SPEC® CFP2006 Result

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IBM Corporation

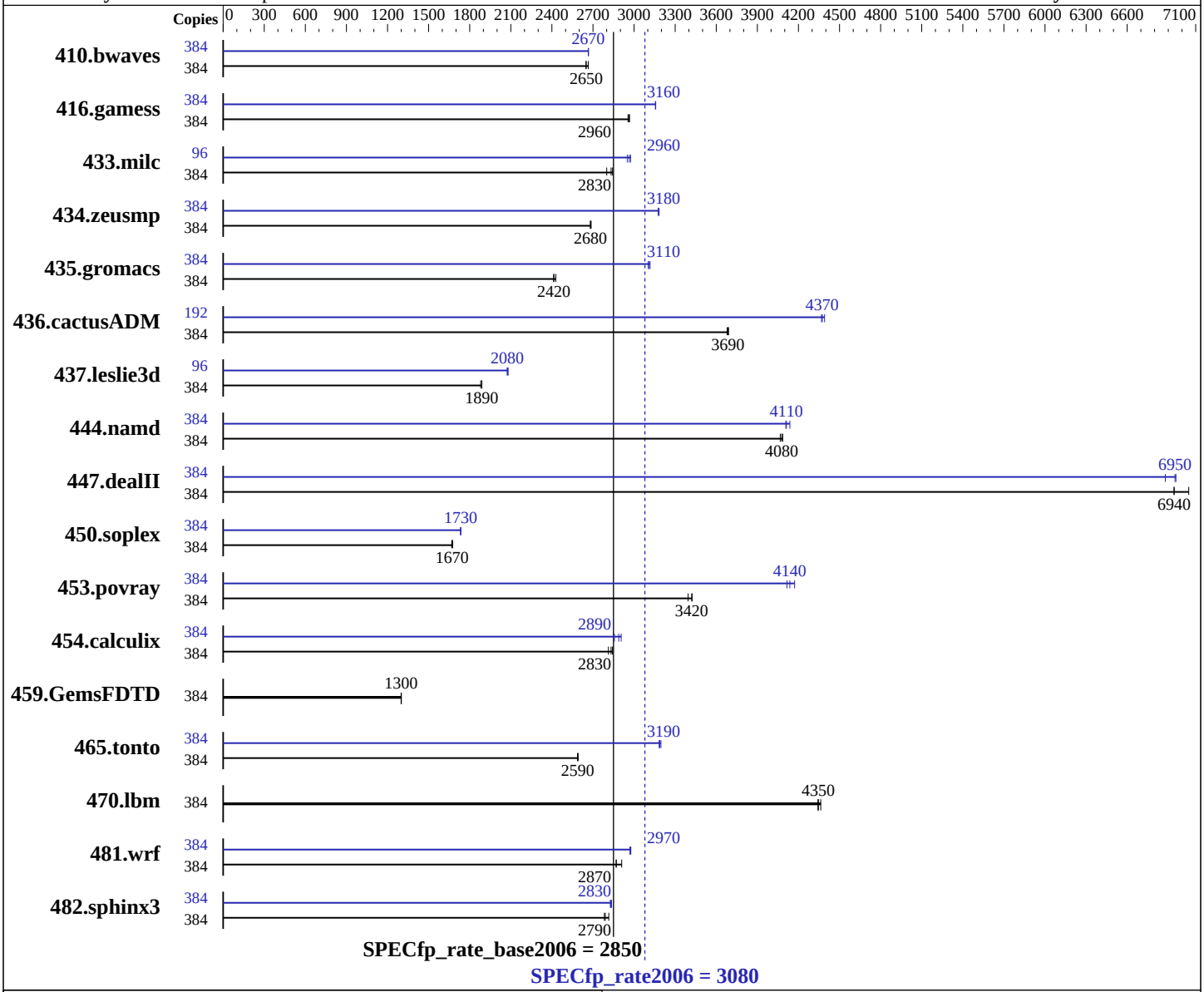
IBM Power 780 (3.44 GHz, 96 core, SLES)

