



# SPEC<sup>®</sup> CFP2006 Result

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## Dell Inc.

### SPECfp<sup>®</sup>\_rate2006 = 117

### PowerEdge M605 (AMD Opteron 2384, 2.70 GHz)

### SPECfp\_rate\_base2006 = 104

CPU2006 license: 55

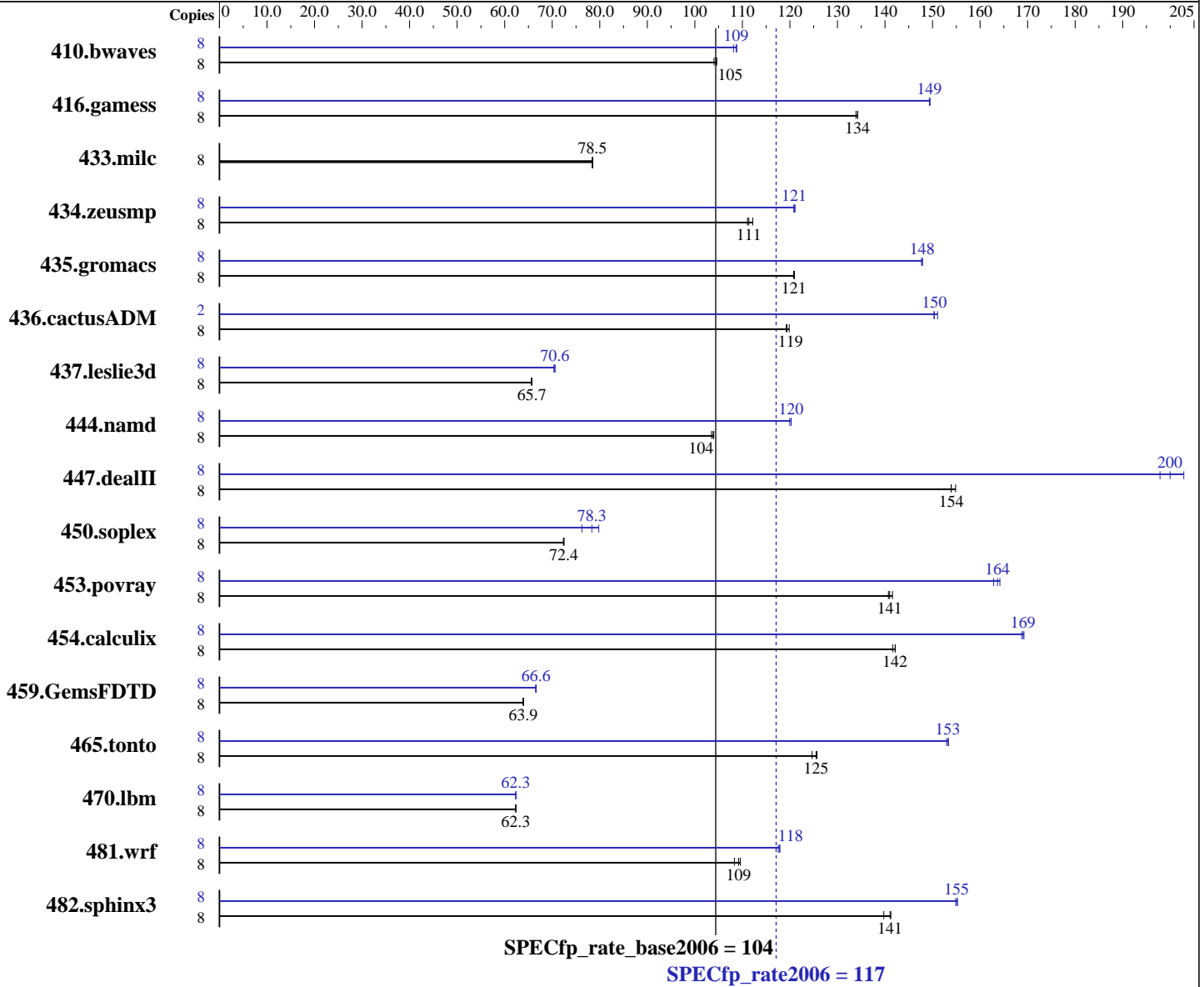
Test date: Nov-2008

Test sponsor: Dell Inc.

