



# 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

## Results Table

Benchmark	Base							Peak						
	Ranks	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Ranks	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
104.milc	512	NC	NC	NC	NC	NC	NC							
107.leslie3d	512	NC	NC	NC	NC	NC	NC							
113.GemsFDTD	512	NC	NC	NC	NC	NC	NC							
115.fds4	512	NC	NC	NC	NC	NC	NC							
121.pop2	512	NC	NC	NC	NC	NC	NC							
122.tachyon	512	NC	NC	NC	NC	NC	NC							
126.lammps	512	NC	NC	NC	NC	NC	NC							
127.wrf2	512	NC	NC	NC	NC	NC	NC							
128.GAPgeofem	512	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	512	NC	NC	NC	NC	NC	NC									
130.socorro	512	NC	NC	NC	NC	NC	NC									
132.zeusmp2	512	NC	NC	NC	NC	NC	NC									
137.lu	512	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  
 Broadcom NICs, Force10 switches  
 File Server Node: Headnode NFS filesystem  
 Head Node: Rackable, IWILL, AMD  
 Other Node: Headnode NFS filesystem  
 Total Compute Nodes: 128  
 Total Chips: 256  
 Total Cores: 512  
 Total Threads: 512  
 Total Memory: 1 TB  
 Base Ranks Run: 512  
 Minimum Peak Ranks: --  
 Maximum Peak Ranks: --

### Software Summary

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

## Note Description: Rackable, IWILL, AMD

### Hardware

Number of nodes: 128  
 Uses of the node: Compute headnode  
 Vendor: Rackable Systems, IWILL, AMD  
 Model: Rackable Systems C1000 chassis, IWILL DK8-HTX  
 CPU Name: AMD Opteron 290  
 CPU(s) orderable: 1-2 chips  
 Chips enabled: 2  
 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

### 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  
 (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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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 (S432) 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: -

CPU MHz: 2600

Primary Cache: 64 KB I + 64 KB D on chip per core

Secondary Cache: 512 KB I+D on chip per core

L3 Cache: None

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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## General Notes

"other" purposes of this node: login, compile, job submission and queuing.  
This node assembled with a 2U chassis and 700 watt ATX power supply.

## Interconnect Description: QLogic InfiniBand HCAs and switches

Hardware	Software
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	

## General Notes

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

## Interconnect Description: Broadcom NICs, Force10 switches

Hardware	Software
Vendor: Force10	
Model: E300	
Switch Model: Force10 E300 Gig-E switch	
Number of Switches: 1	
Number of Ports: 288	
Data Rate: 10 Gbps Ethernet	
Firmware: 1.0	
Topology: Single switch (star)	
Primary Use: file system traffic	

## Base Compiler Invocation

C benchmarks:  
/usr/bin/mpicc -cc=pathcc

C++ benchmarks:

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Tested by: QLogic Performance Engineering

Test date: May-2007

Hardware Availability: Nov-2006

Software Availability: Jul-2007

## 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: -DF2CST -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

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 -O3 -OPT:Ofast -OPT:malloc\_alg=1  
-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=

C++ benchmarks:

126.lammps: -IPA:max\_jobs=4

Fortran benchmarks:

107.leslie3d: -IPA:max\_jobs=4

113.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.20070717.00.html](http://www.spec.org/mpi2007/flags/MPI2007_flags.20070717.00.html)

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

[http://www.spec.org/mpi2007/flags/MPI2007\\_flags.20070717.00.xml](http://www.spec.org/mpi2007/flags/MPI2007_flags.20070717.00.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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