# SPEC® MPIL2007 Result

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## SGI

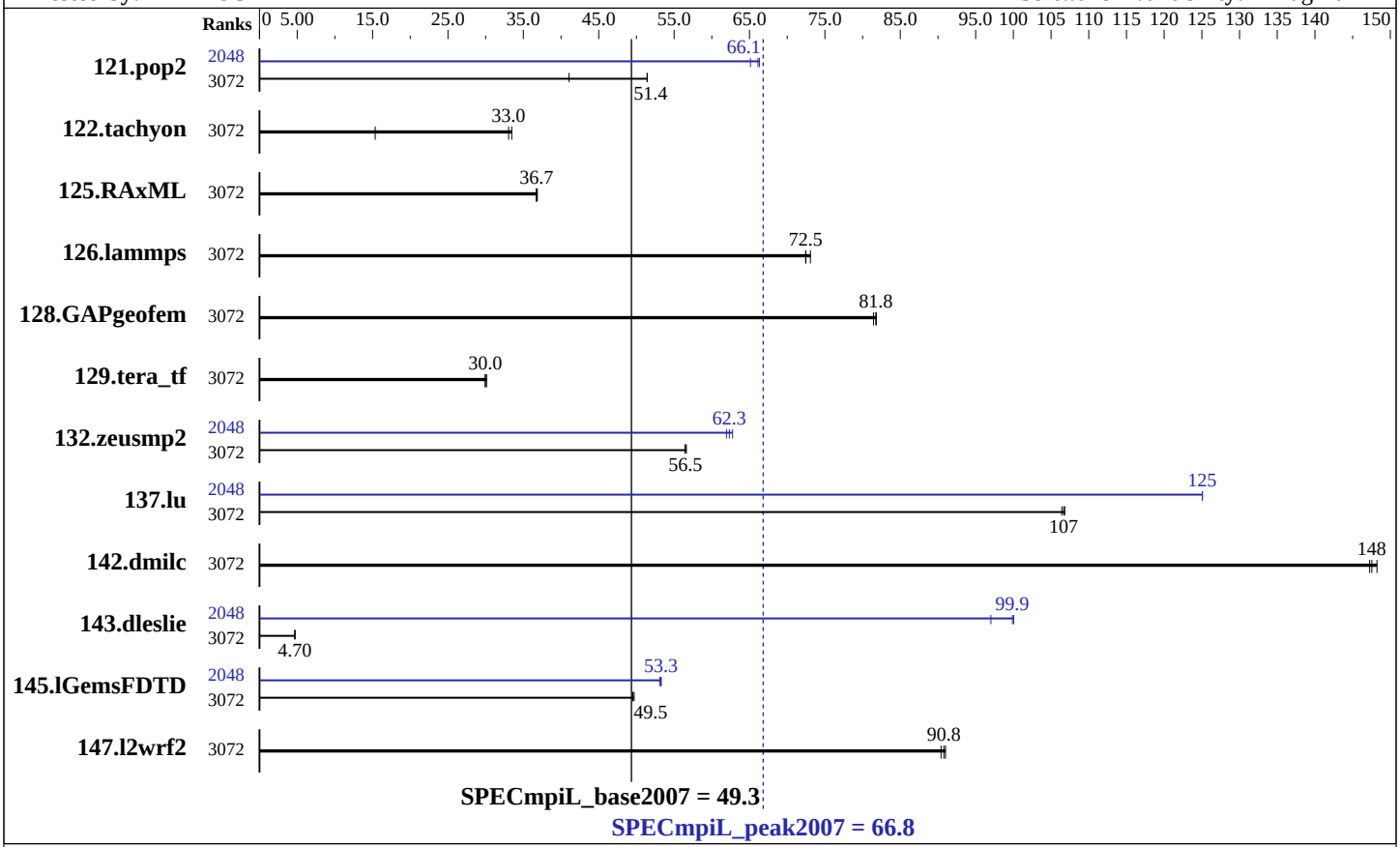
SGI Altix ICE 8400EX
(Intel Xeon X5690, 3.46 GHz)

