# SPEC® CFP2006 Result

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## Dell Inc.

PowerEdge M905 (AMD Opteron 8389, 2.90 GHz)

$SPECfp^{®}2006 =$     22.5

$SPECfp\_base2006 =$     18.3

| | | | |
|---|---|---|---|
| **CPU2006 license:** 55 | | **Test date:** | May-2009 |
| **Test sponsor:** | Dell Inc. | **Hardware Availability:** | May-2009 |
| **Tested by:** | Dell Inc. | **Software Availability:** | Jun-2008 |



Benchmark results bar chart (scale 0 to 115):

- **410.bwaves**: 22.7 / 23.1
- **416.gamess**: 20.0 / 17.9
- **433.milc**: 17.7
- **434.zeusmp**: 16.8 / 15.2
- **435.gromacs**: 19.7 / 16.0
- **436.cactusADM**: 112 / 19.4
- **437.leslie3d**: 17.8 / 16.6
- **444.namd**: 16.1 / 13.9
- **447.dealII**: 28.4 / 21.0
- **450.soplex**: 14.9 / 13.2
- **453.povray**: 21.9 / 19.0
- **454.calculix**: 22.4 / 18.9
- **459.GemsFDTD**: 17.9 / 15.7
- **465.tonto**: 22.9 / 18.1
- **470.lbm**: 24.8 / 28.2
- **481.wrf**: 23.1 / 20.8
- **482.sphinx3**: 24.0 / 21.9

SPECfp_base2006 = 18.3

SPECfp2006 = 22.5

## Hardware

| | |
|---|---|
| CPU Name: | AMD Opteron 8389 |
| CPU Characteristics: | |
| CPU MHz: | 2900 |
| FPU: | Integrated |
| CPU(s) enabled: | 16 cores, 4 chips, 4 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 |

*Continued on next page*

## Software

| | |
|---|---|
| Operating System: | Red Hat Enterprise Linux Server release 5.3, Kernel 2.6.18-128.el5 |
| Compiler: | PGI Server Complete Version 7.2 PathScale Compiler Suite Version 3.2 |
| Auto Parallel: | Yes |
| File System: | ext3 |
| System State: | Run level 3 (multi-user) |
| Base Pointers: | 64-bit |
| Peak Pointers: | 32/64-bit |

*Continued on next page*

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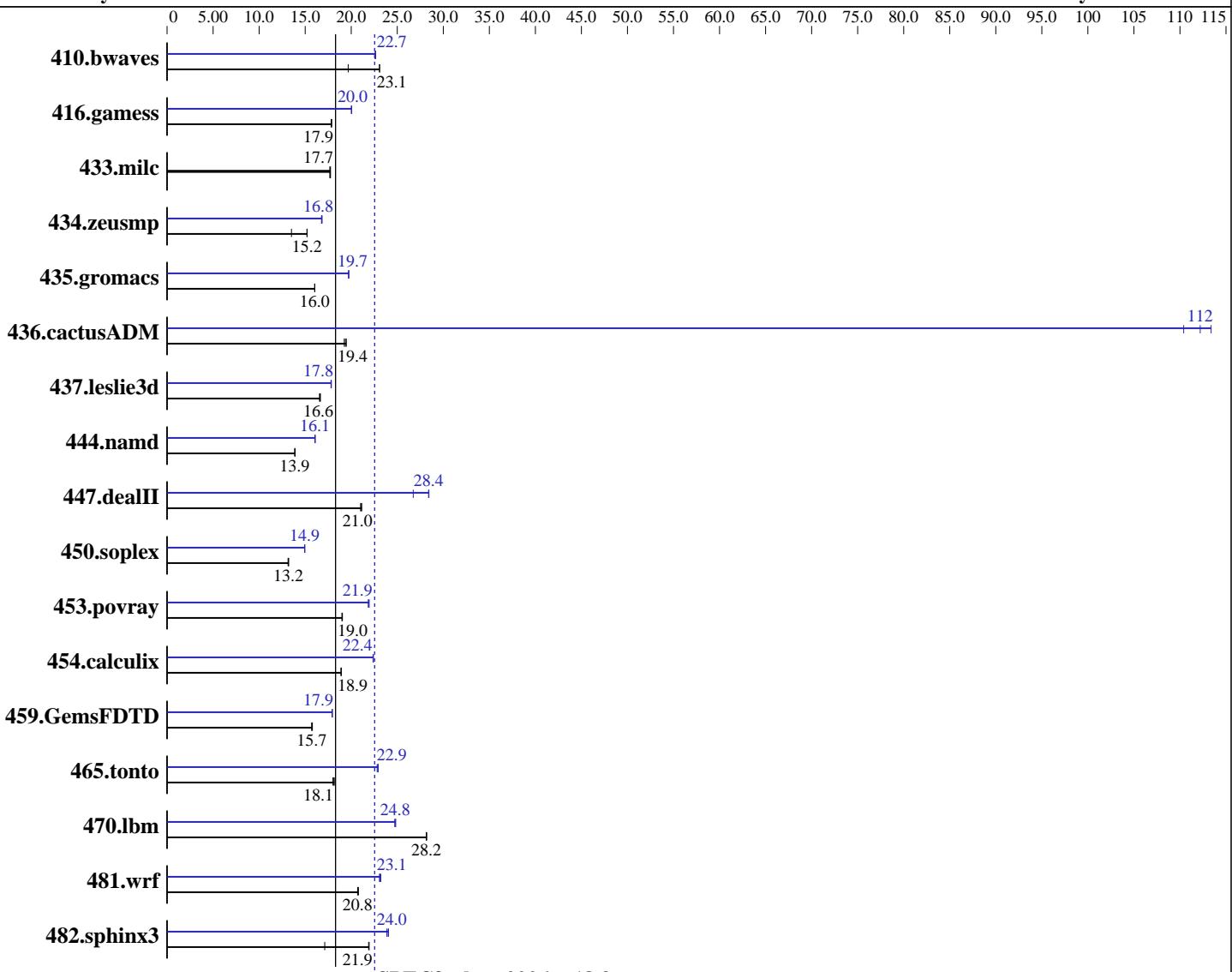| | |
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| | |
|---|---|
| L3 Cache: | 6 MB I+D on chip per chip |
| Other Cache: | None |
| Memory: | 64 GB (16 x 4 GB DDR2-800) |
| Disk Subsystem: | 1 x 73 GB 15000 RPM SAS |
| Other Hardware: | None |

