



# SPEC<sup>®</sup> CFP2006 Result

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## Supermicro

Supermicro A+ Server 4022G-6F (H8DG6-F, AMD Opteron 6378)  
AMD Opteron 6378

SPECfp<sup>®</sup>\_rate2006 = 413

SPECfp\_rate\_base2006 = 369

CPU2006 license: 001176

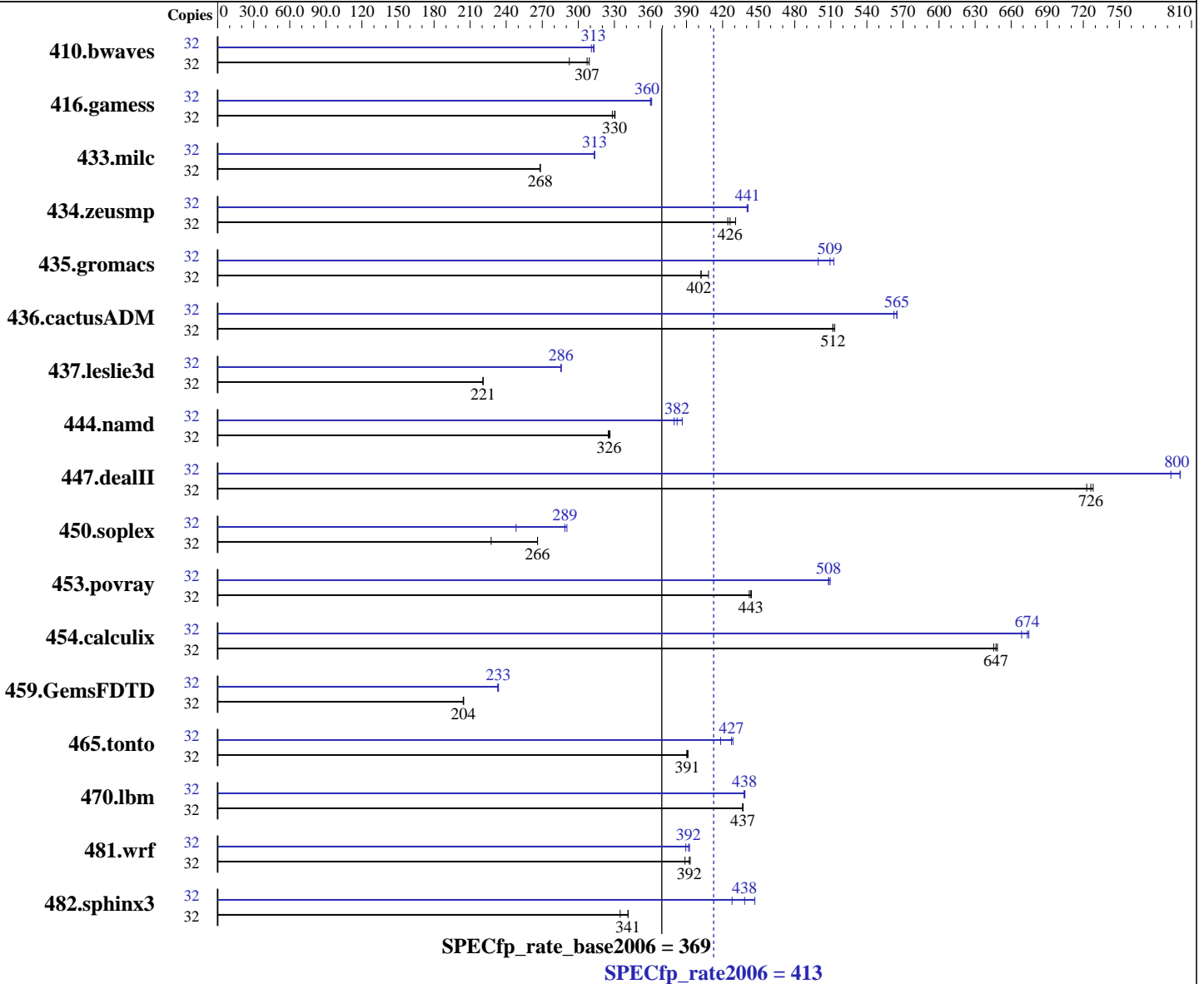
Test sponsor: Supermicro

Tested by: Supermicro

Test date: Aug-2012

Hardware Availability: Sep-2012

Software Availability: Aug-2012



### Hardware

CPU Name: AMD Opteron 6378  
 CPU Characteristics: AMD Turbo CORE technology up to 3.30 GHz  
 CPU MHz: 2400  
 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	1487	293	<b><u>1415</u></b>	<b><u>307</u></b>	1407	309	32	1389	313	1399	311	<b><u>1391</u></b>	<b><u>313</u></b>
416.gamess	32	1895	331	<b><u>1898</u></b>	<b><u>330</u></b>	1909	328	32	1735	361	1741	360	<b><u>1738</u></b>	<b><u>360</u></b>
433.milc	32	1095	268	<b><u>1095</u></b>	<b><u>268</u></b>	1095	268	32	<b><u>937</u></b>	<b><u>313</u></b>	937	313	937	314
434.zeusmp	32	686	424	676	431	<b><u>683</u></b>	<b><u>426</u></b>	32	<b><u>661</u></b>	<b><u>441</u></b>	661	440	660	441
435.gromacs	32	<b><u>568</u></b>	<b><u>402</u></b>	560	408	568	402	32	446	512	<b><u>449</u></b>	<b><u>509</u></b>	457	500
436.cactusADM	32	747	512	<b><u>747</u></b>	<b><u>512</u></b>	745	513	32	677	565	<b><u>677</u></b>	<b><u>565</u></b>	680	563
437.leslie3d	32	<b><u>1362</u></b>	<b><u>221</u></b>	1364	221	1361	221	32	1053	286	<b><u>1053</u></b>	<b><u>286</u></b>	1053	286
444.namd	32	790	325	<b><u>788</u></b>	<b><u>326</u></b>	786	326	32	676	380	<b><u>672</u></b>	<b><u>382</u></b>	664	386
