



# SPEC<sup>®</sup> CFP2006 Result

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## IBM Corporation

### SPECfp<sup>®</sup>\_rate2006 = 84.7

### IBM System x3455 (AMD Opteron 2352)

### SPECfp\_rate\_base2006 = 76.4

CPU2006 license: 11

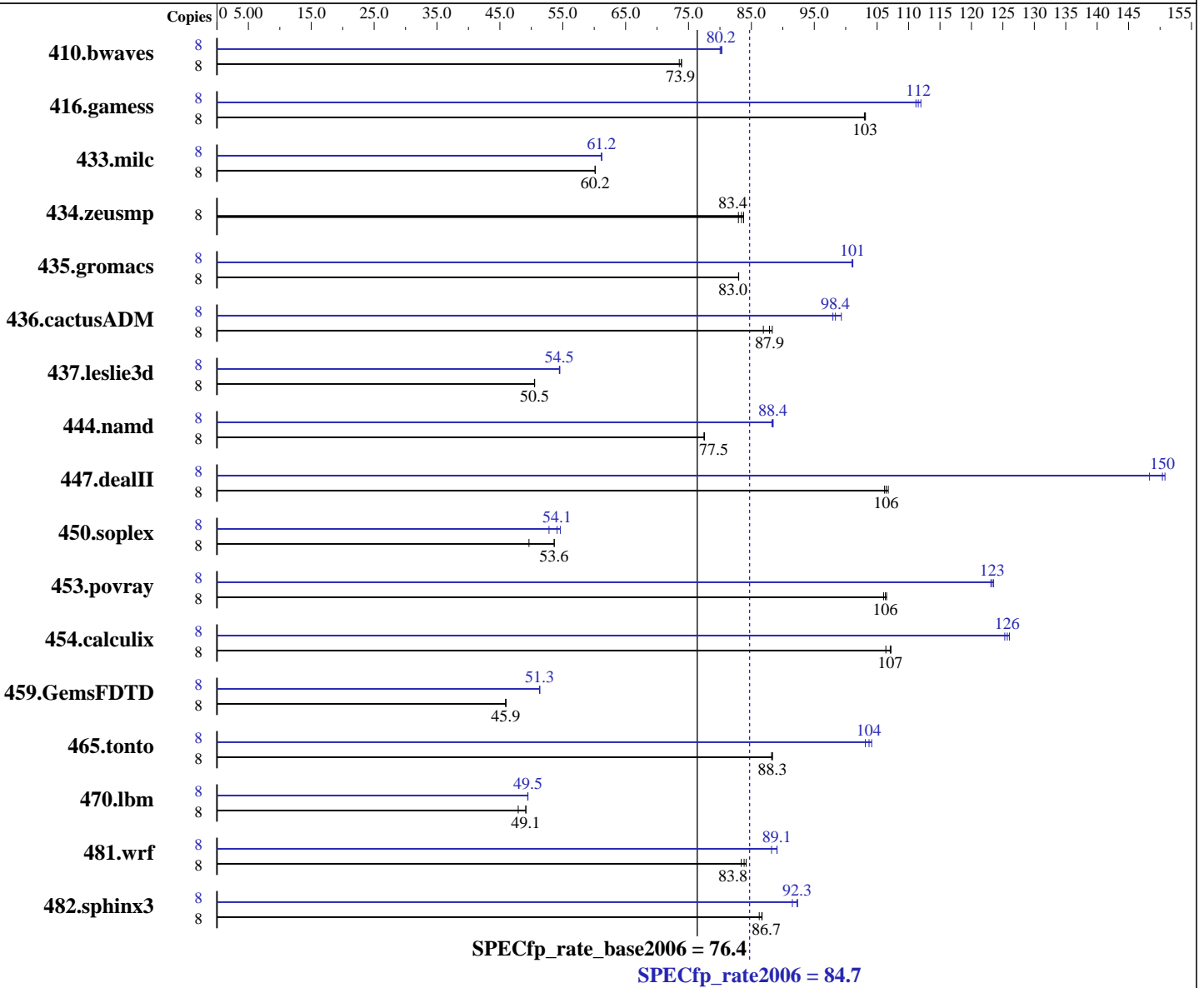
Test sponsor: IBM Corporation

Tested by: Advanced Micro Devices

Test date: Jun-2008

Hardware Availability: Jul-2008

Software Availability: Jun-2008



#### Hardware

CPU Name: AMD Opteron 2352  
 CPU Characteristics: 2100  
 CPU MHz: Integrated  
 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	1479	73.5	<b><u>1472</u></b>	<b><u>73.9</u></b>	1472	73.9	8	1354	80.3	<b><u>1356</u></b>	<b><u>80.2</u></b>	1358	80.0
416.gamess	8	<b><u>1520</u></b>	<b><u>103</u></b>	1519	103	1521	103	8	<b><u>1404</u></b>	<b><u>112</u></b>	1409	111	1399	112
433.milc	8	<b><u>1220</u></b>	<b><u>60.2</u></b>	1220	60.2	1222	60.1	8	1200	61.2	<b><u>1201</u></b>	<b><u>61.2</u></b>	1201	61.2
434.zeusmp	8	869	83.8	878	82.9	<b><u>872</u></b>	<b><u>83.4</u></b>	8	869	83.8	878	82.9	<b><u>872</u></b>	<b><u>83.4</u></b>
435.gromacs	8	<b><u>688</u></b>	<b><u>83.0</u></b>	689	83.0	688	83.0	8	<b><u>565</u></b>	<b><u>101</u></b>	566	101	565	101
436.cactusADM	8	1082	88.3	1100	86.9	<b><u>1088</u></b>	<b><u>87.9</u></b>	8	<b><u>972</u></b>	<b><u>98.4</u></b>	963	99.3	976	98.0
437.leslie3d	8	1488	50.5	1489	50.5	<b><u>1489</u></b>	<b><u>50.5</u></b>	8	<b><u>1380</u></b>	<b><u>54.5</u></b>	1379	54.5	1381	54.5
444.namd	8	828	77.5	<b><u>828</u></b>	<b><u>77.5</u></b>	827	77.6	8	727	88.3	725	88.5	<b><u>726</u></b>	<b><u>88.4</u></b>
447.dealII	8	857	107	862	106	<b><u>860</u></b>	<b><u>106</u></b>	8	617	148	<b><u>609</u></b>	<b><u>150</u></b>	607	151