Hardware Availability: Nov-2008

Tested by: Dell Inc.

Software Availability: Oct-2008



#### Hardware

CPU Name: AMD Opteron 2384  
 CPU Characteristics:  
 CPU MHz: 2700  
 FPU: Integrated  
 CPU(s) enabled: 8 cores, 2 chips, 4 cores/chip  
 CPU(s) orderable: 1,2 chips  
 Primary Cache: 64 KB I + 64 KB D on chip per core  
 Secondary Cache: 512 KB I+D on chip per core

Continued on next page

#### Software

Operating System: SUSE Linux Enterprise Server 10 (x86\_64) SP2  
 Kernel 2.6.16.60-0.21-smp  
 Compiler: PGI Server Complete Version 7.2  
 PathScale Compiler Suite Version 3.2  
 Auto Parallel: Yes  
 File System: ReiserFS  
 System State: Run level 3 (multi-user)  
 Base Pointers: 64-bit  
 Peak Pointers: 32/64-bit

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L3 Cache: 6 MB I+D on chip per chip  
Other Cache: None  
Memory: 32 GB (8 x 4 GB DDR2-800)  
Disk Subsystem: 1 x 80 GB 5400 RPM SATA  
Other Hardware: None

Other Software: binutils 2.18  
32-bit and 64-bit libhugetlbfs libraries

## Results Table

| Benchmark     | Base   |             |             |             |             |             |             | Peak   |             |             |             |             |             |             |
|---------------|--------|-------------|-------------|-------------|-------------|-------------|-------------|--------|-------------|-------------|-------------|-------------|-------------|-------------|
|               | Copies | Seconds     | Ratio       | Seconds     | Ratio       | Seconds     | Ratio       | Copies | Seconds     | Ratio       | Seconds     | Ratio       | Seconds     | Ratio       |
| 410.bwaves    | 8      | 1045        | 104         | 1039        | 105         | <b>1040</b> | <b>105</b>  | 8      | 999         | 109         | <b>1000</b> | <b>109</b>  | 1005        | 108         |
| 416.gamess    | 8      | 1167        | 134         | <b>1167</b> | <b>134</b>  | 1170        | 134         | 8      | 1049        | 149         | 1048        | 149         | <b>1049</b> | <b>149</b>  |
| 433.milc      | 8      | 936         | 78.5        | <b>936</b>  | <b>78.5</b> | 936         | 78.4        | 8      | 936         | 78.5        | <b>936</b>  | <b>78.5</b> | 936         | 78.4        |
| 434.zeusmp    | 8      | 655         | 111         | <b>654</b>  | <b>111</b>  | 649         | 112         | 8      | 603         | 121         | 601         | 121         | <b>602</b>  | <b>121</b>  |
| 435.gromacs   | 8      | 472         | 121         | 473         | 121         | <b>473</b>  | <b>121</b>  | 8      | 386         | 148         | <b>386</b>  | <b>148</b>  | 387         | 148         |
| 436.cactusADM | 8      | 802         | 119         | <b>801</b>  | <b>119</b>  | 798         | 120         | 2      | 158         | 151         | <b>159</b>  | <b>150</b>  | 159         | 150         |
| 437.leslie3d  | 8      | 1146        | 65.6        | <b>1145</b> | <b>65.7</b> | 1144        | 65.7        | 8      | 1065        | 70.6        | 1069        | 70.3        | <b>1066</b> | <b>70.6</b> |
| 444.namd      | 8      | 617         | 104         | 620         | 104         | <b>618</b>  | <b>104</b>  | 8      | 535         | 120         | 533         | 120         | <b>534</b>  | <b>120</b>  |
| 447.dealII    | 8      | 595         | 154         | 591         | 155         | <b>595</b>  | <b>154</b>  | 8      | <b>458</b>  | <b>200</b>  | 463         | 198         | 451         | 203         |
| 450.soplex    | 8      | 922         | 72.4        | <b>921</b>  | <b>72.4</b> | 920         | 72.5        | 8      | <b>852</b>  | <b>78.3</b> | 875         | 76.2        | 836         | 79.8        |
| 453.povray    | 8      | 301         | 142         | 302         | 141         | <b>302</b>  | <b>141</b>  | 8      | 261         | 163         | <b>260</b>  | <b>164</b>  | 259         | 164         |
| 454.calculix  | 8      | 464         | 142         | 466         | 142         | <b>464</b>  | <b>142</b>  | 8      | 391         | 169         | <b>390</b>  | <b>169</b>  | 390         | 169         |
| 459.GemsFDTD  | 8      | 1327        | 64.0        | 1329        | 63.9        | <b>1328</b> | <b>63.9</b> | 8      | <b>1274</b> | <b>66.6</b> | 1276        | 66.5        | 1274        | 66.6        |
| 465.tonto     | 8      | 631         | 125         | <b>627</b>  | <b>125</b>  | 626         | 126         | 8      | 513         | 153         | <b>514</b>  | <b>153</b>  | 515         | 153         |
| 470.lbm       | 8      | <b>1763</b> | <b>62.3</b> | 1762        | 62.4        | 1763        | 62.3        | 8      | 1763        | 62.3        | <b>1763</b> | <b>62.3</b> | 1762        | 62.4        |
| 481.wrf       | 8      | <b>818</b>  | <b>109</b>  | 825         | 108         | 815         | 110         | 8      | 760         | 118         | 758         | 118         | <b>759</b>  | <b>118</b>  |
| 482.sphinx3   | 8      | <b>1105</b> | <b>141</b>  | 1116        | 140         | 1104        | 141         | 8      | 1007        | 155         | <b>1005</b> | <b>155</b>  | 1004        | 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

