# SPEC® CFP2006 Result

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## Dell Inc.

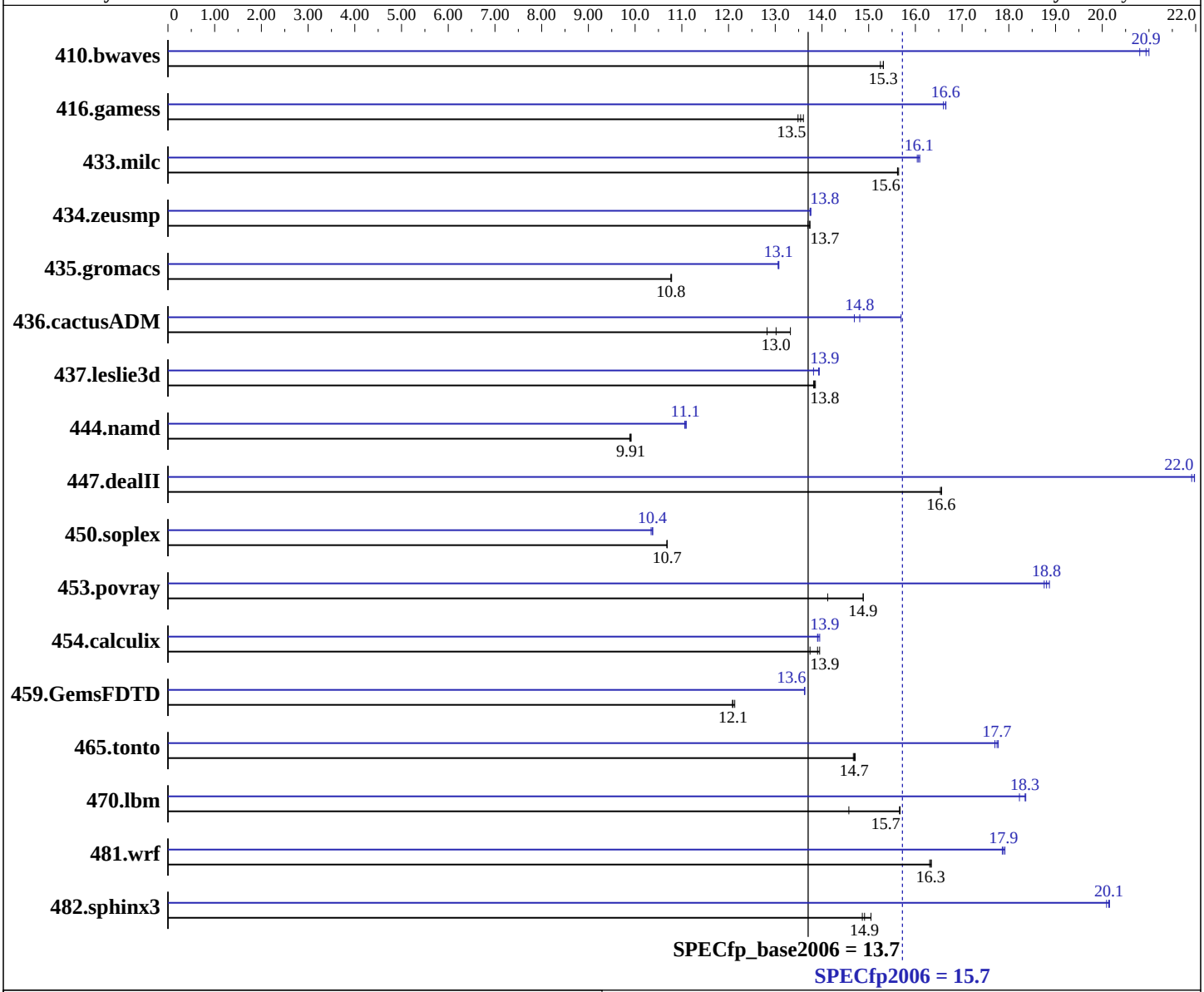
PowerEdge M805 (AMD Opteron 2360 SE, 2.5 GHz)

