SPEC® CFP2006 Result
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Sun Microsystems
Sun Fire X4440

$SPECfp^®\_rate2006 =$ 151
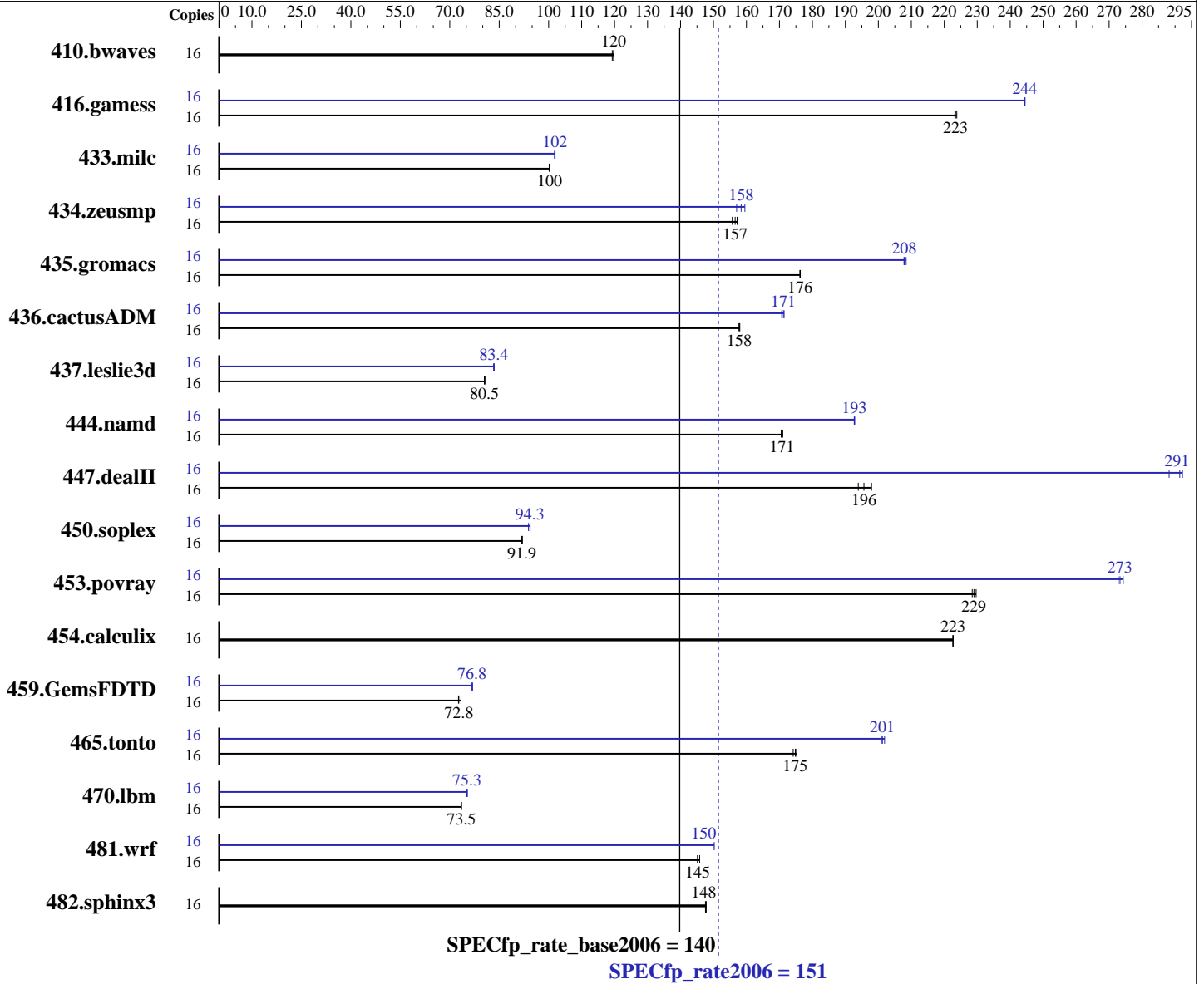
$SPECfp\_rate\_base2006 =$ 140

