



# SPEC<sup>®</sup> CFP2006 Result

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## Supermicro

Supermicro A+ Server 4022G-6F (H8DG6-F, Opteron 6376)  
AMD Opteron 6376

SPECfp<sup>®</sup>\_rate2006 = 403

SPECfp\_rate\_base2006 = 361

CPU2006 license: 001176

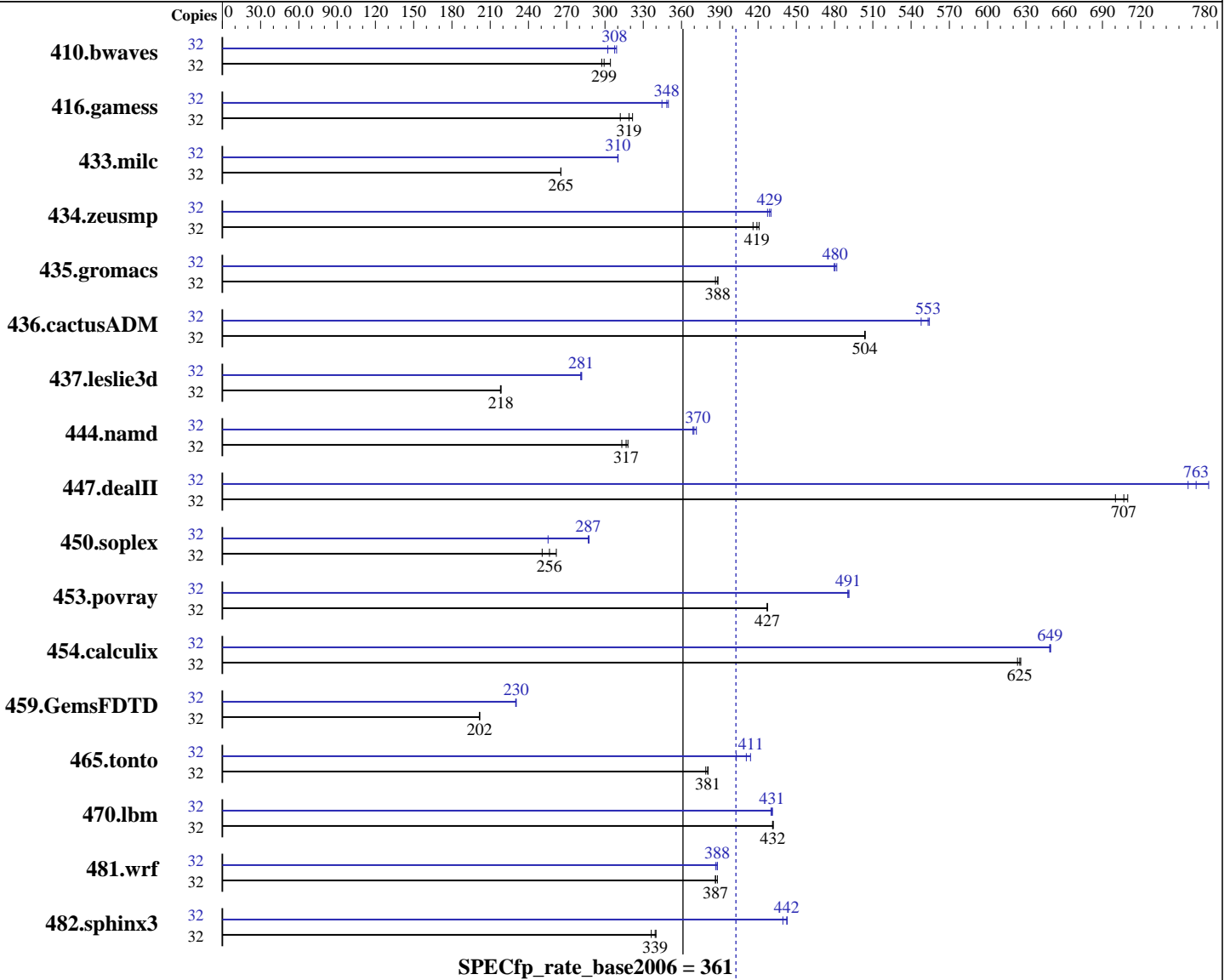
Test sponsor: Supermicro

Tested by: Supermicro

Test date: Oct-2012

Hardware Availability: Nov-2012

Software Availability: Aug-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

Continued on next page

### Software

Operating System: Red Hat Enterprise Linux Server release 6.2, Kernel 2.6.32-220.el6.x86\_64  
 Compiler: C/C++/Fortran: Version 4.5.2 of x86 Open64 Compiler Suite (from AMD)  
 Auto Parallel: No  
 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 500 GB SATA, 7200 RPM  
Other Hardware: None

Other Software: None

## Results Table

Benchmark	Base							Peak						
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
410.bwaves	32	<u>1453</u>	<u>299</u>	1429	304	1462	297	32	1439	302	<u>1414</u>	<u>308</u>	1407	309
416.gamess	32	2008	312	<u>1965</u>	<u>319</u>	1948	322	32	1818	345	<u>1798</u>	<u>348</u>	1792	350
433.milc	32	1106	266	1107	265	<u>1107</u>	<u>265</u>	32	<u>947</u>	<u>310</u>	947	310	947	310
434.zeusmp	32	692	421	<u>695</u>	<u>419</u>	700	416	32	677	430	681	427	<u>679</u>	<u>429</u>
435.gromacs	32	591	387	588	389	<u>588</u>	<u>388</u>	32	476	480	474	482	<u>476</u>	<u>480</u>
436.cactusADM	32	<u>759</u>	<u>504</u>	759	504	759	504	32	698	548	690	554	<u>691</u>	<u>553</u>
437.leslie3d	32	1380	218	1377	218	<u>1377</u>	<u>218</u>	32	1070	281	<u>1069</u>	<u>281</u>	1068	282
