# SPEC® CFP2006 Result

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Tyan
(Test Sponsor: Advanced Micro Devices)

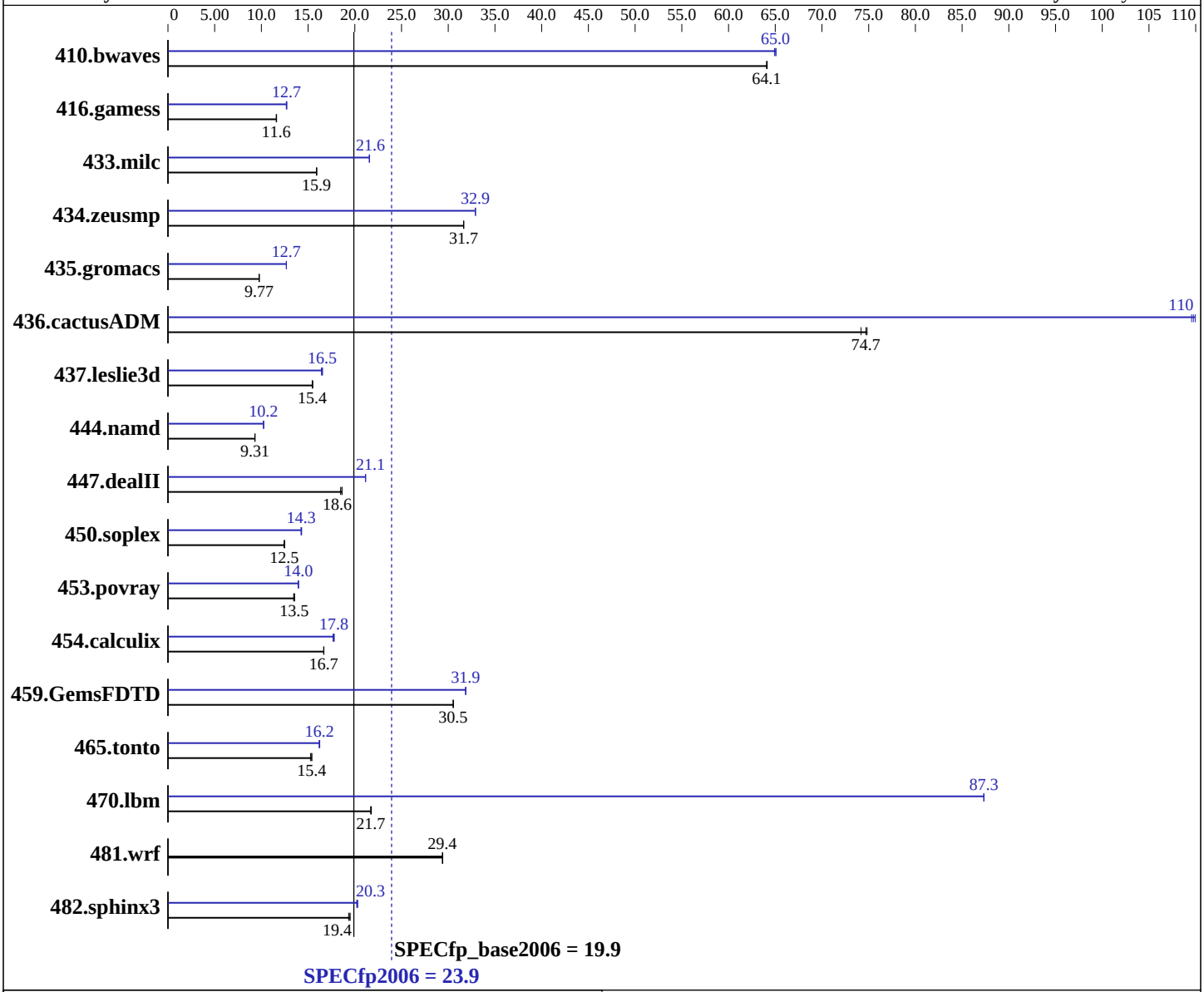
Tyan YR190B8228,
AMD Opteron 4164 EE

SPECfp®2006 = 23.9

SPECfp_base2006 = 19.9

**CPU2006 license:** 49
**Test sponsor:** Advanced Micro Devices
**Tested by:** Advanced Micro Devices

**Test date:** Dec-2010
**Hardware Availability:** Aug-2010
**Software Availability:** May-2010




## Hardware

| | |
|---|---|
| CPU Name: | AMD Opteron 4164 EE |
| CPU Characteristics: | |
| CPU MHz: | 1800 |
| FPU: | Integrated |
| CPU(s) enabled: | 6 cores, 1 chip, 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: | SUSE Linux Enterprise Server 11 (x86_64), Kernel 2.6.27.19-5-default |
| Compiler: | x86 Open64 4.2.3.2 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 |
| Other Software: | None |

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L3 Cache: 6 MB I+D on chip per chip
Other Cache: None
Memory: 16 GB (2 x 8 GB 2Rx4 PC3-10600R-9, ECC)
Disk Subsystem: 1 x 128 GB SATA SSD
Crucial RealSSD C300 CTFDDAC128MAG-1G1
Other Hardware: None

## Results Table

| Benchmark | Base | | | | | | Peak | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Seconds | Ratio | Seconds | Ratio | Seconds | Ratio | Seconds | Ratio | Seconds | Ratio | Seconds | Ratio |
| 410.bwaves | 212 | 64.1 | 212 | 64.1 | **212** | **64.1** | 209 | 64.9 | 209 | 65.1 | **209** | **65.0** |
| 416.gamess | 1690 | 11.6 | 1684 | 11.6 | **1686** | **11.6** | **1541** | **12.7** | 1546 | 12.7 | 1539 | 12.7 |