SPECfp®2006 = 15.7

SPECfp_base2006 = 13.7

**CPU2006 license:** 55
**Test sponsor:** Dell Inc.
**Tested by:** Dell Inc.

**Test date:** Aug-2008
**Hardware Availability:** Aug-2008
**Software Availability:** May-2008




## Hardware

| | |
|---|---|
| CPU Name: | AMD Opteron 2360 SE |
| CPU Characteristics: | |
| CPU MHz: | 2500 |
| FPU: | Integrated |
| CPU(s) enabled: | 8 cores, 2 chips, 4 cores/chip |
| CPU(s) orderable: | 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) SP2, Kernel 2.6.16-60.0.21-smp |
| Compiler: | PGI Server Complete Version 7.2<br>PathScale Compiler Suite Version 3.1 |
| Auto Parallel: | No |
| File System: | ReiserFS |
| System State: | Run level 3 (multi-user) |
| 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 36 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 | **888** | **15.3** | 891 | 15.3 | 887 | 15.3 | **649** | **20.9** | 653 | 20.8 | 647 | 21.0 |
| 416.gamess | 1439 | 13.6 | **1446** | **13.5** | 1452 | 13.5 | 1176 | 16.7 | **1176** | **16.6** | 1180 | 16.6 |
| 433.milc | 587 | 15.6 | **588** | **15.6** | 588 | 15.6 | 572 | 16.0 | 570 | 16.1 | **571** | **16.1** |
| 434.zeusmp | 664 | 13.7 | 662 | 13.7 | **663** | **13.7** | 661 | 13.8 | 662 | 13.7 | **662** | **13.8** |
| 435.gromacs | 663 | 10.8 | 662 | 10.8 | **663** | **10.8** | **546** | **13.1** | 546 | 13.1 | 547 | 13.1 |
| 436.cactusADM | 932 | 12.8 | **918** | **13.0** | 897 | 13.3 | **807** | **14.8** | 761 | 15.7 | 813 | 14.7 |
| 437.leslie3d | 678 | 13.9 | 680 | 13.8 | **679** | **13.8** | **675** | **13.9** | 680 | 13.8 | 674 | 13.9 |
| 444.namd | 809 | 9.91 | 811 | 9.89 | **809** | **9.91** | 725 | 11.1 | 723 | 11.1 | **724** | **11.1** |
| 447.dealII | **691** | **16.6** | 691 | 16.6 | 692 | 16.5 | 521 | 22.0 | **521** | **22.0** | 522 | 21.9 |
| 450.soplex | 781 | 10.7 | 780 | 10.7 | **781** | **10.7** | 806 | 10.3 | 804 | 10.4 | **804** | **10.4** |
| 453.povray | **357** | **14.9** | 377 | 14.1 | 357 | 14.9 | **283** | **18.8** | 282 | 18.9 | 284 | 18.8 |
| 454.calculix | **593** | **13.9** | 591 | 14.0 | 600 | 13.7 | 591 | 14.0 | **593** | **13.9** | 593 | 13.9 |
| 459.GemsFDTD | 874 | 12.1 | **877** | **12.1** | 878 | 12.1 | **779** | **13.6** | 778 | 13.6 | 779 | 13.6 |
| 465.tonto | 671 | 14.7 | **670** | **14.7** | 669 | 14.7 | 556 | 17.7 | **554** | **17.7** | 554 | 17.8 |
| 470.lbm | **877** | **15.7** | 943 | 14.6 | 877 | 15.7 | 754 | 18.2 | **749** | **18.3** | 748 | 18.4 |
| 481.wrf | 684 | 16.3 | **684** | **16.3** | 685 | 16.3 | **625** | **17.9** | 623 | 17.9 | 625 | 17.9 |
| 482.sphinx3 | 1295 | 15.0 | **1307** | **14.9** | 1311 | 14.9 | **968** | **20.1** | 967 | 20.2 | 970 | 20.1 |

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
```

## 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:
-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

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`

## 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_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.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:

410.bwaves: -Mpfi(pass 1) -Mipa=fast(pass 2) -Mipa=inline(pass 2)
-Mpfo(pass 2) -fastsse -Mfprelaxed -Msmartalloc
-Mprefetch=distance:12 -Mprefetch=nta -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: `-fastsse -Mfprelaxed -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 -Mfpapprox=rsqrt -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=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)

Fortran benchmarks:

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

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

Continued on next page

## Peak Other Flags (Continued)

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.20090713.01.html`

You can also download the XML flags source by saving the following link:
`http://www.spec.org/cpu2006/flags/amd123GH-flags.20090713.01.xml`


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