



# SPEC<sup>®</sup> CFP2006 Result

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## Dell Inc.

PowerEdge R415  
(AMD Opteron 4228 HE, 2.80 GHz)

SPECfp<sup>®</sup>\_rate2006 = 170

SPECfp\_rate\_base2006 = 158

CPU2006 license: 55

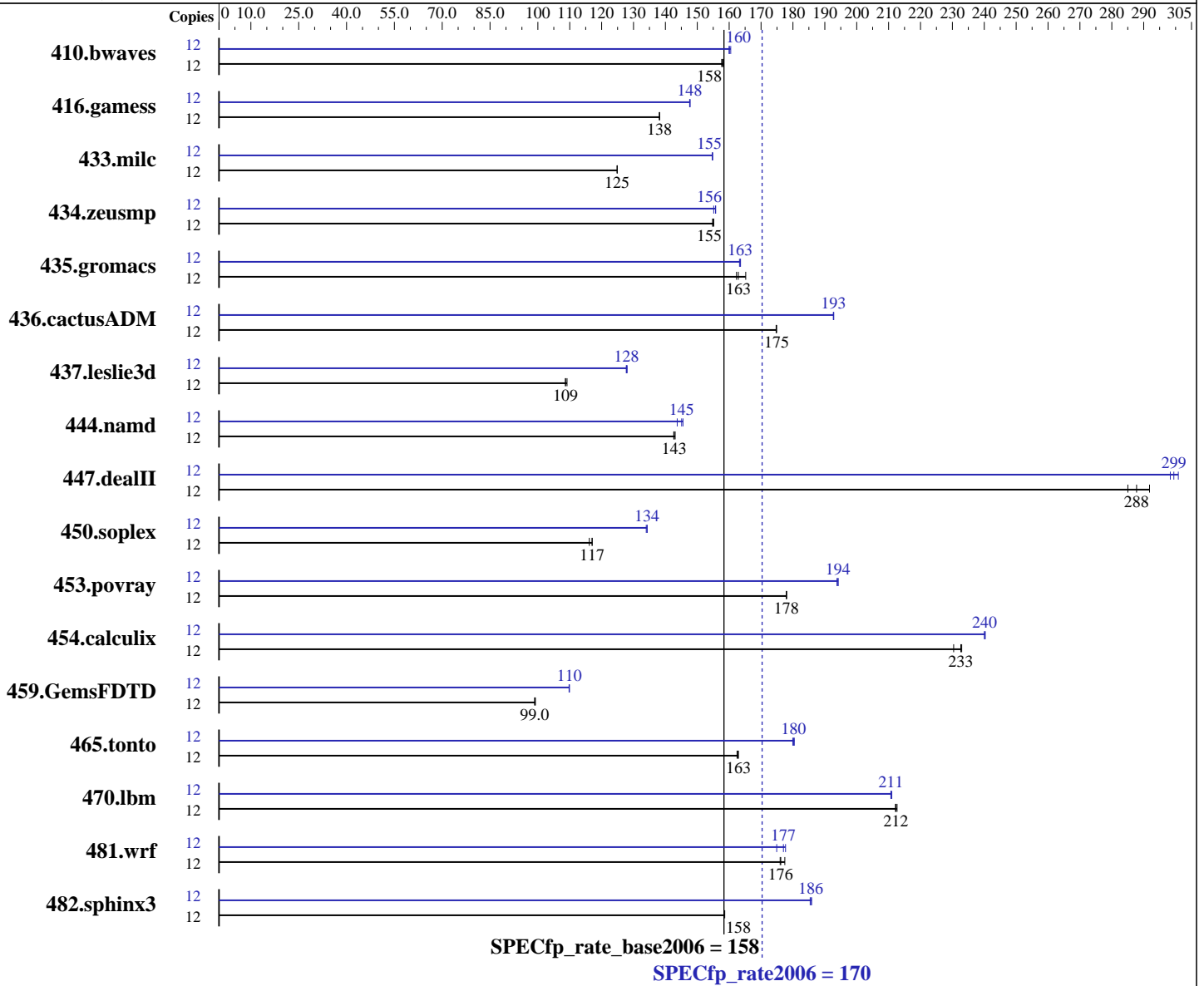
Test sponsor: Dell Inc.

Tested by: Dell Inc.

