# SPEC® CFP2006 Result

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## Supermicro

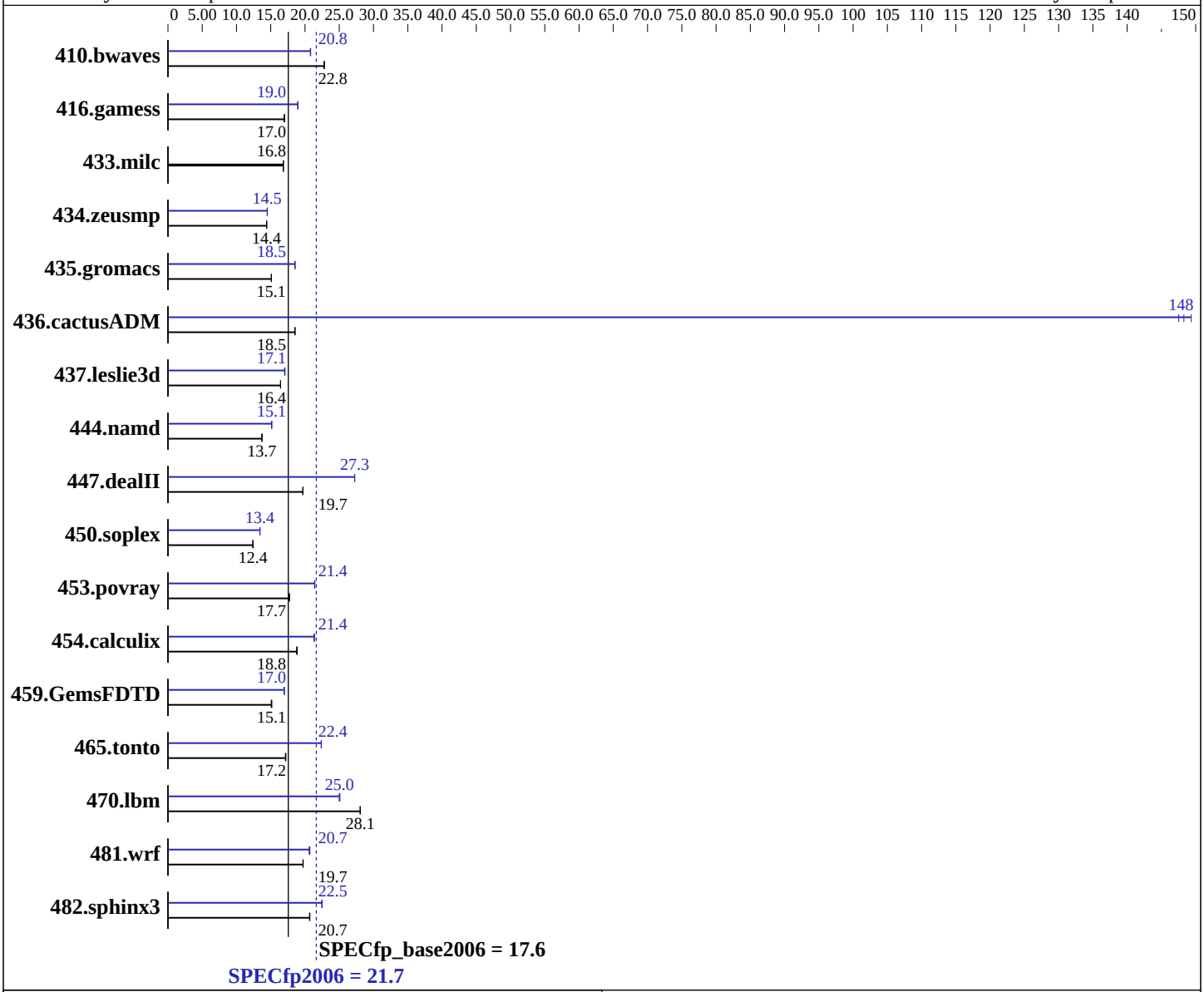
Motherboard H8DA3-2, AMD Opteron 2439 SE

SPECfp®2006 = 21.7

SPECfp_base2006 = 17.6

**CPU2006 license:** 001176
**Test sponsor:** Supermicro
**Tested by:** Supermicro

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




## Hardware

| | |
|---|---|
| CPU Name: | AMD Opteron 2439 SE |
| CPU Characteristics: | |
| CPU MHz: | 2800 |
| FPU: | Integrated |
| CPU(s) enabled: | 12 cores, 2 chips, 6 cores/chip |
| CPU(s) orderable: | 1,2 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: | Red Hat Enterprise Linux Server release 5.3, Advanced Platform, 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 2 (Local multiuser without remote network) |
| Base Pointers: | 64-bit |

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L3 Cache: 6 MB I+D on chip per chip
Other Cache: None
Memory: 32 GB (8x4 GB, DDR2-800, CL5, Reg, Dual Rank)
Disk Subsystem: 1 x 500 GB SATA, 7200 RPM
Other Hardware: None