| 433.milc | 577 | 15.9 | 577 | 15.9 | **577** | **15.9** | **426** | **21.6** | 426 | 21.6 | 426 | 21.6 |
| 434.zeusmp | 288 | 31.6 | 287 | 31.7 | **287** | **31.7** | **277** | **32.9** | 276 | 32.9 | 277 | 32.9 |
| 435.gromacs | 732 | 9.76 | 731 | 9.77 | **731** | **9.77** | 563 | 12.7 | **563** | **12.7** | 563 | 12.7 |
| 436.cactusADM | **160** | **74.7** | 160 | 74.8 | 161 | 74.2 | 109 | 110 | 109 | 110 | **109** | **110** |
| 437.leslie3d | **608** | **15.4** | 606 | 15.5 | 609 | 15.4 | **569** | **16.5** | 569 | 16.5 | 572 | 16.4 |
| 444.namd | 862 | 9.30 | 861 | 9.32 | **861** | **9.31** | **784** | **10.2** | 783 | 10.2 | 785 | 10.2 |
| 447.dealII | 619 | 18.5 | **614** | **18.6** | 614 | 18.6 | 541 | 21.1 | **541** | **21.1** | 541 | 21.2 |
| 450.soplex | 671 | 12.4 | 667 | 12.5 | **669** | **12.5** | **584** | **14.3** | 586 | 14.2 | 583 | 14.3 |
| 453.povray | 393 | 13.6 | 395 | 13.5 | **393** | **13.5** | **381** | **14.0** | 381 | 14.0 | 382 | 13.9 |
| 454.calculix | 495 | 16.7 | 494 | 16.7 | **494** | **16.7** | 467 | 17.7 | **464** | **17.8** | 464 | 17.8 |
| 459.GemsFDTD | **347** | **30.5** | 347 | 30.5 | 348 | 30.5 | **333** | **31.9** | 333 | 31.9 | 333 | 31.9 |
| 465.tonto | 645 | 15.3 | 639 | 15.4 | **640** | **15.4** | **607** | **16.2** | 608 | 16.2 | 606 | 16.2 |
| 470.lbm | **633** | **21.7** | 633 | 21.7 | 631 | 21.8 | 157 | 87.3 | 157 | 87.3 | **157** | **87.3** |
| 481.wrf | 380 | 29.4 | 380 | 29.4 | **380** | **29.4** | 380 | 29.4 | 380 | 29.4 | **380** | **29.4** |
| 482.sphinx3 | 1008 | 19.3 | **1004** | **19.4** | 999 | 19.5 | 965 | 20.2 | **962** | **20.3** | 959 | 20.3 |

