# SPEC® CFP2006 Result

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## Dell Inc.

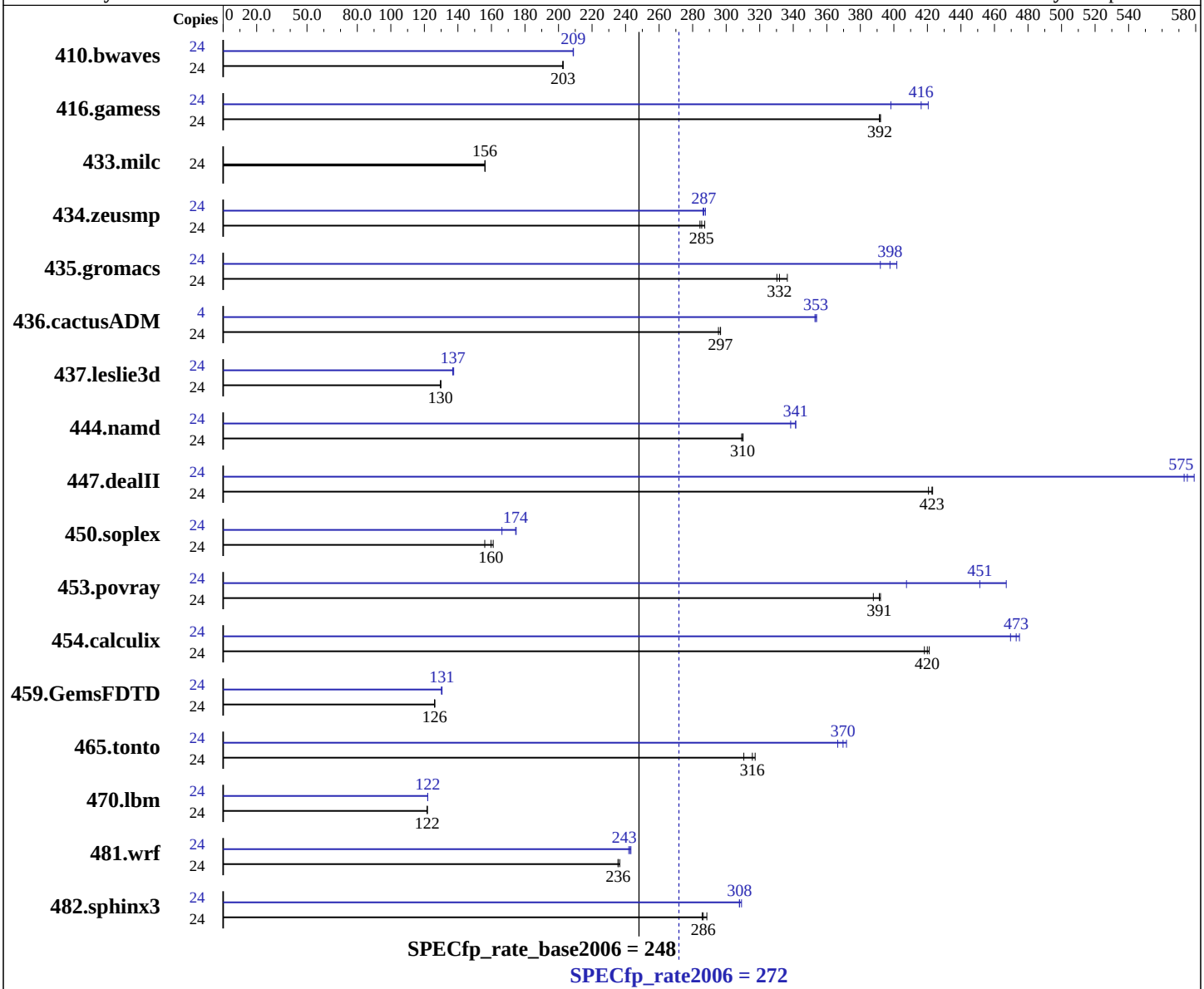
PowerEdge M905 (AMD Opteron 8435, 2.60 GHz)

