



# SPEC® MPIM2007 Result

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## Intel Corporation

Endeavor (Intel Xeon X5560, 2.80 GHz, DDR3-1333 MHz, SMT off, Turbo on)

SPECmpiM\_peak2007 = Not Run

SPECmpiM\_base2007 = 34.9

MPI2007 license: 13

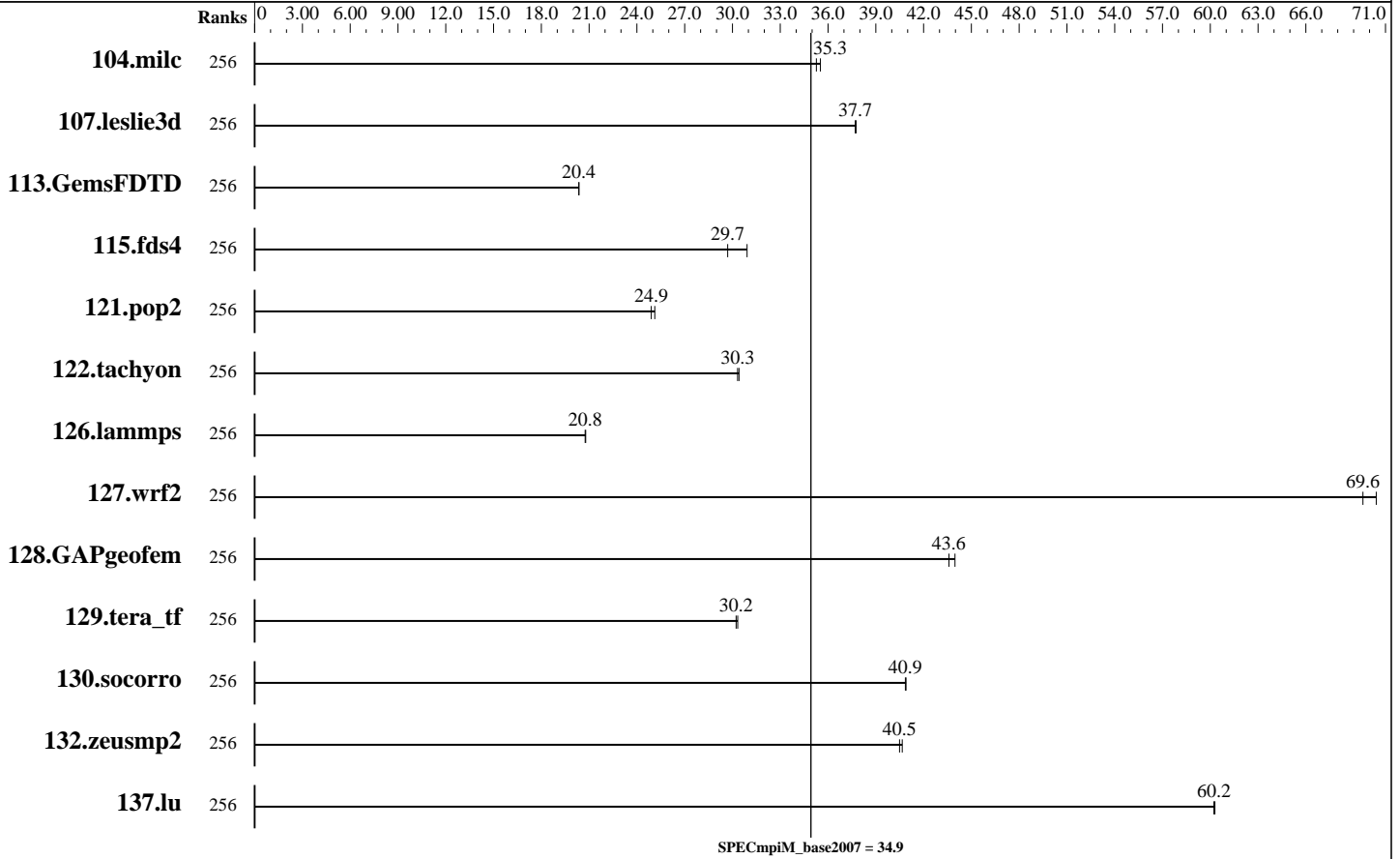
Test sponsor: Intel Corporation

Tested by: Pavel Shelepugin

Test date: Jul-2009

Hardware Availability: Jun-2009

Software Availability: Jun-2009



## Results Table

Benchmark	Base								Peak							
	Ranks	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Ranks	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio		
104.milc	256	44.1	35.5	<b>44.4</b>	<b>35.3</b>											
107.leslie3d	256	138	37.8	<b>138</b>	<b>37.7</b>											
113.GemsFDTD	256	<b>310</b>	<b>20.4</b>	310	20.4											
115.fds4	256	63.1	30.9	<b>65.7</b>	<b>29.7</b>											
121.pop2	256	164	25.1	<b>166</b>	<b>24.9</b>											
122.tachyon	256	<b>92.2</b>	<b>30.3</b>	92.0	30.4											
126.lammps	256	<b>140</b>	<b>20.8</b>	140	20.8											
127.wrf2	256	111	70.4	<b>112</b>	<b>69.6</b>											
128.GAPgeofem	256	47.0	44.0	<b>47.4</b>	<b>43.6</b>											
129.tera_tf	256	<b>91.6</b>	<b>30.2</b>	91.3	30.3											

Table continues on next page. Results appear in the order in which they were run. Bold underlined text indicates a median measurement.



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### Results Table (Continued)

Benchmark	Base						Peak							
	Ranks	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Ranks	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
130.socorro	256	<u>93.4</u>	<u>40.9</u>	93.3	40.9									
132.zeusmp2	256	76.3	40.7	<u>76.6</u>	<u>40.5</u>									
137.lu	256	61.0	60.3	<u>61.0</u>	<u>60.2</u>									

Results appear in the order in which they were run. Bold underlined text indicates a median measurement.

#### Hardware Summary

Type of System: Homogeneous  
 Compute Node: Endeavor Node  
 Interconnect: IB Switch  
 File Server Node: LFS  
 Total Compute Nodes: 32  
 Total Chips: 64  
 Total Cores: 256  
 Total Threads: 256  
 Total Memory: 768 GB  
 Base Ranks Run: 256  
 Minimum Peak Ranks: --  
 Maximum Peak Ranks: --

#### Software Summary

C Compiler: Intel C++ Compiler 11.1 for Linux  
