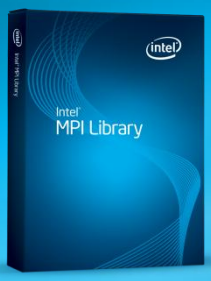


HIGH PERFORMANCE MPI LIBRARY FOR CLUSTER

Intel® MPI Library 5.0

Product Brief

Top Features

- Scalability verified up to 150k processes
- Supports the latest MPI-3 standard
- MPICH ABI compatibility

Available in cluster tools suite:

- Intel® Cluster Studio XE

Interoperable Products

- Intel® Composer XE
- Intel® VTune™ Amplifier XE
- Intel® Inspector XE
- Intel® Math Kernel Library
- Intel® Trace Analyzer and Collector

OS Support:

- Windows*
- Linux*

"Fast and accurate state of the art general purpose CFD solvers is the focus at S & I Engineering Solutions Pvt, Ltd. Scalability and efficiency are key to us when it comes to our choice and use of MPI Libraries. The Intel® MPI Library has enabled us to scale to over 10k cores with high efficiency and performance."

Nikhil Vijay Shende, Director, S & I Engineering Solutions, Pvt. Ltd.

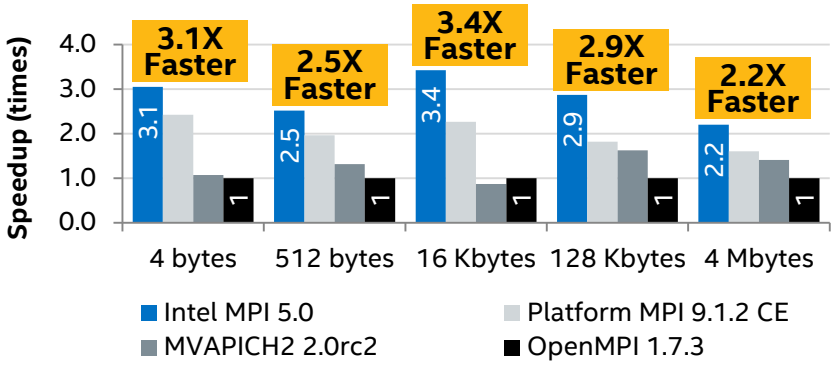
Deliver Flexible, Efficient, and Scalable Cluster Messaging

Intel® MPI Library focuses on making applications perform better on Intel® architecture-based clusters—implementing the high performance Message Passing Interface Version 3.0 specification on multiple fabrics. It enables you to quickly deliver maximum end user performance even if you change or upgrade to new interconnects, without requiring changes to the software or operating environment.

Use this high performance MPI library to develop applications that can run on multiple cluster interconnects chosen by the user at runtime. Benefit from a free runtime environment kit for products developed with Intel MPI library. Get excellent performance for enterprise, divisional, departmental, workgroup, and personal High Performance Computing.

Superior Performance with Intel® MPI Library 5.0

192 Processes, 8 nodes (InfiniBand + shared memory), Linux* 64
Relative (Geomean) MPI Latency Benchmarks (Higher is Better)



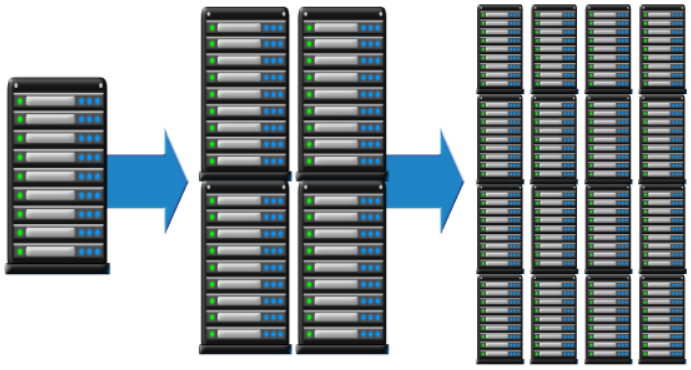
Configuration: Hardware: CPU: Dual Intel® Xeon E5-2697v2@2.70Ghz; 64 GB RAM. Interconnect: Mellanox Technologies* MT27500 Family [ConnectX*-3] FDR.. Software: RedHat* RHEL 6.2; OFED 3.5-2; Intel® MPI Library 5.0 Intel® MPI Benchmarks 3.2.4 (default parameters; built with Intel® C++ Compiler XE 13.1.1 for Linux*);

Software and workloads used in performance tests may have been optimized for performance only on Intel microprocessors. Performance tests, such as SYSmark and MobileMark, are measured using specific computer systems, components, software, operations and functions. Any change to any of those factors may cause the results to vary. You should consult other information and performance tests to assist you in fully evaluating your contemplated purchases, including the performance of that product when combined with other products. * Other brands and names are the property of their respective owners. Benchmark Source: Intel Corporation

