SPEC® CFP2006 Result

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IBM Corporation

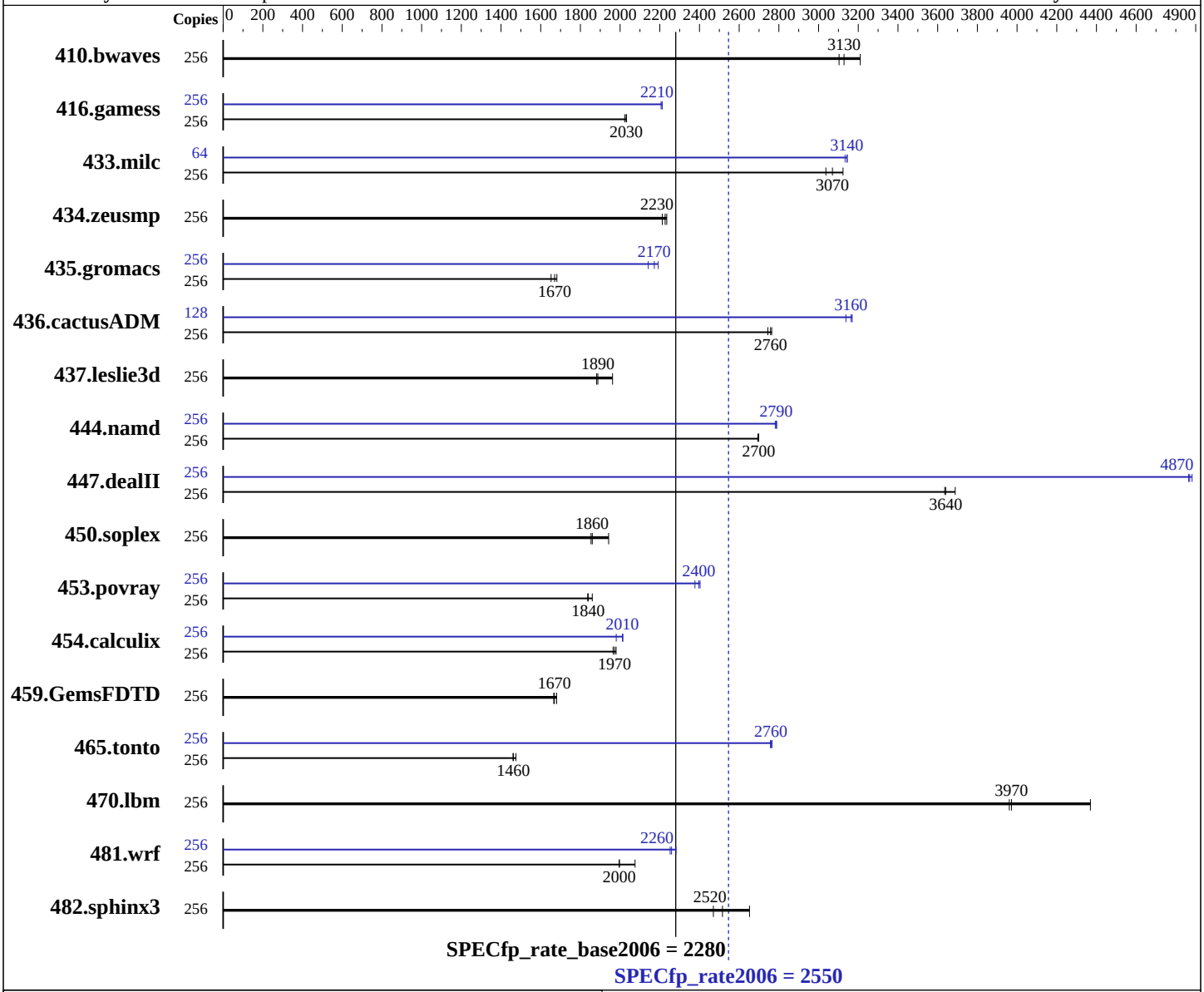
IBM Power 780 (3.86 GHz, 64 core, RedHat)

SPECfp®_rate2006 = 2550

SPECfp_rate_base2006 = 2280

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

Test date: Oct-2010
Hardware Availability: Mar-2010
Software Availability: Nov-2010



Hardware

CPU Name:	POWER7
CPU Characteristics:	Intelligent Energy Optimization enabled, up to 3.94 GHz
CPU MHz:	3860
FPU:	Integrated
CPU(s) enabled:	64 cores, 8 chips, 8 cores/chip, 4 threads/core
CPU(s) orderable:	8,16,24,32,48,64 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 6.0 (ppc64), Kernel 2.6.32-71.el6.ppc64
Compiler:	IBM XL C/C++ for Linux, V11.1 Updated with the Nov2010 PTF IBM XL Fortran for Linux, V13.1 Updated with the Nov2010 PTF
Auto Parallel:	No
File System:	ext2
System State:	Run level 3 (multi-user)

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Secondary Cache: 256 KB I+D on chip per core
L3 Cache: 4 MB I+D on chip per core
Other Cache: None
Memory: 512 GB (64x8 GB) DDR3 1066 MHz
Disk Subsystem: 3x146.8 GB Software RAID-0 SAS SFF 15K RPM
Other Hardware: None

Base Pointers: 32-bit
Peak Pointers: 32/64-bit
Other Software: -Post-Link Optimization for Linux on POWER, Version 5.5.0-3
-MicroQuill SmartHeap 9
-Apache C++ Standard Library 4.2.1

