SPEC® CFP2006 Result

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IBM Corporation

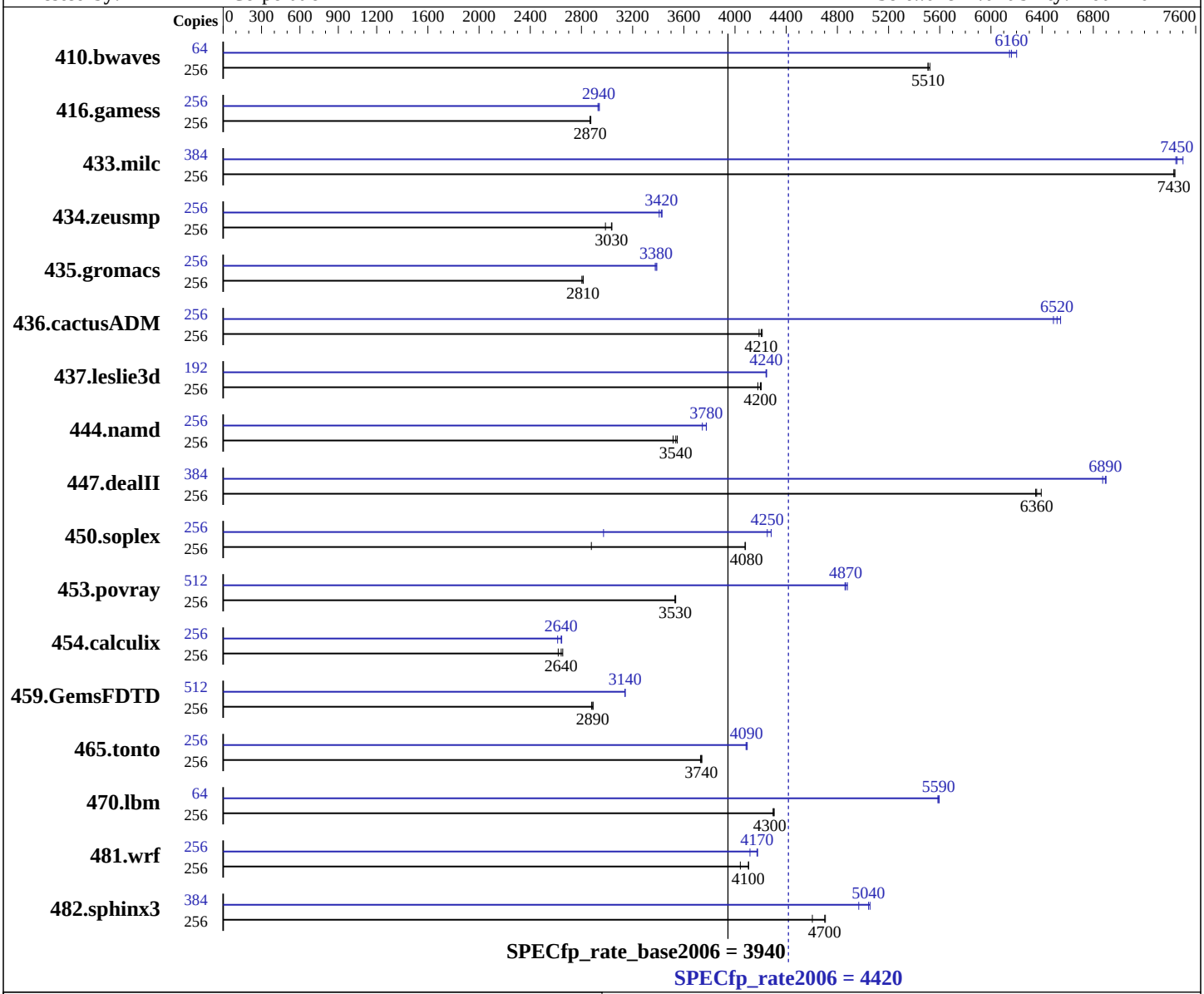
IBM Power E880 (4.35 GHz, 64 core, RHEL)

SPECfp®_rate2006 = 4420

SPECfp_rate_base2006 = 3940

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

Test date: Nov-2014
Hardware Availability: Nov-2014
Software Availability: Jun-2014



Hardware

CPU Name:	POWER8
CPU Characteristics:	Intelligent Energy Optimization enabled, up to 4.53 GHz
CPU MHz:	4359
FPU:	Integrated
CPU(s) enabled:	64 cores, 8 chips, 8 cores/chip, 8 threads/core
CPU(s) orderable:	4,8 Modules
Primary Cache:	32 KB I + 64 KB D on chip per core

