



# SPEC® CFP2006 Result

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## IBM Corporation

### SPECfp®\_rate2006 = 92.2

### IBM System x3455 (AMD Opteron 2360 SE)

### SPECfp\_rate\_base2006 = 83.0

CPU2006 license: 11

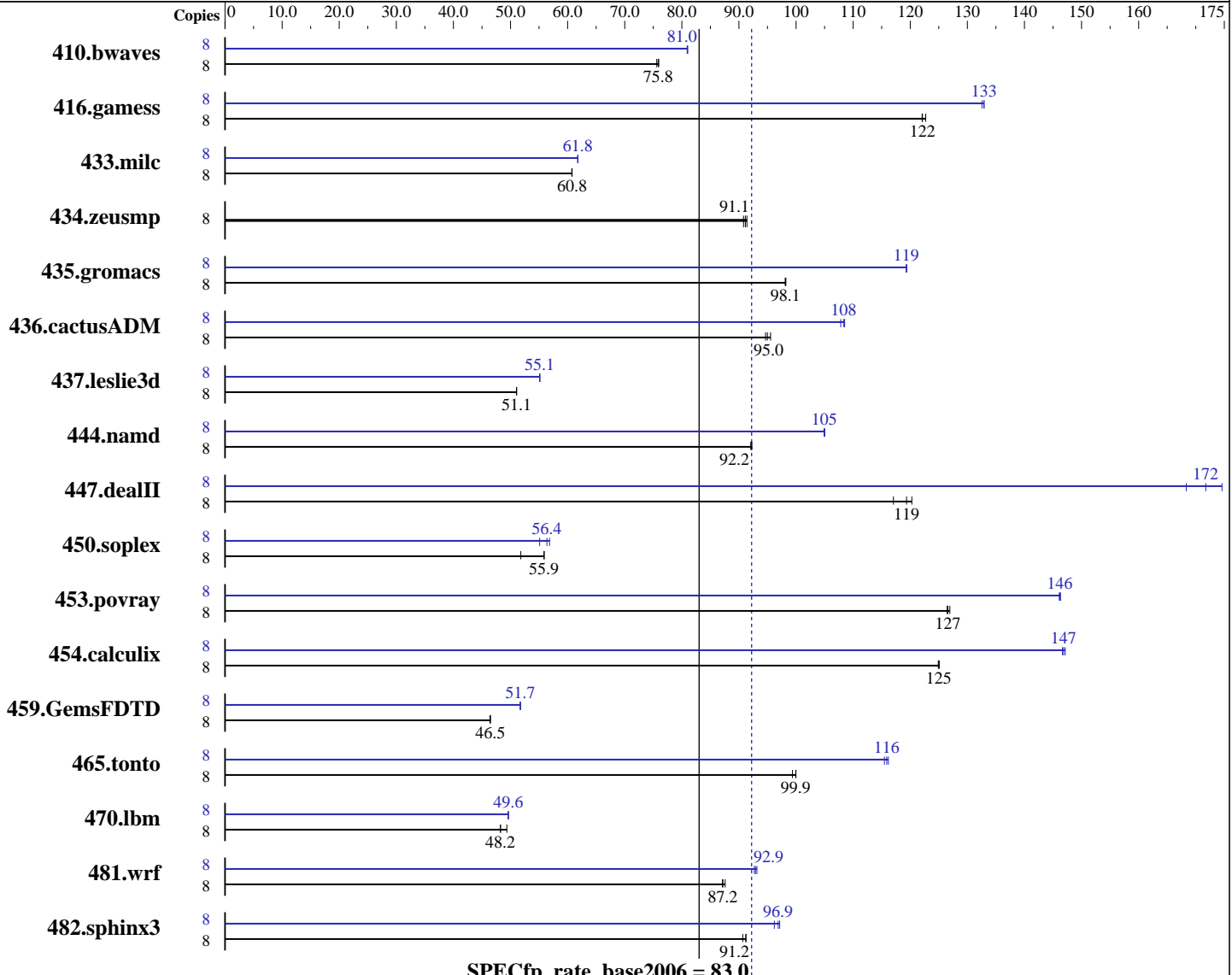
Test date: Jun-2008

Test sponsor: IBM Corporation

Hardware Availability: Jul-2008

Tested by: Advanced Micro Devices

Software Availability: Jun-2008



#### Hardware

CPU Name: AMD Opteron 2360 SE  
 CPU Characteristics:  
 CPU MHz: 2500  
 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	1438	75.6	1431	76.0	<b>1433</b>	<b>75.8</b>	8	<b>1342</b>	<b>81.0</b>	1342	81.0	1343	80.9
416.gamess	8	1276	123	1283	122	<b>1282</b>	<b>122</b>	8	1178	133	1182	133	<b>1178</b>	<b>133</b>
433.milc	8	<b>1208</b>	<b>60.8</b>	1208	60.8	1209	60.7	8	1188	61.8	<b>1189</b>	<b>61.8</b>	1189	61.8
434.zeusmp	8	797	91.4	<b>799</b>	<b>91.1</b>	802	90.8	8	797	91.4	<b>799</b>	<b>91.1</b>	802	90.8
435.gromacs	8	<b>582</b>	<b>98.1</b>	582	98.2	582	98.1	8	<b>479</b>	<b>119</b>	479	119	478	119
436.cactusADM	8	1010	94.7	1001	95.5	<b>1006</b>	<b>95.0</b>	8	887	108	881	109	<b>882</b>	<b>108</b>
437.leslie3d	8	<b>1473</b>	<b>51.1</b>	1473	51.1	1473	51.1	8	1364	55.2	1365	55.1	<b>1364</b>	<b>55.1</b>
444.namd	8	697	92.1	<b>696</b>	<b>92.2</b>	695	92.3	8	<b>611</b>	<b>105</b>	612	105	611	105
447.dealII	8	761	120	<b>767</b>	<b>119</b>	782	117	8	544	168	<b>533</b>	<b>172</b>	524	175
450.soplex	8	1288	51.8	1193	55.9	<b>1194</b>	<b>55.9</b>	8	1211	55.1	<b>1184</b>	<b>56.4</b>	1174	56.8
453.povray	8	<b>336</b>	<b>127</b>	335	127	337	126	8	291	146	291	146	<b>291</b>	<b>146</b>
454.calculix	8	528	125	<b>528</b>	<b>125</b>	528	125	8	450	147	449	147	<b>449</b>	<b>147</b>
459.GemsFDTD	8	1827	46.5	1829	46.4	<b>1827</b>	<b>46.5</b>	8	<b>1641</b>	<b>51.7</b>	1640	51.7	1642	51.7
465.tonto	8	787	100	792	99.4	<b>788</b>	<b>99.9</b>	8	<b>679</b>	<b>116</b>	682	115	678	116
470.lbm	8	2279	48.2	2227	49.4	<b>2279</b>	<b>48.2</b>	8	2215	49.6	<b>2215</b>	<b>49.6</b>	2216	49.6
481.wrf	8	1026	87.1	<b>1025</b>	<b>87.2</b>	1020	87.6	8	964	92.7	959	93.2	<b>962</b>	<b>92.9</b>
482.sphinx3	8	1720	90.7	1709	91.2	<b>1710</b>	<b>91.2</b>	8	1621	96.2	<b>1610</b>	<b>96.9</b>	1605	97.1

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):

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: -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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