## Operating System Notes

The libhugetlbfs libraries were installed using the installation rpms that came with the distribution.

'ulimit -s unlimited' was used to set environment stack size  
'ulimit -l 2097152' was used to set environment locked pages in memory limit

Set vm/nr\_hugepages=7168 in /etc/sysctl.conf  
mount -t hugetlbfs nodev /mnt/hugepages



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## General Notes

Environment variables set by runspec before the start of the run:

HUGETLB\_MORECORE = "yes"

LD\_LIBRARY\_PATH = "/root/cpu2006\_1.1/amd909gh-libs/64:/root/cpu2006\_1.1/amd909gh-libs/32"

NCPUS = "4"

## Base Compiler Invocation

C benchmarks:

pgcc

C++ benchmarks:

pgcpp

Fortran benchmarks:

pgf95

Benchmarks using both Fortran and C:

pgcc pgf95

## 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 -Mnomain  
436.cactusADM: -DSPEC\_CPU\_LP64 -Mnomain  
437.leslie3d: -DSPEC\_CPU\_LP64  
444.namd: -DSPEC\_CPU\_LP64  
447.deall: -DSPEC\_CPU\_LP64  
450.soplex: -DSPEC\_CPU\_LP64  
453.povray: -DSPEC\_CPU\_LP64  
454.calculix: -DSPEC\_CPU\_LP64 -Mnomain  
459.GemsFDTD: -DSPEC\_CPU\_LP64  
465.tonto: -DSPEC\_CPU\_LP64  
470.lbm: -DSPEC\_CPU\_LP64  
481.wrf: -DSPEC\_CPU\_LP64 -DSPEC\_CPU\_CASE\_FLAG -DSPEC\_CPU\_LINUX  
482.sphinx3: -DSPEC\_CPU\_LP64

## Base Optimization Flags

C benchmarks:

-Mvect=cachesize:6291456 -fastsse -Msmartalloc=huge -Mfprelaxed  
-Mipa=fast -Mipa=inline -tp barcelona-64 -Bstatic\_pgi

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## Base Optimization Flags (Continued)

C++ benchmarks:

-Mvect=cachesize:6291456 -fastsse -Msmartalloc=huge -Mfprelaxed  
--zc\_eh -Mipa=fast -Mipa=inline -tp barcelona-64 -Bstatic\_pgi

Fortran benchmarks:

-Mvect=cachesize:6291456 -fastsse -Mfprelaxed -Msmartalloc=huge  
-Mipa=fast -Mipa=inline -tp barcelona-64 -Bstatic\_pgi

Benchmarks using both Fortran and C:

-Mvect=cachesize:6291456 -fastsse -Msmartalloc=huge -Mfprelaxed  
-Mipa=fast -Mipa=inline -tp barcelona-64 -Bstatic\_pgi