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Software

Operating System:	Red Hat Enterprise Linux Server release 7.0 (ppc64) kernel 3.10.0-123.el7.ppc64
Compiler:	C/C++: Version 13.1 of IBM XL C/C++ for Linux; Fortran: Version 15.1 of IBM XL Fortran for Linux
Auto Parallel:	No
File System:	xfs
System State:	Run level 3 (multi-user)
Base Pointers:	32-bit
Peak Pointers:	32/64-bit

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Secondary Cache:	512 KB I+D on chip per core
L3 Cache:	8 MB I+D on chip per core
Other Cache:	16 MB I+D off chip per CDIMM
Memory:	2 TB (64 x 32 GB CDIMMs) DDR3 1600 MHz
Disk Subsystem:	7 x 300 GB 15K RPM SAS SFF-2 Raid5
Other Hardware:	None

Other Software:	Post-Link Optimization for Linux on POWER, version 5.7.0 IBM Advance Toolchain 7.0-3

Results Table

Benchmark	Base							Peak						
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
410.bwaves	256	**632**	**5510**	630	5520	632	5510	64	142	6150	140	6200	**141**	**6160**
416.gamess	256	1748	2870	**1747**	**2870**	1744	2870	256	1711	2930	1705	2940	**1708**	**2940**
433.milc	256	**316**	**7430**	316	7430	316	7440	384	**473**	**7450**	470	7500	474	7440
434.zeusmp	256	767	3040	**768**	**3030**	780	2990	256	**680**	**3420**	679	3430	684	3410
435.gromacs	256	**650**	**2810**	652	2800	650	2810	256	539	3390	541	3380	**540**	**3380**
436.cactusADM	256	730	4190	**728**	**4210**	726	4210	256	467	6540	**469**	**6520**	471	6490
437.leslie3d	256	**573**	**4200**	576	4180	572	4210	192	425	4250	425	4240	**425**	**4240**
444.namd	256	584	3520	**580**	**3540**	579	3550	256	548	3740	**544**	**3780**	544	3780
447.dealII	256	**461**	**6360**	458	6390	461	6350	384	**637**	**6890**	637	6900	639	6870
450.soplex	256	742	2880	**524**	**4080**	523	4080	256	718	2970	**502**	**4250**	499	4280
453.povray	256	385	3540	**385**	**3530**	386	3530	512	558	4880	561	4860	**560**	**4870**
454.calculix	256	**799**	**2640**	796	2650	807	2620	256	798	2650	808	2610	**800**	**2640**
459.GemsFDTD	256	**940**	**2890**	943	2880	940	2890	512	**1730**	**3140**	1730	3140	1729	3140
465.tonto	256	**674**	**3740**	673	3740	675	3730	256	616	4090	**616**	**4090**	615	4100
470.lbm	256	818	4300	**818**	**4300**	817	4310	64	157	5590	**157**	**5590**	157	5600
481.wrf	256	708	4040	**697**	**4100**	696	4110	256	695	4120	685	4180	**685**	**4170**
482.sphinx3	256	1084	4600	**1061**	**4700**	1060	4710	384	1507	4970	1481	5060	**1484**	**5040**

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

Peak Tuning Notes

```
410.bwaves fdpr options: -O4 -m power8 -A 2 -rcl 2 -sls -dir -vrox
416.gamess fdpr options: -O4 -m power8 -A 2 -rcl 2 -sls -dir -vrox
433.milc fdpr options: -O4 -m power8 -A 2 -rcl 2 -sls -dir -vrox
434.zeusmp fdpr options: -O4 -m power8 -A 2 -rcl 2 -sls -dir -vrox
435.gromacs fdpr options: -O4 -m power8 -A 2 -rcl 2 -sls -dir -vrox
436.cactusADM fdpr options: -O4 -m power8 -A 2 -sls -dir -vrox
437.leslie3d fdpr options: -O4 -m power8 -A 2 -rcl 2 -sls -dir -vrox
444.namd fdpr options: -O4 -m power8 -A 2 -rcl 2 -sls -dir -vrox
447.dealII fdpr options: -O4 -m power8 -A 2 -rcl 2 -sls -dir -vrox
453.povray fdpr options: -O4 -m power8 -A 2 -rcl 2 -sls -dir -vrox
454.calculix fdpr options: -O4 -m power8 -A 2 -rcl 2 -sls -dir -vrox
459.GemsFDTD fdpr options: -O4 -m power8 -A 2 -sls -dir -vrox
465.tonto fdpr options: -O4 -m power8 -A 2 -sls -dir -vrox
```

