# SPEC® MPIM2007 Result

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AMD, QLogic Corporation, Rackable Systems, IWILL

AMD Emerald Cluster: AMD Opteron CPUs, QLogic InfiniPath/SilverStorm Interconnect

SPECmpiM_peak2007 = Not Run

SPECmpiM_base2007 = NC

**MPI2007 license:** 0018
**Test sponsor:** QLogic Corporation
**Tested by:** QLogic Performance Engineering

**Test date:** May-2007
**Hardware Availability:** Nov-2006
**Software Availability:** Jul-2007

| | Ranks |
|---|---|
| 104.milc | |
| 107.leslie3d | |
| 113.GemsFDTD | |
| 115.fds4 | |
| 121.pop2 | |
| 122.tachyon | |
| 126.lammps | |
| 127.wrf2 | |
| 128.GAPgeofem | |
| 129.tera_tf | |
| 130.socorro | |
| 132.zeusmp2 | |
| 137.lu | |

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## Results Table

| Benchmark | Base | | | | | | | Peak | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Ranks | Seconds | Ratio | Seconds | Ratio | Seconds | Ratio | Ranks | Seconds | Ratio | Seconds | Ratio | Seconds | Ratio |
| 104.milc | 256 | NC | NC | NC | NC | NC | NC | | | | | | | |
| 107.leslie3d | 256 | NC | NC | NC | NC | NC | NC | | | | | | | |
| 113.GemsFDTD | 256 | NC | NC | NC | NC | NC | NC | | | | | | | |
| 115.fds4 | 256 | NC | NC | NC | NC | NC | NC | | | | | | | |
| 121.pop2 | 256 | NC | NC | NC | NC | NC | NC | | | | | | | |
| 122.tachyon | 256 | NC | NC | NC | NC | NC | NC | | | | | | | |
| 126.lammps | 256 | NC | NC | NC | NC | NC | NC | | | | | | | |
| 127.wrf2 | 256 | NC | NC | NC | NC | NC | NC | | | | | | | |
| 128.GAPgeofem | 256 | NC | NC | NC | NC | NC | NC | | | | | | | |

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 |
| 129.tera_tf | 256 | NC | NC | NC | NC | NC | NC | | | | | | | |
| 130.socorro | 256 | NC | NC | NC | NC | NC | NC | | | | | | | |
| 132.zeusmp2 | 256 | NC | NC | NC | NC | NC | NC | | | | | | | |
| 137.lu | 256 | NC | NC | NC | NC | NC | NC | | | | | | | |

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

### Hardware Summary

| | |
|---|---|
| Type of System: | Homogenous |
| Compute Node: | Rackable, IWILL, AMD |
| Interconnects: | QLogic InfiniBand HCAs and switches<br>Broadcom NICs, Force10 switches |
| File Server Node: | Headnode NFS filesystem |
| Head Node: | Rackable, IWILL, AMD |
| Other Node: | Headnode NFS filesystem |
| Total Compute Nodes: | 64 |
| Total Chips: | 128 |
| Total Cores: | 256 |
| Total Threads: | 256 |
| Total Memory: | 512 GB |
| Base Ranks Run: | 256 |
| Minimum Peak Ranks: | -- |
| Maximum Peak Ranks: | -- |

### Software Summary

| | |
|---|---|
| C Compiler: | QLogic PathScale C Compiler 3.0 |
| C++ Compiler: | QLogic PathScale C++ Compiler 3.0 |
| Fortran Compiler: | QLogic PathScale Fortran Compiler 3.0 |
| Base Pointers: | 64-bit |
| Peak Pointers: | 64-bit |
| MPI Library: | QLogic InfiniPath MPI 2.1 |
| Other MPI Info: | None |
| Pre-processors: | No |
| Other Software: | None |

## Node Description: Rackable, IWILL, AMD

### Hardware

| | |
|---|---|
| Number of nodes: | 64 |
| Uses of the node: | compute, head |
| Vendor: | Rackable Systems, IWILL, AMD |
| Model: | Rackable Systems C1000 chassis, IWILL DK8-HTX motherboard |
| CPU Name: | AMD Opteron 290 |
| CPU(s) orderable: | 1-2 chips |
| Chips enabled: | 2 |
| Cores enabled: | |
| Cores per chip: | 2 |
| Threads per core: | 1 |
| CPU Characteristics: | -- |
| CPU MHz: | 2800 |
| Primary Cache: | 64 KB I + 64 KB D on chip per core |
| Secondary Cache: | 1 MB I+D on chip per core |
| L3 Cache: | None |
| Other Cache: | None |
| Memory: | 8 GB (8 x 1 GB DDR400) |
| Disk Subsystem: | 250 GB, SATA |

