SPEC® CFP2006 Result
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IBM Corporation

IBM Power 780 (3.7 GHz, 128 core, RHEL)

$SPECfp^®\_rate2006 =$ 4180
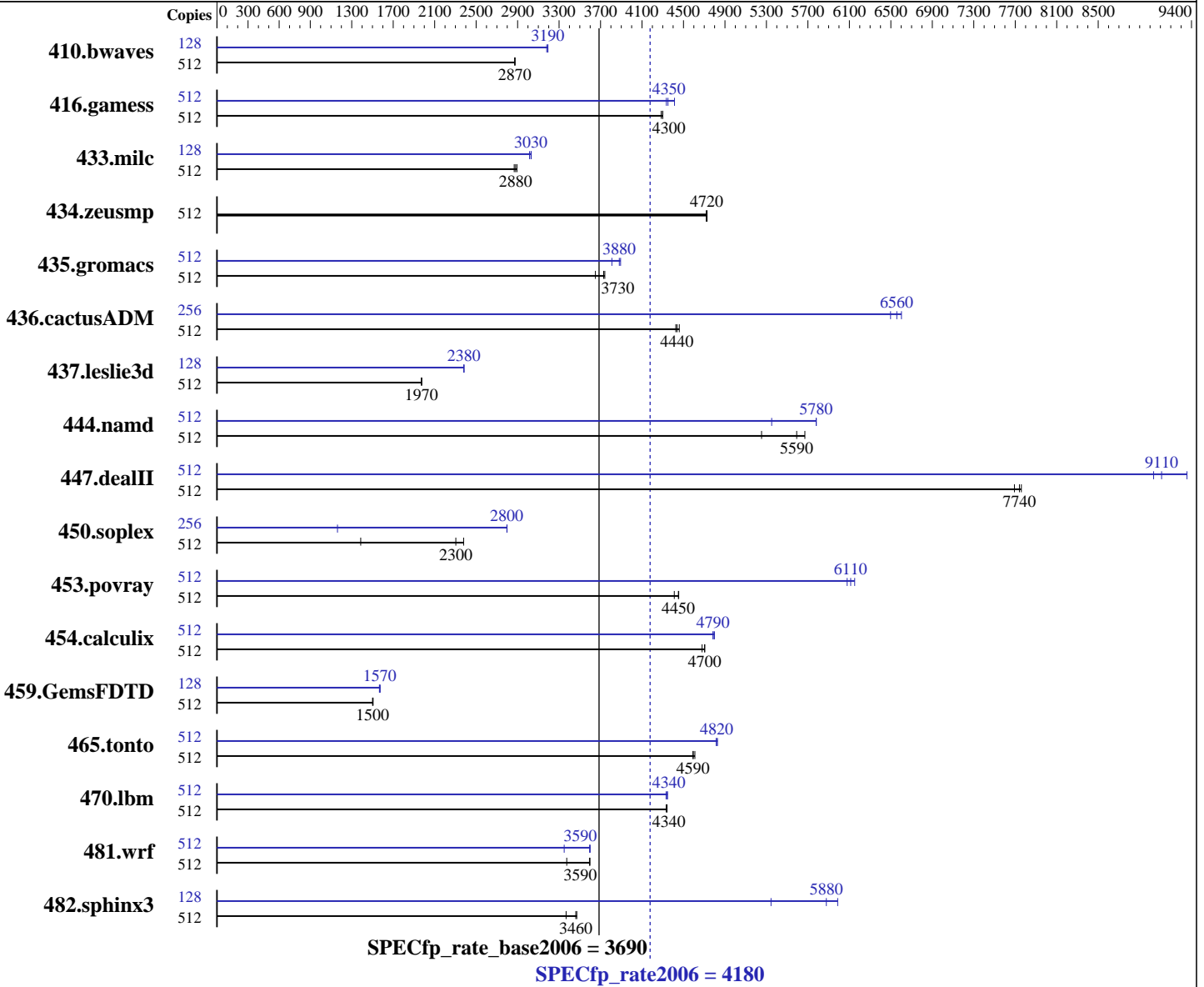
$SPECfp\_rate\_base2006 =$ 3690

CPU2006 license: 11
Test sponsor: IBM Corporation
Tested by: IBM Corporation

Test date: Sep-2012
Hardware Availability: Oct-2012
Software Availability: Dec-2012