 C++ Compiler: Intel C++ Compiler 11.1 for Linux  
 Fortran Compiler: Intel Fortran Compiler 11.1 for Linux  
 Base Pointers: 64-bit  
 Peak Pointers: 64-bit  
 MPI Library: Intel MPI Library 3.2 for Linux  
 Other MPI Info: None  
 Pre-processors: No  
 Other Software: None

### Node Description: Endeavor Node

#### Hardware

Number of nodes: 32  
 Uses of the node: compute  
 Vendor: Intel  
 Model: SR1600UR  
 CPU Name: Intel Xeon X5560  
 CPU(s) orderable: 1-2 chips  
 Chips enabled: 2  
 Cores enabled: 8  
 Cores per chip: 4  
 Threads per core: 1  
 CPU Characteristics: Intel Turbo Boost Technology up to 3.2 GHz, 6.4 GT/s QPI, Hyper-Threading disabled  
 CPU MHz: 2800  
 Primary Cache: 32 KB I + 32 KB D on chip per core  
 Secondary Cache: 256 KB I+D on chip per core  
 L3 Cache: 8 MB I+D on chip per chip, 8 MB shared / 4 cores  
 Other Cache: None  
 Memory: 24 GB (RDIMM 6x4-GB DDR3-1333 MHz)  
 Disk Subsystem: Seagate 400 GB ST3400755SS  
 Other Hardware: None  
 Adapter: Mellanox MHQH29-XTC  
 Number of Adapters: 1  
 Slot Type: PCIe x8 Gen2  
 Data Rate: InfiniBand 4x QDR

#### Software

Adapter: Mellanox MHQH29-XTC  
 Adapter Driver: OFED 1.3.1  
 Adapter Firmware: 2.6.000  
 Operating System: Red Hat EL 5.2, kernel 2.6.18-128  
 Local File System: Linux/ext2  
 Shared File System: Lustre FS  
 System State: Multi-User  
 Other Software: PBS Pro 8.0

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### Node Description: Endeavor Node

Ports Used: 1  
Interconnect Type: InfiniBand

### Node Description: LFS

#### Hardware

Number of nodes: 8  
Uses of the node: fileserver  
Vendor: Intel  
Model: SR1560SF  
CPU Name: Intel Xeon E5462  
CPU(s) orderable: 1-2 chips  
Chips enabled: 2  
Cores enabled: 8  
Cores per chip: 4  
Threads per core: 1  
CPU Characteristics: 1600 MHz FSB  
CPU MHz: 2800  
Primary Cache: 32 KB I + 32 KB D on chip per core  
Secondary Cache: 12 MB I+D on chip per chip, 6 MB shared / 2 cores  
L3 Cache: None  
Other Cache: None  
Memory: 16 GB DDR2 16x1-GB 667 MHz  
Disk Subsystem: Seagate 250 GB  
Other Hardware: connected to DDN storage (see General Notes)  
Adapter: Mellanox MHGH28-XTC  
Number of Adapters: 1  
Slot Type: PCIe x8 Gen2  
Data Rate: InfiniBand 4x DDR  
Ports Used: 1  
Interconnect Type: InfiniBand

