SPEC® CFP2006 Result

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IBM Corporation

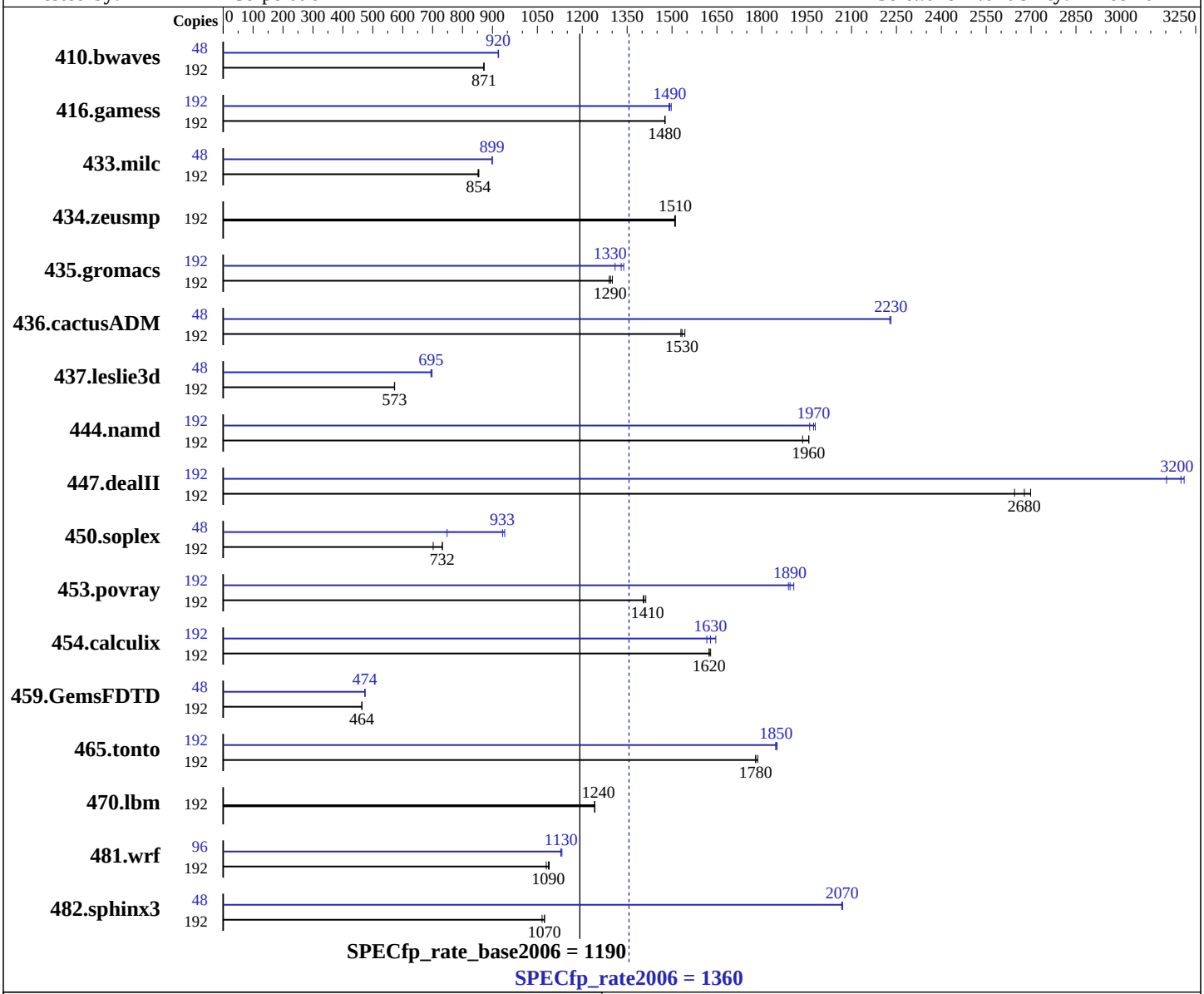
IBM Power 760 (3.4 GHz, 48 core, SLES)

