



# SPEC® MPIM2007 Result

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## SGI

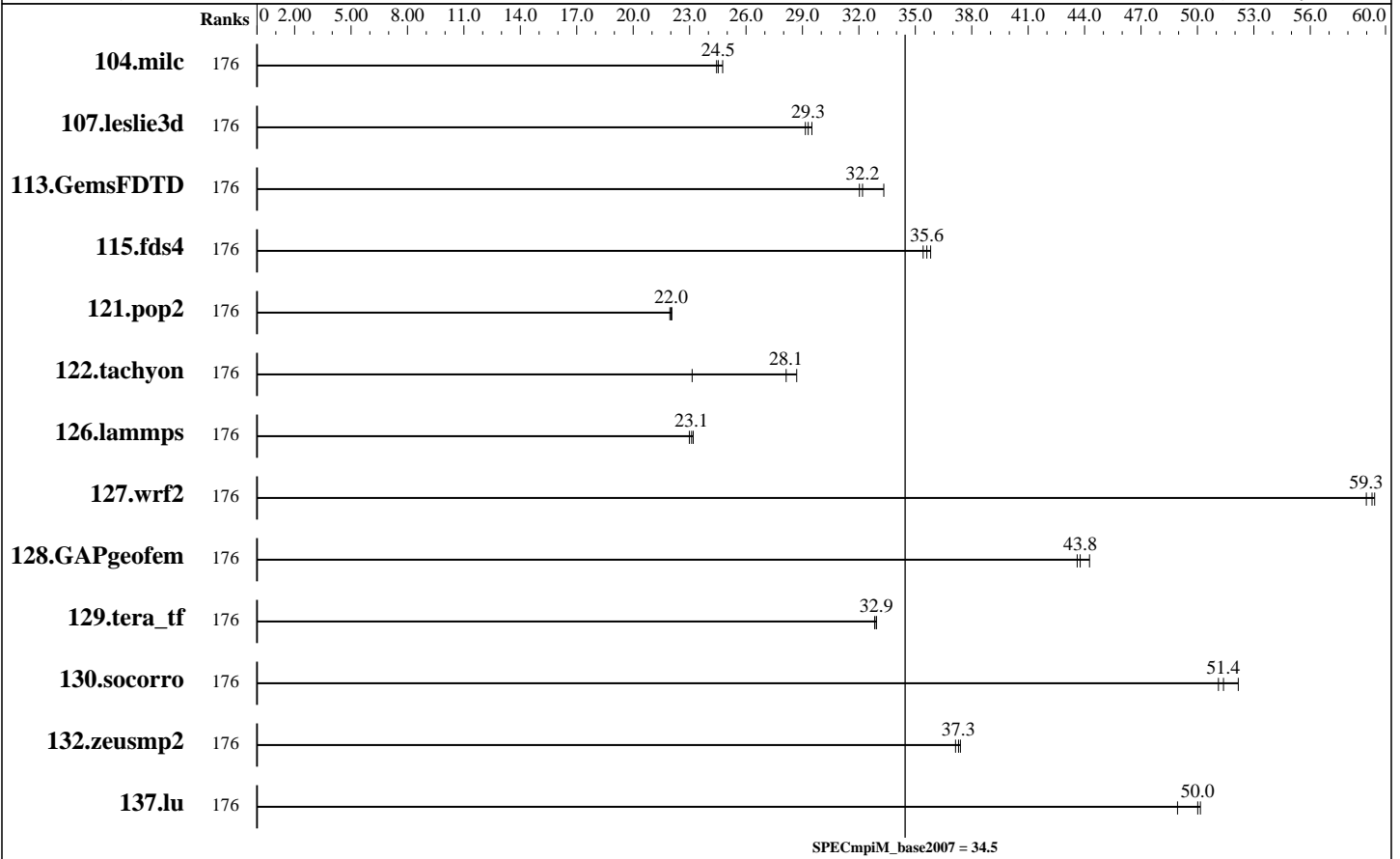
SGI Rackable C2112-4GP3  
(Intel Xeon E5-2699 v4, 2.20 GHz)

