SPEC® CFP2006 Result

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IBM Corporation

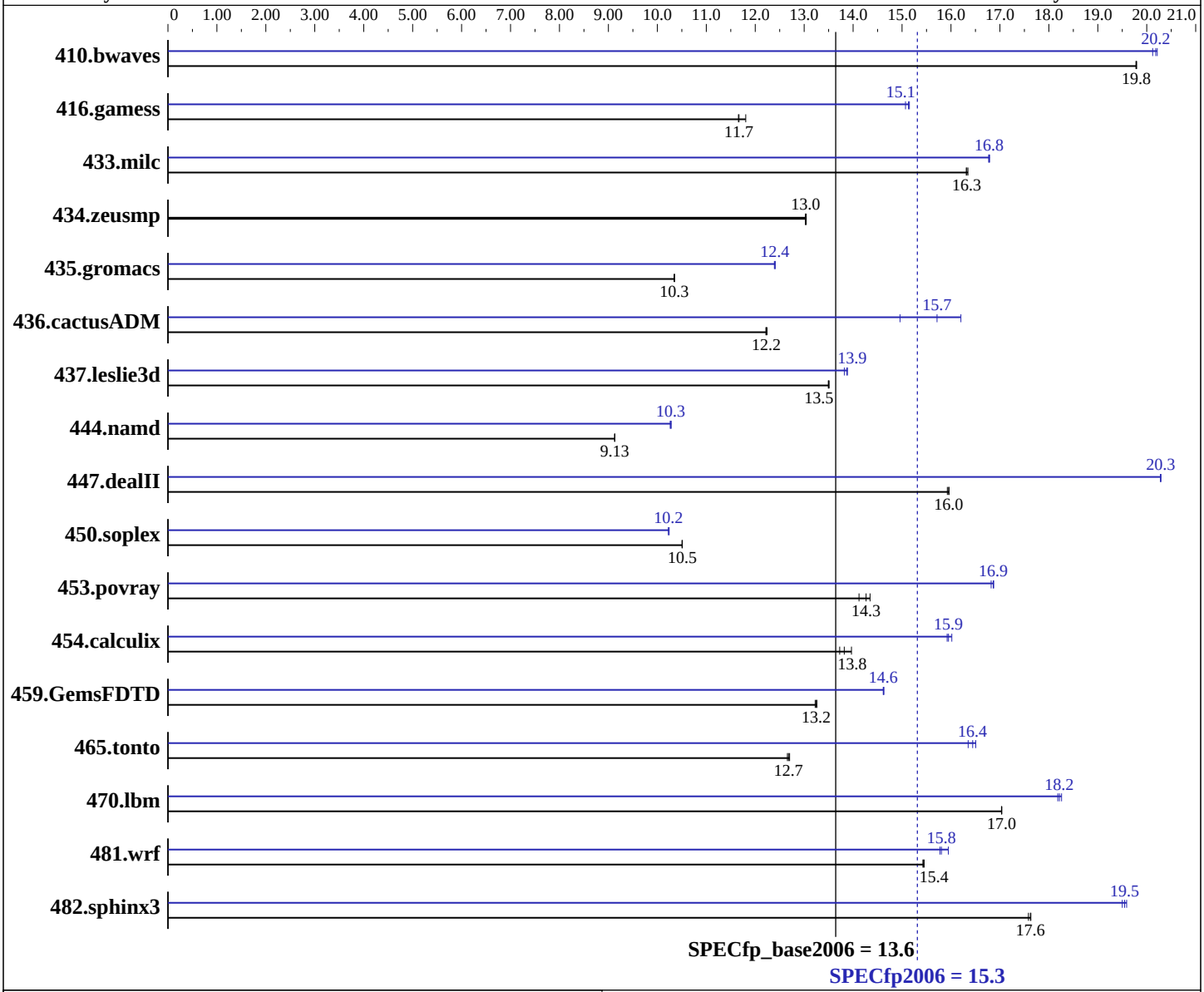
IBM System x3455 (AMD Opteron 2356)

SPECfp®2006 = 15.3

SPECfp_base2006 = 13.6

CPU2006 license: 11
Test sponsor: IBM Corporation
Tested by: Advanced Micro Devices

Test date: Jun-2008
Hardware Availability: Jul-2008
Software Availability: Jun-2008