Continued on next page

### Software

| | |
|---|---|
| Adapter: | Intel 82541PI Gigabit Ethernet controller |
| Adapter Driver: | Part of Linux kernel modules |
| Adapter Firmware: | None |
| Adapter: | QLogic InfiniPath QHT7140 |
| Adapter Driver: | InfiniPath 2.1 |
| Adapter Firmware: | None |
| Operating System: | ClusterCorp Rocks 4.2.1<br>(Based on RedHat Enterprise Linux 4.0 Update 4) |
| Local File System: | Linux ext3 |
| Shared File System: | NFS |
| System State: | Multi-User |
| Other Software: | Sun Grid Engine 6.0 |

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AMD, QLogic Corporation, Rackable Systems, IWILL

AMD Emerald Cluster: AMD Opteron CPUs, QLogic InfiniPath/SilverStorm Interconnect

SPECmpiM_peak2007 = Not Run

SPECmpiM_base200[illegible] = NC

**MPI2007 license:** 0018
**Test sponsor:** QLogic Corporation
**Tested by:** QLogic Performance Engineering

**Test date:** May-2007
**Hardware Availability:** Nov-2006
**Software Availability:** Jul-2007

## Node Description: Rackable, IWILL, AMD

| | |
|---|---|
| Other Hardware: | Nodes custom-built by Rackable Systems. The Rackable C1000 chassis is half-depth with 450W, 48 VDC Power Supply. Integrated Gigabit Ethernet for admin/filesystem. |
| Adapter: | Intel 82541PI Gigabit Ethernet controller |
| Number of Adapters: | 1 |
| Slot Type: | integrated on motherboard |
| Data Rate: | 1 Gbps Ethernet |
| Ports Used: | 1 |
| Interconnect Type: | Ethernet |
| Adapter: | QLogic InfiniPath QHT7140 |
| Number of Adapters: | 1 |
| Slot Type: | HTX |
| Data Rate: | InfiniBand 4x SDR |
| Ports Used: | 1 |
| Interconnect Type: | InfiniBand |

## Node Description: Headnode NFS filesystem

### Hardware

| | |
|---|---|
| Number of nodes: | 1 |
| Uses of the node: | file server, other |
| Vendor: | Tyan |
| Model: | Thunder K8QSD Pro (S[illegible]32) motherboard |
| CPU Name: | AMD Opteron 885 |
| CPU(s) orderable: | 1-4 chips |
| Chips enabled: | 4 |
| Cores enabled: | 8 |
| Cores per chip: | 2 |
| Threads per core: | 1 |
| CPU Characteristics: | [illegible] |
| CPU MHz: | 2600 |
| Primary Cache: | 64 KB I + 64 KB D on chip per core |
| Secondary Cache: | [illegible]MB I+D on chip per core |
| L3 Cache: | No[illegible] |
| Other Cache: | None |
| Memory: | 16 GB (16 x 1 GB DDR400 dimms) |
| Disk Subsystem: | 250 GB, SATA, 7200 RPM |
| Other Hardware: | None |
| Adapter: | Broadcom BCM5704C |
| Number of Adapters: | 2 |
| Slot Type: | integrated on motherboard |
| Data Rate: | 1 Gbps Ethernet |
| Ports Used: | 2 |
| Interconnect Type: | Ethernet |

### Software

| | |
|---|---|
| Adapter: | Broadcom BCM5704C |
| Adapter Driver: | Part of Linux kernel modules |
| Adapter Firmware: | None |
| Operating System: | ClusterCorp Rocks 4.2.1 (Based on RedHat Enterprise Linux 4.0 Update 4) |
| Local File System: | Linux ext3 |
| Shared File System: | NFS |
| System State: | Multi-User |
| Other Software: | Sun Grid Engine 6.0 |

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**Test date:** May-2007
**Hardware Availability:** Nov-2006
**Software Availability:** Jul-2007

## General Notes

"other" purposes of this node: login, compile, job submissio
and queuing.
This node assembled with a 2U chassis and 700 watt ATX 12V Power Supply.

## Interconnect Description: QLogic InfiniBand HCAs and switches

| Hardware | |
|---|---|
| Vendor: | QLogic |
| Model: | InfiniPath and Silverstorm |
| Switch Model: | QLogic SilverStorm 9120 Fabric Director |
| Number of Switches: | 1 |
| Number of Ports: | 144 |
| Data Rate: | InfiniBand 4x SDR and InfiniBand 4x DDR |
| Firmware: | 3.4.0.5.2 |
| Topology: | Single switch (star) |
| Primary Use: | MPI traffic |

**Software**

## General Notes

The data rate between InifniPath HCAs and SilverStorm switches
is SDR. However, DDR is used for inter-switch links.

