



# SPEC® MPIM2007 Result

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Dell, QLogic, ClusterVision,

U. of Cambridge HPC Cluster Darwin,  
QLogic InfiniBand 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: Jul-2006

Software Availability: Feb-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	128	NC	NC	NC	NC	NC	NC							
107.leslie3d	128	NC	NC	NC	NC	NC	NC							
113.GemsFDTD	128	NC	NC	NC	NC	NC	NC							
115.fds4	128	NC	NC	NC	NC	NC	NC							
121.pop2	128	NC	NC	NC	NC	NC	NC							
122.tachyon	128	NC	NC	NC	NC	NC	NC							
126.lammps	128	NC	NC	NC	NC	NC	NC							
127.wrf2	128	NC	NC	NC	NC	NC	NC							
128.GAPgeofem	128	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	128	NC	NC	NC	NC	NC	NC									
130.socorro	128	NC	NC	NC	NC	NC	NC									
132.zeusmp2	128	NC	NC	NC	NC	NC	NC									
137.lu	128	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: Homogeneous  
 Compute Node: Dell PowerEdge 1950  
 Interconnects: QLogic InfiniBand HCAs and switches  
 Ethernet Network for File Server Access  
 File Server Node: Dell PowerVault MD1000  
 Head Node: Dell PowerEdge 1950  
 Total Compute Nodes: 32  
 Total Chips: 64  
 Total Cores: 128  
 Total Threads: 128  
 Total Memory: 256 GB  
 Base Ranks Run: 128  
 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 2.0  
 Other MPI Info: None  
 Co-processors: No  
 Other Software: None

## Node Description: Dell PowerEdge 1950

### Hardware

Number of nodes: 32  
 Uses of the node: compute, head  
 Vendor: Dell  
 Model: Dell PowerEdge 1950  
 CPU Name: Intel Xeon 5160  
 CPU(s) orderable: 2 chips  
 Chips enabled: 2  
 Cores enabled: 4  
 Cores per chip: 2  
 Threads per core: 1  
 CPU Characteristics: 1333 MHz system bus  
 CPU MHz: 3000  
 Primary Cache: 32 KB I + 32 KB D on chip per core  
 Secondary Cache: 4 MB I+D on chip per chip  
 L3 Cache: None  
 Other Cache: None  
 Memory: 8 GB (8 x 1 GB PC2-5300F)  
 Disk Subsystem: SAS, 73 GB, 15000 RPM  
 Other Hardware: None  
 Adapter: QLogic InfiniPath QLE7140

### Software

Adapter: QLogic InfiniPath QLE7140  
 Adapter Driver: InfiniPath 2.0  
 Adapter Firmware: None  
 Operating System: ClusterVisionOS 2.1  
 Based on Scientific Linux SL release 4.3 (Beryllium)  
 Local File System: Linux/ext3  
 Shared File System: NFS  
 System State: Multi-User  
 Other Software: Torque 2.1.2

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## Node Description: Dell PowerEdge 1950

Number of Adapters: 1  
Slot Type: PCIe x8  
Data Rate: InfiniBand 4x SDR  
Ports Used: 1  
Interconnect Type: InfiniBand

## Node Description: Dell PowerVault MD1000

**Hardware**

Number of nodes: 1  
Uses of the node: file server  
Vendor: Dell  
Model: Dell PowerEdge 1950  
CPU Name: Intel Xeon 5160  
CPU(s) orderable: 1-2 chip  
Chips enabled: 2  
Cores enabled: 4  
Cores per chip: 2  
Threads per core: 1  
CPU Characteristics: 1333 MHz system bus  
CPU MHz: 3000  
Primary Cache: 32 KB I + 32 KB D on chip per core  
Secondary Cache: 4 MB I+D on chip per chip  
L3 Cache: None  
Other Cache: None  
Memory: 4 GB (4 x 1 GB PC2-5300F)  
Disk Subsystem: 13.5 TB; 15 x 300 GB SAS, 10000 RPM  
3 Dell PowerVault MD1000 Disk Arrays, each one has 15 disks.  
Other Hardware: None  
Adapter: Chelsio T310 10GBASE-SR RNIC (rev 3)  
Number of Adapters: 1  
Slot Type: PCIe x8 MSI-X  
Data Rate: 10 Gbps Ethernet  
Ports Used: 1  
Interconnect Type: Ethernet

**Software**

Adapter Driver: Chelsio T310 10GBASE-SR RNIC (rev 3)  
cxgb3 1.0.078  
Adapter Firmware: T 3.3.0  
Operating System: ClusterVisionOS 2.1  
Based on Scientific Linux SL release 4.3 (Beryllium)  
Local File System: Linux/ext3  
Shared File System: NFS  
System State: Multi-User  
Other Software: None

## General Notes

A separate node handling login and resources management is not listed as it is not performance related.