SPECmpiM\_peak2007 = Not Run

SPECmpiM\_base2007 = 34.5

MPI2007 license: 14  
Test sponsor: SGI  
Tested by: SGI

Test date: Mar-2016  
Hardware Availability: Mar-2016  
Software Availability: May-2016



## Results Table

Benchmark	Base								Peak							
	Ranks	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Ranks	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio		
104.milc	176	64.1	24.4	63.2	24.8	<b>63.8</b>	<b>24.5</b>									
107.leslie3d	176	179	29.2	<b>178</b>	<b>29.3</b>	177	29.5									
113.GemsFDTD	176	189	33.3	<b>196</b>	<b>32.2</b>	197	32.0									
115.fds4	176	<b>54.8</b>	<b>35.6</b>	54.5	35.8	55.1	35.4									
121.pop2	176	187	22.1	<b>188</b>	<b>22.0</b>	188	22.0									
122.tachyon	176	97.5	28.7	<b>99.4</b>	<b>28.1</b>	121	23.1									
126.lammps	176	127	23.0	126	23.2	<b>126</b>	<b>23.1</b>									
127.wrf2	176	132	59.0	<b>132</b>	<b>59.3</b>	131	59.4									
128.GAPgeofem	176	46.7	44.3	47.4	43.6	<b>47.2</b>	<b>43.8</b>									
129.tera_tf	176	84.1	32.9	84.3	32.8	<b>84.1</b>	<b>32.9</b>									

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	176	74.7	51.1	<b><u>74.3</u></b>	<b><u>51.4</u></b>	73.2	52.2							
132.zeusmp2	176	83.0	37.4	<b><u>83.2</u></b>	<b><u>37.3</u></b>	83.6	37.1							
137.lu	176	75.1	48.9	<b><u>73.5</u></b>	<b><u>50.0</u></b>	73.3	50.2							

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: SGI Rackable C2112-4GP3 Compute Node  
 Interconnects: InfiniBand MPI  
 InfiniBand I/O  
 File Server Node: SGI MIS Server  
 Total Compute Nodes: 4  
 Total Chips: 8  
 Total Cores: 176  
 Total Threads: 176  
 Total Memory: 512 GB  
 Base Ranks Run: 176  
 Minimum Peak Ranks: --  
 Maximum Peak Ranks: --

#### Software Summary

C Compiler: Intel C++ Composer XE 2013 for Linux,  
 Version 14.0.3.174 Build 20140422  
 C++ Compiler: Intel C++ Composer XE 2013 for Linux,  
 Version 14.0.3.174 Build 20140422  
 Fortran Compiler: Intel Fortran Composer XE 2013 for Linux,  
 Version 14.0.3.174 Build 20140422  
 Base Pointers: 64-bit  
 Peak Pointers: Not Applicable  
 MPI Library: SGI MPT 2.14  
 Other MPI Info: MLNX\_OFED\_LINUX-3.1-1.0.3  
 Pre-processors: None  
 Other Software: None

### Node Description: SGI Rackable C2112-4GP3 Compute Node

#### Hardware

Number of nodes: 4  
 Uses of the node: compute  
 Vendor: SGI  
 Model: SGI Rackable C2112-4GP3 (Intel Xeon E5-2699 v4,  
 2.20 GHz)  
 CPU Name: Intel Xeon E5-2699 v4  
 CPU(s) orderable: 1-2 chips  
 Chips enabled: 2  
 Cores enabled: 44  
 Cores per chip: 22  
 Threads per core: 1  
 CPU Characteristics: 22 Core, 2.20 GHz, 9.6 GT/s QPI  
 Intel Turbo Boost Technology up to 3.60 GHz  
 Hyper-Threading Technology disabled  
 CPU MHz: 2220  
 Primary Cache: 32 KB I + 32 KB D on chip per core  
 Secondary Cache: 256 KB I+D on chip per core  
 L3 Cache: 55 MB I+D on chip per chip  
 Other Cache: None  
 Memory: 128 GB (8 x 16 GB 2Rx4 PC4-2400T-R)  
 Disk Subsystem: None  
 Other Hardware: None  
 Adapter: Mellanox MT27620 with ConnectX-4  
 (PCIe x16 Gen3 8 GT/s)