Optimization Notice: Intel's compilers may or may not optimize to the same degree for non-Intel microprocessors for optimizations that are not unique to Intel microprocessors. These optimizations include SSE2, SSE3, and SSSE3 instruction sets and other optimizations. Intel does not guarantee the availability, functionality, or effectiveness of any optimization on microprocessors not manufactured by Intel. Microprocessor-dependent optimizations in this product are intended for use with Intel microprocessors. Certain optimizations not specific to Intel microarchitecture are reserved for Intel microprocessors. Please refer to the applicable product User and Reference Guides for more information regarding the specific instruction sets covered by this notice. Notice revision #20110804 .

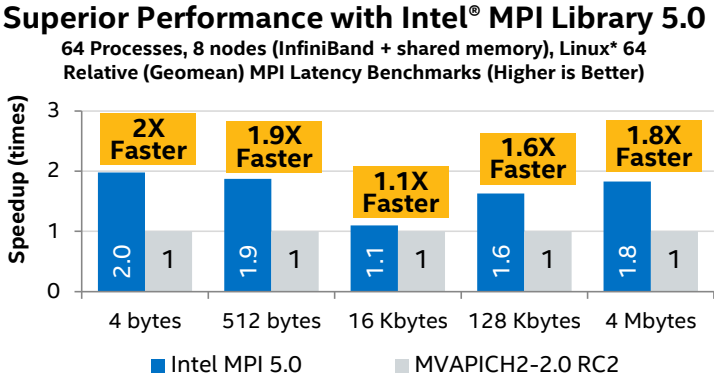
Intel® MPI Library (Intel® MPI) provides reduced MPI latency which can result in faster throughput.

Top Features



Scalability

- Scaling verified up to 150k Processes
- Low overhead allows random access to portions of a trace, making it suitable for analyzing large amounts of performance data.
- Thread safety allows you to trace multithreaded MPI applications for event-based tracing as well as non-MPI threaded applications.
- Improved start scalability through the mpiexec.hydra process manager



Configuration: Hardware: Intel® Xeon® CPU E5-2680 @ 2.70GHz, RAM 64GB; Interconnect: InfiniBand, ConnectX adapters; FDR. MIC: C0-KNC 1238095 kHz; 61 cores. RAM: 15872 MB per card. Software: RHEL 6.2, OFED 1.5.4.1, MPSS Version: 3.2, Intel® C/C++ Compiler XE 13.1.1, Intel® MPI Benchmarks 3.2.4.;

Software and workloads used in performance tests may have been optimized for performance only on Intel microprocessors. Performance tests, such as SYSmark and MobileMark, are measured using specific computer systems, components, software, operations and functions. Any change to any of those factors may cause the results to vary. You should consult other information and performance tests to assist you in fully evaluating your contemplated purchases, including the performance of that product when combined with other products. * Other brands and names are the property of their respective owners. Benchmark Source: Intel Corporation

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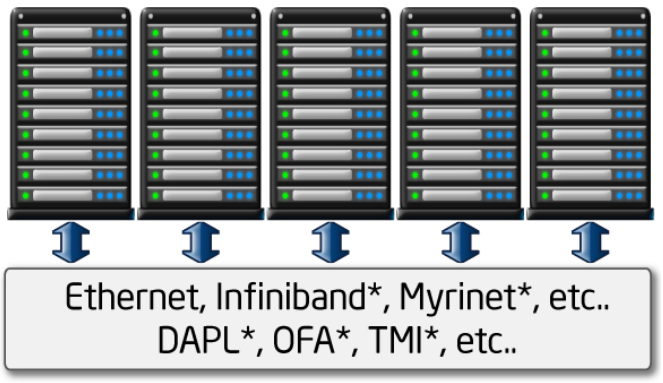
Performance

- Low latency MPI implementation
- Deploy optimized shared memory dynamic connection mode for large SMP nodes
- Increase performance with improved DAPL and OFA fabric support
- Accelerate your applications using the enhanced tuning utility for MPI



Interconnect Independence & Flexible Runtime Fabric Selection

- Get high-performance interconnects, including InfiniBand* and Myrinet*, as well as TCP, shared memory, and others
- Efficiently work through the Direct Access Programming Library (DAPL*), Open Fabrics Association (OFA*), and Tag Matching Interface (TMI*), making it easy for you to test and run applications on a variety of network fabrics.
- Optimizations to all levels of cluster fabrics: from shared memory thru Ethernet and RDMA-based fabrics to the tag matching interconnects

Details

Scalability

Implementing the high performance version 3.0 of the MPI-3 specification on multiple fabrics, Intel® MPI Library 5.0 for Windows* and Linux* focuses on making applications perform better on IA-based clusters. Intel MPI Library enables you to quickly deliver maximum end-user performance, even if you change or upgrade to new interconnects without requiring major modifications to the software or to the operating environment. Intel also provides a free runtime environment kit for products developed with the Intel MPI library.