## Base Other Flags

C benchmarks:

-Mipa=jobs:4

C++ benchmarks:

-Mipa=jobs:4

Fortran benchmarks:

-Mipa=jobs:4

Benchmarks using both Fortran and C:

-Mipa=jobs:4

## Peak Compiler Invocation

C benchmarks:

pgcc

C++ benchmarks (except as noted below):

pathCC

444.namd: pgcpp

Fortran benchmarks (except as noted below):

pathf95

410.bwaves: pgf95

434.zeusmp: pgf95

437.leslie3d: pgf95

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## Peak Compiler Invocation (Continued)

Benchmarks using both Fortran and C (except as noted below):

pgcc pgf95

435.gromacs: pathcc pathf95

481.wrf: pathcc pathf95

## 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 -Mnomain  
 437.leslie3d: -DSPEC\_CPU\_LP64  
 444.namd: -DSPEC\_CPU\_LP64  
 453.povray: -DSPEC\_CPU\_LP64  
 454.calculix: -DSPEC\_CPU\_LP64 -Mnomain  
 459.GemsFDTD: -DSPEC\_CPU\_LP64  
 465.tonto: -DSPEC\_CPU\_LP64  
 470.lbm: -DSPEC\_CPU\_LP64  
 481.wrf: -DSPEC\_CPU\_LP64 -DSPEC\_CPU\_LINUX -fno-second-underscore  
 482.sphinx3: -DSPEC\_CPU\_LP64

## Peak Optimization Flags

C benchmarks:

433.milc: basepeak = yes

470.lbm: -Mvect=cachesize:6291456 -fastsse -Msmartalloc=huge  
-Mprefetch=t0 -Mloop32 -Mfprelaxed -Mipa=fast -Mipa=inline  
-tp barcelona-64 -Bstatic\_pgi

482.sphinx3: -Mpfi=indirect(pass 1) -Mpfo=indirect(pass 2)  
-Mipa=fast(pass 2) -Mipa=inline(pass 2)  
-Mvect=cachesize:6291456 -fastsse -Mfprelaxed -Msmartalloc  
-tp barcelona-64 -Bstatic\_pgi

C++ benchmarks:

444.namd: -Mpfi(pass 1) -Mpfo(pass 2) -Mipa=fast(pass 2)  
-Mipa=inline(pass 2) -Mvect=cachesize:6291456 -fastsse  
-Munroll=n:4 -Munroll=m:8 -Msmartalloc=huge -Mnodepch  
-Mfprelaxed --zc\_eh -tp barcelona-64 -Bstatic\_pgi

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## Peak Optimization Flags (Continued)

447.dealIII: -march=barcelona -Ofast -static -INLINE:aggressive=on  
-fno-exceptions -m32

450.soplex: -march=barcelona -fb\_create fbdata(pass 1)  
-fb\_opt fbdata(pass 2) -L/usr/lib -lhugetlbfs(pass 2) -O3  
-INLINE:aggressive=on -OPT:IEEE\_arith=3  
-OPT:IEEE\_NaN\_Inf=off -OPT:fold\_unsigned\_relops=on  
-OPT:malloc\_alg=1 -CG:load\_exe=0 -fno-exceptions -m32

453.povray: -march=barcelona -fb\_create fbdata(pass 1)  
-fb\_opt fbdata(pass 2) -Ofast -INLINE:aggressive=on

### Fortran benchmarks:

410.bwaves: -Mvect=cachesize:6291456 -fastsse -Msmartalloc  
-Mprefetch=nta -Mfpelaxed -Mipa=fast -Mipa=inline  
-tp barcelona-64 -Bstatic\_pgi

416.gamess: -march=barcelona -fb\_create fbdata(pass 1)  
-fb\_opt fbdata(pass 2)  
-Wl,-T/usr/share/libhugetlbfs/ldscripts/elf\_x86\_64.xBDT(pass 2)  
-L/usr/lib64 -lhugetlbfs(pass 2) -O2 -OPT:Ofast -OPT:ro=3  
-OPT:unroll\_size=256

434.zeusmp: -Mvect=cachesize:6291456 -fastsse -Mfpelaxed  
-Mprefetch=distance:8 -Mprefetch=t0 -Msmartalloc=huge  
-Msmartalloc=hugebss -Mipa=fast -Mipa=inline  
-tp barcelona-64 -Bstatic\_pgi