SPECfp®_rate2006 = 272

SPECfp_rate_base2006 = 248

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

**Test date:** Jun-2009
**Hardware Availability:** Jul-2009
**Software Availability:** Apr-2009




### Hardware

| | |
|---|---|
| CPU Name: | AMD Opteron 8435 |
| CPU Characteristics: | |
| CPU MHz: | 2600 |
| FPU: | Integrated |
| CPU(s) enabled: | 24 cores, 4 chips, 6 cores/chip |
| CPU(s) orderable: | 4 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: | Red Hat Enterprise Linux Server release 5.3, Kernel 2.6.18-128.el5 |
| Compiler: | PGI Server Complete Version 8.0<br>x86 Open64 4.2.2 Compiler Suite (from AMD) |
| Auto Parallel: | Yes |
| 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: 6 MB I+D on chip per chip
Other Cache: None
Memory: 64 GB (16 x 4 GB DDR2-800)
Disk Subsystem: 1 x 73 GB 15000 RPM SAS
Other Hardware: None

Other Software: binutils 2.18

## Results Table

| Benchmark | Base | | | | | | | Peak | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Copies | Seconds | Ratio | Seconds | Ratio | Seconds | Ratio | Copies | Seconds | Ratio | Seconds | Ratio | Seconds | Ratio |
| 410.bwaves | 24 | 1610 | 203 | **1609** | **203** | 1609 | 203 | 24 | 1561 | 209 | 1563 | 209 | **1561** | **209** |
| 416.gamess | 24 | 1201 | 391 | **1200** | **392** | 1199 | 392 | 24 | 1118 | 421 | **1129** | **416** | 1180 | 398 |
| 433.milc | 24 | 1411 | 156 | 1411 | 156 | **1411** | **156** | 24 | 1411 | 156 | 1411 | 156 | **1411** | **156** |
| 434.zeusmp | 24 | 760 | 287 | **765** | **285** | 768 | 284 | 24 | 759 | 288 | **762** | **287** | 763 | 286 |
| 435.gromacs | 24 | **517** | **332** | 519 | 330 | 509 | 336 | 24 | **431** | **398** | 437 | 392 | 427 | 402 |
| 436.cactusADM | 24 | 971 | 295 | **967** | **297** | 967 | 297 | 4 | 135 | 354 | **135** | **353** | 135 | 353 |
| 437.leslie3d | 24 | 1738 | 130 | 1740 | 130 | **1740** | **130** | 24 | 1641 | 138 | **1646** | **137** | 1648 | 137 |
| 444.namd | 24 | **621** | **310** | 621 | 310 | 622 | 309 | 24 | 569 | 338 | 564 | 342 | **564** | **341** |
| 447.dealII | 24 | 653 | 421 | **650** | **423** | 649 | 423 | 24 | **477** | **575** | 474 | 579 | 479 | 573 |
| 450.soplex | 24 | 1283 | 156 | **1253** | **160** | 1243 | 161 | 24 | 1204 | 166 | **1147** | **174** | 1145 | 175 |
| 453.povray | 24 | 329 | 388 | **326** | **391** | 326 | 392 | 24 | 313 | 408 | 273 | 467 | **283** | **451** |
| 454.calculix | 24 | **471** | **420** | 470 | 421 | 473 | 418 | 24 | 422 | 470 | 417 | 475 | **419** | **473** |
| 459.GemsFDTD | 24 | 2021 | 126 | 2018 | 126 | **2018** | **126** | 24 | **1951** | **131** | 1951 | 131 | 1957 | 130 |
| 465.tonto | 24 | **748** | **316** | 761 | 311 | 744 | 317 | 24 | 644 | 367 | **639** | **370** | 635 | 372 |
| 470.lbm | 24 | **2709** | **122** | 2709 | 122 | 2710 | 122 | 24 | 2703 | 122 | 2702 | 122 | **2703** | **122** |
| 481.wrf | 24 | 1138 | 235 | 1133 | 237 | **1138** | **236** | 24 | **1105** | **243** | 1108 | 242 | 1102 | 243 |
| 482.sphinx3 | 24 | 1622 | 288 | **1634** | **286** | 1637 | 286 | 24 | 1519 | 308 | 1513 | 309 | **1519** | **308** |

