SPEC® MPIM2007 Result

Copyright 2006-2010 Standard Performance Evaluation Corporation

IBM Corporation

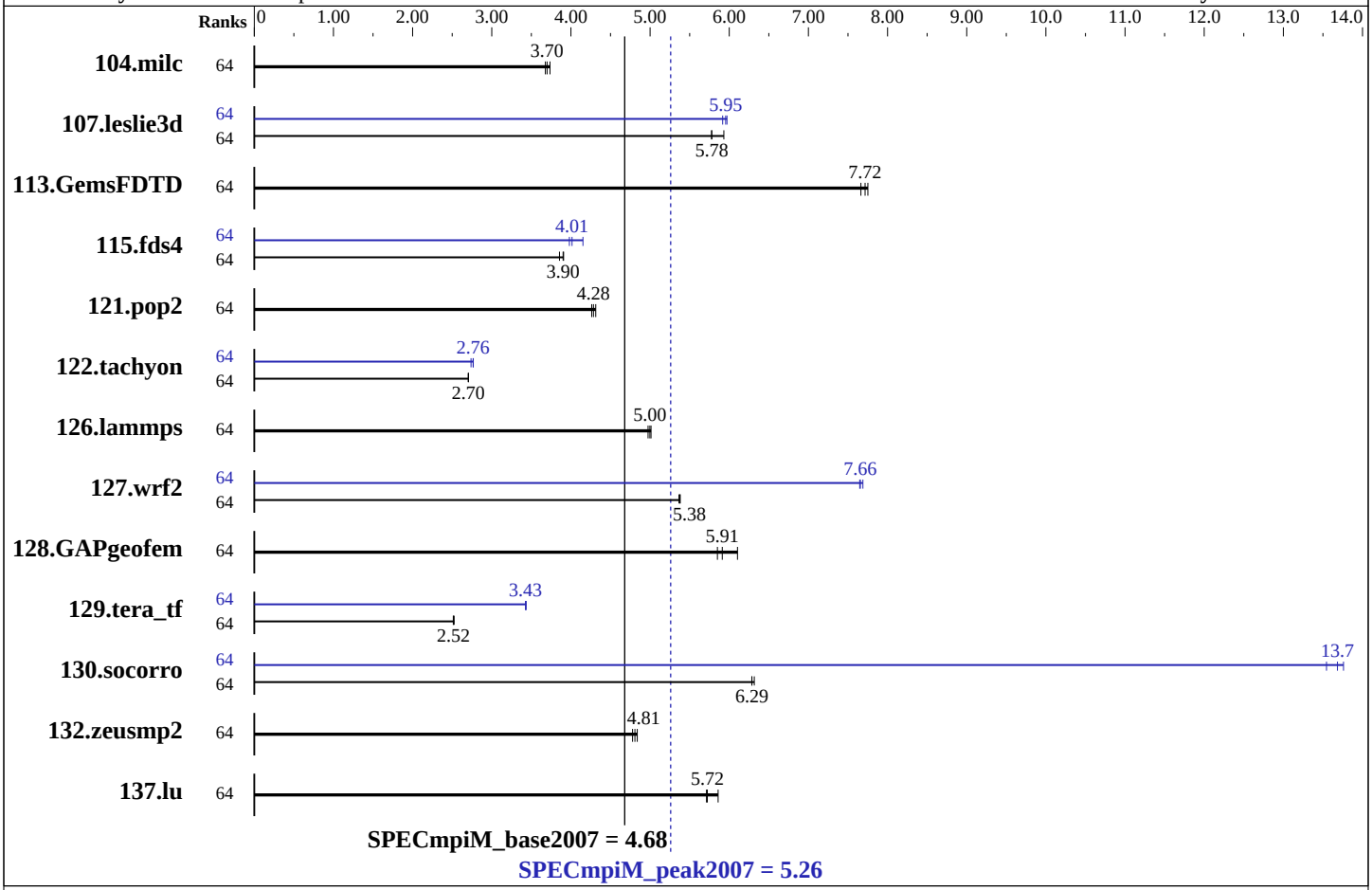
IBM BladeCenter JS22 Express (4 GHz, 8x4 core)