Copies

Benchmark	Copies	Value
410.bwaves	128	3190
	512	2870
416.gamess	512	4350
	512	4300
433.milc	128	3030
	512	2880
434.zeusmp	512	4720
435.gromacs	512	3880
	512	3730
436.cactusADM	256	6560
	512	4440
437.leslie3d	128	2380
	512	1970
444.namd	512	5780
	512	5590
447.dealII	512	9110
	512	7740
450.soplex	256	2800
	512	2300
453.povray	512	6110
	512	4450
454.calculix	512	4790
	512	4700
459.GemsFDTD	128	1570
	512	1500
465.tonto	512	4820
	512	4590
470.lbm	512	4340
	512	4340
481.wrf	512	3590
	512	3590
482.sphinx3	128	5880
	512	3460

SPECfp_rate_base2006 = 3690

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Hardware

CPU Name: POWER7+
CPU Characteristics: Intelligent Energy Optimization enabled, up to 4.144 GHz
CPU MHz: 3724
FPU: Integrated
CPU(s) enabled: 128 cores, 16 chips, 8 cores/chip, 4 threads/core
CPU(s) orderable: 32,64,96,128 cores
Primary Cache: 32 KB I + 32 KB D on chip per core

Continued on next page

Software

Operating System: Red Hat Enterprise Linux Server release 6.3 (ppc64) kernel 2.6.32-279.el6.ppc64
Compiler: C/C++: Version 12.1 of IBM XL C/C++ for Linux; Fortran: Version 14.1 of IBM XL Fortran for Linux
Auto Parallel: No
File System: ext4
System State: Run level 3 (multi-user)
Base Pointers: 32-bit
Peak Pointers: 32/64-bit

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Secondary Cache:	256 KB I+D on chip per core
L3 Cache:	10 MB I+D on chip per core
Other Cache:	None
Memory:	1 TB (64 x 16 GB) DDR3 1066 MHz
Disk Subsystem:	12x146.8 GB SAS SFF 15K RPM
Other Hardware:	None

Other Software: -Post-Link Optimization for Linux on POWER, version 5.6.1-7
-MicroQuill SmartHeap 9
-Apache C++ Standard Library V4.2.1

Results Table

Benchmark	Base							Peak						
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
410.bwaves	512	2420	2880	**_2421_**	**_2870_**	2423	2870	128	547	3180	**_545_**	**_3190_**	545	3190
416.gamess	512	2331	4300	2340	4290	**_2332_**	**_4300_**	512	2313	4330	**_2304_**	**_4350_**	2271	4410
433.milc	512	1639	2870	**_1632_**	**_2880_**	1624	2890	128	390	3010	**_388_**	**_3030_**	388	3030
434.zeusmp	512	987	4720	986	4730	**_987_**	**_4720_**	512	987	4720	986	4730	**_987_**	**_4720_**
435.gromacs	512	1001	3650	**_980_**	**_3730_**	977	3740	512	960	3810	939	3890	**_942_**	**_3880_**
436.cactusADM	512	1383	4430	**_1379_**	**_4440_**	1372	4460	256	**_467_**	**_6560_**	471	6500	463	6600
437.leslie3d	512	2439	1970	**_2439_**	**_1970_**	2438	1970	128	505	2380	505	2380	**_505_**	**_2380_**
444.namd	512	782	5250	**_734_**	**_5590_**	724	5670	512	767	5350	710	5780	**_710_**	**_5780_**
447.dealII	512	761	7690	755	7760	**_757_**	**_7740_**	512	**_643_**	**_9110_**	648	9030	626	9360
450.soplex	512	3079	1390	**_1853_**	**_2300_**	1795	2380	256	1836	1160	763	2800	**_764_**	**_2800_**
453.povray	512	617	4410	612	4450	**_612_**	**_4450_**	512	448	6080	443	6150	**_446_**	**_6110_**
454.calculix	512	898	4710	**_898_**	**_4700_**	903	4680	512	880	4800	**_882_**	**_4790_**	883	4790
459.GemsFDTD	512	3617	1500	**_3616_**	**_1500_**	3606	1510	128	**_865_**	**_1570_**	863	1570	867	1570
465.tonto	512	1093	4610	**_1097_**	**_4590_**	1097	4590	512	1046	4820	**_1045_**	**_4820_**	1043	4830
470.lbm	512	1624	4330	1620	4340	**_1621_**	**_4340_**	512	1619	4350	1624	4330	**_1620_**	**_4340_**
481.wrf	512	1695	3370	1589	3600	**_1592_**	**_3590_**	512	1707	3350	1589	3600	**_1591_**	**_3590_**
482.sphinx3	512	2963	3370	**_2883_**	**_3460_**	2875	3470	128	467	5340	**_424_**	**_5880_**	417	5990

