



SPEC[®] CFP2006 Result

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IBM Corporation

SPECfp[®]_rate2006 = 88.9

IBM System x3455 (AMD Opteron 2356)

SPECfp_rate_base2006 = 80.2

CPU2006 license: 11

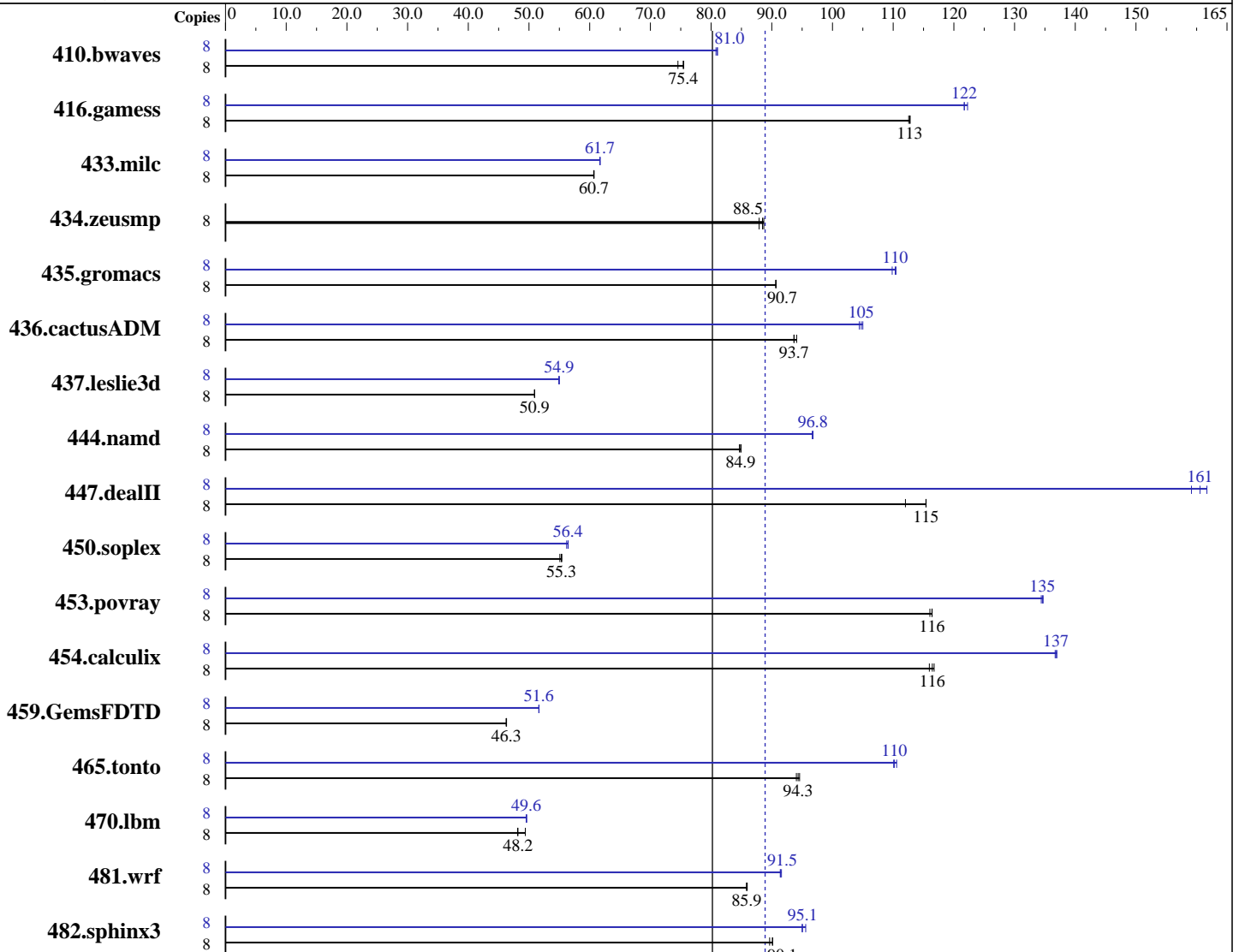
Test sponsor: IBM Corporation

Tested by: Advanced Micro Devices

Test date: Jun-2008

Hardware Availability: Jul-2008

Software Availability: Jun-2008



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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							
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio		
410.bwaves	8	1459	74.5	1440	75.5	<u>1442</u>	<u>75.4</u>	8	<u>1342</u>	<u>81.0</u>	1342	81.0	1346	80.8		
416.gamess	8	<u>1389</u>	<u>113</u>	1392	113	1389	113	8	1287	122	1281	122	<u>1287</u>	<u>122</u>		
433.milc	8	<u>1210</u>	<u>60.7</u>	1209	60.7	1211	60.7	8	1190	61.7	<u>1190</u>	<u>61.7</u>	1191	61.7		
434.zeusmp	8	<u>823</u>	<u>88.5</u>	821	88.7	828	87.9	8	<u>823</u>	<u>88.5</u>	821	88.7	828	87.9		
435.gromacs	8	630	90.7	630	90.7	<u>630</u>	<u>90.7</u>	8	517	110	<u>518</u>	<u>110</u>	520	110		
436.cactusADM	8	1016	94.1	1021	93.7	<u>1021</u>	<u>93.7</u>	8	910	105	<u>913</u>	<u>105</u>	916	104		
437.leslie3d	8	1476	50.9	1477	50.9	<u>1477</u>	<u>50.9</u>	8	<u>1369</u>	<u>54.9</u>	1369	54.9	1367	55.0		
444.namd	8	758	84.7	<u>756</u>	<u>84.9</u>	755	84.9	8	664	96.7	663	96.8	<u>663</u>	<u>96.8</u>		
447.dealII	8	817	112	<u>793</u>	<u>115</u>	793	115	8	575	159	<u>570</u>	<u>161</u>	566	162		
450.soplex	8	1211	55.1	<u>1206</u>	<u>55.3</u>	1204	55.4	8	1187	56.2	1182	56.5	<u>1183</u>	<u>56.4</u>		
453.povray	8	366	116	367	116	<u>366</u>	<u>116</u>	8	<u>316</u>	<u>135</u>	317	134	316	135		
454.calculix	8	<u>567</u>	<u>116</u>	569	116	565	117	8	482	137	483	137	<u>482</u>	<u>137</u>		
459.GemsFDTD	8	<u>1834</u>	<u>46.3</u>	1833	46.3	1836	46.2	8	1643	51.7	<u>1644</u>	<u>51.6</u>	1644	51.6		
465.tonto	8	<u>834</u>	<u>94.3</u>	837	94.1	832	94.6	8	715	110	712	111	<u>714</u>	<u>110</u>		
470.lbm	8	2284	48.1	<u>2281</u>	<u>48.2</u>	2225	49.4	8	2215	49.6	<u>2217</u>	<u>49.6</u>	2218	49.6		
481.wrf	8	1041	85.8	<u>1041</u>	<u>85.9</u>	1040	86.0	8	978	91.4	976	91.6	<u>977</u>	<u>91.5</u>		
482.sphinx3	8	1739	89.6	<u>1730</u>	<u>90.1</u>	1730	90.1	8	1641	95.0	<u>1640</u>	<u>95.1</u>	1631	95.6		

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 150
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):

pathf95

410.bwaves: pgf95

434.zeusmp: pgf95

437.leslie3d: pgf95

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.html>

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

<http://www.spec.org/cpu2006/flags/amd421GH-flags.20090713.xml>

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