450.soplex	8	1344	49.6	<b><u>1244</u></b>	<b><u>53.6</u></b>	1244	53.6	8	1263	52.8	<b><u>1233</u></b>	<b><u>54.1</u></b>	1221	54.6
453.povray	8	400	107	401	106	<b><u>400</u></b>	<b><u>106</u></b>	8	346	123	345	124	<b><u>345</u></b>	<b><u>123</u></b>
454.calculix	8	620	106	<b><u>616</u></b>	<b><u>107</u></b>	616	107	8	524	126	<b><u>525</u></b>	<b><u>126</u></b>	527	125
459.GemsFDTD	8	1849	45.9	1847	46.0	<b><u>1847</u></b>	<b><u>45.9</u></b>	8	<b><u>1654</u></b>	<b><u>51.3</u></b>	1654	51.3	1653	51.3
465.tonto	8	892	88.2	<b><u>891</u></b>	<b><u>88.3</u></b>	891	88.3	8	763	103	<b><u>759</u></b>	<b><u>104</u></b>	756	104
470.lbm	8	<b><u>2238</u></b>	<b><u>49.1</u></b>	2294	47.9	2236	49.2	8	2222	49.5	<b><u>2222</u></b>	<b><u>49.5</u></b>	2224	49.4
481.wrf	8	1062	84.2	1072	83.4	<b><u>1066</u></b>	<b><u>83.8</u></b>	8	1003	89.1	<b><u>1003</u></b>	<b><u>89.1</u></b>	1013	88.2
482.sphinx3	8	1808	86.2	<b><u>1799</u></b>	<b><u>86.7</u></b>	1798	86.7	8	1704	91.5	<b><u>1690</u></b>	<b><u>92.3</u></b>	1688	92.4

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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Test date: Jun-2008

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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 -Mfprefetch -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 -Mfprefetch -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 -Mfprefetch  
-tp barcelona-64 -Bstatic\_pgi

481.wrf: -fastsse -Mvect=noaltcode -Msmartalloc  
-Mprefetch=distance:8 -Mfprefetch -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.html>

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

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

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