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

Compiler Invocation Notes

```
C/C++ compiler updated to December 2012 PTF
Version: 12.01.0000.0002
Fortran compiler updated to December 2012 PTF
Version: 14.01.0000.0002
```

Peak Tuning Notes

```
Post-Link optimization tool used for:
433.milc 435.gromacs 450.soplex 482.sphinx3
    with options -O4 -nodp
434.zeusmp
    with options -O4 -vrox -nodp
 437.leslie3d
```

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Peak Tuning Notes (Continued)

```
     with options -O3 -lu -1 -nodp -sdp 9
444.namd
     with options -O3 -lu -1 -nodp -sdp 9
450.soplex
   with options -O4 -nodp
465.tonto
  with options -O4
482.sphinx3
   with options -O4 -nodp
```

Submit Notes

```
The config file option 'submit' was used
to assign benchmark copy to specific kernel thread using
the "numactl" command (see flags file for details).
```

Operating System Notes

```
ulimit -s (stack) set to 1048576.
ulimit -s (open files) set to 500000.
Filesystem cache changed as follows by root user:
echo 150 > /proc/sys/vm/vfs_cache_pressure
Large pages reserved as follows by root user:
echo 6000 > /proc/sys/vm/nr_hugepages
echo 30000 > /proc/sys/vm/nr_overcommit_hugepages
The Apache C++ Standard Library V4.2.1 was installed from
http://stdcxx.apache.org/download.html using:
   gmake BUILDTYPE=8d CONFIG=gcc.config
```

Platform Notes

```
Service processor memory mirroring property disabled.
Hardware Page Table (HPT) ratio changed as follows by root user on Hardware Management Console (HMC):
chsyscfg -m <CEC NAME> -r prof -i "name=<PROFILE NAME>,lpar_name=<PARTITION NAME>,hpt_ratio=1:512"
```

General Notes

```
The following environment varibles were set before the runspec command:
  export HUGETLB_VERBOSE=0
  export HUGETLB_MORECORE=yes
  export XLFRTEOPTS=intrinthds=1
  export HUGETLB_ELFMAP=RW
```

Base Compiler Invocation

C benchmarks:
```
     xlc -qlanglvl=extc99
```

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Base Compiler Invocation (Continued)

C++ benchmarks:
```
xlC
```

Fortran benchmarks:
```
xlf95
```

Benchmarks using both Fortran and C:
```
xlc -qlanglvl=extc99 xlf95
```

Base Portability Flags

```
     410.bwaves: -qfixed
     416.gamess: -qfixed
      434.zeusmp: -qfixed
    435.gromacs: -qfixed -qextname
 436.cactusADM: -qfixed -qextname
     437.leslie3d: -qfixed
    454.calculix: -qfixed -qextname
          481.wrf: -DNOUNDERSCORE
    482.sphinx3: -qchars=signed
```

Base Optimization Flags

C benchmarks:
```
-O5 -qarch=pwr7 -qtune=pwr7 -q32 -qipa=threads
-B/usr/share/libhugetlbfs/ -tl -Wl,--hugetlbfs-align
```

C++ benchmarks:
```
-O5 -qarch=pwr7 -qtune=pwr7 -q32 -qipa=threads -qrtti
-B/usr/share/libhugetlbfs/ -tl -Wl,--hugetlbfs-align
```

Fortran benchmarks:
```
-O5 -qarch=pwr7 -qtune=pwr7 -q32 -qipa=threads -qalias=nostd
-B/usr/share/libhugetlbfs/ -tl -Wl,--hugetlbfs-align
```

Benchmarks using both Fortran and C:
```
-O5 -qarch=pwr7 -qtune=pwr7 -q32 -qipa=threads
-B/usr/share/libhugetlbfs/ -tl -Wl,--hugetlbfs-align -qalias=nostd
```

Base Other Flags

C benchmarks:

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Base Other Flags (Continued)

C++ benchmarks:

Fortran benchmarks:

Benchmarks using both Fortran and C:

Peak Compiler Invocation

C benchmarks:
```
xlc -qlanglvl=extc99
```

C++ benchmarks:
```
xlC
```

Fortran benchmarks:
```
xlf95
```

Benchmarks using both Fortran and C:
```
xlc -qlanglvl=extc99 xlf95
```

Peak Portability Flags

```
410.bwaves: -qfixed
416.gamess: -qfixed
434.zeusmp: -qfixed
435.gromacs: -qfixed -qextname
436.cactusADM: -DSPEC_CPU_LP64 -qfixed -qextname
437.leslie3d: -qfixed
453.povray: -DSPEC_CPU_LP64
454.calculix: -qfixed -qextname
481.wrf: -DNOUNDERSCORE
482.sphinx3: -qchars=signed
```

