



# SPEC® CFP2006 Result

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## Tyan

(Test Sponsor: Advanced Micro Devices)

Tyan YR190-B8228,  
AMD Opteron 4280

**SPECfp®2006 = 44.5**

**SPECfp\_base2006 = 39.4**

CPU2006 license: 49

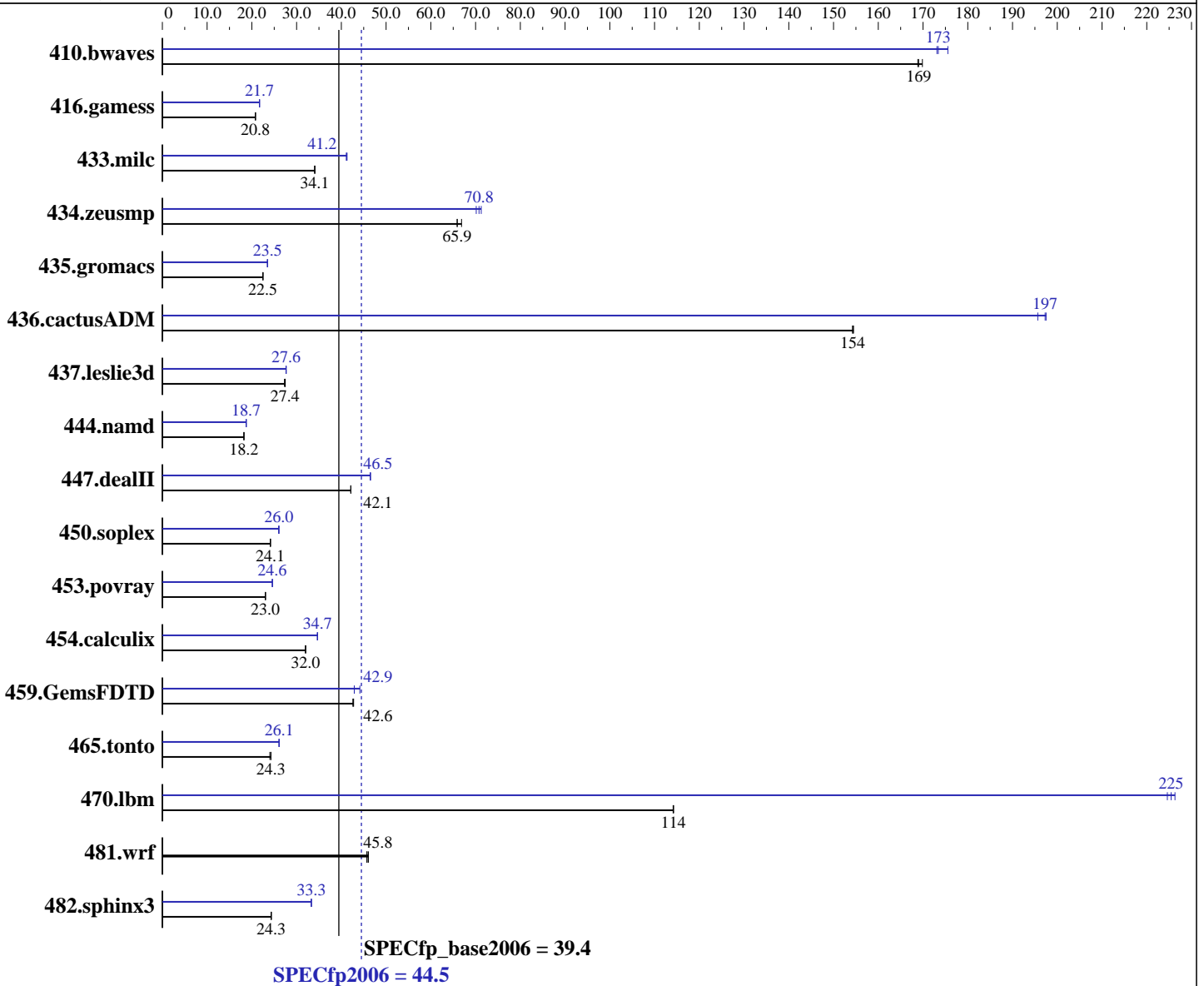
Test sponsor: Advanced Micro Devices

Tested by: Advanced Micro Devices

Test date: Jan-2012

Hardware Availability: Nov-2011

Software Availability: Jul-2011



### Hardware

CPU Name: AMD Opteron 4280  
 CPU Characteristics: AMD Turbo CORE technology up to 3.50 GHz  
 CPU MHz: 2800  
 FPU: Integrated  
 CPU(s) enabled: 16 cores, 2 chips, 8 cores/chip  
 CPU(s) orderable: 1,2 chips

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### Software

Operating System: Red Hat Enterprise Linux Server release 6.1, Kernel 2.6.32-131.0.15.el6.x86\_64  
 Compiler: C/C++/Fortran: Version 4.2.5.2 of x86 Open64 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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Primary Cache: 256 KB I on chip per chip,  
64 KB I shared / 2 cores;  
16 KB D on chip per core

Secondary Cache: 8 MB I+D on chip per chip, 2 MB shared / 2 cores

L3 Cache: 8 MB I+D on chip per chip

Other Cache: None

Memory: 32 GB (4 x 8 GB 2Rx4 PC3-12800R-11, ECC)

Disk Subsystem: 1 x 128 GB SATA, 7200 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	<b>80.4</b>	<b>169</b>	80.0	170	80.5	169	78.5	173	77.4	176	<b>78.4</b>	<b>173</b>
416.gamess	941	20.8	<b>941</b>	<b>20.8</b>	941	20.8	902	21.7	<b>902</b>	<b>21.7</b>	902	21.7
433.milc	269	34.1	270	34.0	<b>270</b>	<b>34.1</b>	<b>223</b>	<b>41.2</b>	222	41.3	223	41.1