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Peak Tuning Notes (Continued)

```
470.lbm fdpr options: -O4 -m power8 -A 2 -rcl 2 -sls -dir -vrox
481.wrf fdpr options: -O4 -m power8 -A 2 -rcl 2 -sls -dir -vrox
482.sphinx3 fdpr options: -O4 -m power8 -A 2 -rcl 2 -sls -dir -vrox
```

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 unlimited

51200 16M large pages defined with sysctl command
Transparent huge page disabled with
echo never > /sys/kernel/mm/transparent_hugepage/enabled
sysctl vm.nr_hugepages=N and reboot to set large page pool
```

General Notes

```
Environment variables set by runspec before the start of the run:
HUGETLB_MORECORE = "yes"
HUGETLB_VERBOSE = "0"
XLFRTEOPTS = "intrinthds=1"
This result uses the post_setup and/or bench_post_setup to drop caches. SPEC has
determined that although the effect may have been negligible for this run, future
submissions will not be considered rule compliant if the post_setup actions drop
caches (e.g. : "echo 3 > /proc/sys/vm/drop_caches").
```

Base Compiler Invocation

C benchmarks:
```
/opt/ibm/xlC/13.1.0/bin/xlc_at -qlanglvl=extc99
```

C++ benchmarks:
```
/opt/ibm/xlC/13.1.0/bin/xlC_at
```

Fortran benchmarks:
```
/opt/ibm/xlf/15.1.0/bin/xlf95_at
```

Benchmarks using both Fortran and C:
```
/opt/ibm/xlC/13.1.0/bin/xlc_at -qlanglvl=extc99
/opt/ibm/xlf/15.1.0/bin/xlf95_at
```

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:
`-qinline=40 -qipa=threads -qlargepage -O5 -qsimd=noauto -lhugetlbfs`

C++ benchmarks:
`-qinline=40 -qipa=threads -qlargepage -O5 -qrtti -lhugetlbfs`

Fortran benchmarks:
`-qipa=threads -qlargepage -O5 -qalias=nostd -lhugetlbfs`

Benchmarks using both Fortran and C:
`-qinline=40 -qipa=threads -qlargepage -O5 -qsimd=noauto -qalias=nostd -lhugetlbfs`

Base Other Flags

C benchmarks:
`-qipa=noobject -qsuppress=1500-036`

C++ benchmarks:
`-qipa=noobject -qsuppress=1500-036`

Fortran benchmarks:
`-qipa=noobject -qsuppress=1500-010 -qsuppress=cmpmsg -qsuppress=1500-036`

Benchmarks using both Fortran and C:
`-qipa=noobject -qsuppress=1500-010 -qsuppress=cmpmsg -qsuppress=1500-036`

Peak Compiler Invocation

C benchmarks:
/opt/ibm/xlC/13.1.0/bin/xlc_at -qlanglvl=extc99

C++ benchmarks:
/opt/ibm/xlC/13.1.0/bin/xlC_at

Fortran benchmarks:
/opt/ibm/xlf/15.1.0/bin/xlf95_at

Benchmarks using both Fortran and C:
/opt/ibm/xlC/13.1.0/bin/xlc_at -qlanglvl=extc99
/opt/ibm/xlf/15.1.0/bin/xlf95_at

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
454.calculix: -qfixed -qextname
481.wrf: -DNOUNDERSCORE
482.sphinx3: -qchars=signed

Peak Optimization Flags

C benchmarks:

433.milc: -qinline=40 -qipa=threads -qlargepage -O5 -qsimd=noauto -qfdpr -lhugetlbfs -Wl,-q

470.lbm: -qinline=40 -qipa=threads -qpdf1(pass 1) -qpdf2(pass 2) -qlargepage -O5 -qsimd=noauto -q64 -qfdpr -lhugetlbfs -Wl,-q

482.sphinx3: -qinline=40 -qipa=threads -qpdf1(pass 1) -qpdf2(pass 2) -qlargepage -O5 -qsimd=noauto -qfdpr -lhugetlbfs -Wl,-q

C++ benchmarks:

444.namd: -qinline=40 -qipa=threads -qlargepage -O4 -qfdpr -lhugetlbfs -Wl,-q

447.dealII: -qinline=40 -qipa=threads -qpdf1(pass 1) -qpdf2(pass 2) -qlargepage -O4 -qfdpr -qrtti -lhugetlbfs -Wl,-q

