SPEC® MPIM2007 Result

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Dell, QLogic, ClusterVision,

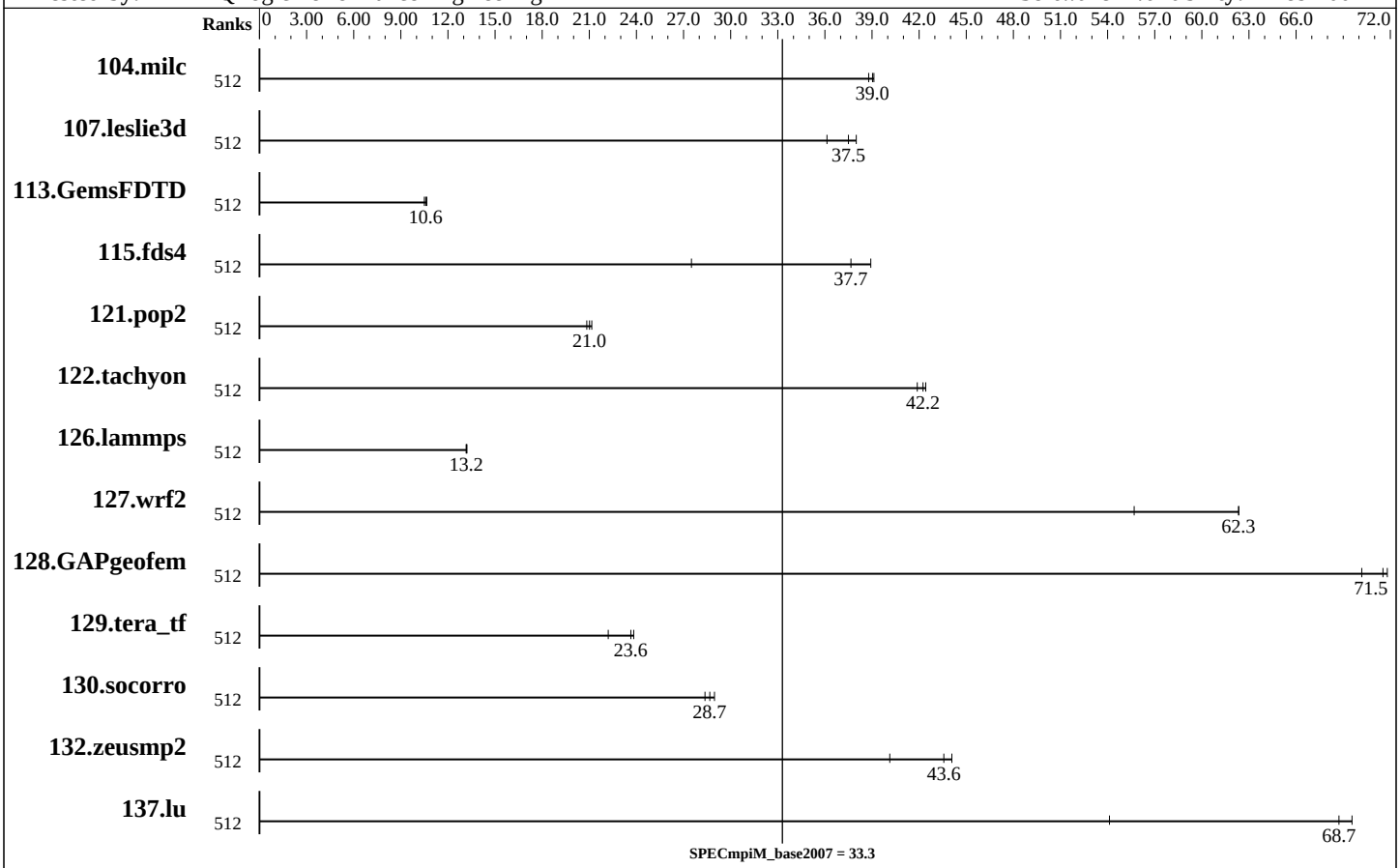
U. of Cambridge HPC Cluster Darwin,
QLogic InfiniBand Interconnect

SPECmpiM_peak2007 = Not Run

SPECmpiM_base2007 = 33.3

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

Test date: May-2007
Hardware Availability: Jul-2006
Software Availability: Feb-2007



Results Table

Benchmark	Base							Peak						
	Ranks	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Ranks	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
104.milc	512	40.3	38.8	40.0	39.1	**40.1**	**39.0**							
107.leslie3d	512	144	36.1	**139**	**37.5**	137	38.0							
113.GemsFDTD	512	592	10.7	601	10.5	**596**	**10.6**							
115.fds4	512	**51.8**	**37.7**	50.1	38.9	70.9	27.5							
121.pop2	512	198	20.8	195	21.2	**196**	**21.0**							
122.tachyon	512	65.9	42.4	**66.2**	**42.2**	66.8	41.9							
126.lammps	512	221	13.2	221	13.2	**221**	**13.2**							
127.wrf2	512	125	62.4	**125**	**62.3**	140	55.7							
128.GAPgeofem	512	**28.9**	**71.5**	28.8	71.8	29.4	70.2							
129.tera_tf	512	**117**	**23.6**	116	23.8	125	22.2							

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	512	**133**	**28.7**	135	28.4	132	29.0							
132.zeusmp2	512	77.3	40.1	**71.2**	**43.6**	70.4	44.1							
137.lu	512	**53.5**	**68.7**	52.8	69.6	67.9	54.1							

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:	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:	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

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 2.0
Other MPI Info:	None
Pre-processors:	No
Other Software:	None

Node Description: Dell PowerEdge 1950

Hardware

Number of nodes:	128
Uses of the node:	compute, head
Vendor:	Dell
Model:	Dell PowerEdge 1950
CPU Name:	Intel Xeon 5160
CPU(s) orderable:	1-2 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
Number of Adapters:	1
Slot Type:	PCIe x8

Continued on next page

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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Software Availability: Feb-2007

Node Description: Dell PowerEdge 1950

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: 3 x 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:	Chelsio T310 10GBASE-SR RNIC (rev 3)
Adapter Driver:	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 resouces management
is not listed as it is not performance related.

Interconnect Description: QLogic InfiniBand HCAs and switches

Hardware

Vendor:	QLogic
Model:	InfiniPath adapters and Silverstorm switches

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Hardware Availability: Jul-2006
Software Availability: Feb-2007

Interconnect Description: QLogic InfiniBand HCAs and switches

Switch Model:	QLogic SilverStorm 9080 Fabric Director (InfiniBand switch)
Number of Switches:	2
Number of Ports:	96
Data Rate:	InfiniBand 4x SDR and InfiniBand 4x DDR
Firmware:	3.4.0.1.3
Switch Model:	QLogic SilverStorm 9240 InfiniBand switch
Number of Switches:	1
Number of Ports:	288
Data Rate:	InfiniBand 4x SDR and InfiniBand 4x DDR
Firmware:	3.4.0.1.3
Topology:	Constant Bisectional Bandwidth, Fat-Tree, Max 5 switch-chip hops.
Primary Use:	MPI traffic

General Notes

```
Two CUs (Computational Unit, 65 nodes) were involved, so
two SilverStorm 9080 switches and the 9240 core switch were
used on this run.
The data rate between InifniPath HCAs and SilverStorm switches
is SDR. However, DDR is used for inter-switch links.
```

Interconnect Description: Ethernet Network for File Server Access

Hardware

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:	1 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

Software

Continued on next page

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

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=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.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`

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Base Other Flags (Continued)

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.20070717.00.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`

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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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