



# SPEC<sup>®</sup> CFP2006 Result

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## Dell Inc.

PowerEdge R515  
(AMD Opteron 4256 EE, 1.60 GHz)

SPECfp<sup>®</sup>\_rate2006 = 144

SPECfp\_rate\_base2006 = 135

CPU2006 license: 55

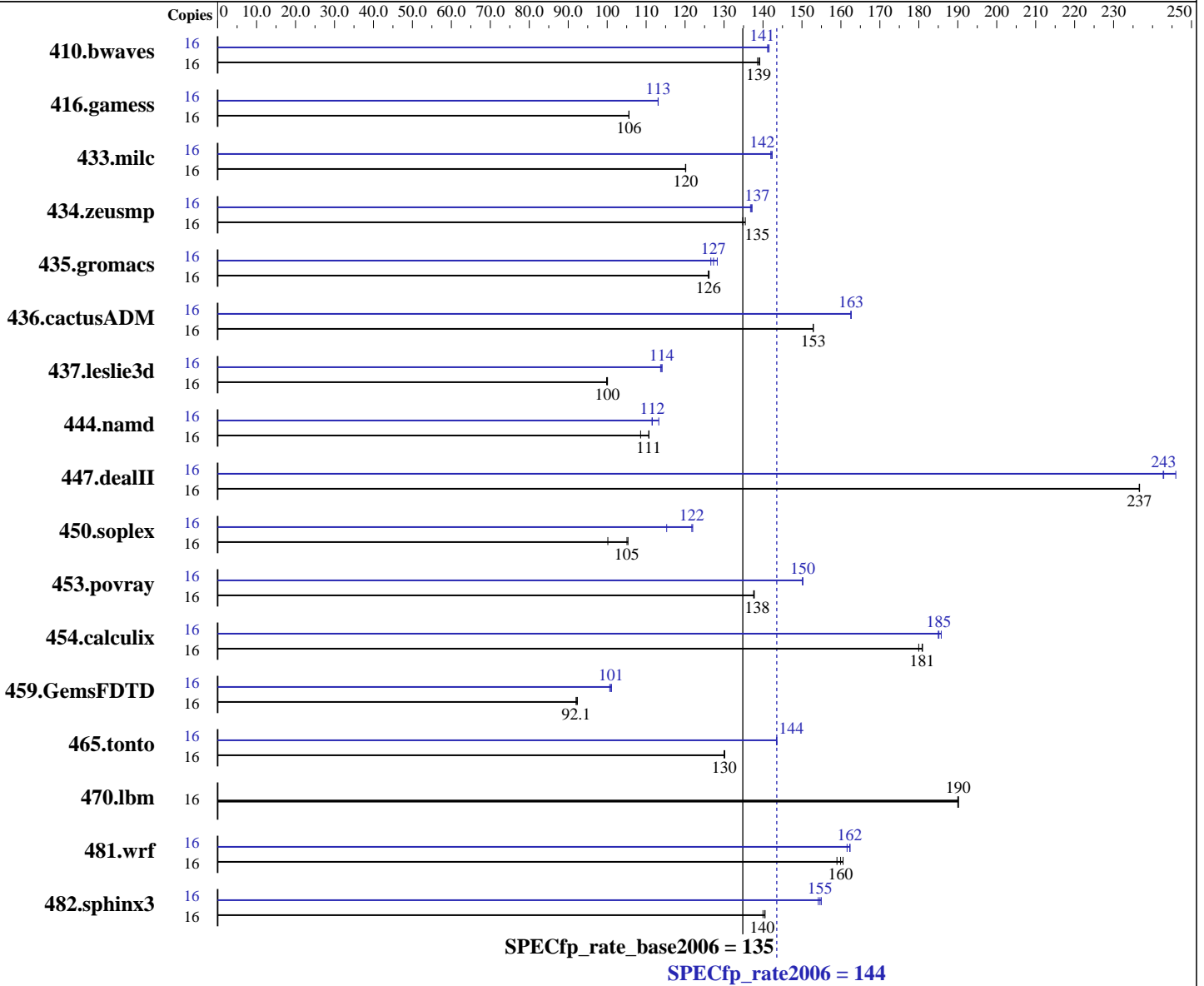
Test sponsor: Dell Inc.