CPU2006 license: 6　　　　　　　　　　　　　　　　　　　　**Test date:** May-2008
Test sponsor: Sun Microsystems　　　　　　　　　　　**Hardware Availability:** May-2008
Tested by: Sun Microsystems　　　　　　　　　　　　**Software Availability:** May-2008

Benchmark	Copies	Base	Peak
410.bwaves	16	120	
416.gamess	16	223	244
433.milc	16	100	102
434.zeusmp	16	157	158
435.gromacs	16	176	208
436.cactusADM	16	158	171
437.leslie3d	16	80.5	83.4
444.namd	16	171	193
447.dealII	16	196	291
450.soplex	16	91.9	94.3
453.povray	16	229	273
454.calculix	16	223	
459.GemsFDTD	16	72.8	76.8
465.tonto	16	175	201
470.lbm	16	73.5	75.3
481.wrf	16	145	150
482.sphinx3	16	148	

SPECfp_rate_base2006 = 140

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Hardware
CPU Name: AMD Opteron 8356
CPU Characteristics:
CPU MHz: 2300
FPU: Integrated
CPU(s) enabled: 16 cores, 4 chips, 4 cores/chip
CPU(s) orderable: 2,4 chips
Primary Cache: 64 KB I + 64 KB D on chip per core
Secondary Cache: 512 KB I+D on chip per core

Continued on next page

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: Multi-user, run level 3
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:	64 GB (16x4GB, 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	16	1816	120	1823	119	**1816**	**120**	16	1816	120	1823	119	**1816**	**120**
416.gamess	16	1400	224	**1402**	**223**	1403	223	16	1281	245	1282	244	**1282**	**244**
433.milc	16	**1464**	**100**	1464	100	1467	100	16	**1442**	**102**	1443	102	1441	102
434.zeusmp	16	926	157	**930**	**157**	935	156	16	**919**	**158**	913	160	927	157
435.gromacs	16	648	176	648	176	**648**	**176**	16	548	208	550	208	**550**	**208**
436.cactusADM	16	**1211**	**158**	1212	158	1210	158	16	**1117**	**171**	1115	171	1120	171
437.leslie3d	16	**1868**	**80.5**	1864	80.7	1868	80.5	16	1802	83.5	**1803**	**83.4**	1805	83.3
444.namd	16	752	171	750	171	**751**	**171**	16	**666**	**193**	666	193	665	193
447.dealII	16	**936**	**196**	925	198	944	194	16	626	292	**628**	**291**	635	288
450.soplex	16	1450	92.0	**1452**	**91.9**	1452	91.9	16	**1415**	**94.3**	1414	94.4	1421	93.9
453.povray	16	**372**	**229**	371	230	373	228	16	**311**	**273**	312	273	310	274
454.calculix	16	593	223	**593**	**223**	593	223	16	593	223	**593**	**223**	593	223
459.GemsFDTD	16	2312	73.4	2337	72.6	**2333**	**72.8**	16	2211	76.8	**2211**	**76.8**	2207	76.9
465.tonto	16	904	174	899	175	**901**	**175**	16	780	202	**782**	**201**	783	201
470.lbm	16	2994	73.4	2989	73.5	**2990**	**73.5**	16	2918	75.3	**2921**	**75.3**	2923	75.2
481.wrf	16	1231	145	**1230**	**145**	1226	146	16	1190	150	1192	150	**1192**	**150**
482.sphinx3	16	2113	148	2110	148	**2111**	**148**	16	2113	148	2110	148	**2111**	**148**

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 4915200' was used to set environment locked pages in memory quantity
Set vm/nr_hugepages=14336 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):
```
pgcc
```

470.lbm: `pathcc`

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: basepeak = yes

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.dealII: -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: basepeak = yes

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: basepeak = yes

    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 (except as noted below):
```
-w
```
```
470.lbm: No flags used
```

C++ benchmarks:
```
444.namd: -w
```

Fortran benchmarks:

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Peak Other Flags (Continued)

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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