434.zeusmp	138	65.9	<b>138</b>	<b>65.9</b>	136	66.9	128	71.3	<b>129</b>	<b>70.8</b>	130	70.1
435.gromacs	318	22.5	<b>318</b>	<b>22.5</b>	318	22.5	304	23.5	<b>304</b>	<b>23.5</b>	304	23.5
436.cactusADM	<b>77.4</b>	<b>154</b>	77.4	154	77.5	154	<b>60.6</b>	<b>197</b>	60.5	198	61.1	196
437.leslie3d	342	27.5	345	27.3	<b>343</b>	<b>27.4</b>	340	27.6	<b>340</b>	<b>27.6</b>	339	27.7
444.namd	440	18.2	440	18.2	<b>440</b>	<b>18.2</b>	428	18.7	428	18.7	<b>428</b>	<b>18.7</b>
447.dealII	<b>272</b>	<b>42.1</b>	272	42.1	272	42.1	<b>246</b>	<b>46.5</b>	246	46.5	246	46.5
450.soplex	<b>345</b>	<b>24.1</b>	345	24.2	346	24.1	320	26.0	320	26.0	<b>320</b>	<b>26.0</b>
453.povray	231	23.0	231	23.0	<b>231</b>	<b>23.0</b>	<b>216</b>	<b>24.6</b>	216	24.6	216	24.6
454.calculix	<b>258</b>	<b>32.0</b>	258	32.0	258	32.0	<b>238</b>	<b>34.7</b>	238	34.7	238	34.7
459.GemsFDTD	248	42.7	<b>249</b>	<b>42.6</b>	249	42.6	240	44.1	<b>247</b>	<b>42.9</b>	247	42.9
465.tonto	<b>406</b>	<b>24.3</b>	405	24.3	410	24.0	377	26.1	377	26.1	<b>377</b>	<b>26.1</b>
470.lbm	120	114	<b>120</b>	<b>114</b>	120	114	<b>60.9</b>	<b>225</b>	60.7	226	61.2	225
481.wrf	<b>244</b>	<b>45.8</b>	244	45.7	243	46.1	<b>244</b>	<b>45.8</b>	244	45.7	243	46.1
482.sphinx3	801	24.3	<b>801</b>	<b>24.3</b>	801	24.3	586	33.3	585	33.3	<b>585</b>	<b>33.3</b>

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 transparent\_hugepage=never as a boot parameter in /boot/grub/menu.lst  
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## Operating System Notes (Continued)

Set kernel/randomize\_va\_space=0 in /etc/sysctl.conf  
cpuspeed stop was used to set the CPU frequency to its maximum.