SPECmpiM_peak2007 = 5.26

SPECmpiM_base2007 = 4.68

MPI2007 license: 0005
Test sponsor: IBM Corporation
Tested by: IBM Corporation

Test date: Oct-2008
Hardware Availability: Nov-2008
Software Availability: Nov-2008



Results Table

Benchmark	Base							Peak						
	Ranks	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Ranks	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
104.milc	64	426	3.68	419	3.74	**423**	**3.70**	64	426	3.68	419	3.74	**423**	**3.70**
107.leslie3d	64	880	5.93	904	5.78	**903**	**5.78**	64	**877**	**5.95**	882	5.92	874	5.97
113.GemsFDTD	64	**818**	**7.72**	814	7.75	823	7.66	64	**818**	**7.72**	814	7.75	823	7.66
115.fds4	64	499	3.91	506	3.86	**500**	**3.90**	64	**486**	**4.01**	490	3.98	470	4.15
121.pop2	64	957	4.31	968	4.26	**963**	**4.28**	64	957	4.31	968	4.26	**963**	**4.28**
122.tachyon	64	1034	2.71	1035	2.70	**1034**	**2.70**	64	1022	2.74	**1012**	**2.76**	1011	2.77
126.lammps	64	582	5.01	**583**	**5.00**	586	4.97	64	582	5.01	**583**	**5.00**	586	4.97
127.wrf2	64	**1450**	**5.38**	1453	5.36	1449	5.38	64	**1018**	**7.66**	1014	7.69	1019	7.65
128.GAPgeofem	64	353	5.85	338	6.10	**349**	**5.91**	64	353	5.85	338	6.10	**349**	**5.91**
129.tera_tf	64	**1100**	**2.52**	1101	2.51	1096	2.52	64	808	3.43	**807**	**3.43**	806	3.43

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	64	604	6.32	**607**	**6.29**	607	6.29	64	282	13.5	**279**	**13.7**	277	13.8
132.zeusmp2	64	641	4.84	649	4.78	**645**	**4.81**	64	641	4.84	649	4.78	**645**	**4.81**
137.lu	64	**642**	**5.72**	627	5.86	644	5.71	64	**642**	**5.72**	627	5.86	644	5.71

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

Hardware Summary

Type of System:	Heterogeneous
Compute Nodes:	IBM System JS22 IBM System JS22
Interconnects:	InfiniBand Ethernet
File Server Node:	IBM System JS22
Head Node:	IBM System JS22
Total Compute Nodes:	8
Total Chips:	16
Total Cores:	32
Total Threads:	64
Total Memory:	144 GB
Base Ranks Run:	64
Minimum Peak Ranks:	64
Maximum Peak Ranks:	64

Software Summary

C Compiler:	IBM XL C/C++ Enterprise Edition V9 for AIX Updated with the September 2008 Fix level
C++ Compiler:	IBM XL C/C++ Enterprise Edition V9 for AIX Updated with the September 2008 Fix level
Fortran Compiler:	IBM XL Fortran Enterprise Edition V11.1 for AIX Updated with the September 2008 Fix level
Base Pointers:	32-bit
Peak Pointers:	32/64-bit
MPI Library:	IBM Parallel Environment for AIX, Version 5 Release 1
Other MPI Info:	None
Pre-processors:	None
Other Software:	IBM Engineering and Scientific Subroutine Library (ESSL) for AIX Version 4 Release 3 Updated with PTF Set 3