Test date: Dec-2011

Hardware Availability: Jan-2012

Software Availability: Jul-2011



**Hardware**

CPU Name: AMD Opteron 4228 HE  
 CPU Characteristics: AMD Turbo CORE technology up to 3.60 GHz  
 CPU MHz: 2800  
 FPU: Integrated  
 CPU(s) enabled: 12 cores, 2 chips, 6 cores/chip  
 CPU(s) orderable: 1,2 chips

**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: 192 KB I on chip per chip,  
64 KB I shared / 2 cores;  
16 KB D on chip per core

Secondary Cache: 6 MB I+D on chip per chip, 2 MB shared / 2 cores

L3 Cache: 8 MB I+D on chip per chip

Other Cache: None

Memory: 32 GB (4 x 8 GB 2Rx4 PC3-12800R-11, ECC)

Disk Subsystem: 2 x 73 GB SAS, 15000 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	12	1032	158	<u>1033</u>	<u>158</u>	1034	158	12	1019	160	1016	160	<u>1019</u>	<u>160</u>
416.gamess	12	1701	138	1701	138	<u>1701</u>	<u>138</u>	12	1590	148	<u>1591</u>	<u>148</u>	1592	148
433.milc	12	<u>882</u>	<u>125</u>	882	125	882	125	12	<u>712</u>	<u>155</u>	712	155	712	155
434.zeusmp	12	705	155	<u>705</u>	<u>155</u>	704	155	12	701	156	704	155	<u>701</u>	<u>156</u>
435.gromacs	12	528	162	519	165	<u>526</u>	<u>163</u>	12	<u>524</u>	<u>163</u>	524	164	525	163
436.cactusADM	12	820	175	<u>821</u>	<u>175</u>	821	175	12	744	193	<u>744</u>	<u>193</u>	744	193
437.leslie3d	12	<u>1038</u>	<u>109</u>	1033	109	1038	109	12	883	128	881	128	<u>883</u>	<u>128</u>
444.namd	12	673	143	675	143	<u>674</u>	<u>143</u>	12	661	146	<u>663</u>	<u>145</u>	670	144
447.dealII	12	470	292	<u>477</u>	<u>288</u>	482	285	12	<u>458</u>	<u>299</u>	456	301	460	298
450.soplex	12	862	116	855	117	<u>855</u>	<u>117</u>	12	745	134	<u>746</u>	<u>134</u>	747	134
453.povray	12	359	178	<u>359</u>	<u>178</u>	359	178	12	329	194	<u>329</u>	<u>194</u>	329	194
454.calculix	12	430	230	425	233	<u>426</u>	<u>233</u>	12	412	240	412	240	<u>412</u>	<u>240</u>
459.GemsFDTD	12	<u>1286</u>	<u>99.0</u>	1283	99.2	1286	99.0	12	1160	110	<u>1159</u>	<u>110</u>	1159	110
465.tonto	12	727	162	725	163	<u>725</u>	<u>163</u>	12	654	180	<u>655</u>	<u>180</u>	656	180
470.lbm	12	775	213	<u>777</u>	<u>212</u>	777	212	12	781	211	<u>782</u>	<u>211</u>	783	211
481.wrf	12	755	177	<u>761</u>	<u>176</u>	762	176	12	766	175	754	178	<u>757</u>	<u>177</u>
482.sphinx3	12	1477	158	1475	159	<u>1477</u>	<u>158</u>	12	1258	186	<u>1260</u>	<u>186</u>	1261	185

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  
Large pages were not enabled for this run  
Binaries were compiled on a system with 2x AMD Opteron 6276 chips + 128GB Memory using RHEL 6.1  
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## Operating System Notes (Continued)

Set kernel/randomize\_va\_space=0 in /etc/sysctl.conf

## General Notes

Environment variables set by runspec before the start of the run:  
LD\_LIBRARY\_PATH = "/root/cpu2006-1.1/amd1104-rate-libs-revA/32:/root/cpu2006-1.1/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>

## Base Compiler Invocation

C benchmarks:  
openc

C++ benchmarks:  
openCC

Fortran benchmarks:  
openf95

Benchmarks using both Fortran and C:  
openc 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.lelie3d: -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  
481.wrf: -DSPEC\_CPU\_LINUX -DSPEC\_CPU\_CASE\_FLAG -DSPEC\_CPU\_LP64  
-fno-second-underscore  
482.sphinx3: -DSPEC\_CPU\_LP64



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## 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:

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  
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

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## Peak 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

## 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.deallI: -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  
-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:bdt=2m:heap=2m -OPT:transform=2  
-OPT:alias=disjoint -WOPT:aggcm=0

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## Peak Optimization Flags (Continued)

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: -march=bdver1 -Ofast -CG:pre\_minreg\_level=2 -LNO:simd=0  
-LNO:fusion=2 -HP:bdt=2m:heap=2m -mso
- 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
- 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>



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

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<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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