Other Software: binutils 2.18  
32-bit and 64-bit libhugetlbfs libraries

## Results Table

| Benchmark | Base Seconds | Base Ratio | Base Seconds | Base Ratio | Base Seconds | Base Ratio | Peak Seconds | Peak Ratio | Peak Seconds | Peak Ratio | Peak Seconds | Peak Ratio |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 410.bwaves | 589 | 23.1 | **589** | **23.1** | 691 | 19.7 | 602 | 22.6 | 600 | 22.7 | **600** | **22.7** |
| 416.gamess | 1095 | 17.9 | 1099 | 17.8 | **1097** | **17.9** | **977** | **20.0** | 976 | 20.1 | 978 | 20.0 |
| 433.milc | 519 | 17.7 | **518** | **17.7** | 517 | 17.8 | 519 | 17.7 | **518** | **17.7** | 517 | 17.8 |
| 434.zeusmp | **599** | **15.2** | 674 | 13.5 | 598 | 15.2 | **542** | **16.8** | 540 | 16.8 | 542 | 16.8 |
| 435.gromacs | 445 | 16.0 | 445 | 16.0 | **445** | **16.0** | 362 | 19.7 | 362 | 19.7 | **362** | **19.7** |
| 436.cactusADM | 614 | 19.5 | 621 | 19.2 | **617** | **19.4** | 105 | 113 | 108 | 110 | **107** | **112** |
| 437.leslie3d | **566** | **16.6** | 568 | 16.6 | 564 | 16.7 | 527 | 17.8 | 528 | 17.8 | **528** | **17.8** |
| 444.namd | 577 | 13.9 | **578** | **13.9** | 578 | 13.9 | 499 | 16.1 | 499 | 16.1 | **499** | **16.1** |
| 447.dealII | 541 | 21.1 | 544 | 21.0 | **544** | **21.0** | 428 | 26.7 | 402 | 28.4 | **403** | **28.4** |
| 450.soplex | 635 | 13.1 | 632 | 13.2 | **632** | **13.2** | 558 | 14.9 | **558** | **14.9** | 558 | 15.0 |
| 453.povray | **280** | **19.0** | 279 | 19.0 | 280 | 19.0 | 243 | 21.9 | **243** | **21.9** | 242 | 21.9 |
| 454.calculix | 437 | 18.9 | 436 | 18.9 | **436** | **18.9** | 369 | 22.4 | **369** | **22.4** | 368 | 22.4 |
| 459.GemsFDTD | **674** | **15.7** | 672 | 15.8 | 676 | 15.7 | 592 | 17.9 | **592** | **17.9** | 591 | 17.9 |
| 465.tonto | 542 | 18.1 | **543** | **18.1** | 546 | 18.0 | 429 | 22.9 | 431 | 22.8 | **430** | **22.9** |
| 470.lbm | **488** | **28.2** | 488 | 28.2 | 487 | 28.2 | 553 | 24.8 | 556 | 24.7 | **555** | **24.8** |
| 481.wrf | **538** | **20.8** | 538 | 20.8 | 540 | 20.7 | **483** | **23.1** | 481 | 23.2 | 484 | 23.1 |
| 482.sphinx3 | 1138 | 17.1 | **890** | **21.9** | 888 | 21.9 | 810 | 24.1 | **812** | **24.0** | 817 | 23.9 |

