



# SPEC<sup>®</sup> CFP2006 Result

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## Supermicro

Supermicro A+ Server 4022G-6F (H8DG6-F, Opteron 6366 HE)  
AMD Opteron 6366 HE

SPECfp<sup>®</sup>\_rate2006 = 350

SPECfp\_rate\_base2006 = 318

CPU2006 license: 001176

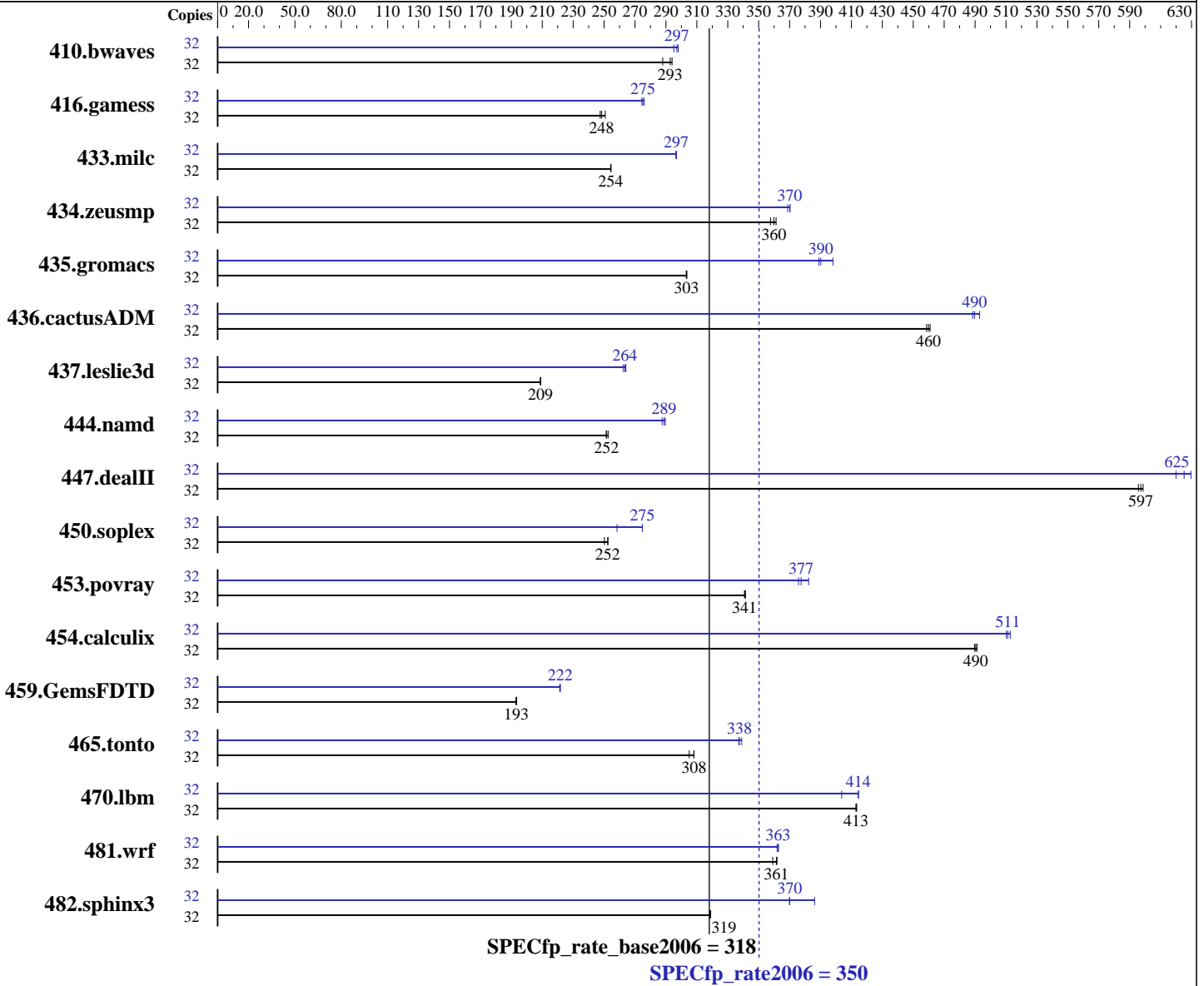
Test sponsor: Supermicro

Tested by: Supermicro

Test date: Sep-2012

Hardware Availability: Nov-2012

Software Availability: Aug-2012



### Hardware

CPU Name: AMD Opteron 6366 HE  
 CPU Characteristics: AMD Turbo CORE technology up to 3.10 GHz  
 CPU MHz: 1800  
 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 6.2, 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	1510	288	<b><u>1485</u></b>	<b><u>293</u></b>	1479	294	32	1460	298	1474	295	<b><u>1464</u></b>	<b><u>297</u></b>
416.gamess	32	2532	247	<b><u>2523</u></b>	<b><u>248</u></b>	2498	251	32	2270	276	2283	274	<b><u>2278</u></b>	<b><u>275</u></b>
433.milc	32	<b><u>1155</u></b>	<b><u>254</u></b>	1154	254	1155	254	32	<b><u>990</u></b>	<b><u>297</u></b>	991	297	990	297
434.zeusmp	32	<b><u>809</u></b>	<b><u>360</u></b>	814	358	806	361	32	<b><u>790</u></b>	<b><u>369</u></b>	<b><u>787</u></b>	<b><u>370</u></b>	786	370
435.gromacs	32	754	303	753	304	<b><u>753</u></b>	<b><u>303</u></b>	32	<b><u>586</u></b>	<b><u>390</u></b>	574	398	587	389
436.cactusADM	32	830	461	<b><u>832</u></b>	<b><u>460</u></b>	834	459	32	<b><u>781</u></b>	<b><u>490</u></b>	776	493	783	488
437.leslie3d	32	<b><u>1440</u></b>	<b><u>209</u></b>	1439	209	1441	209	32	<b><u>1141</u></b>	<b><u>264</u></b>	1139	264	1146	262
444.namd	32	<b><u>1020</u></b>	<b><u>252</u></b>	1021	251	1016	253	32	<b><u>889</u></b>	<b><u>289</u></b>	893	287	886	290
