



# SPEC® CFP2006 Result

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## Supermicro

(Test Sponsor: Advanced Micro Devices)

Supermicro A+ Server 1022G-NTF,  
AMD Opteron 6284 SE

SPECfp®2006 = 47.2

SPECfp\_base2006 = 38.8

CPU2006 license: 49

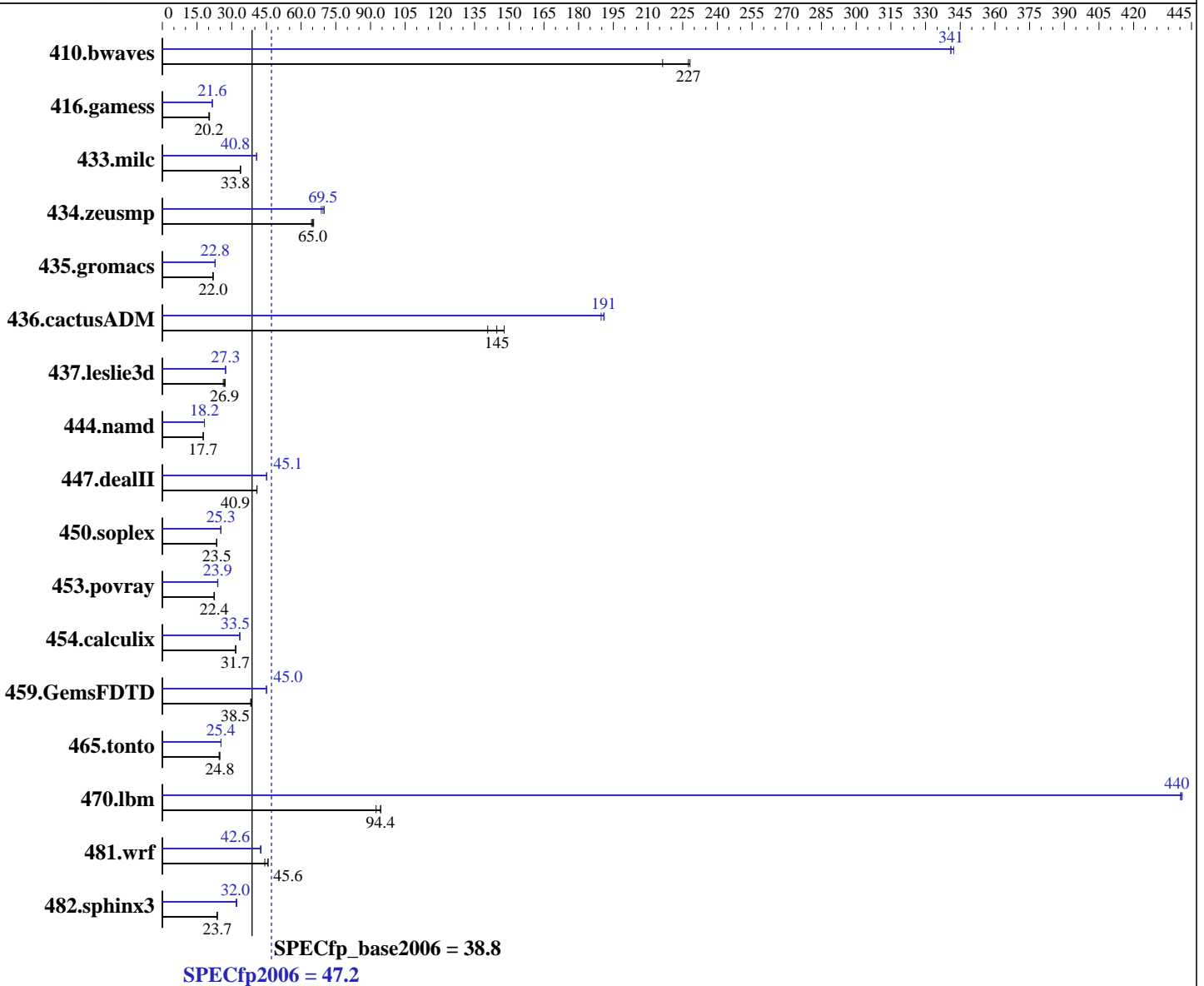
Test sponsor: Advanced Micro Devices

Tested by: Advanced Micro Devices

Test date: Mar-2012

Hardware Availability: Nov-2011

Software Availability: Dec-2011



### Hardware

CPU Name: AMD Opteron 6284 SE  
 CPU Characteristics: AMD Turbo CORE technology up to 3.40 GHz  
 CPU MHz: 2700  
 FPU: Integrated  
 CPU(s) enabled: 32 cores, 2 chips, 16 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: 512 KB I on chip per chip,  
64 KB I shared / 2 cores;  
16 KB D on chip per core

