



# SPEC® CFP2006 Result

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## IBM Corporation

### SPECfp®\_rate2006 = 71.4

### IBM System x3655 (AMD Opteron 2344 HE)

### SPECfp\_rate\_base2006 = 64.4

CPU2006 license: 11

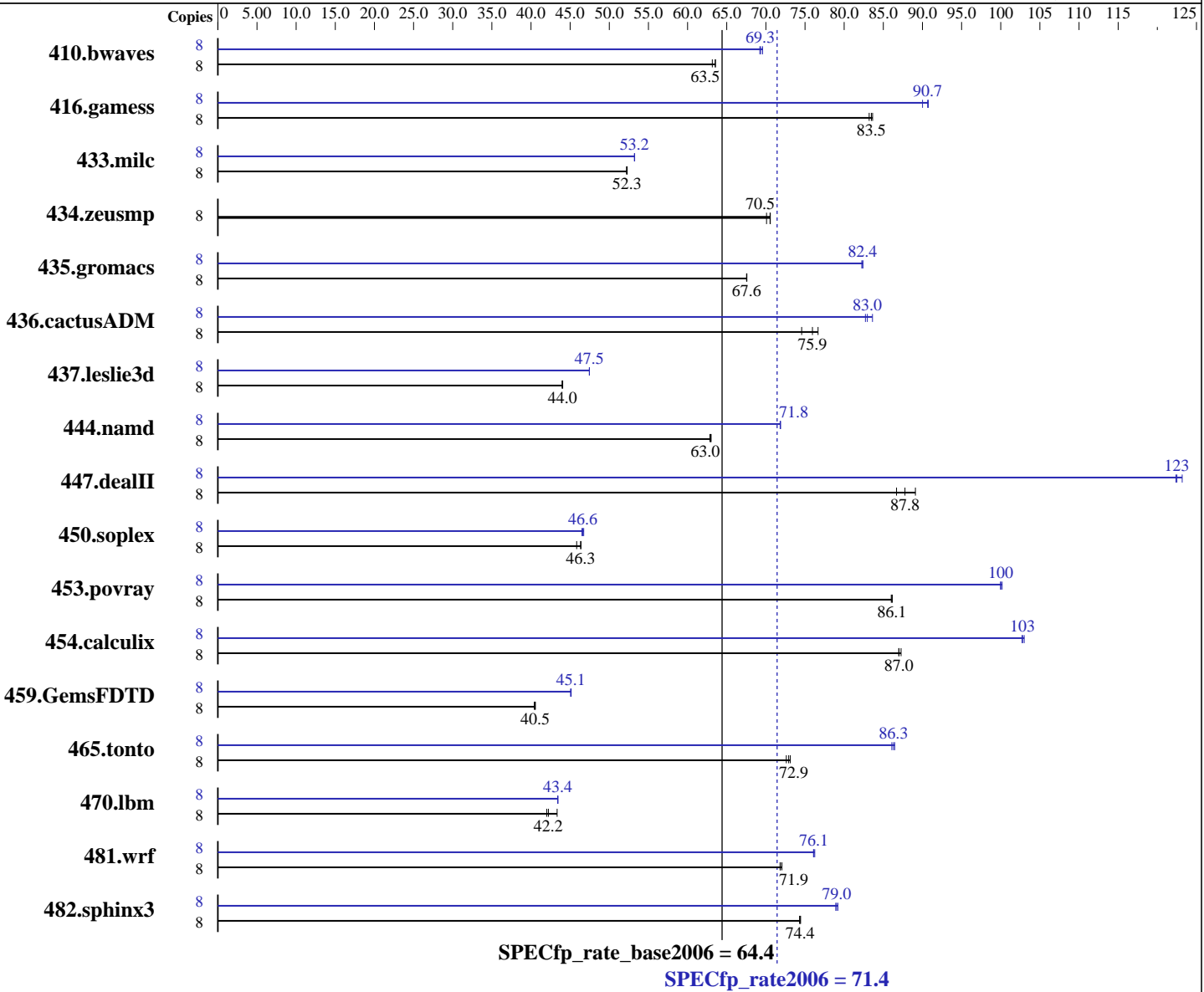
Test sponsor: IBM Corporation

Tested by: Advanced Micro Devices

Test date: Jun-2008

Hardware Availability: Aug-2008

Software Availability: Jun-2008



#### Hardware

CPU Name: AMD Opteron 2344 HE  
 CPU Characteristics:  
 CPU MHz: 1700  
 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	1721	63.2	<u>1711</u>	<u>63.5</u>	1711	63.6	8	1571	69.2	1562	69.6	<u>1568</u>	<u>69.3</u>
416.gamess	8	1873	83.6	1883	83.2	<u>1877</u>	<u>83.5</u>	8	1726	90.8	1740	90.0	<u>1728</u>	<u>90.7</u>
433.milc	8	1405	52.3	<u>1405</u>	<u>52.3</u>	1407	52.2	8	<u>1380</u>	<u>53.2</u>	1379	53.2	1380	53.2
434.zeusmp	8	1032	70.6	<u>1032</u>	<u>70.5</u>	1039	70.1	8	1032	70.6	<u>1032</u>	<u>70.5</u>	1039	70.1
435.gromacs	8	846	67.5	845	67.6	<u>846</u>	<u>67.6</u>	8	693	82.4	694	82.2	<u>694</u>	<u>82.4</u>
436.cactusADM	8	1282	74.6	1247	76.7	<u>1259</u>	<u>75.9</u>	8	1143	83.6	<u>1152</u>	<u>83.0</u>	1156	82.7
437.leslie3d	8	<u>1708</u>	<u>44.0</u>	1710	44.0	1707	44.1	8	1584	47.5	1585	47.4	<u>1584</u>	<u>47.5</u>
444.namd	8	1021	62.9	1019	63.0	<u>1019</u>	<u>63.0</u>	8	893	71.9	<u>893</u>	<u>71.8</u>	893	71.8