447.dealII	32	<b><u>613</u></b>	<b><u>597</u></b>	615	596	611	599	32	<b><u>581</u></b>	<b><u>630</u></b>	<b><u>586</u></b>	<b><u>625</u></b>	590	620
450.soplex	32	1066	250	1057	252	<b><u>1057</u></b>	<b><u>252</u></b>	32	1033	258	<b><u>971</u></b>	<b><u>275</u></b>	971	275
453.povray	32	<b><u>499</u></b>	<b><u>341</u></b>	500	341	499	341	32	453	376	<b><u>451</u></b>	<b><u>377</u></b>	445	382
454.calculix	32	<b><u>538</u></b>	<b><u>490</u></b>	539	490	537	491	32	<b><u>516</u></b>	<b><u>511</u></b>	515	513	517	510
459.GemsFDTD	32	1759	193	<b><u>1756</u></b>	<b><u>193</u></b>	1755	193	32	<b><u>1532</u></b>	<b><u>222</u></b>	1532	222	1534	221
465.tonto	32	1032	305	<b><u>1022</u></b>	<b><u>308</u></b>	1022	308	32	<b><u>933</u></b>	<b><u>338</u></b>	929	339	934	337
470.lbm	32	<b><u>1064</u></b>	<b><u>413</u></b>	1065	413	1064	413	32	1089	404	<b><u>1061</u></b>	<b><u>414</u></b>	1060	415
481.wrf	32	995	359	988	362	<b><u>989</u></b>	<b><u>361</u></b>	32	988	362	985	363	<b><u>986</u></b>	<b><u>363</u></b>
482.sphinx3	32	1957	319	1955	319	<b><u>1957</u></b>	<b><u>319</u></b>	32	<b><u>1685</u></b>	<b><u>370</u></b>	1615	386	1686	370

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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**CPU2006 license:** 001176  
**Test sponsor:** Supermicro  
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**Test date:** Sep-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 questions about this result, please contact the tester.  
For other inquiries, please contact [webmaster@spec.org](mailto:webmaster@spec.org).

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