SPECmpiL_peak2007 = 66.8

SPECmpiL_base2007 = 49.3

**MPI2007 license:** 4
**Test sponsor:** SGI
**Tested by:** SGI

**Test date:** Jun-2011
**Hardware Availability:** Feb-2011
**Software Availability:** Aug-2011




## Results Table

| Benchmark | Base | | | | | | | Peak | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Ranks | Seconds | Ratio | Seconds | Ratio | Seconds | Ratio | Ranks | Seconds | Ratio | Seconds | Ratio | Seconds | Ratio |
| 121.pop2 | 3072 | 94.7 | 41.1 | 75.6 | 51.4 | **75.7** | **51.4** | 2048 | 59.7 | 65.1 | **58.8** | **66.1** | 58.7 | 66.3 |
| 122.tachyon | 3072 | 127 | 15.4 | 58.1 | 33.5 | **58.8** | **33.0** | 3072 | 127 | 15.4 | 58.1 | 33.5 | **58.8** | **33.0** |
| 125.RAxML | 3072 | 79.2 | 36.9 | **79.5** | **36.7** | 79.5 | 36.7 | 3072 | 79.2 | 36.9 | **79.5** | **36.7** | 79.5 | 36.7 |
| 126.lammps | 3072 | 33.6 | 73.1 | 33.9 | 72.4 | **33.9** | **72.5** | 3072 | 33.6 | 73.1 | 33.9 | 72.4 | **33.9** | **72.5** |
| 128.GAPgeofem | 3072 | 72.5 | 81.8 | 72.9 | 81.5 | **72.6** | **81.8** | 3072 | 72.5 | 81.8 | 72.9 | 81.5 | **72.6** | **81.8** |
| 129.tera_tf | 3072 | **36.7** | **30.0** | 36.5 | 30.1 | 36.7 | 29.9 | 3072 | **36.7** | **30.0** | 36.5 | 30.1 | 36.7 | 29.9 |
| 132.zeusmp2 | 3072 | 37.6 | 56.4 | **37.5** | **56.5** | 37.4 | 56.6 | 2048 | 34.2 | 61.9 | 33.8 | 62.8 | **34.0** | **62.3** |
| 137.lu | 3072 | 39.3 | 107 | **39.4** | **107** | 39.5 | 106 | 2048 | **33.6** | **125** | 33.6 | 125 | 33.6 | 125 |
| 142.dmilc | 3072 | 24.9 | 148 | 25.0 | 147 | **25.0** | **148** | 3072 | 24.9 | 148 | 25.0 | 147 | **25.0** | **148** |
| 143.dleslie | 3072 | **660** | **4.70** | 660 | 4.70 | 660 | 4.70 | 2048 | 31.0 | 100 | **31.0** | **99.9** | 32.0 | 97.0 |
| 145.lGemsFDTD | 3072 | **89.1** | **49.5** | 89.1 | 49.5 | 88.8 | 49.7 | 2048 | **82.8** | **53.3** | 82.8 | 53.3 | 83.1 | 53.1 |
| 147.l2wrf2 | 3072 | **90.4** | **90.8** | 90.2 | 91.0 | 90.7 | 90.4 | 3072 | **90.4** | **90.8** | 90.2 | 91.0 | 90.7 | 90.4 |

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

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**Software Availability:** Aug-2011

### Hardware Summary

| | |
|---|---|
| Type of System: | Homogeneous |
| Compute Node: | SGI Altix ICE 8400EX Compute Node |
| Interconnect: | InfiniBand (MPI and I/O) |
| File Server Node: | SGI InfiniteStorage Nexis 2000 NAS |
| Total Compute Nodes: | 256 |
| Total Chips: | 512 |
| Total Cores: | 3072 |
| Total Threads: | 6144 |
| Total Memory: | 6 TB |
| Base Ranks Run: | 3072 |
| Minimum Peak Ranks: | 2048 |
| Maximum Peak Ranks: | 3072 |