Tested by: Dell Inc.

Test date: Nov-2011

Hardware Availability: Dec-2011

Software Availability: Jul-2011



### Hardware

CPU Name: AMD Opteron 4256 EE  
 CPU Characteristics: AMD Turbo CORE technology up to 2.80 GHz  
 CPU MHz: 1600  
 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 6.1, 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: ext4  
 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: 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	16	1569	139	1562	139	<b>1566</b>	<b>139</b>	16	<b>1539</b>	<b>141</b>	1536	142	1540	141		
416.gamess	16	2967	106	<b>2967</b>	<b>106</b>	2966	106	16	<b>2770</b>	<b>113</b>	2771	113	2770	113		
433.milc	16	1223	120	1222	120	<b>1222</b>	<b>120</b>	16	1032	142	<b>1034</b>	<b>142</b>	1034	142		
434.zeusmp	16	1075	135	<b>1080</b>	<b>135</b>	1080	135	16	1061	137	1064	137	<b>1062</b>	<b>137</b>		
435.gromacs	16	907	126	905	126	<b>907</b>	<b>126</b>	16	891	128	902	127	<b>897</b>	<b>127</b>		
436.cactusADM	16	<b>1251</b>	<b>153</b>	1251	153	1250	153	16	1176	163	1176	163	<b>1176</b>	<b>163</b>		
437.leslie3d	16	1503	100	1506	99.8	<b>1504</b>	<b>100</b>	16	1323	114	1318	114	<b>1319</b>	<b>114</b>		
444.namd	16	<b>1160</b>	<b>111</b>	1159	111	1182	109	16	1133	113	<b>1150</b>	<b>112</b>	1151	112		
447.dealII	16	<b>774</b>	<b>237</b>	773	237	774	237	16	754	243	<b>754</b>	<b>243</b>	744	246		
450.soplex	16	1332	100	1267	105	<b>1270</b>	<b>105</b>	16	1158	115	1094	122	<b>1096</b>	<b>122</b>		
453.povray	16	619	138	<b>618</b>	<b>138</b>	618	138	16	<b>567</b>	<b>150</b>	567	150	567	150		
454.calculix	16	<b>730</b>	<b>181</b>	733	180	729	181	16	<b>713</b>	<b>185</b>	711	186	714	185		
459.GemsFDTD	16	1838	92.4	<b>1844</b>	<b>92.1</b>	1844	92.0	16	1686	101	1679	101	<b>1681</b>	<b>101</b>		
465.tonto	16	1209	130	1211	130	<b>1210</b>	<b>130</b>	16	<b>1097</b>	<b>144</b>	1098	143	1097	144		
470.lbm	16	1156	190	<b>1156</b>	<b>190</b>	1157	190	16	1156	190	<b>1156</b>	<b>190</b>	1157	190		
481.wrf	16	1113	161	1124	159	<b>1118</b>	<b>160</b>	16	1101	162	<b>1101</b>	<b>162</b>	1106	162		
482.sphinx3	16	2227	140	2220	140	<b>2220</b>	<b>140</b>	16	2022	154	<b>2017</b>	<b>155</b>	2012	155		

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

## Platform Notes

'Power Management' set to 'Maximum Performance' in BIOS

## 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:  
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:**  
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

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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: basepeak = yes
```

```
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
```

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## Peak Optimization Flags (Continued)

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:bd=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:bd=2m:heap=2m -WOPT:sib=on

434.zeusmp: -march=bdver1 -Ofast -LNO:blocking=off -LNO:interchange=off  
-HP:bd=2m:heap=2m

437.leslie3d: -march=bdver1 -Ofast -CG:pre\_minreg\_level=2 -LNO:simd=0  
-LNO:fusion=2 -HP:bd=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:bd=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:bd=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:bd=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



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

<http://www.spec.org/cpu2006/flags/amd1104-platform-rate-revA.20111122.html>  
<http://www.spec.org/cpu2006/flags/x86-open64-425-flags-rate-revA.html>

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

<http://www.spec.org/cpu2006/flags/amd1104-platform-rate-revA.20111122.xml>  
<http://www.spec.org/cpu2006/flags/x86-open64-425-flags-rate-revA.xml>

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

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