#### Software

Adapter: Mellanox MT27620 with ConnectX-4  
 (PCIe x16 Gen3 8 GT/s)  
 Adapter Driver: OFED-3.1.1-0.3  
 Adapter Firmware: 12.12.1240  
 Adapter: Mellanox MT27500 with ConnectX-3  
 (PCIe x8 Gen3 8 GT/s)  
 Adapter Driver: OFED-3.1.1-0.0  
 Adapter Firmware: 2.35.5100  
 Operating System: SUSE Linux Enterprise Server 12 (x86\_64),  
 Kernel 3.12.44-52.10-default  
 Local File System: ext3  
 Shared File System: NFSv3 IPoIB  
 System State: Multi-user, run level 3  
 Other Software: SGI Tempo Service Node 3.2.0,  
 Build 713r26.sles12-1510192000

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Test sponsor: SGI

Hardware Availability: Mar-2016

Tested by: SGI

Software Availability: May-2016

### Node Description: SGI Rackable C2112-4GP3 Compute Node

Number of Adapters:	1
Slot Type:	PCIe x16 Gen3
Data Rate:	InfiniBand 4x EDR
Ports Used:	1
Interconnect Type:	InfiniBand
Adapter:	Mellanox MT27500 with ConnectX-3 (PCIe x8 Gen3 8 GT/s)
Number of Adapters:	1
Slot Type:	PCIe x8 Gen3
Data Rate:	InfiniBand 4x FDR
Ports Used:	1
Interconnect Type:	InfiniBand

### Node Description: SGI MIS Server

Hardware	
Number of nodes:	1
Uses of the node:	fileserver
Vendor:	SGI
Model:	SGI MIS Server (Intel Xeon X2670, 2.60 GHz)
CPU Name:	Intel Xeon E5-2670
CPU(s) orderable:	1-2 chips
Chips enabled:	2
Cores enabled:	16
Cores per chip:	8
Threads per core:	2
CPU Characteristics:	Intel Turbo Boost Technology up to 3.30 GHz Hyper-Threading Technology enabled
CPU MHz:	2601
Primary Cache:	32 KB I + 32 KB D on chip per core
Secondary Cache:	256 KB I+D on chip per core
L3 Cache:	20 MB I+D on chip per chip
Other Cache:	None
Memory:	128 GB (8 * 16 GB 2Rx4 PC3-10600R-9, ECC)
Disk Subsystem:	45 TB RAID 6 12 x 1 TB SATA (Seagate Constellation, 7200RPM)
Other Hardware:	None
Adapter:	Mellanox MT27500 with ConnectX-3 ASIC
Number of Adapters:	2
Slot Type:	PCIe x8 Gen3
Data Rate:	InfiniBand 4x FDR
Ports Used:	2
Interconnect Type:	InfiniBand

Software	
Adapter:	Mellanox MT27500 with ConnectX-3 ASIC
Adapter Driver:	MLNX_OFED_LINUX-3.1-1.0.3
Adapter Firmware:	2.35.5100
Operating System:	SUSE Linux Enterprise Server 11 SP3 (x86_64), Kernel 3.0.101-0.46-default
Local File System:	xfs
Shared File System:	--
System State:	Multi-user, run level 5
Other Software:	SGI Foundation Software 2.10 Build 710r16.sles11sp3-1404092103



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### Interconnect Description: InfiniBand MPI