Hardware

CPU Name:	AMD Opteron 2356
CPU Characteristics:	
CPU MHz:	2300
FPU:	Integrated
CPU(s) enabled:	8 cores, 2 chips, 4 cores/chip
CPU(s) orderable:	1,2 chips
Primary Cache:	64 KB I + 64 KB D on chip per core
Secondary Cache:	512 KB I+D on chip per core

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Software

Operating System:	SuSE Linux Enterprise Server 10 (x86_64) SP1, Kernel 2.6.16.46-0.12-smp
Compiler:	PGI Server Complete Version 7.2 PathScale Compiler Suite Version 3.2
Auto Parallel:	No
File System:	ReiserFS
System State:	Run level 3 (Full multiuser with network)
Base Pointers:	64-bit
Peak Pointers:	32/64-bit

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L3 Cache: 2 MB I+D on chip per chip
Other Cache: None
Memory: 16 GB (8 x 2 GB, DDR2-667 CL5 Reg Dual Rank)
Disk Subsystem: 1 x 160 GB SATA, 7200 RPM
Other Hardware: None

Other Software: None

Results Table

Benchmark	Base						Peak					
	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
410.bwaves	687	19.8	**687**	**19.8**	687	19.8	672	20.2	675	20.1	**673**	**20.2**
416.gamess	1658	11.8	1680	11.7	**1678**	**11.7**	1292	15.2	**1294**	**15.1**	1299	15.1
433.milc	**562**	**16.3**	563	16.3	562	16.3	547	16.8	**547**	**16.8**	547	16.8
434.zeusmp	**698**	**13.0**	699	13.0	698	13.0	**698**	**13.0**	699	13.0	698	13.0
435.gromacs	690	10.3	**690**	**10.3**	690	10.4	575	12.4	576	12.4	**576**	**12.4**
436.cactusADM	976	12.2	**977**	**12.2**	978	12.2	**760**	**15.7**	738	16.2	799	15.0
437.leslie3d	697	13.5	696	13.5	**696**	**13.5**	677	13.9	**678**	**13.9**	680	13.8
444.namd	879	9.13	**879**	**9.13**	878	9.13	**781**	**10.3**	780	10.3	782	10.3
447.dealII	717	16.0	718	15.9	**717**	**16.0**	564	20.3	564	20.3	**564**	**20.3**
450.soplex	793	10.5	**794**	**10.5**	794	10.5	814	10.2	815	10.2	**815**	**10.2**
453.povray	377	14.1	371	14.3	**373**	**14.3**	315	16.9	316	16.8	**315**	**16.9**
454.calculix	**597**	**13.8**	591	14.0	601	13.7	**517**	**15.9**	518	15.9	515	16.0
459.GemsFDTD	**801**	**13.2**	802	13.2	800	13.3	**726**	**14.6**	725	14.6	726	14.6
465.tonto	**776**	**12.7**	775	12.7	777	12.7	596	16.5	**598**	**16.4**	602	16.4
470.lbm	**807**	**17.0**	807	17.0	806	17.0	756	18.2	**754**	**18.2**	752	18.3
481.wrf	724	15.4	723	15.5	**723**	**15.4**	701	15.9	**707**	**15.8**	708	15.8
482.sphinx3	**1106**	**17.6**	1108	17.6	1105	17.6	995	19.6	1000	19.5	**997**	**19.5**

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

Operating System Notes

```
'numactl' was used to bind copies to the cores
'ulimit -s unlimited' was used to set environment stack size
'ulimit -l 2097152'  was used to set environment locked pages in memory limit
Environment variable PGI_HUGE_PAGES set to 896
Set vm/nr_hugepages=1792 in /etc/sysctl.conf
mount -t hugetlbfs nodev /mnt/hugepages
powersave -f was used to set the CPU frequency to its maximum.
```

Base Compiler Invocation

C benchmarks:

```
pgcc
```

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Base Compiler Invocation (Continued)