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=1000 in /etc/sysctl.conf
mount -t hugetlbfs nodev /mnt/hugepages

powersave -f was used to set the CPU frequency to its maximum.
```

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## Operating System Notes (Continued)

Binaries were compiled on SLES10 SP2 with binutils 2.18

## General Notes

Environment variables set by runspec before the start of the run:
LD_LIBRARY_PATH = "/root/work/cpu2006/amd1002-speed-libs-revA/64:/root/work/cpu2006/amd1002-speed-libs-revA/32"
O64_OMP_AFFINITY_MAP = "0,1,2,3,4,5"
O64_OMP_SPIN_USER_LOCK = "true"

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:
opencc

C++ benchmarks:
openCC

Fortran benchmarks:
openf95

Benchmarks using both Fortran and C:
opencc openf95

## 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
436.cactusADM: -DSPEC_CPU_LP64 -fno-second-underscore
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
459.GemsFDTD: -DSPEC_CPU_LP64
465.tonto: -DSPEC_CPU_LP64
470.lbm: -DSPEC_CPU_LP64
481.wrf: -DSPEC_CPU_LP64 -DSPEC_CPU_LINUX -DSPEC_CPU_CASE_FLAG
-fno-second-underscore

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## Base Portability Flags (Continued)

482.sphinx3: -DSPEC_CPU_LP64

## Base Optimization Flags

C benchmarks:
-march=barcelona -Ofast -HP:bdt=2m:heap=2m

C++ benchmarks:
-march=barcelona -Ofast -static -INLINE:aggressive=on
-HP:bdt=2m:heap=2m

Fortran benchmarks:
-march=barcelona -Ofast -apo -LNO:parallel_overhead=10000
-LNO:fusion_peeling_limit=0 -HP:bdt=2m:heap=2m

Benchmarks using both Fortran and C:
-march=barcelona -Ofast -HP:bdt=2m:heap=2m -apo
-LNO:parallel_overhead=10000 -LNO:fusion_peeling_limit=0

## Peak Compiler Invocation

C benchmarks:
opencc

C++ benchmarks:
openCC

Fortran benchmarks:
openf95

Benchmarks using both Fortran and C:
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 -fno-second-underscore
437.leslie3d: -DSPEC_CPU_LP64
444.namd: -DSPEC_CPU_LP64

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## Peak Portability Flags (Continued)

453.povray: -DSPEC_CPU_LP64
454.calculix: -DSPEC_CPU_LP64
459.GemsFDTD: -DSPEC_CPU_LP64
465.tonto: -DSPEC_CPU_LP64
470.lbm: -DSPEC_CPU_LP64
481.wrf: -DSPEC_CPU_LP64 -DSPEC_CPU_LINUX -DSPEC_CPU_CASE_FLAG
-fno-second-underscore
482.sphinx3: -DSPEC_CPU_LP64

## Peak Optimization Flags

C benchmarks:

433.milc: -march=barcelona -Ofast -apo -CG:movnti=1
-CG:local_sched_alg=1 -CG:locs_shallow_depth=1
-CG:compute_to=on -HP:bdt=2m:heap=2m -LNO:prefetch=3

470.lbm: -march=barcelona -Ofast -mso -apo -CG:sse_cse_regs=0
-LNO:prefetch_ahead=4 -CG:locs_shallow_depth=1
-CG:cmp_peep=on -CG:compute_to=on -OPT:unroll_times_max=8
-OPT:unroll_size=256 -OPT:unroll_level=2 -OPT:keep_ext=on
-OPT:alias=restricted -m3dnow -IPA:inline=off

482.sphinx3: -march=barcelona -fb_create fbdata(pass 1)