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
```

## Operating System Notes

```
    The libhugetlbfs libraries were installed using the
    installation rpms that came with the distribution.

    '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=14336 in /etc/sysctl.conf
    mount -t hugetlbfs nodev /mnt/hugepages
```

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| | | | |
|---|---|---|---|
| **CPU2006 license:** 55 | | **Test date:** | May-2009 |
| **Test sponsor:** | Dell Inc. | **Hardware Availability:** | May-2009 |
| **Tested by:** | Dell Inc. | **Software Availability:** | Jun-2008 |

## Platform Notes

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

## General Notes

```
environment variables set by runspec before the start of the run:
HUGETLB_MORECORE = "yes"
LD_LIBRARY_PATH = "/root/cpu2006-1.1/amd909gh-libs/64:/root/cpu2006-1.1/amd909gh-libs/32"
NCPUS = "8"
```

## 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
```

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## Base Optimization Flags

C benchmarks:
```
-Mvect=cachesize:6291456 -fastsse -Msmartalloc=huge -Mfprelaxed
-Mipa=fast -Mipa=inline -tp barcelona-64 -Bstatic_pgi
```

C++ benchmarks:
```
-Mvect=cachesize:6291456 -fastsse -Msmartalloc=huge -Mfprelaxed
--zc_eh -Mipa=fast -Mipa=inline -tp barcelona-64 -Bstatic_pgi
```

Fortran benchmarks:
```
-Mvect=cachesize:6291456 -fastsse -Mfprelaxed -Msmartalloc=huge
-Mipa=fast -Mipa=inline -tp barcelona-64 -Bstatic_pgi
```

Benchmarks using both Fortran and C:
```
-Mvect=cachesize:6291456 -fastsse -Msmartalloc=huge -Mfprelaxed
-Mipa=fast -Mipa=inline -tp barcelona-64 -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):
```
pathCC
```

```
    444.namd: pgcpp
```

Fortran benchmarks (except as noted below):
```
pgf95
```

```
    416.gamess: pathf95
```

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**Test date:** May-2009

**Hardware Availability:** May-2009

**Software Availability:** Jun-2008

# Peak Compiler Invocation (Continued)

459.GemsFDTD: `pathf95`

465.tonto: `pathf95`

Benchmarks using both Fortran and C (except as noted below):
`pathcc pathf95`

436.cactusADM: `pgcc pgf95`

454.calculix: `pgcc pgf95`

# 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_LINUX -fno-second-underscore
482.sphinx3: -DSPEC_CPU_LP64
```

# Peak Optimization Flags

C benchmarks:

433.milc: `basepeak = yes`

470.lbm: `-Mvect=cachesize:6291456 -fastsse -Msmartalloc=huge`
`-Mprefetch=t0 -Mloop32 -Mfprelaxed -Mipa=fast -Mipa=inline`
`-tp barcelona-64 -Bstatic_pgi`

482.sphinx3: `-Mpfi=indirect(pass 1) -Mpfo=indirect(pass 2)`
`-Mipa=fast(pass 2) -Mipa=inline(pass 2)`
`-Mvect=cachesize:6291456 -fastsse -Mfprelaxed -Msmartalloc`
`-tp barcelona-64 -Bstatic_pgi`

C++ benchmarks:

Continued on next page

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# Peak Optimization Flags (Continued)

```
444.namd: -Mpfi(pass 1) -Mpfo(pass 2) -Mipa=fast(pass 2)
          -Mipa=inline(pass 2) -Mvect=cachesize:6291456 -fastsse
          -Munroll=n:4 -Munroll=m:8 -Msmartalloc=huge -Mnodepchk
          -Mfprelaxed --zc_eh -tp barcelona-64 -Bstatic_pgi

447.dealII: -march=barcelona -Ofast -static -INLINE:aggressive=on
            -fno-exceptions -m32

450.soplex: -march=barcelona -fb_create fbdata(pass 1)
            -fb_opt fbdata(pass 2) -L/usr/lib -lhugetlbfs(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

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

Fortran benchmarks:

