SPEC® CFP2006 Result

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IBM Corporation

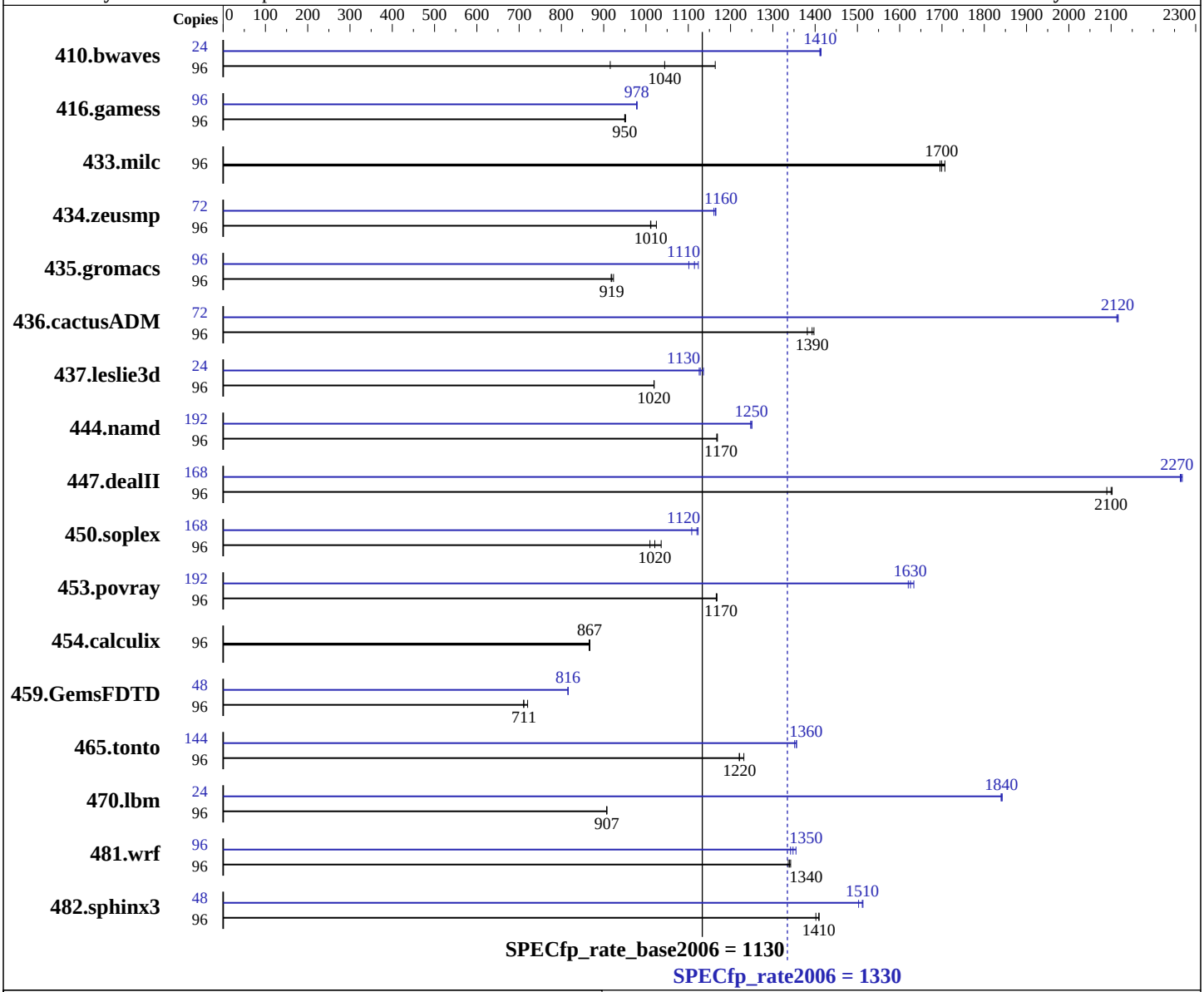
IBM Power S824 (3.5 GHz, 24 core, RHEL)

