



# SPEC<sup>®</sup> CFP2006 Result

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## Supermicro

(Test Sponsor: Advanced Micro Devices)

Supermicro A+ Server 1022G-NTF  
AMD Opteron 6204

SPECfp<sup>®</sup>\_rate2006 = 161

SPECfp\_rate\_base2006 = 151

CPU2006 license: 49

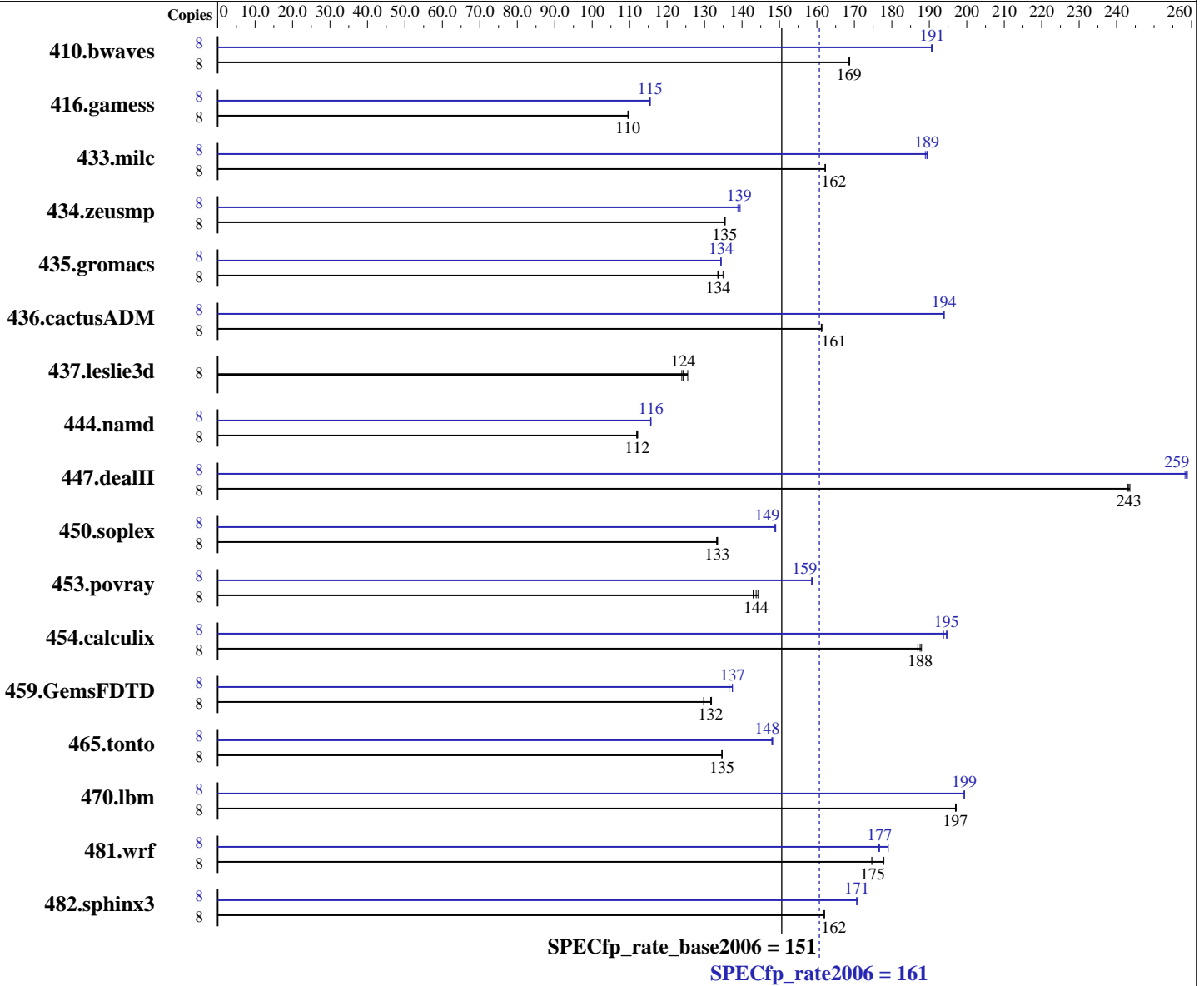
Test sponsor: Advanced Micro Devices

Tested by: Advanced Micro Devices

Test date: Oct-2011

Hardware Availability: Nov-2011

Software Availability: Jul-2011



### Hardware

CPU Name: AMD Opteron 6204  
 CPU Characteristics:  
 CPU MHz: 3300  
 FPU: Integrated  
 CPU(s) enabled: 8 cores, 2 chips, 4 cores/chip  
 CPU(s) orderable: 2,4 chips