```
410.bwaves: -Mvect=cachesize:6291456 -fastsse -Msmartalloc
            -Mprefetch=nta -Mfprelaxed -Mipa=fast -Mipa=inline
            -tp barcelona-64 -Bstatic_pgi

416.gamess: -march=barcelona -fb_create fbdata(pass 1)
            -fb_opt fbdata(pass 2)
            -Wl,-T/usr/share/libhugetlbfs/ldscripts/elf_x86_64.xBDT(pass 2)
            -L/usr/lib64 -lhugetlbfs(pass 2) -O2 -OPT:Ofast -OPT:ro=3
            -OPT:unroll_size=256

434.zeusmp: -Mvect=cachesize:6291456 -fastsse -Mfprelaxed
            -Mprefetch=distance:8 -Mprefetch=t0 -Msmartalloc=huge
            -Msmartalloc=hugebss -Mipa=fast -Mipa=inline
            -tp barcelona-64 -Bstatic_pgi

437.leslie3d: -Mpfi=indirect(pass 1) -Mpfo=indirect(pass 2)
              -Mipa=fast(pass 2) -Mipa=inline(pass 2)
              -Mvect=cachesize:6291456 -fastsse -Mvect=fuse
              -Msmartalloc=huge -Mprefetch=distance:8 -Mprefetch=t0
              -Mfprelaxed -tp barcelona-64 -Bstatic_pgi

459.GemsFDTD: -march=barcelona -Ofast -LNO:fission=2 -LNO:simd=2
              -LNO:prefetch_ahead=1 -CG:load_exe=0 -CG:prefer_lru_reg=off
              -OPT:malloc_alg=1
              -Wl,-T/usr/share/libhugetlbfs/ldscripts/elf_x86_64.xBDT
              -L/usr/lib64 -lhugetlbfs

465.tonto: -march=barcelona -Ofast -OPT:alias=no_f90_pointer_alias
           -LNO:blocking=off -CG:load_exe=1 -IPA:plimit=525
           -OPT:malloc_alg=1
           -Wl,-T/usr/share/libhugetlbfs/ldscripts/elf_x86_64.xBDT
           -L/usr/lib64 -lhugetlbfs
```

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# Peak Optimization Flags (Continued)

Benchmarks using both Fortran and C:

```
435.gromacs: -march=barcelona -Ofast -OPT:rsqrt=2 -OPT:malloc_alg=1
             -Wl,-T/usr/share/libhugetlbfs/ldscripts/elf_x86_64.xBDT
             -L/usr/lib64 -lhugetlbfs

436.cactusADM: -Mvect=cachesize:6291456 -fastsse -Mconcur
               -Msmartalloc=huge -Mfprelaxed -Mipa=fast -Mipa=inline
               -tp barcelona-64 -Bstatic_pgi

454.calculix: -Mpfi=indirect(pass 1) -Mpfo=indirect(pass 2)
              -Mipa=fast(pass 2) -Mipa=inline(pass 2)
              -Mvect=cachesize:6291456 -fastsse -Msmartalloc=huge
              -Mprefetch=t0 -Mpre -Mfprelaxed -tp barcelona-64
              -Bstatic_pgi

481.wrf: -march=barcelona -Ofast -LNO:blocking=off
         -LNO:prefetch_ahead=10 -LANG:copyinout=off
         -IPA:callee_limit=5000 -GRA:prioritize_by_density=on
         -OPT:malloc_alg=1 -m3dnow
         -Wl,-T/usr/share/libhugetlbfs/ldscripts/elf_x86_64.xBDT
         -L/usr/lib64 -lhugetlbfs
```

# Peak Other Flags

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

C++ benchmarks:

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

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)
```
```
435.gromacs: No flags used
```

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## Peak Other Flags (Continued)

481.wrf: No flags used

The flags files that were used to format this result can be browsed at
http://www.spec.org/cpu2006/flags/pgi72_linux_flags.20090710.html
http://www.spec.org/cpu2006/flags/pathscale32-flags.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/pgi72_linux_flags.20090710.xml
http://www.spec.org/cpu2006/flags/pathscale32-flags.xml
http://www.spec.org/cpu2006/flags/amd-platform.xml

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Tested with SPEC CPU2006 v1.1.
Report generated on Wed Jul 23 01:25:57 2014 by SPEC CPU2006 PS/PDF formatter v6932.
Originally published on 23 June 2009.