447.dealII	32	503	728	506	723	<b><u>504</u></b>	<b><u>726</u></b>	32	<b><u>457</u></b>	<b><u>800</u></b>	462	793	457	801
450.soplex	32	1173	227	1003	266	<b><u>1003</u></b>	<b><u>266</u></b>	32	1075	248	<b><u>924</u></b>	<b><u>289</u></b>	919	291
453.povray	32	385	442	383	444	<b><u>384</u></b>	<b><u>443</u></b>	32	335	508	334	510	<b><u>335</u></b>	<b><u>508</u></b>
454.calculix	32	409	645	<b><u>408</u></b>	<b><u>647</u></b>	407	649	32	395	669	<b><u>392</u></b>	<b><u>674</u></b>	391	675
459.GemsFDTD	32	1659	205	<b><u>1661</u></b>	<b><u>204</u></b>	1662	204	32	1457	233	1453	234	<b><u>1455</u></b>	<b><u>233</u></b>
465.tonto	32	807	390	<b><u>806</u></b>	<b><u>391</u></b>	805	391	32	735	429	753	418	<b><u>737</u></b>	<b><u>427</u></b>
470.lbm	32	1006	437	1007	437	<b><u>1007</u></b>	<b><u>437</u></b>	32	<b><u>1003</u></b>	<b><u>438</u></b>	1004	438	1002	439
481.wrf	32	919	389	909	393	<b><u>911</u></b>	<b><u>392</u></b>	32	918	389	<b><u>913</u></b>	<b><u>392</u></b>	911	392
482.sphinx3	32	1863	335	1827	341	<b><u>1827</u></b>	<b><u>341</u></b>	32	1458	428	1396	447	<b><u>1423</u></b>	<b><u>438</u></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 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.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
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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 questions about this result, please contact the tester.  
For other inquiries, please contact [webmaster@spec.org](mailto:webmaster@spec.org).

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