## Interconnect Description: Broadcom NICs, Force10 switches

| Hardware | |
|---|---|
| Vendor: | Force10 |
| Model: | E300 |
| Switch Model: | Force10 E300 Gig-E switch |
| Number of Switches: | 1 |
| Number of Ports: | 288 |
| Data Rate: | 1 Gbps Ethernet |
| Firmware: | [illegible] |
| Topology: | Single switch (star) |
| Primary Use: | file system traffic |

**Software**

# Base Compiler Invocation

C benchmarks:

```
/usr/bin/mpicc  -cc=pathcc
```

C++ benchmarks:

Continued on next page



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## Base Compiler Invocation (Continued)

126.lammps: /usr/bin/mpicxx -CC=pathCC

Fortran benchmarks:

107.leslie3d: /usr/bin/mpif90 -f90=pathf90

113.GemsFDTD: /usr/bin/mpif90 -f90=pathf90

115.fds4: /usr/bin/mpif90 -f90=pathf90

129.tera_tf: /usr/bin/mpif90 -f90=pathf90

132.zeusmp2: /usr/bin/mpif90 -f90=pathf90

137.lu: /usr/bin/mpif90 -f90=pathf90

Benchmarks using both Fortran and C (except as noted below):
/usr/bin/mpicc -cc=pathcc /usr/bin/mpif90 -f90=pathf90

## Base Portability Flags

104.milc: -DSPEC_MPI_LP64
121.pop2: -DSPEC_MPI_DOUBLE_UNDERSCORE -DSPEC_MPI_LP64
122.tachyon: -DSPEC_MPI_LP64
127.wrf2: -DF2CSTYLE -DSPEC_MPI_DOUBLE_UNDERSCORE -DSPEC_MPI_LINUX
-DSPEC_MPI_LP64
128.GAPgeofem: -DSPEC_MPI_LP64
130.socorro: -fno-second-underscore -DSPEC_MPI_LP64

## Base Optimization Flags

C benchmarks:
-march=opteron -Ofast -OPT:malloc_alg=1

C++ benchmarks:

126.lammps: -march=opteron -O3 -OPT:Ofast -CG:local_fwd_sched=on

Fortran benchmarks:

107.leslie3d: -march=opteron -O3 -OPT:Ofast -OPT:malloc_alg=1
-LANG:copyinout=off

113.GemsFDTD: -march=opteron -O3 -OPT:Ofast -OPT:malloc_alg=1
-LANG:copyinout=off

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## Base Optimization Flags (Continued)

115.fds4: `-march=opteron -O3 -OPT:Ofast -OPT:malloc_alg=1 -LANG:copyinout=off`

129.tera_tf: `-march=opteron -O3 -OPT:Ofast -OPT:malloc_alg=1 -LANG:copyinout=off`

132.zeusmp2: `-march=opteron -O3 -OPT:Ofast -OPT:malloc_alg=1 -LANG:copyinout=off`

137.lu: `-march=opteron -O3 -OPT:Ofast -OPT:malloc_alg=1 -LANG:copyinout=off`

Benchmarks using both Fortran and C:

121.pop2: `-march=opteron -Ofast -OPT:malloc_alg=1 -O3 -OPT:Ofast -LANG:copyinout=off`

127.wrf2: `Same as 121.pop2`

128.GAPgeofem: `Same as 121.pop2`

130.socorro: `Same as 121.pop2`

## Base Other Flags

C benchmarks:
`-IPA:max_jobs=4`

C++ benchmarks:

126.lammps: `-IPA:max_jobs=4`

Fortran benchmarks:

107.leslie3d: `-IPA:max_jobs=4`

GemsFDTD: `-IPA:max_jobs=4`

115.fds4: `-IPA:max_jobs=4`

129.tera_tf: `-IPA:max_jobs=4`

132.zeusmp2: `-IPA:max_jobs=4`

137.lu: `-IPA:max_jobs=4`

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## Base Other Flags (Continued)

Benchmarks using both Fortran and C (except as noted below):
`-IPA:max_jobs=4`

The flags file that was used to format this result can be browsed at
`http://www.spec.org/mpi2007/flags/MPI2007_flags.20070717.01.html`

You can also download the XML flags source by saving the following link:
`http://www.spec.org/mpi2007/flags/MPI2007_flags.20070717.01.xml`

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