



# SPEC<sup>®</sup> CFP2006 Result

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## Supermicro

Supermicro Processor Blade SBA-7222G-T2, (BHDGT,  
Opteron 6328)  
AMD Opteron 6328)

SPECfp<sup>®</sup>\_rate2006 = 313

SPECfp\_rate\_base2006 = 285

CPU2006 license: 001176

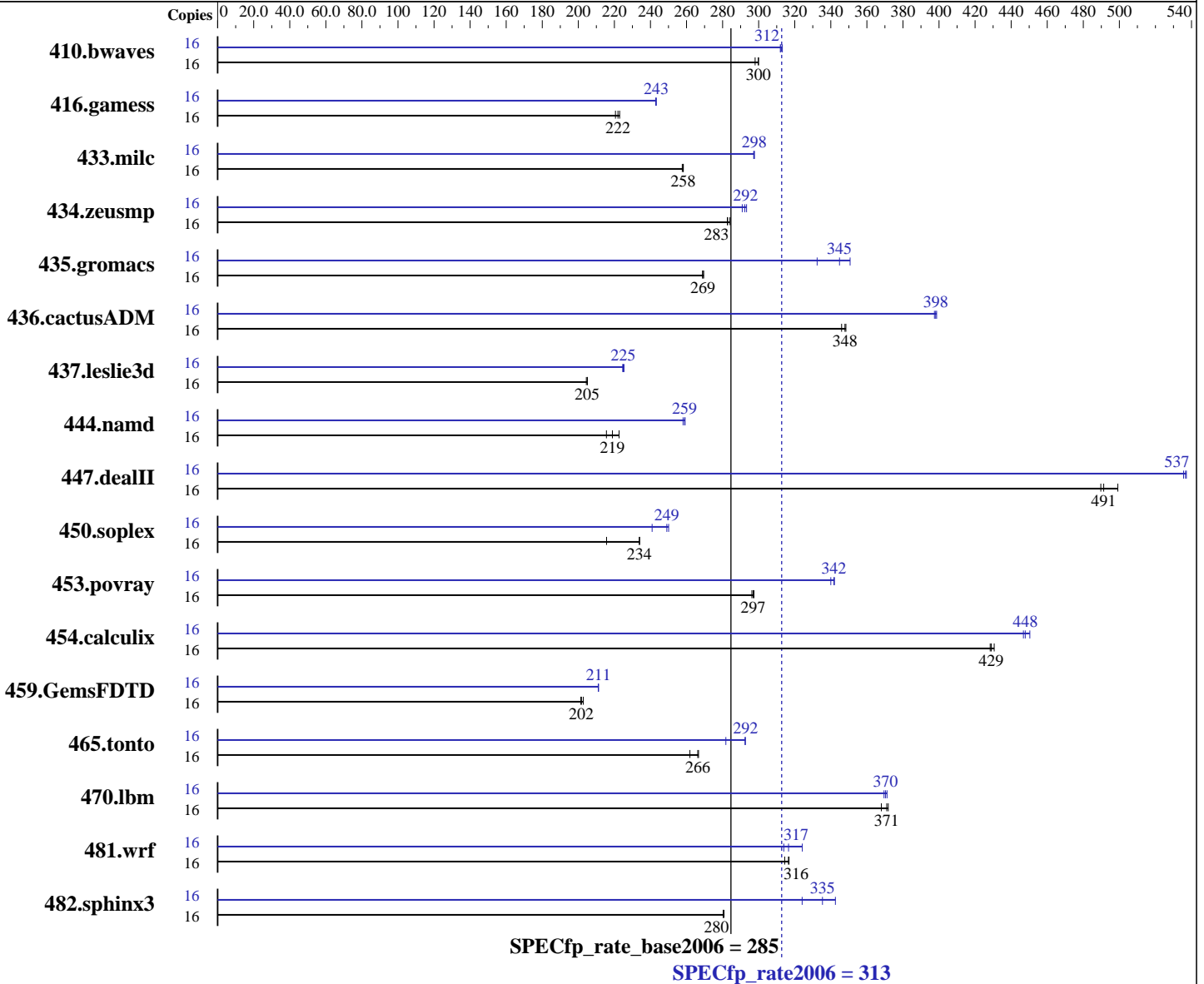
Test sponsor: Supermicro

Tested by: Supermicro

Test date: Oct-2012

Hardware Availability: Nov-2012

Software Availability: Aug-2012



### Hardware

CPU Name: AMD Opteron 6328  
 CPU Characteristics: AMD Turbo CORE technology up to 3.80 GHz  
 CPU MHz: 3200  
 FPU: Integrated  
 CPU(s) enabled: 16 cores, 2 chips, 8 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: 256 KB I on chip per chip,  
64 KB I shared / 2 cores;  
16 KB D on chip per core  
Secondary Cache: 8 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 / 4 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   |                   |                   |                   |                   |                    |                   |
|---------------|--------|-------------------|-------------------|--------------------|-------------------|--------------------|-------------------|--------|-------------------|-------------------|-------------------|-------------------|--------------------|-------------------|
|               | Copies | Seconds           | Ratio             | Seconds            | Ratio             | Seconds            | Ratio             | Copies | Seconds           | Ratio             | Seconds           | Ratio             | Seconds            | Ratio             |
| 410.bwaves    | 16     | 730               | 298               | 725                | 300               | <b><u>725</u></b>  | <b><u>300</u></b> | 16     | 694               | 313               | 697               | 312               | <b><u>696</u></b>  | <b><u>312</u></b> |
| 416.gamess    | 16     | 1420              | 221               | <b><u>1411</u></b> | <b><u>222</u></b> | 1405               | 223               | 16     | 1288              | 243               | 1290              | 243               | <b><u>1288</u></b> | <b><u>243</u></b> |
| 433.milc      | 16     | <b><u>569</u></b> | <b><u>258</u></b> | 570                | 258               | 569                | 258               | 16     | 494               | 298               | <b><u>494</u></b> | <b><u>298</u></b> | 494                | 297               |
| 434.zeusmp    | 16     | 513               | 284               | <b><u>515</u></b>  | <b><u>283</u></b> | 515                | 283               | 16     | 501               | 291               | <b><u>498</u></b> | <b><u>292</u></b> | 496                | 293               |
| 435.gromacs   | 16     | <b><u>425</u></b> | <b><u>269</u></b> | 424                | 270               | 425                | 269               | 16     | 326               | 351               | <b><u>331</u></b> | <b><u>345</u></b> | 344                | 332               |
| 436.cactusADM | 16     | <b><u>550</u></b> | <b><u>348</u></b> | 553                | 346               | 549                | 348               | 16     | 480               | 399               | <b><u>480</u></b> | <b><u>398</u></b> | 481                | 397               |
| 437.leslie3d  | 16     | <b><u>734</u></b> | <b><u>205</u></b> | 736                | 204               | 733                | 205               | 16     | 667               | 225               | <b><u>669</u></b> | <b><u>225</u></b> | 670                | 225               |
| 444.namd      | 16     | 595               | 216               | <b><u>586</u></b>  | <b><u>219</u></b> | 576                | 223               | 16     | 497               | 258               | <b><u>496</u></b> | <b><u>259</u></b> | 495                | 259               |