Node Description: IBM System JS22

Hardware

Number of nodes:	1
Uses of the node:	compute, head, fileserver
Vendor:	IBM Corporation
Model:	IBM System JS22
CPU Name:	POWER6
CPU(s) orderable:	4 cores per blade
Chips enabled:	2
Cores enabled:	4
Cores per chip:	2
Threads per core:	2
CPU Characteristics:	
CPU MHz:	4000
Primary Cache:	64 KB I + 64 KB D on chip per core
Secondary Cache:	4 MB I+D on chip per core
L3 Cache:	None
Other Cache:	None
Memory:	32 GB (4x8 GB) DDR2 500 MHz
Disk Subsystem:	1x146 GB SAS 15K RPM
Other Hardware:	BladeCenter-H chassis Voltaire 4X InfiniBand Pass-thru Module (P/N 43W4419)

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Software

Adapter:	4X InfiniBand DDR Expansion Card (CFFh) for IBM BladeCenter (P/N 43W4423)
Adapter Driver:	devices.pciex.b3157862.rte 6.1.2.0
Adapter Firmware:	2.3.0
Operating System:	IBM AIX V6.1 with the 6100-02 Technology Level
Local File System:	AIX/JFS2
Shared File System:	NFSv3
System State:	Multi-user
Other Software:	None

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Software Availability: Nov-2008

Node Description: IBM System JS22

Adapter:	4X InfiniBand DDR Expansion Card (CFFh) for IBM BladeCenter (P/N 43W4423)
Number of Adapters:	1
Slot Type:	PCIe x8 Gen2
Data Rate:	4x DDR 20Gbps
Ports Used:	1
Interconnect Type:	InfiniBand

General Notes

```
Blade[1] runs the following commands to compose the cluster:
     mkdev -c management -s infiniband -t icm
   /usr/sbin/mkiba -a 192.1.10.1 -m 255.255.255.0 -i ib0 -A iba0 -p 1 -P 0xFFFF -M 65532 -q 4000 -k off -Q 0x1E -S up
     startsrc -s ctcas
     preprpnode mpiblade1
   mkrpdomain mpiblades mpiblade1 mpiblade2 mpiblade3 mpiblade4 mpiblade5 mpiblade6 mpiblade7 mpiblade8
     startrpdomain mpiblades
     cd /usr/lpp/ppe.poe/samples/nrt
     make
     chmod 4755 nrt_api
     shutdown -rF
     su spec
     cd mpiblades.64ranks.load
     ../nrt_api -l
```

Node Description: IBM System JS22

Hardware

Number of nodes:	7
Uses of the node:	compute
Vendor:	IBM Corporation
Model:	IBM System JS22
CPU Name:	POWER6
CPU(s) orderable:	4 cores per blade
Chips enabled:	2
Cores enabled:	4
Cores per chip:	2
Threads per core:	2
CPU Characteristics:	
CPU MHz:	4000
Primary Cache:	64 KB I + 64 KB D on chip per core
Secondary Cache:	4 MB I+D on chip per core
L3 Cache:	None
Other Cache:	None
Memory:	16 GB (4x4 GB) DDR2 667 MHz
Disk Subsystem:	1x146 GB SAS 15K RPM

Continued on next page

Software

Adapter:	4X InfiniBand DDR Expansion Card (CFFh) for IBM BladeCenter (P/N 43W4423)
Adapter Driver:	devices.pciex.b3157862.rte 6.1.2.0
Adapter Firmware:	2.3.0
Operating System:	IBM AIX V6.1 with the 6100-02 Technology Level
Local File System:	AIX/JFS2
Shared File System:	NFSv3
System State:	Multi-user
Other Software:	None

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Tested by: IBM Corporation

Test date: Oct-2008
Hardware Availability: Nov-2008
Software Availability: Nov-2008

Node Description: IBM System JS22

Other Hardware:	BladeCenter-H chassis Voltaire 4X InfiniBand Pass-thru Module (P/N 43W4419)
Adapter:	4X InfiniBand DDR Expansion Card (CFFh) for IBM BladeCenter (P/N 43W4423)
Number of Adapters:	1
Slot Type:	PCIe x8 Gen2
Data Rate:	4x DDR 20Gbps
Ports Used:	1
Interconnect Type:	InfiniBand