C++ benchmarks:
pgcpp

Fortran benchmarks:
pgf95

Benchmarks using both Fortran and C:
pgcc pgf95

Base Portability Flags

410.bwaves: -DSPEC_CPU_LP64
416.gamess: -DSPEC_CPU_LP64
433.milc: -DSPEC_CPU_LP64
434.zeusmp: -DSPEC_CPU_LP64
435.gromacs: -DSPEC_CPU_LP64 -Mnomain
436.cactusADM: -DSPEC_CPU_LP64 -Mnomain
437.leslie3d: -DSPEC_CPU_LP64
444.namd: -DSPEC_CPU_LP64
447.dealII: -DSPEC_CPU_LP64
450.soplex: -DSPEC_CPU_LP64
453.povray: -DSPEC_CPU_LP64
454.calculix: -DSPEC_CPU_LP64 -Mnomain
459.GemsFDTD: -DSPEC_CPU_LP64
465.tonto: -DSPEC_CPU_LP64
470.lbm: -DSPEC_CPU_LP64
481.wrf: -DSPEC_CPU_LP64 -DSPEC_CPU_CASE_FLAG -DSPEC_CPU_LINUX
482.sphinx3: -DSPEC_CPU_LP64

Base Optimization Flags

C benchmarks:
-fastsse -Msmartalloc=huge:150 -Mfprelaxed -Mipa=fast -Mipa=inline
-tp barcelona-64 -Bstatic_pgi

C++ benchmarks:
-fastsse -Msmartalloc=huge:150 -Mfprelaxed --zc_eh -Mipa=fast
-Mipa=inline -tp barcelona-64 -Bstatic_pgi

Fortran benchmarks:
-fastsse -Mfprelaxed -Msmartalloc=huge:150 -Mipa=fast -Mipa=inline
-tp barcelona-64 -Bstatic_pgi

Benchmarks using both Fortran and C:
-fastsse -Msmartalloc=huge:150 -Mfprelaxed -Mipa=fast -Mipa=inline
-tp barcelona-64 -Bstatic_pgi

Base Other Flags

C benchmarks:
`-Mipa=jobs:4`

C++ benchmarks:
`-Mipa=jobs:4`

Fortran benchmarks:
`-Mipa=jobs:4`

Benchmarks using both Fortran and C:
`-Mipa=jobs:4`

Peak Compiler Invocation

C benchmarks (except as noted below):
`pgcc`

470.lbm: `pathcc`

C++ benchmarks (except as noted below):
`pathCC`

444.namd: `pgcpp`

Fortran benchmarks (except as noted below):
`pgf95`

416.gamess: `pathf95`

459.GemsFDTD: `pathf95`

465.tonto: `pathf95`

Benchmarks using both Fortran and C (except as noted below):
`pgcc pgf95`

436.cactusADM: `pathcc pathf95`

Peak Portability Flags

410.bwaves: `-DSPEC_CPU_LP64`
416.gamess: `-DSPEC_CPU_LP64`
433.milc: `-DSPEC_CPU_LP64`
434.zeusmp: `-DSPEC_CPU_LP64`
435.gromacs: `-DSPEC_CPU_LP64 -Mnomain`

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Peak Portability Flags (Continued)

436.cactusADM: -DSPEC_CPU_LP64 -fno-second-underscore
437.leslie3d: -DSPEC_CPU_LP64
444.namd: -DSPEC_CPU_LP64
453.povray: -DSPEC_CPU_LP64
454.calculix: -DSPEC_CPU_LP64 -Mnomain
459.GemsFDTD: -DSPEC_CPU_LP64
465.tonto: -DSPEC_CPU_LP64
470.lbm: -DSPEC_CPU_LP64
481.wrf: -DSPEC_CPU_LP64 -DSPEC_CPU_CASE_FLAG -DSPEC_CPU_LINUX
482.sphinx3: -DSPEC_CPU_LP64

Peak Optimization Flags

C benchmarks:

433.milc: -fastsse -Msmartalloc=huge:150 -Msafeptr -Mfprelaxed
-Mipa=inline -Mipa=arg -Mipa=const -Mipa=ptr -Mipa=shape
-tp barcelona-64 -Bstatic_pgi

470.lbm: -march=barcelona -Ofast -CG:sse_cse_regs=0
-CG:locs_shallow_depth=1 -m3dnow

482.sphinx3: -Mpfi=indirect(pass 1) -Mpfo=indirect(pass 2)
-Mipa=fast(pass 2) -Mipa=inline(pass 2) -fastsse
-Mfprelaxed -Msmartalloc -tp barcelona-64 -Bstatic_pgi