Peak Optimization Flags

C benchmarks:

```
433.milc: -Wl,-q -O5 -qarch=pwr7 -qtune=pwr7 -qipa=threads
          -lhugetlbfs

470.lbm: -qpdf1(pass 1) -qpdf2(pass 2) -O5 -qarch=pwr7 -qtune=pwr7
         -qipa=threads -B/usr/share/libhugetlbfs/ -tl
         -Wl,--hugetlbfs-align
```

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Peak Optimization Flags (Continued)

```
482.sphinx3: -Wl,-q -qpdf1(pass 1) -qpdf2(pass 2) -O4 -qarch=pwr7
             -qtune=pwr7 -qipa=threads -lhugetlbfs
```

C++ benchmarks:

```
   444.namd: -Wl,-q -qpdf1(pass 1) -qpdf2(pass 2) -O5 -qarch=pwr7
             -qtune=pwr7 -qipa=threads -lhugetlbfs

  447.dealII: -O4 -qarch=pwr7 -qtune=pwr7 -qipa=threads -qrtti
             -qcpp_stdinc=/autobench/sources/speccpu2006/stdcxx421/include/ansi:/autobench/sources/speccpu2006/stdcxx421/include:/opt/ibmcmp/vacpp/12.1/inclu
             -lsmartheap -L/autobench/sources/speccpu2006/stdcxx421/lib
             -R/autobench/sources/speccpu2006/stdcxx421/lib -lstd8d

   450.soplex: -Wl,-q -qpdf1(pass 1) -qpdf2(pass 2) -O3 -qarch=pwr7
             -qtune=pwr7 -q64 -lhugetlbfs

  453.povray: -Wl,-q -qpdf1(pass 1) -qpdf2(pass 2) -O4 -qarch=pwr7
             -qtune=pwr7 -qipa=threads -qsimd -q64 -lsmartheap64
```

Fortran benchmarks:

```
   410.bwaves: -qpdf1(pass 1) -qpdf2(pass 2) -O4 -qarch=pwr7 -qtune=pwr7
             -qipa=threads -qsmallstack=dynlenonheap -q64 -lhugetlbfs

  416.gamess: -qpdf1(pass 1) -qpdf2(pass 2) -O5 -qarch=pwr7 -qtune=pwr7
             -qipa=threads -qalias=nostd -lhugetlbfs

  434.zeusmp: basepeak = yes

  437.leslie3d: -Wl,-q -O5 -qarch=pwr7 -qtune=pwr7 -qipa=threads -q64
             -B/usr/share/libhugetlbfs/ -tl -Wl,--hugetlbfs-align

459.GemsFDTD: -O4 -qarch=pwr7 -qtune=pwr7 -qipa=threads -qsimd
             -B/usr/share/libhugetlbfs/ -tl -Wl,--hugetlbfs-align

   465.tonto: -Wl,-q -qpdf1(pass 1) -qpdf2(pass 2) -O5 -qarch=pwr7
             -qtune=pwr7 -qipa=threads -qsimd -lhugetlbfs
```

Benchmarks using both Fortran and C:

```
  435.gromacs: -Wl,-q -qpdf1(pass 1) -qpdf2(pass 2) -O4 -qarch=pwr7
             -qtune=pwr7 -qipa=threads -qsimd -lhugetlbfs

436.cactusADM: -O4 -qarch=pwr7 -qtune=pwr7 -qipa=threads -qsimd
             -qnostrict -q64 -lhugetlbfs

  454.calculix: -qpdf1(pass 1) -qpdf2(pass 2) -O5 -qarch=pwr7 -qtune=pwr7
             -qipa=threads -B/usr/share/libhugetlbfs/ -tl
             -Wl,--hugetlbfs-align
```

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Peak Optimization Flags (Continued)

481.wrf: -O3 -qarch=pwr7 -qtune=pwr7 -q64 -lhugetlbfs

Peak Other Flags

C benchmarks:

C++ benchmarks:

Fortran benchmarks:

Benchmarks using both Fortran and C:

The flags files that were used to format this result can be browsed at
http://www.spec.org/cpu2006/flags/IBM-Linux-XL.20121024.html
http://www.spec.org/cpu2006/flags/IBM-Power.html

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2006/flags/IBM-Linux-XL.20121024.xml
http://www.spec.org/cpu2006/flags/IBM-Power.xml

For questions about this result, please contact the tester.
For other inquiries, please contact webmaster@spec.org.

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