General Notes

Each blade runs the following commands to compose the cluster, where $CLUSTER_INDEX is 2-8 for Blade[2]-Blade[8]:

```
mkdev -c management -s infiniband -t icm
/usr/sbin/mkiba -a 192.1.10.$CLUSTER_INDEX -m 255.255.255.0 -i ib0 -A iba0 -p 1 -P 0xFFFF -M 65532 -q 4000 -k off -Q 0x1E -S up
startsrc -s ctcas
preprpnode mpiblade1
cd /usr/lpp/ppe.poe/samples/nrt
make
chmod 4755 nrt_api
shutdown -rF
su spec
cd mpiblades.64ranks.load
../nrt_api -l
```

Interconnect Description: InfiniBand

Hardware	
Vendor:	IBM Corporation
Model:	4x DDR InfiniBand
Switch Model:	QLogic SilverStorm 9024
Number of Switches:	1
Number of Ports:	24
Data Rate:	4x DDR 20Gbps
Firmware:	4.2.1.1.1
Topology:	single switch
Primary Use:	MPI Communication

Software

Interconnect Description: Ethernet

Hardware	
Vendor:	IBM Corporation
Model:	4-port Gigabit Ethernet

Software

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Test sponsor: IBM Corporation
Tested by: IBM Corporation

Test date: Oct-2008
Hardware Availability: Nov-2008
Software Availability: Nov-2008

Interconnect Description: Ethernet

Switch Model:	IBM BladeCenter 4-port Gigabit Ethernet switch module (P/N 26K6483)
Number of Switches:	1
Number of Ports:	18
Data Rate:	1Gbps
Firmware:	1.08
Topology:	single switch
Primary Use:	File system

Compiler Invocation Notes

Blade[1], with 32GB of memory and 32GB of paging space, was used to compile the benchmarks.

Submit Notes

The config file option 'submit' was used.

```
submit = poe task_stride.2level.32+64rank 4 2 8 $ranks $command -procs $ranks -hostfile /spec/MapFiles/ib0hosts.8x.1-8
```

General Notes

```
Environment settings:
    All ulimits set to unlimited
    ranks                 = 64
    CWD                   = /spec/mpi2007
    MEMORY_AFFINITY       = MCM
    XLFRTEOPTS            = intrinthds=1
    MP_PGMMODEL           = spmd
    MP_MSG_API            = mpi
    MP_DEVTYPE            = ib
    MP_CLOCK_SOURCE       = AIX
    MP_STDINMODE          = none
    MP_SHARED_MEMORY      = yes
    MP_SINGLE_THREAD      = yes
    MP_EUILIB             = us
    NRT_WINDOW_COUNT      = 1
    MP_RESD               = no
    MP_PULSE              = 0
    ADAPTER_USE           = shared
    EUIDEVICE             = sn_single
    MP_CSS_INTERRUPT      = no
    MP_BUFFER_MEM         = 67108864
    MP_USE_BULK_XFER      = yes
    MP_BULK_MIN_MSG_SIZE  = 8192
    MP_EAGER_LIMIT        = 65536
    MP_WAIT_MODE          = yield
    MP_INFOLEVEL          = 0
    MP_LABELIO            = no
```

Continued on next page

General Notes (Continued)

```
MP_STDOUTMODE          = unordered
MP_PMDLOG              = no
NRT_JOB_KEY            = 64
```

Compiler Invocation

C benchmarks:
`/usr/bin/mpcc_r`

C++ benchmarks:

126.lammps: `/usr/bin/mpCC_r`

Fortran benchmarks:
`/usr/bin/mpxlf95_r`

Benchmarks using both Fortran and C:
`/usr/bin/mpcc_r /usr/bin/mpxlf95_r`

Portability Flags

107.leslie3d: `-qfixed`
115.fds4: `-DSPEC_MPI_LC_NO_TRAILING_UNDERSCORE -qfixed`
121.pop2: `-DSPEC_MPI_AIX`
127.wrf2: `-DNOUNDERSCORE -DSPEC_MPI_AIX`
130.socorro: `-DSPEC_NO_UNDERSCORE -qcpluscmt`
132.zeusmp2: `-qfixed -DSPEC_SINGLE_UNDERSCORE`
137.lu: `-qfixed`

Base Optimization Flags

C benchmarks:
`-bmaxdata:0x80000000 -O5 -D_ILS_MACROS -bdatapsize:64K -bstackpsize:64K -btextpsize:64K`

C++ benchmarks:

126.lammps: `-bmaxdata:0x80000000 -O5`

Fortran benchmarks:
`-bmaxdata:0x80000000 -O4 -qstrict -qalias=nostd -qhot=level=0 -qsave -bdatapsize:64K -bstackpsize:64K -btextpsize:64K`

Benchmarks using both Fortran and C:
`-bmaxdata:0x80000000 -O5 -D_ILS_MACROS -bdatapsize:64K -bstackpsize:64K -btextpsize:64K -O4 -qstrict -qalias=nostd`

Continued on next page

Base Optimization Flags (Continued)

Benchmarks using both Fortran and C (continued):
`-qhot=level=0 -qsave`

Peak Optimization Flags

C benchmarks:

104.milc: `basepeak = yes`

122.tachyon: `-O5 -lessl -D_ILS_MACROS -bdatapsize:64K -bstackpsize:64K -btextpsize:64K -q64`

C++ benchmarks:

126.lammps: `basepeak = yes`

Fortran benchmarks:

107.leslie3d: `-O5 -bdatapsize:64K -bstackpsize:64K -btextpsize:64K -bmaxdata:0x70000000`

113.GemsFDTD: `basepeak = yes`

129.tera_tf: `-O5 -qessl -lessl -bdatapsize:64K -bstackpsize:64K -btextpsize:64K`

137.lu: `basepeak = yes`

Benchmarks using both Fortran and C:

115.fds4: `-O5 -lessl -D_ILS_MACROS -bdatapsize:64K -bstackpsize:64K -btextpsize:64K -qstrict -qalias=nostd -qhot=level=0 -qsave -q64`

121.pop2: `basepeak = yes`

127.wrf2: `-O5 -bmaxdata:0x80000000`

128.GAPgeofem: `basepeak = yes`

130.socorro: `-O5 -lessl -D_ILS_MACROS -bdatapsize:64K -bstackpsize:64K -btextpsize:64K -qessl -bmaxdata:0x80000000`

132.zeusmp2: `basepeak = yes`

Other Flags

C benchmarks:
```
-w -qsuppress=1500-036 -qipa=noobject -qipa=threads
```

C++ benchmarks:

126.lammps: `-w -qsuppress=1500-036 -qipa=noobject -qipa=threads`

Fortran benchmarks:
```
-w -qsuppress=1500-036 -qsuppress=cmpmsg -qspillsize=32648
```

Benchmarks using both Fortran and C:
```
-w -qsuppress=1500-036 -qipa=noobject -qipa=threads -qsuppress=cmpmsg
-qspillsize=32648
```

The flags files that were used to format this result can be browsed at
http://www.spec.org/mpi2007/flags/MPI2007_flags.20081105.html
http://www.spec.org/mpi2007/flags/IBM-XL.html
http://www.spec.org/mpi2007/flags/IBM-AIX.html

You can also download the XML flags sources by saving the following links:
http://www.spec.org/mpi2007/flags/MPI2007_flags.20081105.xml
http://www.spec.org/mpi2007/flags/IBM-XL.xml
http://www.spec.org/mpi2007/flags/IBM-AIX.xml

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For other inquiries, please contact webmaster@spec.org.

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