



# SPEC<sup>®</sup> CFP2006 Result

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## Dell Inc.

### SPECfp<sup>®</sup>\_rate2006 = 94.2

### PowerEdge 2970 (AMD Opteron 2360 SE, 2.5 GHz)

### SPECfp\_rate\_base2006 = 84.7

CPU2006 license: 55

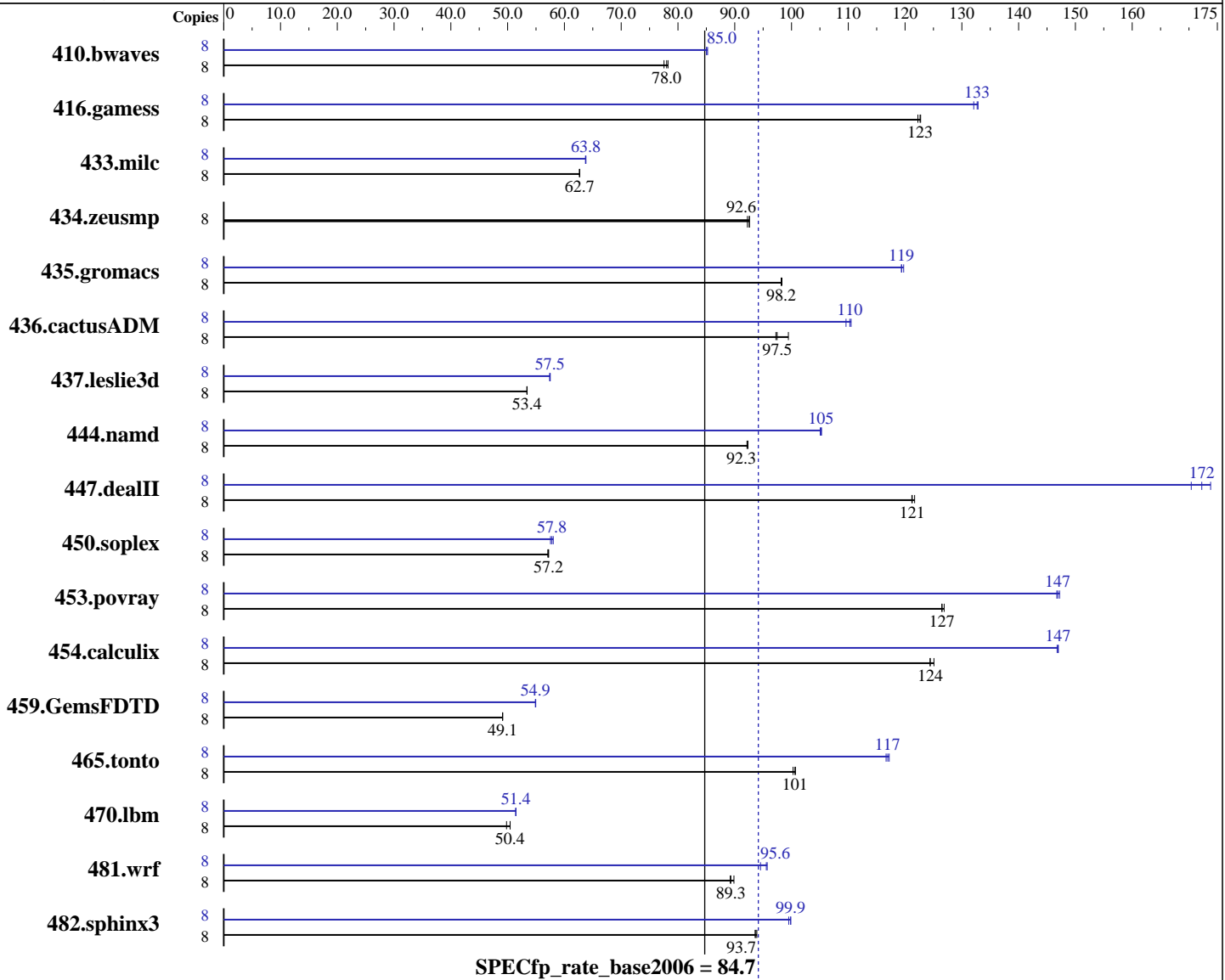
Test date: Jun-2008

Test sponsor: Dell Inc.

Hardware Availability: Jun-2008

Tested by: Dell Inc.