444.namd	32	819	313	<u>811</u>	<u>317</u>	807	318	32	696	369	690	372	<u>694</u>	<u>370</u>
447.dealII	32	523	700	516	710	<u>518</u>	<u>707</u>	32	<u>480</u>	<u>763</u>	473	773	483	757
450.soplex	32	1064	251	<u>1041</u>	<u>256</u>	1019	262	32	1045	255	<u>930</u>	<u>287</u>	928	288
453.povray	32	399	427	<u>398</u>	<u>427</u>	398	427	32	<u>347</u>	<u>491</u>	346	491	347	490
454.calculix	32	423	623	<u>422</u>	<u>625</u>	422	626	32	407	649	<u>407</u>	<u>649</u>	407	649
459.GemsFDTD	32	1684	202	<u>1684</u>	<u>202</u>	1683	202	32	<u>1474</u>	<u>230</u>	1476	230	1474	230
465.tonto	32	<u>827</u>	<u>381</u>	831	379	827	381	32	<u>767</u>	<u>411</u>	781	403	760	414
470.lbm	32	<u>1019</u>	<u>432</u>	1019	431	1018	432	32	<u>1021</u>	<u>431</u>	1019	431	1022	430
481.wrf	32	<u>924</u>	<u>387</u>	925	387	921	388	32	924	387	921	388	<u>921</u>	<u>388</u>
482.sphinx3	32	1855	336	<u>1838</u>	<u>339</u>	1834	340	32	1419	439	<u>1409</u>	<u>442</u>	1408	443

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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AMD Opteron 6376

SPECfp\_rate2006 = 403

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**CPU2006 license:** 001176  
**Test sponsor:** Supermicro  
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**Test date:** Oct-2012  
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## Operating System Notes (Continued)

```
Set vm/nr_hugepages=28672 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 = "896"
```

```
LD_LIBRARY_PATH = "/home/spec/amd1206-rate-libs-revA/32:/home/spec/amd1206-rate-libs-revA/64"
```