447.dealII	8	1027	89.1	<u>1043</u>	<u>87.8</u>	1056	86.7	8	748	122	<u>747</u>	<u>123</u>	743	123
450.soplex	8	1456	45.8	1438	46.4	<u>1440</u>	<u>46.3</u>	8	1435	46.5	1428	46.7	<u>1431</u>	<u>46.6</u>
453.povray	8	495	86.0	494	86.1	<u>494</u>	<u>86.1</u>	8	425	100	426	100	<u>426</u>	<u>100</u>
454.calculix	8	756	87.3	759	87.0	<u>759</u>	<u>87.0</u>	8	<u>642</u>	<u>103</u>	641	103	642	103
459.GemsFDTD	8	2100	40.4	<u>2095</u>	<u>40.5</u>	2093	40.6	8	1881	45.1	<u>1882</u>	<u>45.1</u>	1884	45.1
465.tonto	8	<u>1080</u>	<u>72.9</u>	1077	73.1	1084	72.6	8	<u>912</u>	<u>86.3</u>	911	86.5	914	86.1
470.lbm	8	2616	42.0	<u>2603</u>	<u>42.2</u>	2537	43.3	8	2531	43.4	<u>2531</u>	<u>43.4</u>	2532	43.4
481.wrf	8	1244	71.8	1240	72.1	<u>1244</u>	<u>71.9</u>	8	1175	76.1	1172	76.2	<u>1174</u>	<u>76.1</u>
482.sphinx3	8	2098	74.3	<u>2097</u>	<u>74.4</u>	2095	74.4	8	<u>1973</u>	<u>79.0</u>	1976	78.9	1969	79.2

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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Software Availability: Jun-2008

## 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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Tested with SPEC CPU2006 v1.0.  
Report generated on Tue Sep 13 11:34:18 2016 by SPEC CPU2006 PS/PDF formatter v6932.  
Originally published on 5 August 2008.