Hardware		Software
Vendor:	Mellanox Technologies	
Model:	None	
Switch Model:	Mellanox SB7790	
Number of Switches:	6	
Number of Ports:	36	
Data Rate:	InfiniBand 4x EDR	
Firmware:	11.1.102	
Topology:	Fat Tree	
Primary Use:	MPI traffic	

### Interconnect Description: InfiniBand I/O

Hardware		Software
Vendor:	Mellanox Technologies	
Model:	None	
Switch Model:	Mellanox MSX6036F-1SFS	
Number of Switches:	2	
Number of Ports:	36	
Data Rate:	InfiniBand 4x FDR	
Firmware:	9.3.5080	
Switch Model:	Mellanox MSX6025	
Number of Switches:	4	
Number of Ports:	36	
Data Rate:	InfiniBand 4x FDR	
Firmware:	9.3.6000	
Topology:	Fat Tree	
Primary Use:	I/O traffic	

### Submit Notes

The config file option 'submit' was used.

### General Notes

130.socorro (base): "nullify\_ptrs" src.alt was used.

129.tera\_tf (base): "add\_rank\_support" src.alt was used.

Software environment:

```

export MPI_REQUEST_MAX=65536
export MPI_TYPE_MAX=32768
export MPI_IB_DEVS=1
export MPI_CONNECTIONS_THRESHOLD=0
export MPI_IB_UPGRADE_SENDS=50
export MPI_IB_IMM_UPGRADE=false

```

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## General Notes (Continued)

```
export MPI_IB_HYPER_LAZY=false
ulimit -s unlimited
```

### BIOS settings:

```
AMI BIOS version T20151001184140
Hyper-Threading Technology disabled
Transparent HugePages enabled
Intel Turbo Boost Technology enabled (default)
Intel Turbo Boost Technology activated with
  modprobe acpi_cpufreq
  cpupower frequency-set -u 2601MHz -d 2601MHz -g performance
```

### 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 up to 32 sockets, and 2 switches for up to 64 sockets.

### Additional notes regarding interconnect:

The Infiniband network consists of two independent planes, with half the switches in the system allocated to each plane. I/O traffic is restricted to one plane, while MPI traffic is restricted to the other plane.

## Base Compiler Invocation

### C benchmarks:

```
icc
```

### C++ benchmarks:

```
126.lammps: icpc
```

### Fortran benchmarks:

```
ifort
```

### Benchmarks using both Fortran and C:

```
icc ifort
```

## Base Portability Flags

```
121.pop2: -DSPEC_MPI_CASE_FLAG
127.wrf2: -DSPEC_MPI_CASE_FLAG -DSPEC_MPI_LINUX
130.socorro: -assume nostd_intent_in
```



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## Base Optimization Flags

C benchmarks:

-O3 -xCORE-AVX2 -no-prec-div

C++ benchmarks:

126.lammps: -O3 -xCORE-AVX2 -no-prec-div -ansi-alias

Fortran benchmarks:

-O3 -xCORE-AVX2 -no-prec-div

Benchmarks using both Fortran and C:

-O3 -xCORE-AVX2 -no-prec-div

## Base Other Flags

C benchmarks:

-lmpi

C++ benchmarks:

126.lammps: -lmpi

Fortran benchmarks:

-lmpi

Benchmarks using both Fortran and C:

-lmpi

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

[http://www.spec.org/mpi2007/flags/SGI\\_x86\\_64\\_Intel14\\_flags.20140908.html](http://www.spec.org/mpi2007/flags/SGI_x86_64_Intel14_flags.20140908.html)

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

[http://www.spec.org/mpi2007/flags/SGI\\_x86\\_64\\_Intel14\\_flags.20140908.xml](http://www.spec.org/mpi2007/flags/SGI_x86_64_Intel14_flags.20140908.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).

Tested with SPEC MPI2007 v2.0.1.

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