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 6386SE chips + 128GB Memory using RHEL 6.3

## 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.deallI: -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
```

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## Base Portability Flags (Continued)

481.wrf: -DSPEC\_CPU\_LINUX -DSPEC\_CPU\_CASE\_FLAG -DSPEC\_CPU\_LP64  
-fno-second-underscore  
482.sphinx3: -DSPEC\_CPU\_LP64

## Base Optimization Flags

### C benchmarks:

-Ofast -OPT:malloc\_alg=1 -HP:bd=2m:heap=2m -IPA:plimit=8000  
-IPA:small\_pu=100 -mso -march=bdver1

### C++ benchmarks:

-Ofast -static -CG:load\_exe=0 -OPT:malloc\_alg=1 -INLINE:aggressive=on  
-HP:bd=2m:heap=2m -D\_\_OPEN64\_FAST\_SET -march=bdver1

### Fortran benchmarks:

-Ofast -LNO:blocking=off -LNO:simd\_peel\_align=on -OPT:rsqrt=2  
-OPT:unroll\_size=256 -HP:bd=2m:heap=2m -mso -march=bdver1

### Benchmarks using both Fortran and C:

-Ofast -OPT:malloc\_alg=1 -HP:bd=2m:heap=2m -IPA:plimit=8000  
-IPA:small\_pu=100 -mso -march=bdver1 -LNO:blocking=off  
-LNO:simd\_peel\_align=on -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

## Peak Portability Flags

410.bwaves: -DSPEC\_CPU\_LP64  
416.gamess: -DSPEC\_CPU\_LP64  
433.milc: -DSPEC\_CPU\_LP64  
434.zeusmp: -DSPEC\_CPU\_LP64

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## Peak Portability Flags (Continued)

435.gromacs: -DSPEC\_CPU\_LP64  
 436.cactusADM: -DSPEC\_CPU\_LP64 -fno-second-underscore  
 437.leslie3d: -DSPEC\_CPU\_LP64  
 444.namd: -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\_LINUX -DSPEC\_CPU\_CASE\_FLAG -DSPEC\_CPU\_LP64  
 -fno-second-underscore

## Peak Optimization Flags

C benchmarks:

433.milc: -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 -mso  
 -march=bdver1

470.lbm: -Ofast -CG:cmp\_peep=on -OPT:keep\_ext=on -HP:bdt=2m:heap=2m  
 -IPA:plimit=8000 -IPA:small\_pu=100 -march=bdver1 -mso

482.sphinx3: -fb\_create fbdata(pass 1) -fb\_opt fbdata(pass 2) -Ofast  
 -m32 -IPA:plimit=1000 -OPT:malloc\_alg=2 -CG:cmp\_peep=on  
 -CG:p2align=0 -CG:load\_exe=1 -CG:dsched=on  
 -INLINE:aggressive=on -LNO:prefetch=2 -LNO:prefetch\_ahead=4  
 -mso -march=bdver2

C++ benchmarks:

444.namd: -Ofast -IPA:plimit=3000 -LNO:ignore\_feedback=off  
 -CG:local\_sched\_alg=0 -CG:load\_exe=0 -OPT:unroll\_size=256  
 -fno-exceptions -HP:bdt=2m:heap=2m -LNO:if\_select\_conv=1  
 -OPT:alias=disjoint -LNO:psimd\_iso\_unroll=ON -march=bdver1

447.dealIII: -Ofast -D\_\_OPEN64\_FAST\_SET -static -INLINE:aggressive=on  
 -LNO:opt=1 -LNO:simd=2 -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 -CG:movext\_icmp=off -TENV:frame\_pointer=off  
 -march=bdver1

450.soplex: -fb\_create fbdata(pass 1) -fb\_opt fbdata(pass 2) -O3  