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## Interconnect Description: QLogic InfiniBand HCAs and switches

Hardware		Software
Vendor:	QLogic	
Model:	InfiniPath adapters and Silverstorm switches	
Switch Model:	QLogic SilverStorm 9080 Fabric Director (InfiniBand switch)	
Number of Switches:	1	
Number of Ports:	96	
Data Rate:	InfiniBand 4x SDR and InfiniBand 4x DDR	
Firmware:	3.4.0.1.3	
Topology:	Full Bisectional Bandwidth, Fat-Tree, Max 3 switch-chip hops.	
Primary Use:	MPI traffic	

## General Notes

The 32 nodes used are from one CU (Computational Unit, 65 nodes) of the 9 CUs in the Darwin cluster. Jobs within one CU use one SilverStorm 9080 switch.  
The data rate between InfiniPath HCAs and SilverStorm switches is SDR. However, DDR is used for inter-switch links.

## Interconnect Description: Ethernet Network for File Server Access

Hardware		Software
Vendor:	Chelsio, Nortel	
Model:	Chelsio T310 adapters and Nortel 5530 5510 8610 switches	
Switch Model:	Nortel Ethernet Routing Switch 5510-24T	
Number of Switches:	1	
Number of Ports:	24	
Data Rate:	1 Gbps Ethernet	
Firmware:	1.0.0.16	
Switch Model:	Nortel Ethernet Routing Switch 5510-48T	
Number of Switches:	3	
Number of Ports:	48	
Data Rate:	10 Gbps Ethernet	
Firmware:	1.0.0.16	
Switch Model:	Nortel Ethernet Routing Switch 5530-24TFD	
Number of Switches:	2	
Number of Ports:	26	
Data Rate:	1 Gbps Ethernet (24 ports) and 10 Gbps Ethernet (2 ports)	
Firmware:	4.2.0.12	
Switch Model:	Nortel Passport 8610 switch 4.1.0.0	
Number of Switches:	1	
Number of Ports:	24	

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Tested by: QLogic Performance Engineering

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Hardware Availability: Jul-2006

Software Availability: Feb-2007

## Interconnect Description: Ethernet Network for File Server Access

Data Rate: 10 Gbps Ethernet  
 Firmware: Optivity Switch Manager version 4.1  
 Topology: Three CUs are connected with six Ethernet Routing switches 5530-24TFD, 5510-24T and 5510-48T as a ring. Each of two 5530-24TFD switches is connected to the Nortel Passport 8610 switch through two 10Gbit ports. See Slide 10 of NortelEthernetSwitchDiagram.pdf for a network diagram.  
 Primary Use: file system traffic

## Base Compiler Invocation

C benchmarks:

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

C++ benchmarks:

`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

`107.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`

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## Base Portability Flags (Continued)

130.socorro: -fno-second-underscore -DSPEC\_MPI\_LP64

## Base Optimization Flags

C benchmarks:

-march=core -Ofast

C++ benchmarks:

126.lammps: -march=core -O3 -OPT:Ofast -CG:local\_fwd\_sched=on

Fortran benchmarks:

107.leslie3d: -march=core -O3 -OPT:Ofast -OPT:malloc\_alg=1  
-LANG:copyinout=off

113.GemsFDTD: -march=core -O3 -OPT:Ofast -OPT:malloc\_alg=1  
-LANG:copyinout=off

115.fds4: -march=core -O3 -OPT:Ofast -OPT:malloc\_alg=1  
-LANG:copyinout=off

129.tera\_tf: -march=core -O3 -OPT:Ofast -OPT:malloc\_alg=1  
-LANG:copyinout=off

132.zeusmp2: -march=core -O3 -OPT:Ofast -OPT:malloc\_alg=1  
-LANG:copyinout=off

137.lu: -march=core -O3 -OPT:Ofast -OPT:malloc\_alg=1  
-LANG:copyinout=off

Benchmarks using both Fortran and C:

121.pop2: -march=core -Ofast -O3 -OPT:Ofast -OPT:malloc\_alg=1  
-LANG:copyinout=off

127.wrf2: Same as 121.pop2

128.GA3geofem: Same as 121.pop2

130.socorro: Same as 121.pop2



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## 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

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

### 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.html](http://www.spec.org/mpi2007/flags/MPI2007_flags.20070717.html)

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

[http://www.spec.org/mpi2007/flags/MPI2007\\_flags.20070717.xml](http://www.spec.org/mpi2007/flags/MPI2007_flags.20070717.xml)

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For other inquiries, please contact [webmaster@spec.org](mailto:webmaster@spec.org).

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