-fb_opt fbdata(pass 2) -Ofast -OPT:malloc_alg=2
-CG:sse_cse_regs=0 -CG:locs_shallow_depth=1 -CG:cmp_peep=on
-CG:local_sched_alg=1 -INLINE:aggressive=on

C++ benchmarks:

444.namd: -march=barcelona -fb_create fbdata(pass 1)
-fb_opt fbdata(pass 2) -Ofast -LNO:ignore_feedback=off
-CG:local_sched_alg=2 -CG:load_exe=0 -CG:compute_to=on
-OPT:unroll_size=256 -fno-exceptions -HP:bdt=2m:heap=2m

447.dealII: -march=barcelona -Ofast -static -INLINE:aggressive=on
-LNO:opt=0 -fno-emit-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 -CG:load_exe=0 -fno-exceptions
-m32 -HP:bdt=2m:heap=2m

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## Peak Optimization Flags (Continued)

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: -march=barcelona -Ofast -apo -OPT:malloc_alg=2
-CG:use_prefetchnta=on -CG:cmp_peep=on -LNO:blocking=off
-LNO:prefetch=3 -LNO:prefetch_ahead=5
-LNO:ignore_feedback=off -LNO:apo_use_feedback=on
-WOPT:aggstr=0

416.gamess: -march=barcelona -fb_create fbdata(pass 1)
-fb_opt fbdata(pass 2) -O3 -LNO:fu=6 -LNO:blocking=0
-LNO:prefetch=0 -OPT:Ofast -OPT:ro=3 -OPT:unroll_size=256
-HP:bdt=2m:heap=2m

434.zeusmp: -march=barcelona -Ofast -apo -LNO:blocking=off
-LNO:interchange=off -LNO:fusion_peeling_limit=0
-OPT:treeheight=on -OPT:unroll_size=256 -CG:cmp_peep=on
-CG:compute_to=on -GRA:prioritize_by_density=on
-HP:bdt=2m:heap=2m

437.leslie3d: -march=barcelona -Ofast -apo -OPT:unroll_size=256
-LNO:prefetch_ahead=4 -LNO:parallel_overhead=32768
-GRA:prioritize_by_density=on -m3dnow -HP:bdt=2m:heap=2m

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

465.tonto: -march=barcelona -Ofast -apo
-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 -apo -OPT:rsqrt=2
-HP:bdt=2m:heap=2m

436.cactusADM: -march=barcelona -fb_create fbdata(pass 1)
-fb_opt fbdata(pass 2) -Ofast -apo
-LANG:heap_allocation_threshold=1000 -LNO:prefetch_ahead=1
-HP:bdt=2m:heap=2m

454.calculix: -march=barcelona -Ofast -LNO:prefetch_ahead=30
-CG:load_exe=0 -CG:ptr_load_use=0 -CG:local_sched_alg=2
-CG:compute_to=on -WOPT:unroll=2 -GRA:optimize_boundary=on
-HP:bdt=2m:heap=2m -apo

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## Peak Optimization Flags (Continued)

481.wrf: `basepeak = yes`

The flags files that were used to format this result can be browsed at
`http://www.spec.org/cpu2006/flags/x86-open64-423-flags-speed-revA.20101207.html`
`http://www.spec.org/cpu2006/flags/amd-platform-speed-revA.html`

You can also download the XML flags sources by saving the following links:
`http://www.spec.org/cpu2006/flags/x86-open64-423-flags-speed-revA.20101207.xml`
`http://www.spec.org/cpu2006/flags/amd-platform-speed-revA.xml`


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For other inquiries, please contact webmaster@spec.org.

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