Peak Pointers: 32/64-bit
Other Software: binutils 2.18

## Results Table

| Benchmark | Base | | | | | | Peak | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Seconds | Ratio | Seconds | Ratio | Seconds | Ratio | Seconds | Ratio | Seconds | Ratio | Seconds | Ratio |
| 410.bwaves | **597** | **22.8** | 595 | 22.8 | 597 | 22.8 | 654 | 20.8 | 652 | 20.8 | **653** | **20.8** |
| 416.gamess | 1150 | 17.0 | 1154 | 17.0 | **1153** | **17.0** | 1034 | 18.9 | **1032** | **19.0** | 1032 | 19.0 |
| 433.milc | 545 | 16.9 | 546 | 16.8 | **545** | **16.8** | 545 | 16.9 | 546 | 16.8 | **545** | **16.8** |
| 434.zeusmp | 631 | 14.4 | 632 | 14.4 | **632** | **14.4** | 629 | 14.5 | 627 | 14.5 | **628** | **14.5** |
| 435.gromacs | 473 | 15.1 | **473** | **15.1** | 473 | 15.1 | **385** | **18.5** | 385 | 18.6 | 385 | 18.5 |
| 436.cactusADM | **644** | **18.5** | 644 | 18.5 | 645 | 18.5 | **80.6** | **148** | 81.0 | 148 | 80.0 | 149 |
| 437.leslie3d | 572 | 16.4 | 572 | 16.4 | **572** | **16.4** | 552 | 17.0 | 550 | 17.1 | **551** | **17.1** |
| 444.namd | 584 | 13.7 | 585 | 13.7 | **585** | **13.7** | 529 | 15.1 | **529** | **15.1** | 530 | 15.1 |
| 447.dealII | 580 | 19.7 | **581** | **19.7** | 581 | 19.7 | 420 | 27.3 | **420** | **27.3** | 420 | 27.2 |
| 450.soplex | **672** | **12.4** | 673 | 12.4 | 672 | 12.4 | 621 | 13.4 | 621 | 13.4 | **621** | **13.4** |
| 453.povray | 302 | 17.6 | 300 | 17.7 | **300** | **17.7** | **248** | **21.4** | 249 | 21.4 | 248 | 21.4 |
| 454.calculix | 439 | 18.8 | **438** | **18.8** | 437 | 18.9 | 386 | 21.4 | **386** | **21.4** | 387 | 21.3 |
| 459.GemsFDTD | **701** | **15.1** | 701 | 15.1 | 704 | 15.1 | 626 | 17.0 | **625** | **17.0** | 625 | 17.0 |
| 465.tonto | 572 | 17.2 | 574 | 17.1 | **572** | **17.2** | **440** | **22.4** | 439 | 22.4 | 440 | 22.4 |
| 470.lbm | 490 | 28.0 | **490** | **28.1** | 489 | 28.1 | **549** | **25.0** | 549 | 25.0 | 547 | 25.1 |
| 481.wrf | 567 | 19.7 | 566 | 19.7 | **566** | **19.7** | 542 | 20.6 | 539 | 20.7 | **540** | **20.7** |
| 482.sphinx3 | 944 | 20.7 | **942** | **20.7** | 941 | 20.7 | 868 | 22.5 | 866 | 22.5 | **867** | **22.5** |

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=5400 in /etc/sysctl.conf
mount -t hugetlbfs nodev /mnt/hugepages
```

## General Notes

```
Environment variables set by runspec before the start of the run:
HUGETLB_LIMIT = "450"
LD_LIBRARY_PATH = "/spec/amd0905is-libs/64:/spec/amd0905is-libs/32"
NCPUS = "12"
PGI_HUGE_PAGES = "450"

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

System was tested in an open environment.
To ensure system stability, a 550W (minimum) ATX power supply
[ 4-pin (+12V), 8-pin (+12V) and 24-pin are required ]

Product description can be obtained at:
http://www.supermicro.com/Aplus/motherboard/Opteron2000/MCP55/H8DA3-2.cfm
```

## 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

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## Base Portability Flags (Continued)

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

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## Peak Compiler Invocation (Continued)

444.namd: pgcpp

Fortran benchmarks (except as noted below):
openf95

410.bwaves: pgf95

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

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## Peak Optimization Flags (Continued)

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

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:

Continued on next page

## Peak Optimization Flags (Continued)

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 -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/amd-platform.20090710.html
http://www.spec.org/cpu2006/flags/pgi80_linux_flags.20090914.html
http://www.spec.org/cpu2006/flags/x86-open64-4.2.2-flags-revE.html

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2006/flags/amd-platform.20090710.xml
http://www.spec.org/cpu2006/flags/pgi80_linux_flags.20090914.xml
http://www.spec.org/cpu2006/flags/x86-open64-4.2.2-flags-revE.xml

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