SPECfp®_rate2006 = 1360

SPECfp_rate_base2006 = 1190

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

Test date: Jan-2013
Hardware Availability: Mar-2013
Software Availability: Dec-2012



Hardware

CPU Name:	POWER7+
CPU Characteristics:	Intelligent Energy Optimization enabled, up to 3.787 GHz
CPU MHz:	3416
FPU:	Integrated
CPU(s) enabled:	48 cores, 8 chips, 6 cores/chip, 4 threads/core
CPU(s) orderable:	12, 24, 36, 48 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 SP2 (ppc64) kernel 3.0.42-0.7-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:	ext3
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: 512 GB (64 x 8 GB) DDR3 1066 MHz
Disk Subsystem: 3 x 146.8 GB Raid0 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	192	2995	871	**2994**	**871**	2993	872	48	**709**	**920**	709	920	710	919
416.gamess	192	**2547**	**1480**	2545	1480	2547	1480	192	**2518**	**1490**	2511	1500	2523	1490
433.milc	192	2063	854	**2064**	**854**	2069	852	48	490	899	**490**	**899**	490	899
434.zeusmp	192	**1157**	**1510**	1158	1510	1156	1510	192	**1157**	**1510**	1158	1510	1156	1510
435.gromacs	192	1062	1290	1054	1300	**1059**	**1290**	192	1024	1340	1047	1310	**1031**	**1330**
436.cactusADM	192	1487	1540	1500	1530	**1496**	**1530**	48	**257**	**2230**	257	2230	257	2230
437.leslie3d	192	3154	572	**3151**	**573**	3149	573	48	646	698	650	694	**649**	**695**
444.namd	192	795	1940	787	1960	**787**	**1960**	192	786	1960	**780**	**1970**	778	1980
447.dealII	192	831	2640	814	2700	**820**	**2680**	192	697	3150	684	3210	**686**	**3200**
450.soplex	192	2281	702	**2187**	**732**	2185	733	48	535	748	**429**	**933**	425	941
453.povray	192	**726**	**1410**	727	1400	723	1410	192	536	1910	541	1890	**539**	**1890**
454.calculix	192	**975**	**1620**	975	1620	972	1630	192	962	1650	**973**	**1630**	980	1620
459.GemsFDTD	192	4392	464	**4392**	**464**	4396	463	48	1075	474	**1075**	**474**	1074	474
465.tonto	192	1062	1780	1057	1790	**1061**	**1780**	192	**1022**	**1850**	1020	1850	1023	1850
470.lbm	192	2124	1240	**2124**	**1240**	2125	1240	192	2124	1240	**2124**	**1240**	2125	1240
481.wrf	192	1986	1080	1968	1090	**1973**	**1090**	96	950	1130	**950**	**1130**	947	1130
482.sphinx3	192	3511	1070	**3485**	**1070**	3484	1070	48	**452**	**2070**	453	2070	452	2070

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
```

Continued on next page

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.

Large pages reserved as follows by root user:
echo 12672 > /proc/sys/vm/nr_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

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

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 -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:

C++ benchmarks:

Fortran benchmarks:

Benchmarks using both Fortran and C:

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: -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: basepeak = yes

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=/opt/stdcxx421/include/ansi:/opt/stdcxx421/include:/opt/ibmcmp/vacpp/12.1/i
-lsmartheap -L/opt/stdcxx421/lib -R/opt/stdcxx421/lib
-lstd8d

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

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Peak Optimization Flags (Continued)

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

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-Power.20130226.html
http://www.spec.org/cpu2006/flags/IBM-Linux-XL.20121024.html

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2006/flags/IBM-Power.20130226.xml
http://www.spec.org/cpu2006/flags/IBM-Linux-XL.20121024.xml

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