Software Availability: Jun-2008



#### Hardware

CPU Name: AMD Opteron 2360 SE  
 CPU Characteristics: 2500  
 CPU MHz: Integrated  
 FPU: 8 cores, 2 chips, 4 cores/chip  
 CPU(s) enabled: 1,2 chips  
 CPU(s) orderable: 64 KB I + 64 KB D on chip per core  
 Primary Cache: 512 KB I+D on chip per core  
 Secondary Cache:

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#### Software

Operating System: SUSE Linux Enterprise Server 10 (x86\_64) SP1, Kernel 2.6.16.46-0.12-smp  
 Compiler: PGI Server Complete Version 7.2 PathScale Compiler Suite Version 3.2  
 Auto Parallel: No  
 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: 2 MB I+D on chip per chip  
Other Cache: None  
Memory: 16 GB (4 x 4GB, DDR2-667, CL5)  
Disk Subsystem: 1 x 73GB 2.5" SAS 10000 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	1402	77.5	1389	78.2	<b>1394</b>	<b>78.0</b>	8	1276	85.2	1279	85.0	<b>1278</b>	<b>85.0</b>
416.gamess	8	1281	122	<b>1277</b>	<b>123</b>	1276	123	8	1186	132	1179	133	<b>1180</b>	<b>133</b>
433.milc	8	<b>1172</b>	<b>62.7</b>	1172	62.7	1172	62.7	8	1151	63.8	<b>1152</b>	<b>63.8</b>	1153	63.7
434.zeusmp	8	786	92.6	789	92.2	<b>786</b>	<b>92.6</b>	8	786	92.6	789	92.2	<b>786</b>	<b>92.6</b>
435.gromacs	8	581	98.3	<b>582</b>	<b>98.2</b>	582	98.2	8	477	120	479	119	<b>478</b>	<b>119</b>
436.cactusADM	8	983	97.3	961	99.4	<b>981</b>	<b>97.5</b>	8	872	110	<b>867</b>	<b>110</b>	865	110
437.leslie3d	8	1408	53.4	1407	53.4	<b>1408</b>	<b>53.4</b>	8	1308	57.5	1310	57.4	<b>1309</b>	<b>57.5</b>
444.namd	8	695	92.3	696	92.2	<b>695</b>	<b>92.3</b>	8	<b>610</b>	<b>105</b>	611	105	609	105
447.dealII	8	755	121	752	122	<b>755</b>	<b>121</b>	8	537	170	<b>531</b>	<b>172</b>	527	174
450.soplex	8	1169	57.1	<b>1167</b>	<b>57.2</b>	1166	57.2	8	1159	57.6	<b>1154</b>	<b>57.8</b>	1150	58.0
453.povray	8	335	127	<b>336</b>	<b>127</b>	337	126	8	<b>290</b>	<b>147</b>	290	147	289	147
454.calculix	8	531	124	528	125	<b>530</b>	<b>124</b>	8	<b>449</b>	<b>147</b>	449	147	450	147
459.GemsFDTD	8	1728	49.1	<b>1728</b>	<b>49.1</b>	1728	49.1	8	1545	55.0	1546	54.9	<b>1545</b>	<b>54.9</b>
465.tonto	8	<b>782</b>	<b>101</b>	782	101	785	100	8	<b>673</b>	<b>117</b>	675	117	672	117
470.lbm	8	2179	50.4	<b>2179</b>	<b>50.4</b>	2207	49.8	8	2137	51.4	<b>2137</b>	<b>51.4</b>	2137	51.4
481.wrf	8	<b>1001</b>	<b>89.3</b>	994	89.9	1002	89.2	8	<b>935</b>	<b>95.6</b>	945	94.5	934	95.7
482.sphinx3	8	1661	93.9	<b>1664</b>	<b>93.7</b>	1666	93.6	8	1567	99.5	1561	99.9	<b>1561</b>	<b>99.9</b>

Results appear in the order in which they were run. Bold underlined text indicates a median measurement.

## Operating System Notes

```
'numactl' was used to bind copies to the cores
Environment variable PGI_HUGE_PAGES set to 150
'ulimit -s unlimited' was used to set environment stack size
'ulimit -l 2097152' was used to set environment locked pages in memory limit
mount -t hugetlbfs nodev /mnt/hugepages
Set vm/nr_hugepages=1200 in /etc/sysctl.conf
```

## Base Compiler Invocation

C benchmarks:  
pgcc

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## Base Compiler Invocation (Continued)

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.dealII: -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:  
-fastsse -Msmartalloc=huge:150 -Mfprelaxed -Mipa=fast -Mipa=inline  
-tp barcelona-64 -Bstatic\_pgi

C++ benchmarks:  
-fastsse -Msmartalloc=huge:150 -Mfprelaxed --zc\_eh -Mipa=fast  
-Mipa=inline -tp barcelona-64 -Bstatic\_pgi

Fortran benchmarks:  
-fastsse -Mfprelaxed -Msmartalloc=huge:150 -Mipa=fast -Mipa=inline  
-tp barcelona-64 -Bstatic\_pgi

Benchmarks using both Fortran and C:  
-fastsse -Msmartalloc=huge:150 -Mfprelaxed -Mipa=fast -Mipa=inline  
-tp barcelona-64 -Bstatic\_pgi