SPECfp®_rate2006 = 3080

SPECfp_rate_base2006 = 2850

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

Test date: Aug-2011
Hardware Availability: Oct-2011
Software Availability: Jul-2011



Hardware

CPU Name:	POWER7
CPU Characteristics:	Intelligent Energy Optimization enabled, up to 3.780 GHz
CPU MHz:	3444
FPU:	Integrated
CPU(s) enabled:	96 cores, 16 chips, 6 cores/chip, 4 threads/core
CPU(s) orderable:	24,48,72,96 cores
Primary Cache:	32 KB I + 32 KB D on chip per core

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Software

Operating System:	SUSE Linux Enterprise Server 11 SP1 (ppc64), Kernel 2.6.32.12-0.7-ppc64
Compiler:	C/C++: Version 11.1 of IBM XL C/C++ for Linux; Fortran: Version 13.1 of IBM XL Fortran for Linux
Auto Parallel:	No
File System:	ext2

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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: 1 TB (64 x 16 GB) DDR3 1066 MHz
Disk Subsystem: 10 x 146.8 GB Raid0 SAS SFF 15K RPM
Other Hardware: None

System State: Run level 3 (multi-user)
Base Pointers: 32-bit
Peak Pointers: 32/64-bit
Other Software: -IBM Post-Link Optimization for Linux on POWER, version 5.6.0-4
-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	384	1958	2670	**1969**	**2650**	1970	2650	384	**1958**	**2670**	1958	2670	1956	2670
416.gamess	384	2534	2970	**2538**	**2960**	2544	2960	384	2381	3160	2383	3160	**2382**	**3160**
433.milc	384	1259	2800	1240	2840	**1245**	**2830**	96	299	2950	296	2970	**297**	**2960**
434.zeusmp	384	**1303**	**2680**	1301	2690	1304	2680	384	**1100**	**3180**	1098	3180	1100	3180
435.gromacs	384	**1135**	**2420**	1137	2410	1129	2430	384	**881**	**3110**	880	3120	884	3100
436.cactusADM	384	**1245**	**3690**	1247	3680	1244	3690	192	525	4370	523	4390	**525**	**4370**
437.leslie3d	384	**1912**	**1890**	1911	1890	1920	1880	96	435	2070	**435**	**2080**	434	2080
444.namd	384	757	4070	**755**	**4080**	754	4090	384	**749**	**4110**	750	4110	744	4140
447.dealII	384	623	7050	633	6940	**633**	**6940**	384	**632**	**6950**	639	6880	632	6960
450.soplex	384	**1914**	**1670**	1911	1680	1919	1670	384	1847	1730	1846	1740	**1847**	**1730**
453.povray	384	597	3420	602	3390	**597**	**3420**	384	**494**	**4140**	490	4170	496	4120
454.calculix	384	1115	2840	1126	2810	**1119**	**2830**	384	1109	2860	**1097**	**2890**	1090	2910
459.GemsFDTD	384	3131	1300	**3134**	**1300**	3136	1300	384	3131	1300	**3134**	**1300**	3136	1300
465.tonto	384	1461	2590	**1460**	**2590**	1458	2590	384	**1185**	**3190**	1187	3180	1182	3200
470.lbm	384	1209	4360	1215	4340	**1214**	**4350**	384	1209	4360	1215	4340	**1214**	**4350**
481.wrf	384	1474	2910	**1494**	**2870**	1495	2870	384	1441	2980	1444	2970	**1443**	**2970**
482.sphinx3	384	2658	2820	2689	2780	**2683**	**2790**	384	2647	2830	**2646**	**2830**	2639	2840

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 July2011 PTF
    Version 11.01.0000.0003
Fortran compiler updated to July2011 PTF
    Version 13.01.0000.0003
```

Peak Tuning Notes