Results appear in the order in which they were run. Bold underlined text indicates a median measurement.

## Submit Notes

```
The config file option 'submit' was used.
'numactl' was used to bind copies to the cores.
See the configuration file for details.
```

## Operating System Notes

```
'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=10800 in /etc/sysctl.conf
mount -t hugetlbfs nodev /mnt/hugepages
```

## Platform Notes

```
HyperTransport Technology = HT 1 (Default = HT 3)
```

## General Notes

```
Environment variables set by runspec before the start of the run:
HUGETLB_LIMIT = "450"
LD_LIBRARY_PATH = "/root/cpu2006-1.1/amd0905is-libs/64:/root/cpu2006-1.1/amd0905is-libs/32"
NCPUS = "6"
PGI_HUGE_PAGES = "450"

The x86 Open64 Compiler Suite is only available from (and supported by) AMD at
http://developer.amd.com/cpu/open64
```

# 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:
```
-fastsse -Msmartalloc=huge -Mfprelaxed -Mipa=fast -Mipa=inline
-tp shanghai-64 -Bstatic_pgi
```

C++ benchmarks:
```
-fastsse -Msmartalloc=huge -Mfprelaxed --zc_eh -Mipa=fast
-Mipa=inline -tp shanghai-64 -Bstatic_pgi
```

Fortran benchmarks:
```
-fastsse -Msmartalloc=huge -Mfprelaxed -Mvect=short -Mipa=fast
-Mipa=inline -tp shanghai-64 -Bstatic_pgi
```

Benchmarks using both Fortran and C:
```
-fastsse -Msmartalloc=huge -Mfprelaxed -Mipa=fast -Mipa=inline
-tp shanghai-64 -Mvect=short -Bstatic_pgi
```

## 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:
```
pgcc
```

C++ benchmarks (except as noted below):
```
openCC
```

444.namd: `pgcpp`

Fortran benchmarks (except as noted below):
```
openf95
```

410.bwaves: `pgf95`

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## Peak Compiler Invocation (Continued)

434.zeusmp: pgf95

437.leslie3d: pgf95

Benchmarks using both Fortran and C (except as noted below):
pgcc pgf95

435.gromacs: opencc openf95

## 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
436.cactusADM: -DSPEC_CPU_LP64 -Mnomain
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: basepeak = yes

470.lbm: -fastsse -Msmartalloc=huge -Mprefetch=t0 -Mloop32
-Mfprelaxed -Mipa=fast -Mipa=inline -tp shanghai-64
-Bstatic_pgi

482.sphinx3: -Mpfi=indirect(pass 1) -Mpfo=indirect(pass 2)
-Mipa=fast(pass 2) -Mipa=inline(pass 2) -fastsse
-Mfprelaxed -Msmartalloc -tp shanghai-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 -Mnodepchk -Mfprelaxed --zc_eh
-tp shanghai-64 -Bstatic_pgi

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## Peak Optimization Flags (Continued)

447.dealII: -march=barcelona -Ofast -static -INLINE:aggressive=on
-LNO:opt=0 -Wf,-fno-exceptions -m32 -OPT:unroll_times_max=8
-OPT:unroll_size=256 -OPT:unroll_level=2 -HP:bdt=2m:heap=2m
-GRA:unspill=on -CG:cmp_peep=on -TENV:frame_pointer=off

