



# SPEC<sup>®</sup> CFP2006 Result

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## Sun Microsystems Sun Fire X4140

SPECfp<sup>®</sup>\_rate2006 = 86.2

SPECfp\_rate\_base2006 = 78.7

CPU2006 license: 6

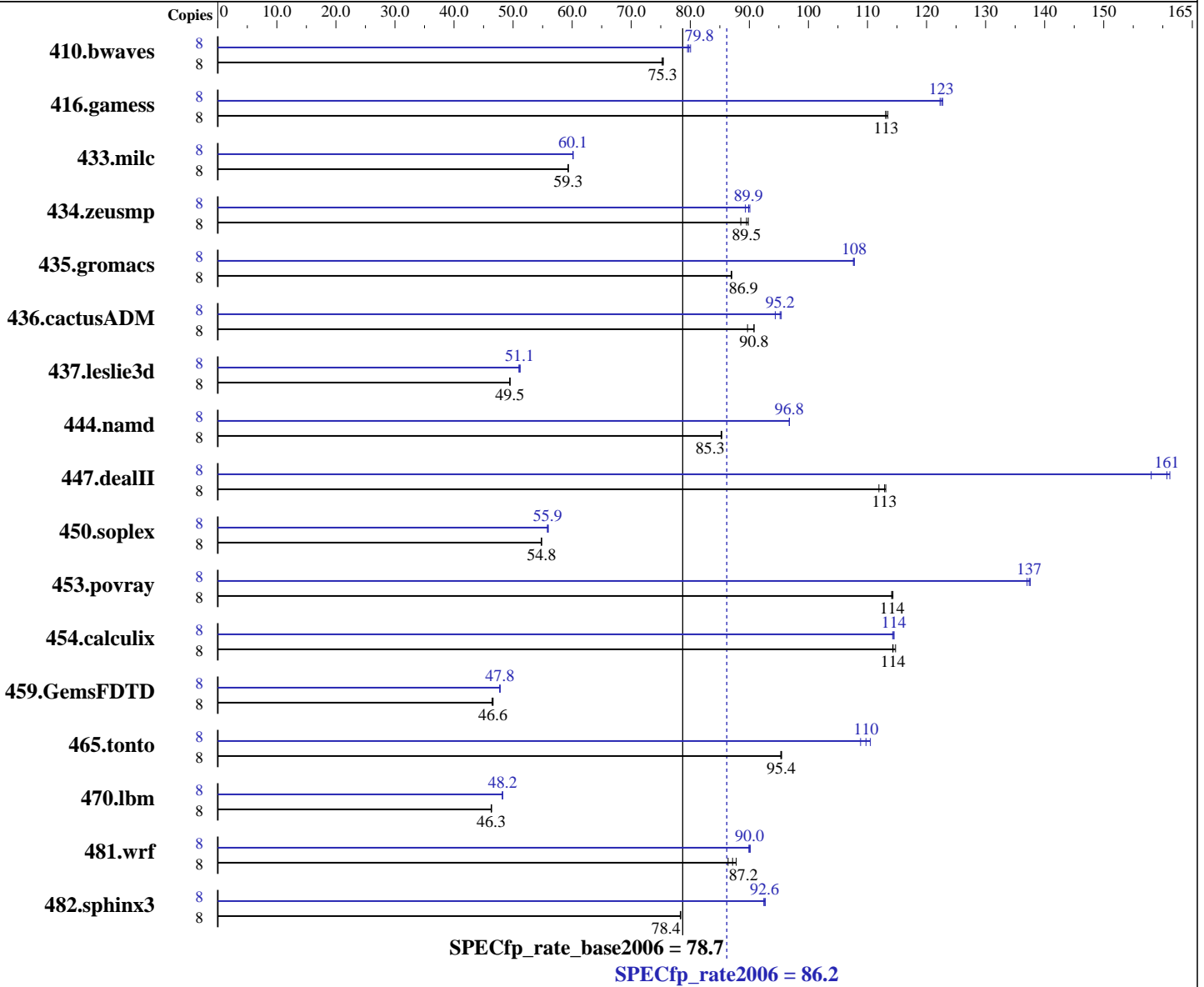
Test sponsor: Sun Microsystems

Tested by: Sun Microsystems

Test date: May-2008

Hardware Availability: May-2008

Software Availability: May-2008



### Hardware

CPU Name: AMD Opteron 2356  
 CPU Characteristics: 2300  
 CPU MHz: Integrated  
 FPU: 8 cores, 2 chips, 4 cores/chip  
 CPU(s) enabled: 1,2 chips  
 CPU(s) orderable: 64 KB I + 64 KB D on chip per core  
 Primary Cache: 512 KB I+D on chip per core  
 Secondary Cache:

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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: ext3  
 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 (8x4GB, DDR2-667, CL5, Reg, Dual Rank)  
Disk Subsystem: SAS, 72 GB, 10 K 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	1441	75.4	<b>1444</b>	<b>75.3</b>	1445	75.2	8	1358	80.0	<b>1363</b>	<b>79.8</b>	1367	79.5
416.gamess	8	<b>1384</b>	<b>113</b>	1385	113	1381	113	8	<b>1278</b>	<b>123</b>	1276	123	1281	122
433.milc	8	<b>1238</b>	<b>59.3</b>	1238	59.3	1238	59.3	8	<b>1221</b>	<b>60.1</b>	1221	60.2	1222	60.1
434.zeusmp	8	<b>813</b>	<b>89.5</b>	810	89.8	822	88.6	8	815	89.3	<b>810</b>	<b>89.9</b>	808	90.1
435.gromacs	8	<b>657</b>	<b>86.9</b>	656	87.0	657	86.9	8	530	108	531	108	<b>530</b>	<b>108</b>
436.cactusADM	8	1066	89.7	<b>1053</b>	<b>90.8</b>	1053	90.8	8	1013	94.4	<b>1004</b>	<b>95.2</b>	1002	95.4
437.leslie3d	8	1520	49.5	1521	49.4	<b>1520</b>	<b>49.5</b>	8	1469	51.2	<b>1472</b>	<b>51.1</b>	1475	51.0
444.namd	8	<b>752</b>	<b>85.3</b>	753	85.2	752	85.3	8	663	96.8	663	96.7	<b>663</b>	<b>96.8</b>
447.dealII	8	809	113	<b>811</b>	<b>113</b>	818	112	8	<b>570</b>	<b>161</b>	568	161	579	158
450.soplex	8	1217	54.8	1218	54.8	<b>1217</b>	<b>54.8</b>	8	1192	56.0	<b>1194</b>	<b>55.9</b>	1196	55.8
453.povray	8	373	114	372	114	<b>373</b>	<b>114</b>	8	<b>310</b>	<b>137</b>	311	137	309	138
454.calculix	8	578	114	<b>577</b>	<b>114</b>	575	115	8	576	114	578	114	<b>577</b>	<b>114</b>
459.GemsFDTD	8	1821	46.6	<b>1822</b>	<b>46.6</b>	1828	46.4	8	1775	47.8	<b>1777</b>	<b>47.8</b>	1778	47.7
465.tonto	8	<b>825</b>	<b>95.4</b>	825	95.5	826	95.3	8	712	110	<b>717</b>	<b>110</b>	723	109
470.lbm	8	2371	46.4	<b>2374</b>	<b>46.3</b>	2375	46.3	8	2279	48.2	<b>2280</b>	<b>48.2</b>	2282	48.2
481.wrf	8	<b>1025</b>	<b>87.2</b>	1018	87.8	1034	86.4	8	<b>992</b>	<b>90.0</b>	994	89.9	991	90.2
482.sphinx3	8	1991	78.3	1990	78.4	<b>1990</b>	<b>78.4</b>	8	1682	92.7	1687	92.4	<b>1684</b>	<b>92.6</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
Environment variable PGI_HUGE_PAGES set to 150
'ulimit -s unlimited' was used to set environment stack size
'ulimit -l 2457600' was used to set environment locked pages in memory quantity
Set vm/nr_hugepages=1200 in /etc/sysctl.conf
mount -t hugetlbfs nodev /mnt/hugepages
```

## Platform Notes

Default BIOS settings were used.



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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=jobs:4 -Mipa=fast -Mipa=inline -Mfprelaxed  
 -Msmartalloc=huge:150 -tp barcelona-64 -Bstatic\_pgi

C++ benchmarks:  
 -fast -Mipa=jobs:4 -Mipa=fast -Mipa=inline -Mfprelaxed  
 -Msmartalloc=huge:150 --zc\_eh -tp barcelona-64 -Bstatic\_pgi

Fortran benchmarks:  
 -fast -Mipa=jobs:4 -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=jobs:4 -Mipa=fast -Mipa=inline -Mfprelaxed  
-Msmartalloc=huge:150 -tp barcelona-64 -Bstatic\_pgi

## Base Other Flags

C benchmarks:  
-w  
C++ benchmarks:  
-w  
Fortran benchmarks:  
-w  
Benchmarks using both Fortran and C:  
-w

## 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=jobs:4 -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=jobs:4(pass 2) -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.deaIII: -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: -Mpfi(pass 1) -Mipa=jobs:4(pass 2) -Mipa=fast(pass 2)  
-Mipa=inline(pass 2) -Mpfo(pass 2) -fastsse -Mfprelaxed  
-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 -Mfprelaxed -Msmartalloc=huge:150 -Mipa=jobs:4  
-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 -Mfpapprox=rsqrt -Mipa=jobs:4 -Mipa=fast  
-Mipa=inline -Mfprelaxed -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 -Mfprelaxed -Msmartalloc=huge:150 -Mipa=jobs:4  
-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

C++ benchmarks:

444.namd: -w

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## Peak Other Flags (Continued)

Fortran benchmarks:

410.bwaves: -w

434.zeusmp: -w

Benchmarks using both Fortran and C:

435.gromacs: -w

454.calculix: -w

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

<http://www.spec.org/cpu2006/flags/amd123GH-flags.20090713.html>

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

<http://www.spec.org/cpu2006/flags/amd123GH-flags.20090713.xml>

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

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