



# SPEC® CFP2006 Result

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## IBM Corporation

SPECfp®\_rate2006 = 94.7

### IBM BladeCenter LS22 (AMD Opteron 2356)

SPECfp\_rate\_base2006 = 86.3

CPU2006 license: 11

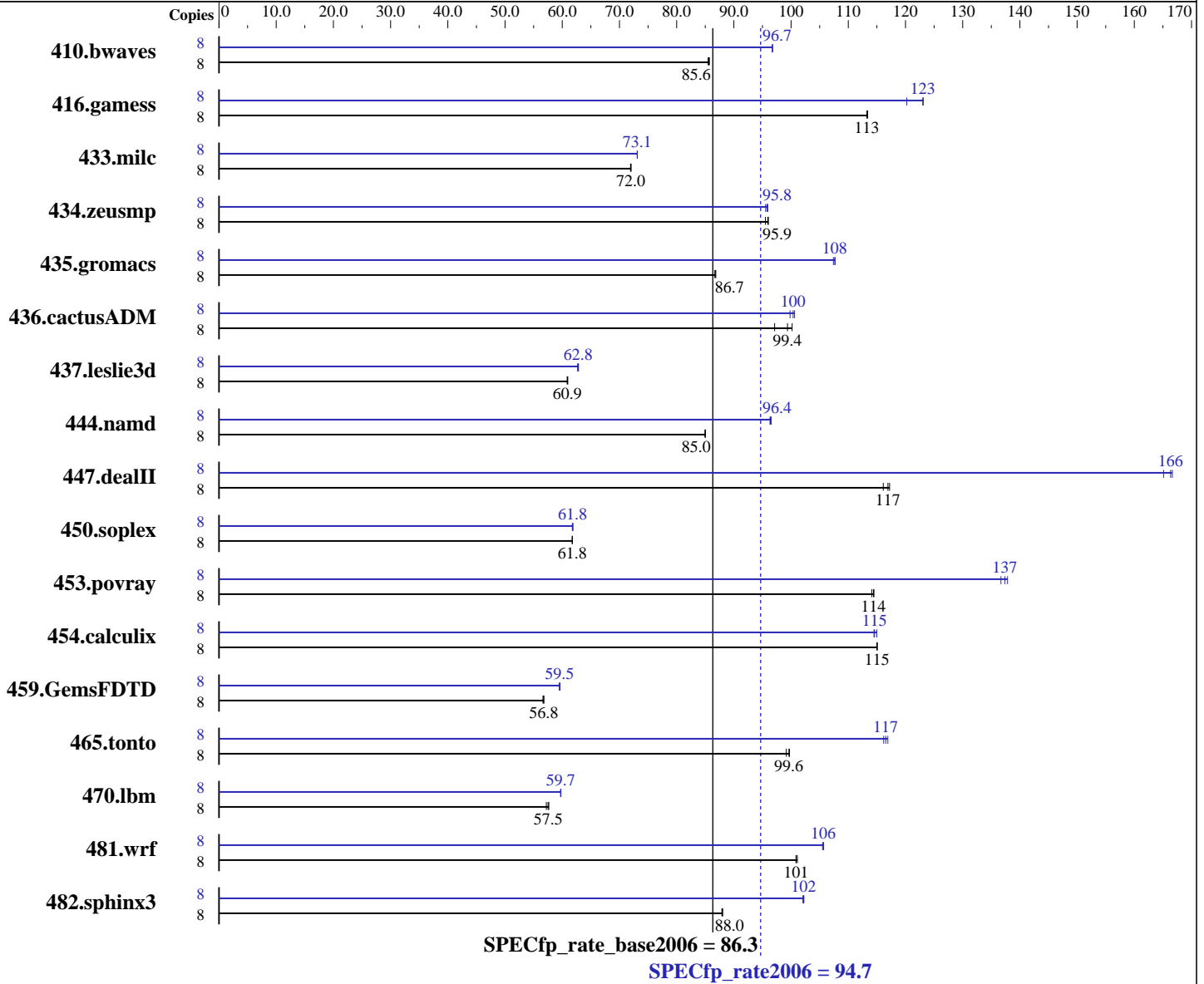
Test date: Jun-2008

Test sponsor: IBM Corporation

Hardware Availability: Sep-2008

Tested by: IBM Corporation

Software Availability: May-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 3.1  
 Auto Parallel: No  
 File System: ReiserFS  
 System State: Runlevel 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: 32 GB (8 x 4 GB DDR2-6400 ECC)  
Disk Subsystem: 1 x 73 GB SAS, 10000 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	1272	85.5	<b><u>1270</u></b>	<b><u>85.6</u></b>	1268	85.7	8	1124	96.7	<b><u>1124</u></b>	<b><u>96.7</u></b>	1124	96.8		
416.gamess	8	1381	113	1383	113	<b><u>1383</u></b>	<b><u>113</u></b>	8	<b><u>1273</u></b>	<b><u>123</u></b>	1272	123	1303	120		
433.milc	8	1020	72.0	<b><u>1020</u></b>	<b><u>72.0</u></b>	1021	71.9	8	<b><u>1004</u></b>	<b><u>73.1</u></b>	1004	73.1	1005	73.1		
434.zeusmp	8	758	96.0	<b><u>759</u></b>	<b><u>95.9</u></b>	762	95.5	8	<b><u>760</u></b>	<b><u>95.8</u></b>	762	95.5	759	95.9		
435.gromacs	8	659	86.7	658	86.8	<b><u>659</u></b>	<b><u>86.7</u></b>	8	<b><u>531</u></b>	<b><u>108</u></b>	530	108	532	107		
436.cactusADM	8	954	100	<b><u>962</u></b>	<b><u>99.4</u></b>	984	97.1	8	<b><u>953</u></b>	<b><u>100</u></b>	958	99.8	950	101		
437.leslie3d	8	<b><u>1235</u></b>	<b><u>60.9</u></b>	1233	61.0	1236	60.9	8	1197	62.8	<b><u>1198</u></b>	<b><u>62.8</u></b>	1200	62.7		
444.namd	8	<b><u>755</u></b>	<b><u>85.0</u></b>	755	85.0	755	85.0	8	666	96.3	665	96.5	<b><u>666</u></b>	<b><u>96.4</u></b>		