Performance

Optimized shared memory path for multicore platforms allows more communication throughput and lower latencies. Native InfiniBand interface (OFED verbs) also provides support for lower latencies. Multi-rail capability for higher bandwidth and increased interprocess communication an d Tag Matching Interface (TMI) support for higher performance on Qlogic* PSM and Myricom* MX interconnects.

Intel® MPI Library Supports Multiple Hardware Fabrics

Whether you need to run TCP sockets, shared memory, or one of many Remote Direct Memory Access (RDMA) based interconnects, including InfiniBand*, Intel MPI Library covers all your configurations by providing an accelerated universal, multi-fabric layer for fast interconnects via the Direct Access Programming Library (DAPL*) or the Open Fabrics Association (OFA*) methodology. Develop MPI code independent of the fabric, knowing it will run efficiently on whatever fabric is chosen by the user at runtime.

Additionally, Intel MPI Library provides new levels of performance and flexibility for applications achieved through improved interconnect support for Myrinet* MX and QLogic* PSM interfaces, faster on-node messaging and an application tuning capability that adjusts to the cluster architecture and application structure.

Intel MPI Library dynamically establishes the connection, but only when needed, which reduces the memory footprint. It also automatically chooses the fastest transport available. Memory requirements are reduced by several methods including a two-phase communication buffer enlargement capability which allocates only the memory space actually required.

What's New

Feature	Benefit
Scalability	Continuing to build on our scaling successes of previous releases we have now scaled our Intel(r) MPI Library up to 150k processes.
MPI standard support	Supports the latest MPI-3 standard and enabling non-blocking collectives for higher performance on large jobs, improved one sided communications for fast RMA and support for large messages > 2GB.
Compatibility	MPICH ABI Compatibility between versions of Argonne National Labs*, IBM and Cray* MPICH implementation that simplifies use of MPICH based code without the need to recompile or relink saving developer's time and effort.

Purchase Options

Several suites are available combining the tools to build, verify and tune your application. The products covered in this product brief are highlighted in blue. Single or multi-user licenses along with volume, academic, and student discounts are available.

	Suites >>	Intel® Cluster Studio XE	Intel® Parallel Studio XE	Intel® C++ Studio XE	Intel® Fortran Studio XE	Intel® Composer XE	Intel® C++ Composer XE	Intel® Fortran Composer XE
Components	Intel® C / C++ Compiler	●	●	●		●	●	
	Intel® Fortran Compiler	●	●		●	●		●
	Intel® Integrated Performance Primitives[3]	●	●	●		●	●	
	Intel® Math Kernel Library[3]	●	●	●	●	●	●	●
	Intel® Cilk™ Plus	●	●	●		●	●	
	Intel® Threading Building Blocks	●	●	●		●	●	
	Intel® Inspector XE	●	●	●	●			
	Intel® VTune™ Amplifier XE	●	●	●	●			
	Intel® Advisor XE	●	●	●	●			
	Static Analysis	●	●	●	●			
	Intel® MPI Library	●						
	Intel® Trace Analyzer & Collector	●						
	Rogue Wave IMSL* Library[2]							●
	Operating System[1]	W, L	W, L	W, L	W, L	W, L	W, L, O	W, L, O

Note: [1] Operating System: W=Windows*, L= Linux*, O= OS X*. [2] Available in Intel® Visual Fortran Composer XE for Windows with IMSL* or as an addon to Fortran based products

[3] Not available individually on OS X, it is included in Intel® C++ & Fortran Composer XE suites for OS X

Technical Specifications

Specs at a Glance	
Processor support	Validated for use with multiple generations of Intel® and compatible processors including but not limited to: 2nd Generation Intel® Core™2 processor, Intel® Core™2 processor, Intel® Core™ processor, Intel® Xeon™ processor, Intel® Xeon Phi™ coprocessor.
Operating systems	Windows* and Linux*
Programming languages	Natively supports C, C++ and Fortran development
System requirements	Please refer to www.intel.com/software/products/systemrequirements/ for details on hardware and software requirements.
Support	A free Runtime Environment Kit is available to run applications that were developed using Intel® MPI Library All product updates, Intel® Premier Support services and Intel® Support Forums are included for one year. Intel Premier Support gives you secure, web-based, engineer-to-engineer support.

Learn more about Intel MPI Library

- Click or enter the link below: http://intel.ly/intel-mpi
- Or scan the QR code on the left

Download a free 30-day evaluation

- Click or enter the link below: http://intel.ly/sw-tools-eval
- Click on 'Cluster Tools' link

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