```
IBM Post-Link optimization tool used for:
433.milc 435.gromacs 436.cactusADM 450.soplex 482.sphinx3
     with options -O4 -nodp
444.namd
     with options -O3 -lu -1 -nodp -sdp 9
```

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Peak Tuning Notes (Continued)

```
465.tonto
     with options -O4
470.lbm
     with options -kr -O4 -sdp 9 -vrox -m power7
```

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 2097152
Large pages reserved as follows by root user:
  echo 25728 > /proc/sys/vm/nr_hugepages
The following environment varibles were set before the runspec command:
    export XLFRTEOPTS=intrinthds=1
    export HUGETLB_VERBOSE=0
    export HUGETLB_MORECORE=yes
    export HUGETLB_ELFMAP=RW
```

General Notes

```
447.dealII (peak): "apache_stdcxx_4_2_1" src.alt was used.
447.dealII (base): "apache_stdcxx_4_2_1" src.alt was used.

The Apache C++ Standard Library V4.2.1 was installed from
http://stdcxx.apache.org/download.html using:
    gmake BUILDTYPE=8d CONFIG=gcc.config
IBM Post-Link optimization tool can be downloaded from
http://www-304.ibm.com/webapp/set2/sas/f/lopdiags/sdkdownload.html
```

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 -lhugetlbfs`

C++ benchmarks:
`-O4 -qrtti`
`-qcpp_stdinc=/root/stdcxx421/include/ansi:/root/stdcxx421/include:/opt/ibmcmp/vacpp/11.1/include`
`-lhugetlbfs -L/root/stdcxx421/lib -R/root/stdcxx421/lib -lstd8d`

Fortran benchmarks:
`-O5 -qalias=nostd -lhugetlbfs`

Benchmarks using both Fortran and C:
`-O5 -qalias=nostd -lhugetlbfs`

Base Other Flags

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

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

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

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

Peak Compiler Invocation

C benchmarks:
`xlc -qlanglvl=extc99`

Continued on next page

Peak Compiler Invocation (Continued)

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: -qfixed -qextname -DSPEC_CPU_LP64
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 -lhugetlbfs

470.lbm: basepeak = yes

482.sphinx3: -Wl,-q -qpdf1(pass 1) -qpdf2(pass 2) -O4 -lhugetlbfs

C++ benchmarks:

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

447.dealII: -O4 -qrtti
-qcpp_stdinc=/root/stdcxx421/include/ansi:/root/stdcxx421/include:/opt/ibmcmp/vacpp/11.1/i
-lsmartheap -lhugetlbfs -L/root/stdcxx421/lib
-R/root/stdcxx421/lib -lstd8d

450.soplex: -Wl,-q -O3 -qarch=auto -qtune=auto -lhugetlbfs

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

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Peak Optimization Flags (Continued)

Fortran benchmarks:

410.bwaves: `-qpdf1`(pass 1) `-qpdf2`(pass 2) `-O5 -q64 -lhugetlbfs`

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

434.zeusmp: `-O5 -qsmallstack=dynlenonheap -qalias=nostd -B/usr/share/libhugetlbfs/ -tl -Wl,--hugetlbfs-align`

437.leslie3d: `-O5 -lhugetlbfs`

459.GemsFDTD: `basepeak = yes`

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

Benchmarks using both Fortran and C:

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

436.cactusADM: `-Wl,-q -O4 -q64 -qsimd -qnostrict -qsmallstack=dynlenonheap -qalias=nostd -lhugetlbfs`

454.calculix: `-qpdf1`(pass 1) `-qpdf2`(pass 2) `-O5 -lhugetlbfs`

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

Peak Other Flags

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

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

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

Benchmarks using both Fortran and C:
`-qipa=noobject -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.html`

You can also download the XML flags source by saving the following link:
`http://www.spec.org/cpu2006/flags/IBM-Linux-XL.20101123.xml`

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