| 447.dealII    | 16     | 374               | 490               | 367                | 499               | <b><u>373</u></b>  | <b><u>491</u></b> | 16     | 341               | 537               | 342               | 536               | <b><u>341</u></b>  | <b><u>537</u></b> |
| 450.soplex    | 16     | 619               | 216               | <b><u>571</u></b>  | <b><u>234</u></b> | 570                | 234               | 16     | 554               | 241               | <b><u>536</u></b> | <b><u>249</u></b> | 534                | 250               |
| 453.povray    | 16     | 287               | 296               | <b><u>287</u></b>  | <b><u>297</u></b> | 286                | 297               | 16     | <b><u>249</u></b> | <b><u>342</u></b> | 250               | 340               | 249                | 342               |
| 454.calculix  | 16     | 307               | 431               | <b><u>308</u></b>  | <b><u>429</u></b> | 308                | 428               | 16     | 293               | 450               | <b><u>295</u></b> | <b><u>448</u></b> | 295                | 447               |
| 459.GemsFDTD  | 16     | <b><u>842</u></b> | <b><u>202</u></b> | 843                | 201               | 837                | 203               | 16     | <b><u>804</u></b> | <b><u>211</u></b> | 804               | 211               | 804                | 211               |
| 465.tonto     | 16     | <b><u>591</u></b> | <b><u>266</u></b> | 601                | 262               | 590                | 267               | 16     | 559               | 282               | 538               | 293               | <b><u>538</u></b>  | <b><u>292</u></b> |
| 470.lbm       | 16     | 597               | 368               | 591                | 372               | <b><u>593</u></b>  | <b><u>371</u></b> | 16     | 595               | 370               | 592               | 371               | <b><u>594</u></b>  | <b><u>370</u></b> |
| 481.wrf       | 16     | 564               | 317               | <b><u>565</u></b>  | <b><u>316</u></b> | 568                | 314               | 16     | 569               | 314               | 551               | 324               | <b><u>565</u></b>  | <b><u>317</u></b> |
| 482.sphinx3   | 16     | 1112              | 280               | 1110               | 281               | <b><u>1112</u></b> | <b><u>280</u></b> | 16     | 910               | 343               | 962               | 324               | <b><u>930</u></b>  | <b><u>335</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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SPECfp\_rate\_base2006 = 285

CPU2006 license: 001176

Test sponsor: Supermicro

Tested by: Supermicro

Test date: Oct-2012

Hardware Availability: Nov-2012

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## Operating System Notes (Continued)

```
Set vm/nr_hugepages=14336 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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CPU2006 license: 001176

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Test date: Oct-2012

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Software Availability: Aug-2012

## 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:bdt=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:bdt=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:bdt=2m:heap=2m -march=bdver1

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

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

Benchmarks using both Fortran and C:

435.gromacs: -Ofast -OPT:rsqrt=2 -HP:bdt=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:bdt=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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