437.leslie3d: -Mphi=indirect(pass 1) -Mpfo=indirect(pass 2)  
-Mipa=fast(pass 2) -Mipa=inline(pass 2)  
-Mvect=cachesize:6291456 -fastsse -Mvect=fuse  
-Msmartalloc=huge -Mprefetch=distance:8 -Mprefetch=t0  
-Mfpelaxed -tp barcelona-64 -Bstatic\_pgi

459.GemsFDTD: -march=barcelona -Ofast -LNO:fission=2 -LNO:simd=2  
-LNO:prefetch\_ahead=1 -CG:load\_exe=0 -CG:prefer\_lru\_reg=off  
-OPT:malloc\_alg=1  
-Wl,-T/usr/share/libhugetlbfs/ldscripts/elf\_x86\_64.xBDT  
-L/usr/lib64 -lhugetlbfs

465.tonto: -march=barcelona -Ofast -OPT:alias=no\_f90\_pointer\_alias  
-LNO:blocking=off -CG:load\_exe=1 -IPA:plimit=525  
-OPT:malloc\_alg=1  
-Wl,-T/usr/share/libhugetlbfs/ldscripts/elf\_x86\_64.xBDT  
-L/usr/lib64 -lhugetlbfs

### Benchmarks using both Fortran and C:

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## Peak Optimization Flags (Continued)

435.gromacs: -march=barcelona -Ofast -OPT:rsqrt=2 -OPT:malloc\_alg=1  
-Wl,-T/usr/share/libhugetlbfs/ldscripts/elf\_x86\_64.xBDT  
-L/usr/lib64 -lhugetlbfs

436.cactusADM: -Mvect=cachesize:6291456 -fastsse -Mconcur  
-Msmartalloc=huge -Mfprelaxed -Mipa=fast -Mipa=inline  
-tp barcelona-64 -Bstatic\_pgi

454.calculix: -Mpfi=indirect(pass 1) -Mpfo=indirect(pass 2)  
-Mipa=fast(pass 2) -Mipa=inline(pass 2)  
-Mvect=cachesize:6291456 -fastsse -Msmartalloc=huge  
-Mprefetch=t0 -Mpre -Mfprelaxed -tp barcelona-64  
-Bstatic\_pgi

481.wrf: -march=barcelona -Ofast -LNO:blocking=off  
-LNO:prefetch\_ahead=10 -LANG:copyinout=off  
-IPA:callee\_limit=5000 -GRA:prioritize\_by\_density=on  
-OPT:malloc\_alg=1 -m3dnow  
-Wl,-T/usr/share/libhugetlbfs/ldscripts/elf\_x86\_64.xBDT  
-L/usr/lib64 -lhugetlbfs

## Peak Other Flags

C benchmarks:  
-Mipa=jobs:4(pass 2)

C++ benchmarks:  
444.namd: -Mipa=jobs:4(pass 2)

Fortran benchmarks (except as noted below):  
-Mipa=jobs:4(pass 2)

416.gamess: No flags used

459.GemsFDTD: No flags used

465.tonto: No flags used

Benchmarks using both Fortran and C (except as noted below):  
-Mipa=jobs:4(pass 2)

435.gromacs: No flags used

481.wrf: No flags used



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

[http://www.spec.org/cpu2006/flags/pgi72\\_linux\\_flags.20090713.html](http://www.spec.org/cpu2006/flags/pgi72_linux_flags.20090713.html)  
[http://www.spec.org/cpu2006/flags/CPU2006\\_flags.20090710.html](http://www.spec.org/cpu2006/flags/CPU2006_flags.20090710.html)  
<http://www.spec.org/cpu2006/flags/amd-platform-amd909gh.html>

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

[http://www.spec.org/cpu2006/flags/pgi72\\_linux\\_flags.20090713.xml](http://www.spec.org/cpu2006/flags/pgi72_linux_flags.20090713.xml)  
[http://www.spec.org/cpu2006/flags/CPU2006\\_flags.20090710.xml](http://www.spec.org/cpu2006/flags/CPU2006_flags.20090710.xml)  
<http://www.spec.org/cpu2006/flags/amd-platform-amd909gh.xml>

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