447.dealII	8	<b><u>783</u></b>	<b><u>117</u></b>	788	116	781	117	8	549	167	<b><u>550</u></b>	<b><u>166</u></b>	554	165		
450.soplex	8	1080	61.8	1081	61.7	<b><u>1080</u></b>	<b><u>61.8</u></b>	8	<b><u>1079</u></b>	<b><u>61.8</u></b>	1080	61.8	1078	61.9		
453.povray	8	<b><u>372</u></b>	<b><u>114</u></b>	372	114	373	114	8	309	138	<b><u>310</u></b>	<b><u>137</u></b>	311	137		
454.calculix	8	574	115	574	115	<b><u>574</u></b>	<b><u>115</u></b>	8	576	114	<b><u>576</u></b>	<b><u>115</u></b>	574	115		
459.GemsFDTD	8	<b><u>1496</u></b>	<b><u>56.8</u></b>	1499	56.6	1495	56.8	8	<b><u>1426</u></b>	<b><u>59.5</u></b>	1427	59.5	1424	59.6		
465.tonto	8	<b><u>790</u></b>	<b><u>99.6</u></b>	789	99.7	794	99.2	8	<b><u>675</u></b>	<b><u>117</u></b>	678	116	673	117		
470.lbm	8	1906	57.7	1921	57.2	<b><u>1911</u></b>	<b><u>57.5</u></b>	8	1839	59.8	<b><u>1840</u></b>	<b><u>59.7</u></b>	1840	59.7		
481.wrf	8	886	101	884	101	<b><u>886</u></b>	<b><u>101</u></b>	8	846	106	<b><u>846</u></b>	<b><u>106</u></b>	847	106		
482.sphinx3	8	1774	87.9	<b><u>1772</u></b>	<b><u>88.0</u></b>	1771	88.0	8	1528	102	1525	102	<b><u>1526</u></b>	<b><u>102</u></b>		

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 2457600' 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  
Processor Performance States Disabled in BIOS  
Memory ChipKill Disabled in BIOS



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## Base Compiler Invocation

C benchmarks:

pgcc

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:

-fast -Mipa=fast -Mipa=inline -Mfprelaxed -Msmartalloc=huge:150  
-tp barcelona-64 -Bstatic\_pgi

C++ benchmarks:

-fast -Mipa=fast -Mipa=inline -Mfprelaxed -Msmartalloc=huge:150  
--zc\_eh -tp barcelona-64 -Bstatic\_pgi

Fortran benchmarks:

-fast -Mipa=fast -Mipa=inline -Mfprelaxed -Msmartalloc=huge:150  
-tp barcelona-64 -Bstatic\_pgi

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## Base Optimization Flags (Continued)

Benchmarks using both Fortran and C:

-fast -Mipa=fast -Mipa=inline -Mfprelaxed -Msmartalloc=huge:150  
-tp barcelona-64 -Bstatic\_pgi

## Base Other Flags

C benchmarks:

-w -Mipa=jobs:4

C++ benchmarks:

-w -Mipa=jobs:4

Fortran benchmarks:

-w -Mipa=jobs:4

Benchmarks using both Fortran and C:

-w -Mipa=jobs:4

## Peak Compiler Invocation

C benchmarks (except as noted below):

pathcc

433.milc: pgcc

C++ benchmarks (except as noted below):

pathCC

444.namd: pgcpp

Fortran benchmarks (except as noted below):

pathf95

410.bwaves: pgf95

434.zeusmp: pgf95

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

pgcc pgf95

436.cactusADM: pathcc pathf95

481.wrf: pathcc pathf95



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## 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
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_LINUX -fno-second-underscore
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 -m3dnow

```

```

482.sphinx3: -march=barcelona -Ofast

```

C++ benchmarks:

```

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

```

```

447.dealIII: -march=barcelona -Ofast -static -INLINE:aggressive=on
-OPT:malloc_alg=1 -m32 -fno-exceptions

```

```

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

```

```

453.povray: -march=barcelona -fb_create fbdata(pass 1)
-fb_opt fbdata(pass 2) -Ofast -CG:load_exe=0

```

Fortran benchmarks:

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## Peak Optimization Flags (Continued)

410.bwaves: -Mphi(pass 1) -Mipa=fast(pass 2) -Mipa=inline(pass 2)  
-Mpfo(pass 2) -fastsse -Mfp relaxed -Msmartalloc  
-Mprefetch=distance:12 -Mprefetch=nta -tp barcelona-64  
-Bstatic\_pgi

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: -fastsse -Mfp relaxed -Msmartalloc=huge:150 -Mipa=fast  
-Mipa=inline -tp barcelona-64 -Bstatic\_pgi

437.leslie3d: -march=barcelona -Ofast -m3dnow -OPT:unroll\_size=256  
-CG:load\_exe=0 -OPT:malloc\_alg=1

459.GemsFDTD: -march=barcelona -Ofast -LNO:fission=2 -LNO:simd=2  
-OPT:malloc\_alg=1

465.tonto: -march=barcelona -Ofast -OPT:malloc\_alg=1  
-OPT:alias=no\_f90\_pointer\_alias -LNO:blocking=off  
-CG:load\_exe=1 -IPA:plimit=525

Benchmarks using both Fortran and C:

435.gromacs: -fast -Mfp approx=rsqrt -Mipa=fast -Mipa=inline -Mfp relaxed  
-Msmartalloc=huge:150 -tp barcelona-64 -Bstatic\_pgi

436.cactusADM: -march=barcelona -fb\_create fbdata(pass 1)  
-fb\_opt fbdata(pass 2) -Ofast -WOPT:aggstr=0

454.calculix: -fastsse -Mfp relaxed -Msmartalloc=huge:150 -Mipa=fast  
-Mipa=inline -tp barcelona-64 -Bstatic\_pgi

481.wrf: -march=barcelona -Ofast -LNO:blocking=off  
-LNO:prefetch\_ahead=10 -OPT:malloc\_alg=1 -m3dnow  
-LANG:copyinout=off -IPA:callee\_limit=5000

## Peak Other Flags

C benchmarks:

433.milc: -w -Mipa=jobs:4

C++ benchmarks:

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

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## Peak Other Flags (Continued)

Fortran benchmarks:

410.bwaves: -w -Mipa=jobs:4(pass 2)

434.zeusmp: -w -Mipa=jobs:4

Benchmarks using both Fortran and C:

435.gromacs: -w -Mipa=jobs:4

454.calculix: -w -Mipa=jobs:4

The flags file that was used to format this result can be browsed at

<http://www.spec.org/cpu2006/flags/amd123GH-flags.20090713.00.html>

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

<http://www.spec.org/cpu2006/flags/amd123GH-flags.20090713.00.xml>

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For other inquiries, please contact [webmaster@spec.org](mailto:webmaster@spec.org).

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