SPECfp®_rate2006 = 1330

SPECfp_rate_base2006 = 1130

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

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



Hardware

CPU Name:	POWER8
CPU Characteristics:	Intelligent Energy Optimization enabled, up to 3.92 GHz
CPU MHz:	3525
FPU:	Integrated
CPU(s) enabled:	24 cores, 4 chips, 6 cores/chip, 8 threads/core
CPU(s) orderable:	2 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:	512 GB (16 x 32 GB CDIMMs) DDR3 1600 MHz
Disk Subsystem:	5 x 300 GB 15K RPM SAS SFF-2 Raid0
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	96	**1249**	**1040**	1121	1160	1425	915	24	231	1410	231	1410	**231**	**1410**
416.gamess	96	**1978**	**950**	1975	952	1979	950	96	**1921**	**978**	1922	978	1920	979
433.milc	96	520	1700	516	1710	**519**	**1700**	96	520	1700	516	1710	**519**	**1700**
434.zeusmp	96	**864**	**1010**	853	1020	864	1010	72	562	1170	**563**	**1160**	564	1160
435.gromacs	96	747	918	**746**	**919**	742	923	96	**615**	**1110**	610	1120	622	1100
436.cactusADM	96	821	1400	830	1380	**824**	**1390**	72	406	2120	**407**	**2120**	407	2110
437.leslie3d	96	**886**	**1020**	886	1020	885	1020	24	199	1140	200	1130	**200**	**1130**
444.namd	96	659	1170	659	1170	**659**	**1170**	192	1234	1250	**1232**	**1250**	1231	1250
447.dealII	96	522	2100	526	2090	**523**	**2100**	168	**848**	**2270**	849	2260	847	2270
450.soplex	96	773	1040	793	1010	**784**	**1020**	168	1264	1110	1247	1120	**1250**	**1120**
453.povray	96	**438**	**1170**	438	1170	437	1170	192	630	1620	625	1630	**628**	**1630**
454.calculix	96	915	866	**914**	**867**	913	867	96	915	866	**914**	**867**	913	867
459.GemsFDTD	96	1434	710	**1432**	**711**	1415	720	48	625	815	624	816	**624**	**816**
465.tonto	96	**774**	**1220**	767	1230	774	1220	144	**1045**	**1360**	1045	1360	1048	1350
470.lbm	96	1453	908	1454	907	**1454**	**907**	24	179	1840	179	1840	**179**	**1840**
481.wrf	96	802	1340	**800**	**1340**	799	1340	96	792	1350	799	1340	**796**	**1350**
482.sphinx3	96	1335	1400	1327	1410	**1328**	**1410**	48	623	1500	**619**	**1510**	618	1510

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 1048576.

19200 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"
```

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`

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Base Portability Flags (Continued)

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`

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Peak Compiler Invocation (Continued)

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: basepeak = yes

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

450.soplex: -qinline=40 -qipa=threads -qpdf1(pass 1) -qpdf2(pass 2)
-qlargepage -O3 -qarch=auto -qtune=auto -qsimd
-qprefetch=dscr=147 -lhugetlbfs

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Peak Optimization Flags (Continued)

453.povray: -qinline=40 -qipa=threads -qpdf1(pass 1) -qpdf2(pass 2) -qlargepage -O3 -qarch=auto -qtune=auto -qprefetch=dscr=147 -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=84 -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: basepeak = yes

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

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Peak Other Flags (Continued)

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):
`-qipa=noobject -qsuppress=1500-010 -qsuppress=cmpmsg -qsuppress=1500-036`

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

436.cactusADM: `-qsuppress=1586-476`(pass 2) `-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.V13L.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.V13L.xml
http://www.spec.org/cpu2006/flags/IBM-Linux-V7.xml

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