



# SPEC<sup>®</sup> CFP2006 Result

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## Supermicro

(Test Sponsor: Advanced Micro Devices)

Supermicro A+ Server 1022G-NTF,  
AMD Opteron 6376

SPECfp<sup>®</sup>2006 = 45.5

SPECfp\_base2006 = 37.8

CPU2006 license: 49

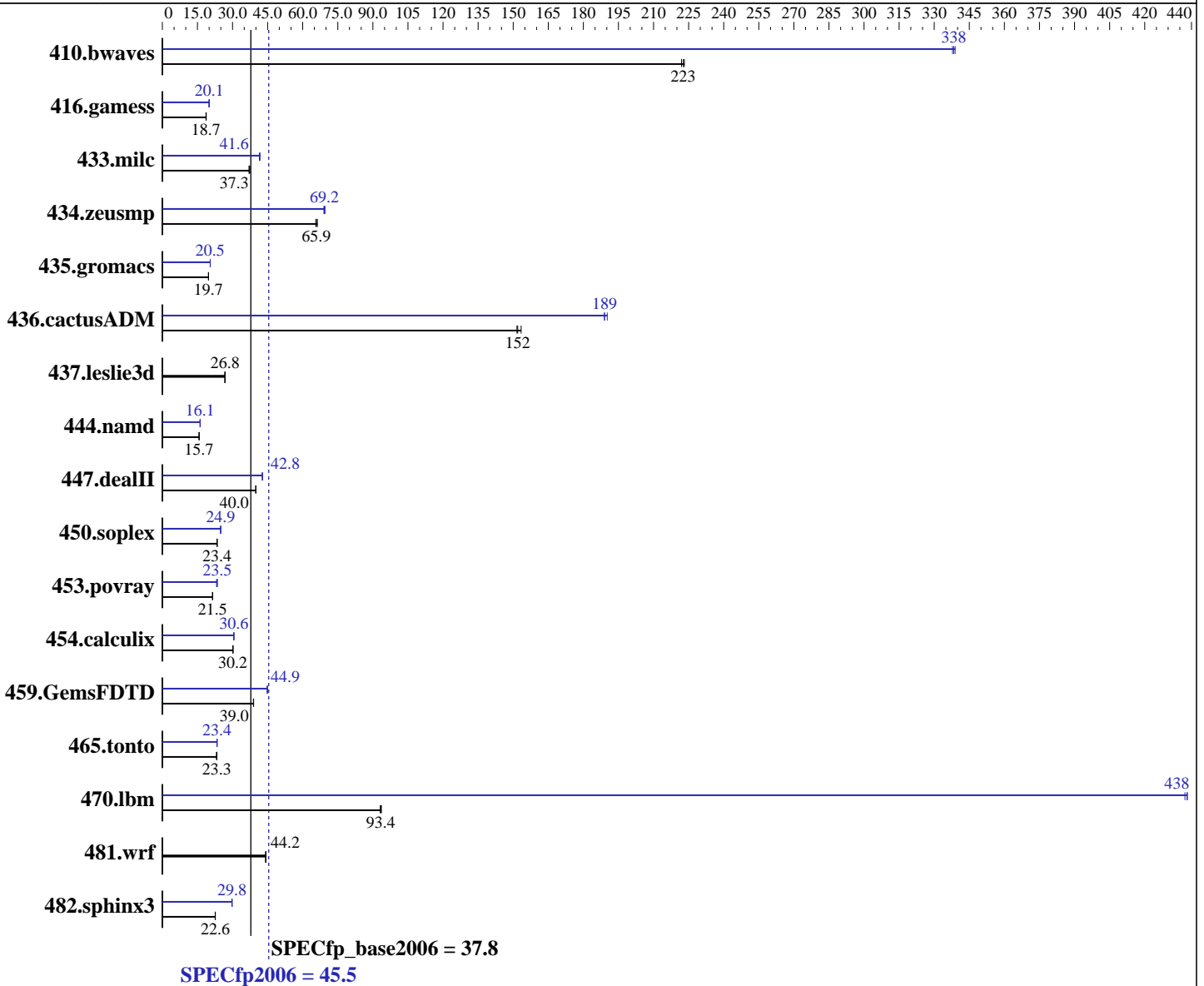
Test sponsor: Advanced Micro Devices

Tested by: Advanced Micro Devices

Test date: Oct-2012

Hardware Availability: Nov-2012

Software Availability: Jun-2012



### Hardware

CPU Name: AMD Opteron 6376  
 CPU Characteristics: AMD Turbo CORE technology up to 3.20 GHz  
 CPU MHz: 2300  
 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 6.3,  
Kernel 2.6.32-279.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: 128 GB (16 x 8 GB 2Rx4 PC3-12800R-11, ECC)  
Disk Subsystem: 1 x 320 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	60.9	223	61.2	222	<b>61.0</b>	<b>223</b>	40.2	338	<b>40.2</b>	<b>338</b>	40.1	339
416.gamess	1043	18.8	1050	18.7	<b>1048</b>	<b>18.7</b>	975	20.1	<b>975</b>	<b>20.1</b>	985	19.9
433.milc	246	37.3	248	37.0	<b>246</b>	<b>37.3</b>	220	41.7	<b>221</b>	<b>41.6</b>	221	41.5
434.zeusmp	137	66.3	<b>138</b>	<b>65.9</b>	139	65.6	131	69.6	<b>131</b>	<b>69.2</b>	132	69.1
435.gromacs	<b>362</b>	<b>19.7</b>	362	19.7	362	19.7	349	20.5	349	20.5	<b>349</b>	<b>20.5</b>
436.cactusADM	77.9	153	<b>78.7</b>	<b>152</b>	78.8	152	62.8	190	63.2	189	<b>63.2</b>	<b>189</b>
437.leslie3d	350	26.9	352	26.7	<b>350</b>	<b>26.8</b>	350	26.9	352	26.7	<b>350</b>	<b>26.8</b>
444.namd	510	15.7	<b>510</b>	<b>15.7</b>	511	15.7	497	16.1	<b>497</b>	<b>16.1</b>	496	16.2
447.dealII	286	40.0	286	39.9	<b>286</b>	<b>40.0</b>	267	42.8	<b>267</b>	<b>42.8</b>	268	42.7
450.soplex	<b>356</b>	<b>23.4</b>	357	23.4	356	23.4	334	25.0	<b>334</b>	<b>24.9</b>	335	24.9
453.povray	248	21.5	248	21.5	<b>248</b>	<b>21.5</b>	<b>227</b>	<b>23.5</b>	230	23.2	227	23.5
454.calculix	273	30.2	<b>273</b>	<b>30.2</b>	273	30.2	270	30.6	<b>270</b>	<b>30.6</b>	270	30.6
459.GemsFDTD	272	39.0	273	38.9	<b>272</b>	<b>39.0</b>	<b>236</b>	<b>44.9</b>	237	44.8	236	44.9
465.tonto	422	23.3	426	23.1	<b>422</b>	<b>23.3</b>	<b>421</b>	<b>23.4</b>	421	23.3	420	23.4
470.lbm	147	93.2	<b>147</b>	<b>93.4</b>	147	93.6	<b>31.4</b>	<b>438</b>	31.4	437	31.4	438
481.wrf	253	44.1	<b>252</b>	<b>44.2</b>	252	44.2	253	44.1	<b>252</b>	<b>44.2</b>	252	44.2
482.sphinx3	<b>862</b>	<b>22.6</b>	863	22.6	860	22.7	<b>654</b>	<b>29.8</b>	655	29.8	654	29.8

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)

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
```

```
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: basepeak = yes

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 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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