 -LNO:ignore\_feedback=off -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 -mno-fma4 -HP:bdt=2m:heap=2m -WOPT:sib=on

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## Peak Optimization Flags (Continued)

450.soplex (continued):

-march=bdver1

453.povray: -fb\_create fbdata(pass 1) -fb\_opt fbdata(pass 2) -Ofast

-CG:pre\_local\_sched=off -CG:p2align=0 -CG:p2align\_split=on

-CG:dsched=on -INLINE:aggressive=on -HP:bd=2m:heap=2m

-OPT:transform=2 -OPT:alias=disjoint -WOPT:aggcm=0

-march=bdver2

Fortran benchmarks:

410.bwaves: -fb\_create fbdata(pass 1) -fb\_opt fbdata(pass 2) -Ofast

-OPT:Ofast -OPT:treeheight=on -LNO:blocking=off

-LNO:ignore\_feedback=off -LNO:fu=4 -LNO:loop\_model\_simd=on

-LNO:simd\_rm\_unity\_remainder=on -WOPT:aggstr=0

-HP:bd=2m:heap=2m -CG:cmp\_peep=on -march=bdver1

416.gamess: -fb\_create fbdata(pass 1) -fb\_opt fbdata(pass 2) -Ofast

-LNO:fu=6 -LNO:blocking=0 -LNO:simd=2 -OPT:ro=3

-OPT:recip=on -CG:local\_sched\_alg=1 -HP:bd=2m:heap=2m

-WOPT:sib=on -march=bdver1

434.zeusmp: -fb\_create fbdata(pass 1) -fb\_opt fbdata(pass 2) -Ofast

-LNO:blocking=off -LNO:interchange=off -IPA:plimit=1500

-HP:bd=2m:heap=2m -march=bdver1

437.leslie3d: -Ofast -CG:pre\_minreg\_level=2 -LNO:simd=0 -LNO:fusion=2

-HP:bd=2m:heap=2m -mso -march=bdver1

459.GemsFDTD: -Ofast -IPA:plimit=1500 -OPT:unroll\_size=1024

-OPT:unroll\_times\_max=16 -LNO:fission=2

-CG:local\_sched\_alg=2 -HP -march=bdver1

465.tonto: -Ofast -OPT:alias=no\_f90\_pointer\_alias -LNO:blocking=off

-CG:load\_exe=1 -CG:local\_sched\_alg=3 -IPA:plimit=525

-HP:bd=2m:heap=2m -march=bdver1

Benchmarks using both Fortran and C:

435.gromacs: -Ofast -OPT:rsqrt=2 -HP:bd=2m:heap=2m

-CG:local\_sched\_alg=2 -CG:load\_exe=3 -GRA:unspill=on

-march=bdver1 -LNO:simd=3

436.cactusADM: -fb\_create fbdata(pass 1) -fb\_opt fbdata(pass 2) -Ofast

-LNO:blocking=off -LNO:prefetch=2 -LNO:pf2=0

-LNO:prefetch\_ahead=4 -HP -CG:locs\_shallow\_depth=1

-CG:load\_exe=0 -CG:dsched=on -WOPT:sib=on -march=bdver1

454.calculix: -Ofast -OPT:unroll\_size=256 -OPT:alias=disjoint

-GRA:optimize\_boundary=on -CG:dsched=on -HP:bd=2m:heap=2m

-march=bdver1

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## Peak Optimization Flags (Continued)

```
481.wrf: -Ofast -LNO:blocking=off -LANG:copyinout=off
         -IPA:callee_limit=5000 -GRA:prioritize_by_density=on -HP
         -WOPT:sib=on -march=bdver1
```

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

<http://www.spec.org/cpu2006/flags/x86-open64-452-flags-rate-revA-I.html>

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

<http://www.spec.org/cpu2006/flags/x86-open64-452-flags-rate-revA-I.xml>

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

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