Set vm/nr\_hugepages=2000 in /etc/sysctl.conf  
mount -t hugetlbfs nodev /mnt/hugepages

## General Notes

Environment variables set by runspec before the start of the run:

```
LD_LIBRARY_PATH = "/root/work/cpu2006v1.2/amd1104-speed-libs-revA/32:/root/work/cpu2006v1.2/amd1104-speed-libs-revA/64"
O64_OMP_AFFINITY_MAP = "0,1,2,3,4,5,6,7,8,9,10,11,12,13,14,15"
O64_OMP_SPIN_COUNT = "800000"
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>

Binaries were compiled on a system with 2x AMD Opteron 6220 chips + 64GB Memory using RHEL 6.1

## 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
```

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## Base Portability Flags (Continued)

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

## Base Optimization Flags

C benchmarks:

-march=bdver1 -Ofast -HP:bdt=2m:heap=2m -apo -mso  
 -OPT:alias=restricted -OPT:malloc\_alg=2 -LNO:parallel\_overhead=10000

C++ benchmarks:

-march=bdver1 -Ofast -static -CG:load\_exe=0 -CG:p2align=0  
 -INLINE:aggressive=on -HP:bdt=2m:heap=2m -D\_\_OPEN64\_FAST\_SET

Fortran benchmarks:

-march=bdver1 -Ofast -LNO:blocking=off -LNO:fusion\_peeling\_limit=0  
 -LNO:parallel\_overhead=10000 -OPT:rsqrt=2 -OPT:unroll\_size=256  
 -HP:bdt=2m:heap=2m -apo

Benchmarks using both Fortran and C:

-march=bdver1 -Ofast -HP:bdt=2m:heap=2m -apo -mso  
 -OPT:alias=restricted -OPT:malloc\_alg=2 -LNO:parallel\_overhead=10000  
 -LNO:blocking=off -LNO:fusion\_peeling\_limit=0 -OPT:rsqrt=2  
 -OPT:unroll\_size=256

## Peak Compiler Invocation

C benchmarks:

opencc

C++ benchmarks:

openCC

Fortran benchmarks:

openf95

Benchmarks using both Fortran and C:

opencc openf95



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## 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
447.dealII: -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
482.sphinx3: -DSPEC_CPU_LP64

```

## Peak Optimization Flags

C benchmarks:

```

433.milc: -march=bdver1 -Ofast -CG:movnti=1 -CG:locs_best=on
-HP:bdt=2m:heap=2m -IPA:plimit=7000 -IPA:callee_limit=1200
-OPT:struct_array_copy=2 -OPT:alias=field_sensitive

470.lbm: -march=bdver1 -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=bdver1 -fb_create fbdata(pass 1)
-fb_opt fbdata(pass 2) -Ofast -LNO:loop_model_simd=on
-LNO:simd_rm_unity_remainder=on -OPT:malloc_alg=2
-CG:cmp_peep=on -CG:local_sched_alg=2 -CG:use_incdec=off
-INLINE:aggressive=on -WOPT:sib=on -HP

```

C++ benchmarks:

```

444.namd: -march=bdver1 -fb_create fbdata(pass 1)
-fb_opt fbdata(pass 2) -Ofast -LNO:ignore_feedback=off
-CG:local_sched_alg=2 -CG:load_exe=0 -OPT:unroll_size=256
-fno-exceptions -HP:bdt=2m:heap=2m