#### Software

Adapter: Mellanox MHGH28-XTC  
Adapter Driver: OFED 1.3.1  
Adapter Firmware: 2.6.000  
Operating System: Red Hat EL 5.2, kernel 2.6.18-53  
Local File System: None  
Shared File System: Lustre FS  
System State: Multi-User  
Other Software: None

### Interconnect Description: IB Switch

#### Hardware

Vendor: Mellanox  
Model: Mellanox MTS3600Q-1UNC  
Switch Model: Mellanox MTS3600Q-1UNC  
Number of Switches: 46  
Number of Ports: 36  
Data Rate: InfiniBand 4x QDR  
Firmware: 7.1.000  
Topology: Fat tree  
Primary Use: MPI traffic, FS traffic

#### Software



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## Submit Notes

The config file option 'submit' was used.

## General Notes

### MPI startup command:

mpirun command was used to start MPI jobs. This command starts an independent ring of mpd daemons, launches an MPI job, and shuts down the mpd ring upon the job termination. The mpirun command automatically detects if an MPI job is submitted in a session allocated using a job scheduler (like PBS Pro). In this case, the mpirun command extracts the host list from the respective environment and uses these nodes automatically.

### BIOS settings:

Intel Hyper-Threading Technology (SMT): Disabled (default is Enabled)  
Intel Turbo Boost Technology (Turbo) : Enabled (default is Enabled)

### RAM configuration:

Compute nodes have 1x4-GB RDIMM on each memory channel.

### Network:

Forty six 36-port switches: 18 core switches and 28 leaf switches. Each leaf has one link to each core. Remaining 18 ports on 25 of 28 leafs are used for compute nodes. On the remaining 3 leafs the ports are used for FS nodes and other peripherals.

### Job placement:

Each MPI job was assigned to a topologically compact set of nodes, i.e. the minimal needed number of leaf switches was used for each job: 1 switch for 16/32/64/128 ranks, 2 switches for 256 ranks, 4 switches for 512 ranks.

### Fileserver:

Intel SR1560SF systems connected via IB to DataDirect Networks S2A9900 storage which is: 160 disks, 300GB/disk, 48TB total, 35TB available.

PBS Pro was used for job submission. It has no impact on performance.

Can be found at: <http://www.altair.com>

Lustre File System 1.6.6 was used. Download from:

<http://www.sun.com/software/products/lustre>

## Base Compiler Invocation

C benchmarks:

mpiicc

C++ benchmarks:

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Standard Performance Evaluation Corporation

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<http://www.spec.org/>

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## Base Compiler Invocation (Continued)

126.lammps: mpiicpc

Fortran benchmarks:

mpiifort

Benchmarks using both Fortran and C:

mpiicc mpiifort

## Base Portability Flags

121.pop2: -DSPEC\_MPI\_CASE\_FLAG

126.lammps: -DMPICH\_IGNORE\_CXX\_SEEK

127.wrf2: -DSPEC\_MPI\_CASE\_FLAG -DSPEC\_MPI\_LINUX

## Base Optimization Flags

C benchmarks:

-O3 -xSSE4.2 -no-prec-div

C++ benchmarks:

126.lammps: -O3 -xSSE4.2 -no-prec-div

Fortran benchmarks:

-O3 -xSSE4.2 -no-prec-div

Benchmarks using both Fortran and C:

-O3 -xSSE4.2 -no-prec-div

The flags file that was used to format this result can be browsed at

[http://www.spec.org/mpi2007/flags/EM64T\\_Intel111\\_flags.html](http://www.spec.org/mpi2007/flags/EM64T_Intel111_flags.html)

You can also download the XML flags source by saving the following link:

[http://www.spec.org/mpi2007/flags/EM64T\\_Intel111\\_flags.xml](http://www.spec.org/mpi2007/flags/EM64T_Intel111_flags.xml)



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For questions about this result, please contact the tester.  
For other inquiries, please contact [webmaster@spec.org](mailto:webmaster@spec.org).

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