Secondary Cache: 16 MB I+D on chip per chip, 2 MB shared / 2 cores

L3 Cache: 16 MB I+D on chip per chip, 8 MB shared / 8 cores

Other Cache: None

Memory: 64 GB (8 x 8 GB 2Rx4 PC3-12800R-11, ECC)

Disk Subsystem: 1 x 500 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	<u>59.7</u>	<u>227</u>	59.6	228	62.8	216	39.9	341	<u>39.9</u>	<u>341</u>	39.7	342
416.gamess	<u>969</u>	<u>20.2</u>	959	20.4	971	20.2	909	21.5	905	21.6	<u>906</u>	<u>21.6</u>
433.milc	272	33.7	<u>272</u>	<u>33.8</u>	272	33.8	<u>225</u>	<u>40.8</u>	225	40.7	225	40.8
434.zeusmp	139	65.4	<u>140</u>	<u>65.0</u>	141	64.5	130	70.0	<u>131</u>	<u>69.5</u>	132	68.7
435.gromacs	325	22.0	<u>325</u>	<u>22.0</u>	328	21.8	313	22.8	<u>313</u>	<u>22.8</u>	314	22.8
436.cactusADM	84.9	141	<u>82.6</u>	<u>145</u>	80.8	148	<u>62.6</u>	<u>191</u>	62.5	191	63.0	190
437.leslie3d	<u>349</u>	<u>26.9</u>	346	27.2	357	26.3	343	27.4	345	27.3	<u>344</u>	<u>27.3</u>
444.namd	454	17.7	453	17.7	<u>454</u>	<u>17.7</u>	<u>441</u>	<u>18.2</u>	441	18.2	441	18.2
447.dealII	280	40.9	<u>280</u>	<u>40.9</u>	280	40.9	<u>254</u>	<u>45.1</u>	254	45.1	254	45.1
450.soplex	355	23.5	<u>355</u>	<u>23.5</u>	355	23.5	330	25.3	330	25.3	<u>330</u>	<u>25.3</u>
453.povray	236	22.5	238	22.3	<u>237</u>	<u>22.4</u>	<u>222</u>	<u>23.9</u>	223	23.9	221	24.0
454.calculix	261	31.7	260	31.7	<u>260</u>	<u>31.7</u>	246	33.5	247	33.5	<u>246</u>	<u>33.5</u>
459.GemsFDTD	278	38.2	275	38.6	<u>276</u>	<u>38.5</u>	235	45.1	<u>236</u>	<u>45.0</u>	236	45.0
465.tonto	<u>397</u>	<u>24.8</u>	396	24.8	401	24.5	388	25.4	<u>388</u>	<u>25.4</u>	388	25.4
470.lbm	<u>146</u>	<u>94.4</u>	146	94.4	149	92.4	<u>31.2</u>	<u>440</u>	31.2	440	31.2	441
481.wrf	<u>245</u>	<u>45.6</u>	244	45.7	252	44.3	<u>262</u>	<u>42.6</u>	262	42.7	263	42.4
482.sphinx3	820	23.8	824	23.7	<u>821</u>	<u>23.7</u>	605	32.2	611	31.9	<u>610</u>	<u>32.0</u>

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=4000 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 = "4000"

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 = "0,1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,27,28,29,30,31"

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

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## Base 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

## 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:

openc

### C++ benchmarks:

openCC

### Fortran benchmarks:

openf95

### Benchmarks using both Fortran and C:

openc 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: -march=bdver1 -Ofast -OPT:unroll\_size=256 -LNO:blocking=off  
-LANG:copyinout=off -IPA:callee\_limit=5000  
-GRA:prioritize\_by\_density=on -CG:load\_exe=1 -HP  
-WOPT:sib=on -apo

The flags files that were used to format this result can be browsed at

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

<http://www.spec.org/cpu2006/flags/amd-platform-speed-revA-I.html>

You can also download the XML flags sources by saving the following links:

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

<http://www.spec.org/cpu2006/flags/amd-platform-speed-revA-I.xml>

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

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Page 7