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Peak Optimization Flags (Continued)

450.soplex: -qinline=40 -qipa=threads -qpdf1(pass 1) -qpdf2(pass 2)
-qlargepage -O3 -qarch=auto -qtune=auto -qsimd
-qnoprefetch -lhugetlbfs

453.povray: -qinline=40 -qipa=threads -qpdf1(pass 1) -qpdf2(pass 2)
-qlargepage -O3 -qarch=auto -qtune=auto
-qprefetch=dscr=0x93 -qfdpr -lhugetlbfs -Wl,-q

Fortran benchmarks:

410.bwaves: -qipa=threads -qlargepage -O5 -qsimd=noauto -qfdpr
-qsmallstack=dynlenonheap -lhugetlbfs -Wl,-q

416.gamess: -qipa=threads -qlargepage -O5 -qsimd=noauto
-qprefetch=dscr=0x54 -qipa=partition=large -qfdpr
-qalias=nostd -lhugetlbfs -Wl,-q

434.zeusmp: -qipa=threads -qlargepage -O4 -qsimd=noauto -q64 -qfdpr
-qxlf90=nosignedzero -lhugetlbfs -Wl,-q

437.leslie3d: -qipa=threads -qpdf1(pass 1) -qpdf2(pass 2) -qlargepage
-O5 -q64 -qfdpr -lhugetlbfs -Wl,-q
-B/opt/at7.0/share/libhugetlbfs/ -tl -Wl,--hugetlbfs-align

459.GemsFDTD: -qipa=threads -qpdf1(pass 1) -qpdf2(pass 2) -qlargepage
-O5 -q64 -qipa=partition=large -qfdpr -lhugetlbfs -Wl,-q

465.tonto: Same as 459.GemsFDTD

Benchmarks using both Fortran and C:

435.gromacs: -qinline=40 -qipa=threads -qpdf1(pass 1) -qpdf2(pass 2)
-qlargepage -O4 -qipa=partition=large -qfdpr -lhugetlbfs
-Wl,-q

436.cactusADM: -qinline=40 -qipa=threads -qpdf1(pass 1) -qpdf2(pass 2)
-qlargepage -O4 -qarch=pwr7 -qtune=pwr7
-qipa=partition=large -q64 -qfdpr -lhugetlbfs -Wl,-q

454.calculix: -qinline=40 -qipa=threads -O5 -qsimd=noauto -qfdpr
-lhugetlbfs -Wl,-q

481.wrf: -qinline=40 -qipa=threads -qlargepage -O5
-qipa=partition=large -qfdpr -lhugetlbfs -Wl,-q

Peak Other Flags

C benchmarks (except as noted below):
`-qsuppress=1586-476`(pass 2) `-qipa=noobject -qsuppress=1500-036`

433.milc: `-qipa=noobject -qsuppress=1500-036`

C++ benchmarks (except as noted below):
`-qsuppress=1586-476`(pass 2) `-qipa=noobject -qsuppress=1500-036`

444.namd: `-qipa=noobject -qsuppress=1500-036`

Fortran benchmarks (except as noted below):
`-qipa=noobject -qsuppress=1500-010 -qsuppress=cmpmsg -qsuppress=1500-036`

437.leslie3d: `-qsuppress=1586-476`(pass 2) `-qipa=noobject -qsuppress=1500-010 -qsuppress=cmpmsg -qsuppress=1500-036`

459.GemsFDTD: `-qsuppress=1586-476`(pass 2) `-qipa=noobject -qsuppress=1500-010 -qsuppress=cmpmsg -qsuppress=1500-036`

465.tonto: `-qsuppress=1586-476`(pass 2) `-qipa=noobject -qsuppress=1500-010 -qsuppress=cmpmsg -qsuppress=1500-036`

Benchmarks using both Fortran and C (except as noted below):
`-qsuppress=1586-476`(pass 2) `-qipa=noobject -qsuppress=1500-010 -qsuppress=cmpmsg -qsuppress=1500-036`

454.calculix: `-qsuppress=1500-010 -qsuppress=cmpmsg -qsuppress=1500-036`

481.wrf: `-qipa=noobject -qsuppress=1500-010 -qsuppress=cmpmsg -qsuppress=1500-036`

The flags files that were used to format this result can be browsed at
http://www.spec.org/cpu2006/flags/IBM-XL.V13La.html
http://www.spec.org/cpu2006/flags/IBM-Linux-V7.html

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2006/flags/IBM-XL.V13La.xml
http://www.spec.org/cpu2006/flags/IBM-Linux-V7.xml

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