors including CPU performance, network bandwidth, network quality of service (QoS) and the skill level of the developer writing MPI code and the basic algorithms.

Planning information

Customer responsibilities

The customer must provide at least the minimum hardware and software environments in which Platform MPI will operate as stated in the *Platform MPI*

Users Guide. It is recommended that the customer assign a developer who has responsibility for planning, installing, maintaining and administering Platform MPI.

Packaging

IBM Platform MPI V8.3 is distributed as a single DVD media option or available for electronic download in two eAssemblies as follows:

- IBM International Program License Agreement (L-VASN-8SUQ84) in multiple languages
- Required files:
 - IBM Platform MPI Entitlement File
 - IBM Platform MPI 8.3 Release Notes for Linux
 - IBM Platform MPI 8.3 Release Notes for Windows
 - IBM Platform MPI User's Guide
- Platform MPI Installation package for General Release:
 - Linux , 64-bit OS
 - Linux , 32-bit OS
 - Windows

This program, when downloaded from a website, contains the applicable IBM license agreement and License Information, if appropriate, and will be presented for acceptance at the time of installation of the program. For future reference, the license and License Information will be stored in a directory such as LICENSE.TXT.

Security, auditability, and control

IBM Platform MPI uses the security and auditability features of the system in which it is installed.

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

Software Services

IBM Software Services has the breadth, depth, and reach to manage your services needs. You can leverage the deep technical skills of our lab-based, software services team and the business consulting, project management, and infrastructure expertise of our IBM Global Services team. Also, we extend our IBM Software Services reach through IBM Business Partners to provide an extensive portfolio of capabilities. Together, we provide the global reach, intellectual capital, industry insight, and technology leadership to support a wide range of critical business needs.

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Product group: IBM Platform Computing
Product Identifier Description (PID)
IBM Platform MPI 5725G83

Product category: Other Software

Charge metric

Program name	Part number or PID number	Charge metric
IBM Platform MPI	5725-G83	Managed core resource value unit (RVU) and 12 months subscription and support

Resource Value Unit (RVU)

RVU is a unit of measure by which the program can be licensed. RVU Proofs of Entitlement are based on the number of units of a specific resource used or managed by the program. Licensee must obtain sufficient entitlements for the number of RVUs required for licensee's environment for the specific resources as specified in the program specific table. RVU entitlements are specific to the program and the type of resource and may not be exchanged, interchanged, or aggregated with RVU entitlements of another program or resource. Refer to the program-specific RVU table.

Notes :

- Some programs may require licenses for the resources available to **and** the resources being managed by the program. In that case, the following applies. In addition to the entitlements required for the resources used by the program directly, licensee must obtain entitlements for this program sufficient to cover the resources managed by the program.
- Some programs may be licensed on a managed basis **only** . In that case, the following applies. Instead of the entitlements required for the resources used by the program directly, licensee must obtain entitlements for this program sufficient to cover the resources managed by the program.

The program in this announcement has Value Unit-Based pricing:

Program number	Program name	Value Unit exhibit
5725-G83	Platform MPI	VUE139

For this program, the resource for the purpose of the RVU calculation are Activated Processor Cores managed by the program. An Activated Processor Core is a processor core that is available for use in a physical or virtual server, regardless of whether the capacity of the processor core can be or is limited through virtualization technologies, operating system commands, BIOS settings, or similar restrictions. Licensee can deploy the program using either Full Capacity licensing or Virtualization Capacity (Sub-Capacity) licensing according to the Passport Advantage Sub-Capacity Licensing Terms (refer to the website below). If using Full Capacity licensing, each Activated Processor Core in the physical hardware environment managed by the program must be counted, except for those servers from which the program permanently no longer manages. If using Virtualization Capacity licensing, the Virtualization Capacity License Counting Rules at

defines how many Activated Processor Cores must be counted.

Resource Value Unit Conversion Table

From 1 to 2,500 Resources, 1.0 (RVU/UVU) per Resource
From 2,501 to 10,000 Resources, 2,500 RVUs plus 0.8 RVUs per Resource above 2,500
From 10,001 to 50,000 Resources, 8,500 RVUs plus 0.6 RVUs per Resource above 10,000
From 50,001 to 150,000 Resources, 32,500 RVUs plus 0.4 RVUs per Resource above 50,000
For more than 150,000 Resources, 72,500 RVUs plus 0.2 RVUs per Resource above 150,000

Passport Advantage

Program name/Description	Part number
IBM PLATFORM MPI V8.3 MULTIPLATFORM ENGLISH MEDIA PACK	AK006EN
IBM PLATFORM MPI RVU INITL FT LIC + S&S 12 MO	D0Q0BLL
IBM PLATFORM MPI RVU LIC + SW S&S 12 MO	D0Q15LL
IBM PLATFORM MPI RVU SW S&S REINSTATE 12 MO	D0Q16LL
IBM PLATFORM MPI RVU SUBSQ FT LIC+S&S 12 MO	E0DWZLL
IBM PLATFORM MPI RVU ANNUAL SW S&S RNWL	E0DXHLL

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License Information form number

L-VASN-8SUQ84

The program's License Information will be available for review on the IBM Software License Agreement website

<http://www.ibm.com/software/sla/sladb.nsf>

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Yes

Limited warranty

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Volume orders (IVO)

No

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No

System i Software Maintenance applies

No

Variable charges apply

No

Educational allowance available

Not applicable.

Statement of good security practices

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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.

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Prices

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