SPEC® CFP2006 Result

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IBM Corporation

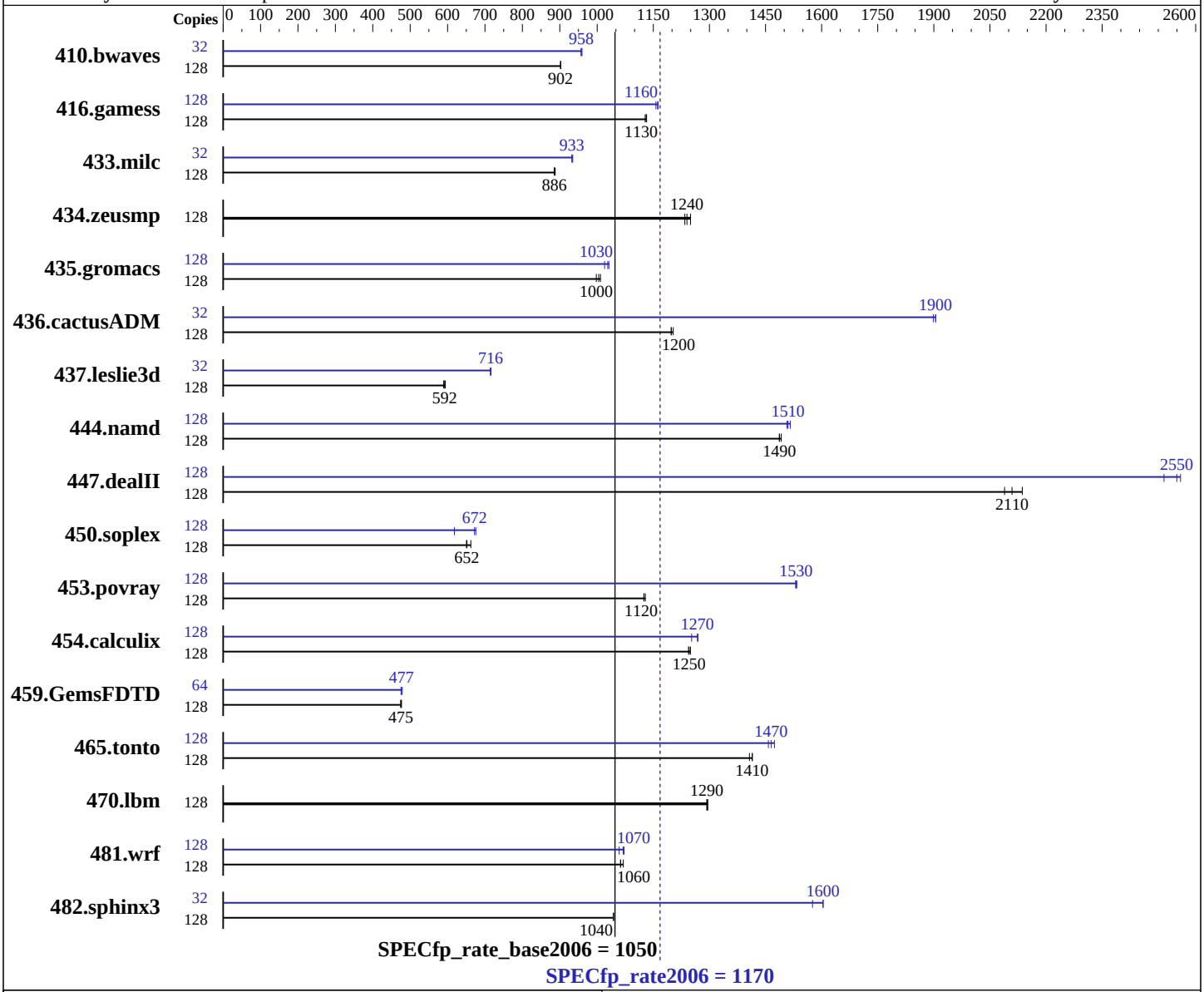
IBM Power 750 Express (4.0 GHz, 32 core, SLES)

SPECfp®_rate2006 = 1170

SPECfp_rate_base2006 = 1050

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 4.431 GHz
CPU MHz:	4060
FPU:	Integrated
CPU(s) enabled:	32 cores, 8 chips, 4 cores/chip, 4 threads/core
CPU(s) orderable:	8, 16, 24, 32 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: 256 GB (64 x 4 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	128	1929	902	**1928**	**902**	1927	903	32	454	957	**454**	**958**	453	959
416.gamess	128	**2217**	**1130**	2214	1130	2221	1130	128	2155	1160	**2158**	**1160**	2166	1160
433.milc	128	**1327**	**886**	1324	888	1327	885	32	**315**	**933**	314	935	315	932
434.zeusmp	128	932	1250	**939**	**1240**	944	1230	128	932	1250	**939**	**1240**	944	1230
435.gromacs	128	906	1010	**910**	**1000**	916	998	128	**889**	**1030**	896	1020	886	1030
436.cactusADM	128	1271	1200	1277	1200	**1277**	**1200**	32	201	1900	201	1910	**201**	**1900**
437.leslie3d	128	**2032**	**592**	2025	594	2041	590	32	**420**	**716**	420	716	421	714
444.namd	128	688	1490	690	1490	**690**	**1490**	128	681	1510	677	1520	**680**	**1510**
447.dealII	128	701	2090	**694**	**2110**	685	2140	128	**574**	**2550**	572	2560	582	2520
450.soplex	128	1641	650	1612	662	**1638**	**652**	128	1726	618	**1589**	**672**	1580	676
453.povray	128	605	1120	**605**	**1120**	603	1130	128	**445**	**1530**	445	1530	444	1530
454.calculix	128	845	1250	849	1240	**848**	**1250**	128	832	1270	**833**	**1270**	843	1250
459.GemsFDTD	128	2860	475	2848	477	**2859**	**475**	64	1428	476	**1425**	**477**	1418	479
465.tonto	128	895	1410	**890**	**1410**	890	1410	128	864	1460	855	1470	**860**	**1470**
470.lbm	128	1357	1300	1360	1290	**1360**	**1290**	128	1357	1300	1360	1290	**1360**	**1290**
481.wrf	128	1346	1060	1336	1070	**1346**	**1060**	128	1351	1060	**1337**	**1070**	1334	1070
482.sphinx3	128	2392	1040	2390	1040	**2391**	**1040**	32	396	1580	389	1600	**389**	**1600**

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 8448 > /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
```

Platform Notes

```
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"
```

Base Compiler Invocation

C benchmarks:

```
xlc -qlanglvl=extc99
```

C++ benchmarks:

```
xlC
```

Fortran benchmarks:

```
xlf95
```

Continued on next page

Base Compiler Invocation (Continued)

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`

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`

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Peak Optimization Flags (Continued)

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

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

Peak Other Flags

C benchmarks:

C++ benchmarks:

Fortran benchmarks:

Continued on next page

Peak Other Flags (Continued)

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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