



# SPEC® CFP2006 Result

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## IBM Corporation

**SPECfp®2006 = 14.7**

## IBM System x3655 (AMD Opteron 2356)

**SPECfp\_base2006 = 13.1**

CPU2006 license: 11

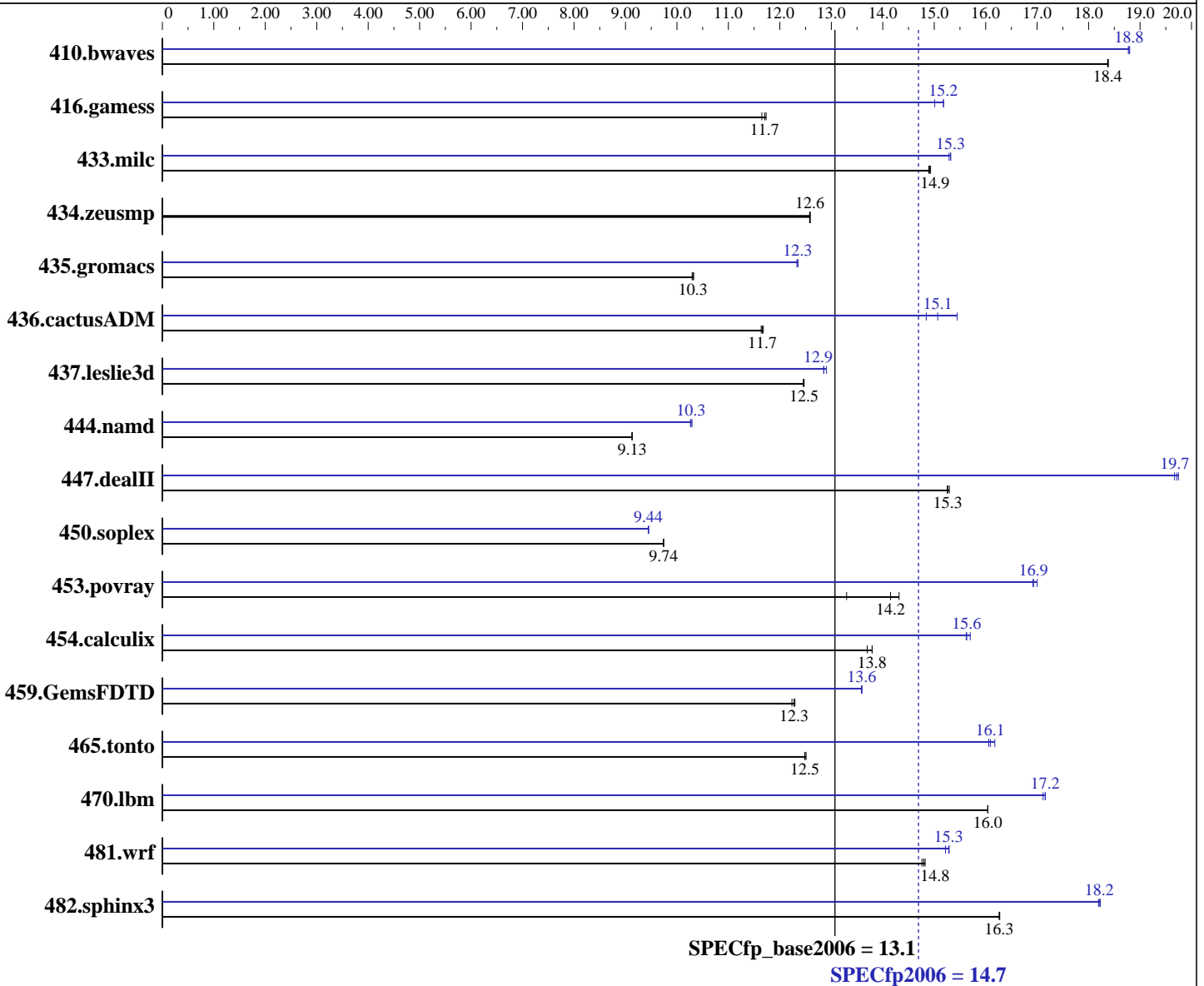
Test sponsor: IBM Corporation

Tested by: Advanced Micro Devices

Test date: Jun-2008

Hardware Availability: Jul-2008

Software Availability: Jun-2008



### Hardware

CPU Name: AMD Opteron 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: 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					
	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
410.bwaves	<b>740</b>	<b>18.4</b>	739	18.4	740	18.4	<b>723</b>	<b>18.8</b>	723	18.8	724	18.8
416.gamess	1681	11.6	1669	11.7	<b>1673</b>	<b>11.7</b>	1290	15.2	<b>1290</b>	<b>15.2</b>	1304	15.0
433.milc	615	14.9	616	14.9	<b>616</b>	<b>14.9</b>	<b>599</b>	<b>15.3</b>	599	15.3	600	15.3
434.zeusmp	723	12.6	723	12.6	<b>723</b>	<b>12.6</b>	723	12.6	723	12.6	<b>723</b>	<b>12.6</b>
435.gromacs	694	10.3	692	10.3	<b>692</b>	<b>10.3</b>	579	12.3	578	12.4	<b>578</b>	<b>12.3</b>
436.cactusADM	<b>1025</b>	<b>11.7</b>	1023	11.7	1027	11.6	<b>793</b>	<b>15.1</b>	774	15.4	805	14.8
437.leslie3d	<b>754</b>	<b>12.5</b>	755	12.5	754	12.5	728	12.9	731	12.9	<b>731</b>	<b>12.9</b>
444.namd	<b>878</b>	<b>9.13</b>	879	9.12	878	9.13	779	10.3	781	10.3	<b>781</b>	<b>10.3</b>
447.dealII	748	15.3	750	15.3	<b>749</b>	<b>15.3</b>	<b>580</b>	<b>19.7</b>	579	19.7	582	19.7
450.soplex	856	9.74	<b>856</b>	<b>9.74</b>	857	9.74	882	9.45	<b>883</b>	<b>9.44</b>	883	9.44
453.povray	400	13.3	<b>376</b>	<b>14.2</b>	372	14.3	314	16.9	<b>314</b>	<b>16.9</b>	313	17.0
454.calculix	602	13.7	598	13.8	<b>598</b>	<b>13.8</b>	525	15.7	528	15.6	<b>528</b>	<b>15.6</b>
459.GemsFDTD	867	12.2	<b>864</b>	<b>12.3</b>	863	12.3	<b>781</b>	<b>13.6</b>	781	13.6	780	13.6
465.tonto	788	12.5	<b>788</b>	<b>12.5</b>	787	12.5	608	16.2	613	16.1	<b>612</b>	<b>16.1</b>
470.lbm	856	16.0	<b>857</b>	<b>16.0</b>	857	16.0	803	17.1	<b>801</b>	<b>17.2</b>	801	17.2
481.wrf	754	14.8	757	14.8	<b>755</b>	<b>14.8</b>	731	15.3	<b>731</b>	<b>15.3</b>	734	15.2
482.sphinx3	<b>1198</b>	<b>16.3</b>	1199	16.3	1198	16.3	<b>1070</b>	<b>18.2</b>	1069	18.2	1071	18.2

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 896
'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=1792 in /etc/sysctl.conf
mount -t hugetlbfs nodev /mnt/hugepages
powersave -f was used to set the CPU frequency to its maximum.
```

## 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.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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<b>Tested by:</b> Advanced Micro Devices	<b>Software Availability:</b> Jun-2008

## 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 11:35:05 2016 by SPEC CPU2006 PS/PDF formatter v6932.  
Originally published on 5 August 2008.