447.dealII: -march=bdver1 -Ofast -LNO:simd=0 -D__OPEN64_FAST_SET
-static -INLINE:aggressive=on -OPT:alias=disjoint
-OPT:unroll_times_max=8 -OPT:unroll_size=256
-OPT:unroll_level=2 -HP:bdt=2m:heap=2m

```

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## Peak Optimization Flags (Continued)

450.soplex: -march=bdver1 -fb\_create fbdata(pass 1)  
-fb\_opt fbdata(pass 2) -O3 -INLINE:aggressive=on -OPT:RO=1  
-OPT:IEEE\_arith=3 -OPT:IEEE\_NaN\_Inf=off  
-OPT:fold\_unsigned\_relops=on -fno-exceptions -CG:p2align=0  
-m32 -HP:bdt=2m:heap=2m -WOPT:sib=on

453.povray: -march=bdver1 -fb\_create fbdata(pass 1)  
-fb\_opt fbdata(pass 2) -Ofast -CG:pre\_local\_sched=off  
-INLINE:aggressive=on -HP:bdt=2m:heap=2m -OPT:transform=2  
-OPT:alias=disjoint -WOPT:aggcm=0

### Fortran benchmarks:

410.bwaves: -march=bdver1 -fb\_create fbdata(pass 1)  
-fb\_opt fbdata(pass 2) -Ofast -apo -OPT:Ofast  
-OPT:treeheight=on -LNO:blocking=off -LNO:prefetch=2  
-LNO:pf2=0 -LNO:prefetch\_ahead=3 -LNO:ignore\_feedback=off  
-LNO:fu=4 -LNO:loop\_model\_simd=on  
-LNO:simd\_rm\_unity\_remainder=on -WOPT:aggstr=0  
-HP:bdt=2m:heap=2m -CG:cmp\_peep=on -CG:p2align=0

416.gamess: -march=bdver1 -fb\_create fbdata(pass 1)  
-fb\_opt fbdata(pass 2) -O3 -LNO:fu=6 -LNO:blocking=0  
-LNO:simd=0 -OPT:Ofast -OPT:ro=3 -OPT:unroll\_size=256  
-OPT:unroll\_times\_max=2 -CG:local\_sched\_alg=1  
-HP:bdt=2m:heap=2m -WOPT:sib=on

434.zeusmp: -march=bdver1 -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=bdver1 -Ofast -LNO:prefetch=2 -LNO:blocking=off  
-CG:interior\_ptrs=on -OPT:unroll\_size=256  
-GRA:prioritize\_by\_density=on -HP:bdt=2m:heap=2m

459.GemsFDTD: -march=bdver1 -Ofast -OPT:unroll\_size=0 -LNO:fission=2  
-CG:load\_exe=0 -CG:local\_sched\_alg=2 -HP -apo

465.tonto: -march=bdver1 -Ofast -OPT:alias=no\_f90\_pointer\_alias  
-LNO:blocking=off -CG:load\_exe=1 -CG:local\_sched\_alg=1  
-IPA:plimit=525 -HP

### Benchmarks using both Fortran and C:

435.gromacs: -march=bdver1 -fb\_create fbdata(pass 1)  
-fb\_opt fbdata(pass 2) -Ofast -OPT:rsqrt=2  
-HP:bdt=2m:heap=2m

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## Peak Optimization Flags (Continued)

```
436.cactusADM: -march=bdver1 -fb_create fbdata(pass 1)
               -fb_opt fbdata(pass 2) -Ofast -LNO:blocking=off
               -LNO:prefetch=2 -HP:bdt=2m:heap=2m -CG:locs_shallow_depth=1
               -CG:load_exe=0 -WOPT:sib=on -apo
```

```
454.calculix: -march=bdver1 -Ofast -OPT:unroll_size=256
              -GRA:optimize_boundary=on -HP:bdt=2m:heap=2m
```

```
481.wrf: basepeak = yes
```

The flags file that was used to format this result can be browsed at

<http://www.spec.org/cpu2006/flags/x86-open64-425-flags-speed-revA.html>

You can also download the XML flags source by saving the following link:

<http://www.spec.org/cpu2006/flags/x86-open64-425-flags-speed-revA.xml>

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For other inquiries, please contact [webmaster@spec.org](mailto:webmaster@spec.org).

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