450.soplex: -march=barcelona -fb_create fbdata(pass 1)
-fb_opt fbdata(pass 2) -O3 -INLINE:aggressive=on
-OPT:IEEE_arith=3 -OPT:IEEE_NaN_Inf=off
-OPT:fold_unsigned_relops=on -OPT:malloc_alg=1
-CG:load_exe=0 -fno-exceptions -m32 -HP:bdt=2m

453.povray: -march=barcelona -fb_create fbdata(pass 1)
-fb_opt fbdata(pass 2) -Ofast -INLINE:aggressive=on
-HP:bdt=2m:heap=2m

Fortran benchmarks:

410.bwaves: -fastsse -Msmartalloc -Mprefetch=nta -Mfprelaxed
-Mipa=fast -Mipa=inline -tp shanghai-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 -HP:bdt=2m:heap=2m

434.zeusmp: -fastsse -Mfprelaxed -Mprefetch=distance:8 -Mprefetch=t0
-Msmartalloc=huge -Msmartalloc=hugebss -Mipa=fast
-Mipa=inline -tp shanghai-64 -Bstatic_pgi

437.leslie3d: -Mpfi=indirect(pass 1) -Mpfo=indirect(pass 2)
-Mipa=fast(pass 2) -Mipa=inline(pass 2) -fastsse
-Mvect=fuse -Msmartalloc=huge -Mprefetch=distance:8
-Mprefetch=t0 -Mfprelaxed -tp shanghai-64 -Bstatic_pgi

459.GemsFDTD: -march=barcelona -Ofast -LNO:fission=2 -LNO:simd=2
-LNO:prefetch_ahead=1 -CG:load_exe=0 -HP

465.tonto: -march=barcelona -Ofast -OPT:alias=no_f90_pointer_alias
-LNO:blocking=off -CG:load_exe=1 -IPA:plimit=525 -HP

Benchmarks using both Fortran and C:

435.gromacs: -march=barcelona -Ofast -OPT:rsqrt=2 -HP:bdt=2m:heap=2m

436.cactusADM: -fastsse -Mconcur -Msmartalloc=huge -Mfprelaxed -Mipa=fast
-Mipa=inline -tp shanghai-64 -Bstatic_pgi

454.calculix: -Mpfi=indirect(pass 1) -Mpfo=indirect(pass 2)
-Mipa=fast(pass 2) -Mipa=inline(pass 2) -fastsse
-Mvect=short -Msmartalloc=huge -Mprefetch=t0 -Mpre

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## Peak Optimization Flags (Continued)

454.calculix (continued):
`-Mfprelaxed -tp shanghai-64 -Bstatic_pgi`

481.wrf: `-fastsse -Mvect=noaltcode -Msmartalloc=huge -Mprefetch=distance:8 -Mfprelaxed -tp shanghai-64 -Bstatic_pgi`

## Peak Other Flags

C benchmarks:
`-Mipa=jobs:4`(pass 2)

C++ benchmarks:

444.namd: `-Mipa=jobs:4`(pass 2)

Fortran benchmarks:

410.bwaves: `-Mipa=jobs:4`

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

437.leslie3d: `-Mipa=jobs:4`(pass 2)

Benchmarks using both Fortran and C:

436.cactusADM: `-Mipa=jobs:4`

454.calculix: `-Mipa=jobs:4`(pass 2)

The flags files that were used to format this result can be browsed at
http://www.spec.org/cpu2006/flags/pgi80_linux_flags.20090710.html
http://www.spec.org/cpu2006/flags/x86-open64-4.2.2-flags-revB.html
http://www.spec.org/cpu2006/flags/amd-platform.html

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2006/flags/pgi80_linux_flags.20090710.xml
http://www.spec.org/cpu2006/flags/x86-open64-4.2.2-flags-revB.xml
http://www.spec.org/cpu2006/flags/amd-platform.xml

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