### Software Summary

| | |
|---|---|
| C Compiler: | Intel C++ Composer XE 2011 for Linux, Version 12.0.3.174 Build 20110309 |
| C++ Compiler: | Intel C++ Composer XE 2011 for Linux, Version 12.0.3.174 Build 20110309 |
| Fortran Compiler: | Intel Fortran Composer XE 2011 for Linux, Version 12.0.3.174 Build 20110309 |
| Base Pointers: | 64-bit |
| Peak Pointers: | 64-bit |
| MPI Library: | SGI MPT 2.04 Patch 10789 |
| Other MPI Info: | OFED 1.4.2 |
| Pre-processors: | None |
| Other Software: | None |

## Node Description: SGI Altix ICE 8400EX Compute Node

### Hardware

| | |
|---|---|
| Number of nodes: | 256 |
| Uses of the node: | compute |
| Vendor: | SGI |
| Model: | SGI Altix ICE 8400EX (Intel Xeon X5690, 3.46 GHz) |
| CPU Name: | Intel Xeon X5690 |
| CPU(s) orderable: | 1-2 chips |
| Chips enabled: | 2 |
| Cores enabled: | 12 |
| Cores per chip: | 6 |
| Threads per core: | 2 |
| CPU Characteristics: | Six Core, 3.46 GHz, 6.4 GT/s QPI<br>Intel Turbo Boost Technology up to 3.73 GHz<br>Hyper-Threading Technology enabled |
| CPU MHz: | 3467 |
| Primary Cache: | 32 KB I + 32 KB D on chip per core |
| Secondary Cache: | 256 KB I+D on chip per core |
| L3 Cache: | 12 MB I+D on chip per chip |
| Other Cache: | None |
| Memory: | 24 GB (6 x 4 GB 2Rx4 PC3-10600R-9, ECC) |
| Disk Subsystem: | None |
| Other Hardware: | None |
| Adapter: | Mellanox MT26428 ConnectX IB QDR (PCIe x8 Gen2 5 GT/s) |
| Number of Adapters: | 2 |
| Slot Type: | PCIe x8 Gen2 |
| Data Rate: | InfiniBand 4x QDR |
| Ports Used: | 1 |
| Interconnect Type: | InfiniBand |

### Software

| | |
|---|---|
| Adapter: | Mellanox MT26428 ConnectX IB QDR (PCIe x8 Gen2 5 GT/s) |
| Adapter Driver: | OFED-1.4.2 |
| Adapter Firmware: | 2.7.8200 |
| Operating System: | SUSE Linux Enterprise Server 11 SP1, Kernel 2.6.32.13-0.4-default |
| Local File System: | NFSv3 |
| Shared File System: | NFSv3 IPoIB |
| System State: | Multi-user, run level 3 |
| Other Software: | SGI ProPack 7SP1 for Linux, Build 701r3.sles11-1005252113<br>SGI Tempo Compute Node 2.1, Build 701r3.sles11-1005252113 |

## Node Description: SGI InfiniteStorage Nexis 2000 NAS

### Hardware

| | |
|---|---|
| Number of nodes: | 1 |
| Uses of the node: | fileserver |
| Vendor: | SGI |
| Model: | SGI Altix XE 270 (Intel Xeon X5670, 2.93 GHz) |
| CPU Name: | Intel Xeon X5670 |
| CPU(s) orderable: | 1-2 chips |
| Chips enabled: | 2 |
| Cores enabled: | 12 |
| Cores per chip: | 6 |
| Threads per core: | 2 |
| CPU Characteristics: | Intel Turbo Boost Technology up to 3.33 GHz<br>Hyper-Threading Technology enabled |
| CPU MHz: | 2933 |
| Primary Cache: | 32 KB I + 32 KB D on chip per core |
| Secondary Cache: | 256 KB I+D on chip per chip |
| L3 Cache: | 12 MB I+D on chip per chip |
| Other Cache: | None |
| Memory: | 96 GB (12*8 GB DDR3-1333 CL9 DIMMs) |
| Disk Subsystem: | 8.8 TB RAID 5<br>60 x 146 GB SAS (Seagate Cheetah 15K.5) |
| Other Hardware: | None |
| Adapter: | Mellanox MT26428 ConnectX IB QDR (PCIe x8 Gen2 5 GT/s) |
| Number of Adapters: | 2 |
| Slot Type: | PCIe x8 Gen2 |
| Data Rate: | InfiniBand 4x QDR |
| Ports Used: | 2 |
| Interconnect Type: | InfiniBand |