C++ benchmarks:

444.namd: -Mpfi(pass 1) -Mpfo(pass 2) -Mipa=fast(pass 2)
-Mipa=inline(pass 2) -fastsse -Munroll=n:4 -Munroll=m:8
-Msmartalloc=huge:150 -Mnodepchk -Mfprelaxed --zc_eh
-tp barcelona-64 -Bstatic_pgi

447.dealII: -march=barcelona -Ofast -static -INLINE:aggressive=on
-fno-exceptions -m32

450.soplex: -march=barcelona -fb_create fbdata(pass 1)
-fb_opt fbdata(pass 2) -O3 -TENV:frame_pointer=off
-LNO:prefetch=1 -OPT:malloc_alg=1 -CG:load_exe=0 -m32

453.povray: -march=barcelona -fb_create fbdata(pass 1)
-fb_opt fbdata(pass 2) -Ofast

Fortran benchmarks:

410.bwaves: -Mpfi(pass 1) -Mpfo(pass 2) -Mipa=fast(pass 2)
-Mipa=inline(pass 2) -fastsse -Msmartalloc
-Mprefetch=distance:12 -Mprefetch=nta -Mpre -Mfprelaxed
-tp barcelona-64 -Bstatic_pgi

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Peak Optimization Flags (Continued)

416.gamess: `-march=barcelona -fb_create fbdata`(pass 1)
`-fb_opt fbdata`(pass 2) `-O2 -OPT:Ofast -OPT:ro=3`
`-OPT:unroll_size=256`

434.zeusmp: `basepeak = yes`

437.leslie3d: `-Mpfi=indirect`(pass 1) `-Mpfo=indirect`(pass 2)
`-Mipa=fast`(pass 2) `-Mipa=inline`(pass 2) `-fastsse`
`-Mvect=fuse -Msmartalloc=huge:150 -Mprefetch=distance:8`
`-Mprefetch=t0 -Mfprelaxed -tp barcelona-64 -Bstatic_pgi`

459.GemsFDTD: `-march=barcelona -Ofast -LNO:fission=2 -LNO:simd=2`
`-LNO:prefetch_ahead=1 -CG:load_exe=0`

465.tonto: `-march=barcelona -Ofast -OPT:alias=no_f90_pointer_alias`
`-LNO:blocking=off -CG:load_exe=1 -IPA:plimit=525`

Benchmarks using both Fortran and C:

435.gromacs: `-fastsse -Msmartalloc=huge:150 -Mfprelaxed -Mfpapprox=rsqrt`
`-Mipa=fast -Mipa=inline -tp barcelona-64 -Bstatic_pgi`

436.cactusADM: `-march=barcelona -fb_create fbdata`(pass 1)
`-fb_opt fbdata`(pass 2) `-Ofast -LNO:blocking=off`

454.calculix: `-Mpfi=indirect`(pass 1) `-Mpfo=indirect`(pass 2)
`-Mipa=fast`(pass 2) `-Mipa=inline`(pass 2) `-fastsse`
`-Msmartalloc=huge:150 -Mprefetch=t0 -Mpre -Mfprelaxed`
`-tp barcelona-64 -Bstatic_pgi`

481.wrf: `-fastsse -Mvect=noaltcode -Msmartalloc`
`-Mprefetch=distance:8 -Mfprelaxed -tp barcelona-64`
`-Bstatic_pgi`

Peak Other Flags

C benchmarks (except as noted below):
`-Mipa=jobs:4`(pass 2)

470.lbm: `No flags used`

C++ benchmarks:

444.namd: `-Mipa=jobs:4`(pass 2)

Continued on next page

Peak Other Flags (Continued)

Fortran benchmarks (except as noted below):
`-Mipa=jobs:4`(pass 2)

416.gamess: `No flags used`

459.GemsFDTD: `No flags used`

465.tonto: `No flags used`

Benchmarks using both Fortran and C (except as noted below):
`-Mipa=jobs:4`(pass 2)

436.cactusADM: `No flags used`

481.wrf: `No flags used`

The flags file that was used to format this result can be browsed at
`http://www.spec.org/cpu2006/flags/amd421GH-flags.html`

You can also download the XML flags source by saving the following link:
`http://www.spec.org/cpu2006/flags/amd421GH-flags.xml`

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