



SPEC[®] CFP2006 Result

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IBM Corporation

SPECfp[®]_rate2006 = 86.0

IBM System x3655 (AMD Opteron 2356)

SPECfp_rate_base2006 = 77.6

CPU2006 license: 11

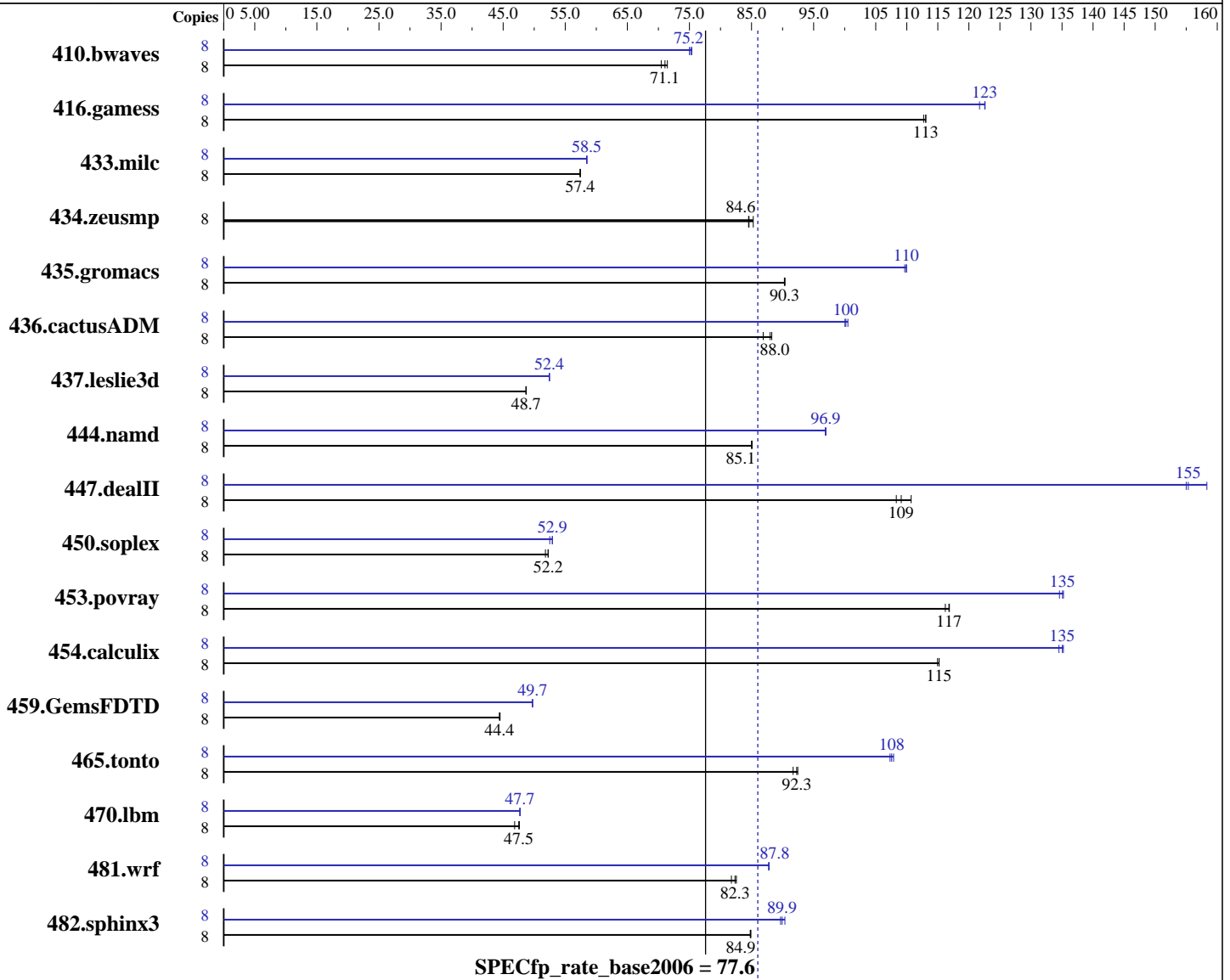
Test date: Jun-2008

Test sponsor: IBM Corporation

Hardware Availability: Jul-2008

Tested by: Advanced Micro Devices

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: ext3
 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 73.4 GB SAS, 15000 RPM
Other Hardware: None

Other Software: None

Results Table

Benchmark	Base							Peak						
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
410.bwaves	8	1543	70.5	1522	71.4	1530	71.1	8	1450	75.0	1442	75.4	1446	75.2
416.gamess	8	1385	113	1390	113	1385	113	8	1277	123	1287	122	1278	123
433.milc	8	1280	57.4	1279	57.4	1279	57.4	8	1256	58.5	1256	58.5	1256	58.5
434.zeusmp	8	861	84.5	861	84.6	854	85.3	8	861	84.5	861	84.6	854	85.3
435.gromacs	8	633	90.3	632	90.3	632	90.4	8	520	110	519	110	521	110
436.cactusADM	8	1083	88.3	1086	88.0	1100	86.9	8	951	101	956	100	954	100
437.leslie3d	8	1546	48.7	1543	48.7	1544	48.7	8	1434	52.4	1434	52.5	1434	52.4
444.namd	8	755	85.0	754	85.1	754	85.1	8	662	96.9	662	96.9	662	97.0
447.dealII	8	839	109	845	108	827	111	8	590	155	589	155	578	158
450.soplex	8	1288	51.8	1277	52.2	1277	52.3	8	1271	52.5	1261	52.9	1261	52.9
453.povray	8	364	117	366	116	364	117	8	316	135	315	135	315	135
454.calculix	8	574	115	573	115	573	115	8	489	135	491	135	488	135
459.GemsFDTD	8	1911	44.4	1907	44.5	1911	44.4	8	1707	49.7	1706	49.7	1708	49.7
465.tonto	8	852	92.4	858	91.7	853	92.3	8	730	108	732	108	734	107
470.lbm	8	2314	47.5	2346	46.8	2309	47.6	8	2303	47.7	2304	47.7	2305	47.7
481.wrf	8	1093	81.8	1085	82.3	1082	82.6	8	1018	87.7	1017	87.8	1017	87.8
482.sphinx3	8	1839	84.8	1837	84.9	1837	84.9	8	1739	89.7	1725	90.4	1734	89.9

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
Environment variable PGI_HUGE_PAGES set to 150
'ulimit -s unlimited' was used to set environment stack size
'ulimit -l 2097152' was used to set environment locked pages in memory limit
Set vm/nr_hugepages=1200 in /etc/sysctl.conf
mount -t hugetlbfs nodev /mnt/hugepages
```

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

```



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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.deallI: -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: -Mphi=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: -Mphi=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)

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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.20090713.00.html>

You can also download the XML flags source by saving the following link:

<http://www.spec.org/cpu2006/flags/amd421GH-flags.20090713.00.xml>

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