Results Table

Benchmark	Base							Peak						
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
410.bwaves	256	1084	3210	**1112**	**3130**	1121	3100	256	1084	3210	**1112**	**3130**	1121	3100
416.gamess	256	**2469**	**2030**	2466	2030	2478	2020	256	**2266**	**2210**	2272	2210	2266	2210
433.milc	256	752	3120	774	3040	**766**	**3070**	64	188	3130	187	3140	**187**	**3140**
434.zeusmp	256	**1046**	**2230**	1042	2240	1053	2210	256	**1046**	**2230**	1042	2240	1053	2210
435.gromacs	256	1087	1680	**1094**	**1670**	1106	1650	256	834	2190	853	2140	**841**	**2170**
436.cactusADM	256	1107	2760	**1109**	**2760**	1115	2740	128	487	3140	483	3170	**483**	**3160**
437.leslie3d	256	1227	1960	**1275**	**1890**	1279	1880	256	1227	1960	**1275**	**1890**	1279	1880
444.namd	256	**761**	**2700**	761	2700	762	2690	256	738	2780	**737**	**2790**	736	2790
447.dealII	256	794	3690	**804**	**3640**	806	3640	256	**601**	**4870**	602	4860	600	4880
450.soplex	256	1099	1940	**1148**	**1860**	1152	1850	256	1099	1940	**1148**	**1860**	1152	1850
453.povray	256	**740**	**1840**	742	1840	732	1860	256	567	2400	573	2380	**568**	**2400**
454.calculix	256	1075	1960	1067	1980	**1071**	**1970**	256	1066	1980	1049	2010	**1050**	**2010**
459.GemsFDTD	256	1616	1680	**1627**	**1670**	1631	1670	256	1616	1680	**1627**	**1670**	1631	1670
465.tonto	256	1708	1480	1725	1460	**1722**	**1460**	256	**913**	**2760**	911	2770	914	2760
470.lbm	256	805	4370	**886**	**3970**	888	3960	256	805	4370	**886**	**3970**	888	3960
481.wrf	256	1378	2080	**1432**	**2000**	1433	2000	256	**1266**	**2260**	1253	2280	1270	2250
482.sphinx3	256	1881	2650	**1983**	**2520**	2020	2470	256	1881	2650	**1983**	**2520**	2020	2470

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

Peak Tuning Notes

```
IBM Post-Link Optimization tool with
options "-O4 -nodp" used for
  433.milc 435.gromacs 450.soplex 482.sphinx3
options "-O4 -vrox -nodp" used for
  434.zeusmp
options "-O3 -lu -1 -nodp -sdp 9"  used for
  437.leslie3d 444.namd
options "-O4"  used for
  465.tonto
```

Submit Notes

```
The config file option 'submit' was used.
 Benchmarks bound to a processor using numactl on the submit command.
```

Operating System Notes

```
ulimit -s (stack) set to 1048576.
Large pages reserved as follows by root user:
  echo 18000 > /proc/sys/vm/nr_hugepages
The following environment varibles were set before the runspec command:
  XLFRTEOPTS=intrinthds=1
  HUGETLB_VERBOSE=0
  HUGETLB_MORECORE=yes
  HUGETLB_ELFMAP=RW
447.dealII (peak): "apache_stdcxx_4_2_1" src.alt was used.
447.dealII (base): "apache_stdcxx_4_2_1" src.alt was used.
```

Base Compiler Invocation

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

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 -B/usr/share/libhugetlbfs/ -tl
-Wl,--hugetlbfs-align
```

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

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

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

Base Other Flags

C benchmarks:
```
-qipa=threads
```

C++ benchmarks:
```
-qipa=threads
```

Fortran benchmarks:
```
-qipa=threads
```

Benchmarks using both Fortran and C:
```
-qipa=threads
```

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 -lhugetlbfs

470.lbm: basepeak = yes

482.sphinx3: basepeak = yes

C++ benchmarks:

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

447.dealII: -O4 -qarch=pwr7 -qtune=pwr7 -qrtti
-qcpp_stdinc=/autobench/sources/stdcxx-4.2.1/dist/include/ansi:/autobench/sources/stdcxx-4.2.1/dist/include:/opt/ibmcmp/vacpp/11.1/incl
-lsmartheap -L/autobench/sources/stdcxx-4.2.1/dist/lib
-R/autobench/sources/stdcxx-4.2.1/dist/lib -lstd8d

450.soplex: basepeak = yes

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

Fortran benchmarks:

410.bwaves: basepeak = yes

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

434.zeusmp: basepeak = yes

437.leslie3d: basepeak = yes

Continued on next page

Peak Optimization Flags (Continued)

459.GemsFDTD: `basepeak = yes`

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

Benchmarks using both Fortran and C:

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

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

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

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

Peak Other Flags

C benchmarks:
`-qipa=threads`

C++ benchmarks:
`-qipa=threads`

Fortran benchmarks:
`-qipa=threads`

Benchmarks using both Fortran and C (except as noted below):
`-qipa=threads`

The flags file that was used to format this result can be browsed at
`http://www.spec.org/cpu2006/flags/IBM-Linux-XL.20101123.01.html`

You can also download the XML flags source by saving the following link:
`http://www.spec.org/cpu2006/flags/IBM-Linux-XL.20101123.01.xml`

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