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### Software

Operating System: Red Hat Enterprise Linux Server release 6.1,  
 Kernel 2.6.32-131.0.15.el6.x86\_64  
 Compiler: C/C++/Fortran: Version 4.2.5.2 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: 128 KB I on chip per chip,  
64 KB I shared / 2 cores;  
16 KB D on chip per core  
Secondary Cache: 4 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 / 2 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	8	644	169	<b>645</b>	<b>169</b>	645	169	8	570	191	<b>570</b>	<b>191</b>	571	191		
416.gamess	8	<b>1430</b>	<b>110</b>	1430	110	1429	110	8	1356	116	1357	115	<b>1357</b>	<b>115</b>		
433.milc	8	<b>453</b>	<b>162</b>	453	162	453	162	8	389	189	388	189	<b>388</b>	<b>189</b>		
434.zeusmp	8	537	136	<b>538</b>	<b>135</b>	538	135	8	524	139	<b>523</b>	<b>139</b>	522	140		
435.gromacs	8	423	135	<b>428</b>	<b>134</b>	428	134	8	425	134	<b>425</b>	<b>134</b>	425	134		
436.cactusADM	8	593	161	<b>593</b>	<b>161</b>	593	161	8	493	194	493	194	<b>493</b>	<b>194</b>		
437.leslie3d	8	599	126	607	124	<b>605</b>	<b>124</b>	8	599	126	607	124	<b>605</b>	<b>124</b>		
444.namd	8	574	112	572	112	<b>572</b>	<b>112</b>	8	555	116	<b>555</b>	<b>116</b>	555	116		
447.dealII	8	377	243	376	244	<b>376</b>	<b>243</b>	8	354	259	<b>354</b>	<b>259</b>	354	258		
450.soplex	8	<b>500</b>	<b>133</b>	500	133	501	133	8	448	149	448	149	<b>448</b>	<b>149</b>		
453.povray	8	298	143	<b>296</b>	<b>144</b>	295	144	8	268	159	268	159	<b>268</b>	<b>159</b>		
454.calculix	8	353	187	351	188	<b>352</b>	<b>188</b>	8	339	195	<b>339</b>	<b>195</b>	341	194		
459.GemsFDTD	8	654	130	644	132	<b>645</b>	<b>132</b>	8	622	137	<b>618</b>	<b>137</b>	618	137		
465.tonto	8	585	135	585	135	<b>585</b>	<b>135</b>	8	531	148	<b>532</b>	<b>148</b>	532	148		
470.lbm	8	<b>558</b>	<b>197</b>	558	197	557	197	8	551	199	<b>551</b>	<b>199</b>	552	199		
481.wrf	8	<b>511</b>	<b>175</b>	502	178	512	175	8	506	177	<b>506</b>	<b>177</b>	499	179		
482.sphinx3	8	963	162	962	162	<b>963</b>	<b>162</b>	8	912	171	914	171	<b>914</b>	<b>171</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 kernel/randomize\_va\_space=0 in /etc/sysctl.conf

Set vm/nr\_hugepages=7168 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 = "/root/work/cpu2006v1.1/amd1104-rate-libs-revA/32:/root/work/cpu2006v1.1/amd1104-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 6276 chips + 128GB 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  
454.calculix: -DSPEC\_CPU\_LP64  
459.GemsFDTD: -DSPEC\_CPU\_LP64  
465.tonto: -DSPEC\_CPU\_LP64

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## Base Portability Flags (Continued)

470.lbm: -DSPEC\_CPU\_LP64  
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:

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

### C++ benchmarks:

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

### Fortran benchmarks:

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

### Benchmarks using both Fortran and C:

-march=bdver1 -Ofast -OPT:malloc\_alg=1 -HP:bd=2m:heap=2m  
-IPA:plimit=8000 -IPA:small\_pu=100 -mso -LNO:blocking=off  
-OPT:rsqrt=2 -OPT:unroll\_size=256

## Peak Compiler Invocation

### C benchmarks:

openc

### C++ benchmarks:

openCC

### Fortran benchmarks:

openf95

### Benchmarks using both Fortran and C:

openc openf95

## Peak Portability Flags

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

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## Peak Portability Flags (Continued)

```

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
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
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 -mso

470.lbm: -march=bdver1 -Ofast -CG:cmp_peep=on
      -OPT:unroll_times_max=8 -OPT:unroll_size=256
      -OPT:unroll_level=2 -OPT:keep_ext=on -HP:bdt=2m:heap=2m
      -IPA:plimit=8000 -IPA:small_pu=100 -mso

482.sphinx3: -march=bdver1 -fb_create fbdata(pass 1)
      -fb_opt fbdata(pass 2) -Ofast -OPT:malloc_alg=2
      -CG:cmp_peep=on -CG:local_sched_alg=2 -INLINE:aggressive=on
      -LNO:prefetch=2 -LNO:prefetch_ahead=4 -mso

```

### 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 -D__OPEN64_FAST_SET -static
      -INLINE:aggressive=on -LNO:opt=0 -LNO:simd=0
      -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

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

```

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## Peak Optimization Flags (Continued)

450.soplex (continued):

```
-OPT:fold_unsigned_relops=on -fno-exceptions -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:bd=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 -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
```

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 -LNO:blocking=off -LNO:interchange=off
-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
```

465.tonto:

```
-march=bdver1 -Ofast -OPT:alias=no_f90_pointer_alias
-LNO:blocking=off -CG:load_exe=1 -IPA:plimit=525
-HP:bdt=2m:heap=2m
```

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
```

436.cactusADM:

```
-march=bdver1 -fb_create fbdata(pass 1)
-fb_opt fbdata(pass 2) -Ofast -LNO:blocking=off
-LNO:prefetch=2 -HP -CG:locs_shallow_depth=1 -CG:load_exe=0
-WOPT:sib=on
```

454.calculix:

```
-march=bdver1 -Ofast -OPT:unroll_size=256
-GRA:optimize_boundary=on -HP:bdt=2m:heap=2m
```

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## Peak Optimization Flags (Continued)

```
481.wrf: -march=bdver1 -Ofast -LNO:blocking=off -LANG:copyinout=off
        -IPA:callee_limit=5000 -GRA:prioritize_by_density=on
        -CG:load_exe=1 -HP -WOPT:sib=on
```

The flags files that were used to format this result can be browsed at

<http://www.spec.org/cpu2006/flags/x86-open64-425-flags-rate-revA.html>  
<http://www.spec.org/cpu2006/flags/amd1104-platform-rate-revA.html>

You can also download the XML flags sources by saving the following links:

<http://www.spec.org/cpu2006/flags/x86-open64-425-flags-rate-revA.xml>  
<http://www.spec.org/cpu2006/flags/amd1104-platform-rate-revA.xml>

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

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