### Software

| | |
|---|---|
| Adapter: | Mellanox MT26428 ConnectX IB QDR (PCIe x8 Gen2 5 GT/s) |
| Adapter Driver: | OFED-1.4.0 |
| Adapter Firmware: | 2.7.0 |
| Operating System: | SUSE Linux Enterprise Server 11 (x86_64)<br>Kernel 2.6.27.19-5-default |
| Local File System: | xfs |
| Shared File System: | -- |
| System State: | Multi-user, run level 3 |
| Other Software: | SGI Foundation Software 2, Build 700r3.sles11-1004061553 |

## Interconnect Description: InfiniBand (MPI and I/O)

### Hardware

| | |
|---|---|
| Vendor: | Mellanox Technologies and SGI |
| Model: | None |
| Switch Model: | SGI QDR_1.5_HYPR_2454 with Mellanox Device 48438 (Infiniscale IV) |
| Number of Switches: | 64 |
| Number of Ports: | 36 |
| Data Rate: | InfiniBand 4x QDR |
| Firmware: | 5040005 |
| Topology: | Enhanced Hypercube |
| Primary Use: | MPI and I/O traffic |

### Software

## Submit Notes

```
The config file option 'submit' was used.
For peak benchmarks that used 2048 MPI ranks, four ranks
were assigned to each CPU chip, leaving 2 cores per chip idle.
```

## General Notes

```
Software environment:
  export MPI_REQUEST_MAX=65536
  export MPI_TYPE_MAX=32768
  export MPI_BUFS_THRESHOLD=1
  export MPI_IB_RAILS=2
  ulimit -s unlimited

BIOS settings:
  AMI BIOS version 080016
  Hyper-Threading Technology enabled (default)
  Intel Turbo Boost Technology enabled (default)
  Intel Turbo Boost Technology activated in the OS via
    /etc/init.d/acpid start
    /etc/init.d/powersaved start
    powersave -f

Job Placement:
  In the base run, each MPI job was assigned to a topologically compact
  set of nodes, i.e. the minimal needed number of switches was
  used for each job: 2 switches for 96 ranks,
  4 switches for 192 ranks, 8 switches for 384 ranks,
  16 switches for 768 ranks, 32 switches for 1536 ranks,
  and 64 switches for 3072 ranks.

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 can
  use both planes.
```

# Compiler Invocation

C benchmarks:
`icc`

C++ benchmarks:

126.lammps: `icpc`

Fortran benchmarks:
`ifort`

Continued on next page

## Compiler Invocation (Continued)

Benchmarks using both Fortran and C:
icc ifort

## Portability Flags

121.pop2: -DSPEC_MPI_CASE_FLAG

## Base Optimization Flags

C benchmarks:
-O3 -xSSE4.2 -no-prec-div

C++ benchmarks:

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

Fortran benchmarks:
-O3 -xSSE4.2 -no-prec-div

Benchmarks using both Fortran and C:
-O3 -xSSE4.2 -no-prec-div

## Peak Optimization Flags

C benchmarks:

122.tachyon: basepeak = yes

125.RAxML: basepeak = yes

142.dmilc: basepeak = yes

C++ benchmarks:

126.lammps: basepeak = yes

Fortran benchmarks:

129.tera_tf: basepeak = yes

137.lu: -O3 -xSSE4.2 -no-prec-div

143.dleslie: Same as 137.lu

Continued on next page

## Peak Optimization Flags (Continued)

145.lGemsFDTD: `Same as 137.lu`

Benchmarks using both Fortran and C:

121.pop2: `-O3 -xSSE4.2 -no-prec-div`

128.GAPgeofem: `basepeak = yes`

132.zeusmp2: `Same as 121.pop2`

147.l2wrf2: `basepeak = yes`

## 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_Intel12_flags.html`

You can also download the XML flags source by saving the following link:
`http://www.spec.org/mpi2007/flags/SGI_x86_64_Intel12_flags.xml`


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For questions about this result, please contact the tester.
For other inquiries, please contact webmaster@spec.org.

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