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## 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 (except as noted below):

pgcc

470.lbm: pathcc

C++ benchmarks (except as noted below):

pathCC

444.namd: pgcpp

Fortran benchmarks (except as noted below):

pgf95

416.gamess: pathf95

459.GemsFDTD: pathf95

465.tonto: pathf95

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

pgcc pgf95

436.cactusADM: 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 -Mnomain

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## Peak Portability Flags (Continued)

436.cactusADM: -DSPEC\_CPU\_LP64 -fno-second-underscore  
 437.leslie3d: -DSPEC\_CPU\_LP64  
 444.namd: -DSPEC\_CPU\_LP64  
 447.dealII: -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

## Peak Optimization Flags

C benchmarks:

433.milc: -fastsse -Msmartalloc=huge:150 -Msafeptr -Mfprelaxed  
 -Mipa=inline -Mipa=arg -Mipa=const -Mipa=ptr -Mipa=shape  
 -tp barcelona-64 -Bstatic\_pgi  
 470.lbm: -march=barcelona -Ofast -CG:sse\_cse\_regs=0  
 -CG:locs\_shallow\_depth=1 -m3dnow  
 482.sphinx3: -Mpfi=indirect(pass 1) -Mpfo=indirect(pass 2)  
 -Mipa=fast(pass 2) -Mipa=inline(pass 2) -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) -fastsse -Munroll=n:4 -Munroll=m:8  
 -Msmartalloc=huge:150 -Mnodepchk -Mfprelaxed --zc\_eh  
 -tp barcelona-64 -Bstatic\_pgi  
 447.dealII: -march=barcelona -Ofast -static -INLINE:aggressive=on  
 -fno-exceptions -m32  
 450.soplex: -march=barcelona -fb\_create fbdata(pass 1)  
 -fb\_opt fbdata(pass 2) -O3 -TENV:frame\_pointer=off  
 -LNO:prefetch=1 -OPT:malloc\_alg=1 -CG:load\_exe=0 -m32  
 453.povray: -march=barcelona -fb\_create fbdata(pass 1)  
 -fb\_opt fbdata(pass 2) -Ofast

Fortran benchmarks:

410.bwaves: -Mpfi(pass 1) -Mpfo(pass 2) -Mipa=fast(pass 2)  
 -Mipa=inline(pass 2) -fastsse -Msmartalloc  
 -Mprefetch=distance:12 -Mprefetch=nta -Mpre -Mfprelaxed

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## Peak Optimization Flags (Continued)

410.bwaves (continued):

-tp barcelona-64 -Bstatic\_pgi

416.gamess: -march=barcelona -fb\_create fbdata(pass 1)

-fb\_opt fbdata(pass 2) -O2 -OPT:Ofast -OPT:ro=3

-OPT:unroll\_size=256

434.zeusmp: basepeak = yes

437.leslie3d: -Mphi=indirect(pass 1) -Mpfo=indirect(pass 2)

-Mipa=fast(pass 2) -Mipa=inline(pass 2) -fastsse

-Mvect=fuse -Msmartalloc=huge:150 -Mprefetch=distance:8

-Mprefetch=t0 -Mfprefaxed -tp barcelona-64 -Bstatic\_pgi

459.GemsFDTD: -march=barcelona -Ofast -LNO:fission=2 -LNO:simd=2

-LNO:prefetch\_ahead=1 -CG:load\_exe=0

465.tonto: -march=barcelona -Ofast -OPT:alias=no\_f90\_pointer\_alias

-LNO:blocking=off -CG:load\_exe=1 -IPA:plimit=525

Benchmarks using both Fortran and C:

435.gromacs: -fastsse -Msmartalloc=huge:150 -Mfprefaxed -Mfpapprox=rsqrt

-Mipa=fast -Mipa=inline -tp barcelona-64 -Bstatic\_pgi

436.cactusADM: -march=barcelona -fb\_create fbdata(pass 1)

-fb\_opt fbdata(pass 2) -Ofast -LNO:blocking=off

454.calculix: -Mphi=indirect(pass 1) -Mpfo=indirect(pass 2)

-Mipa=fast(pass 2) -Mipa=inline(pass 2) -fastsse

-Msmartalloc=huge:150 -Mprefetch=t0 -Mpre -Mfprefaxed

-tp barcelona-64 -Bstatic\_pgi

481.wrf: -fastsse -Mvect=noaltcode -Msmartalloc

-Mprefetch=distance:8 -Mfprefaxed -tp barcelona-64

-Bstatic\_pgi

## Peak Other Flags

C benchmarks (except as noted below):

-Mipa=jobs:4(pass 2)

470.lbm: No flags used

C++ benchmarks:

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

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## Peak Other Flags (Continued)

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)

436.cactusADM: No flags used

481.wrf: No flags used

The flags file that was used to format this result can be browsed at

<http://www.spec.org/cpu2006/flags/amd421GH-flags.20090713.01.html>

You can also download the XML flags source by saving the following link:

<http://www.spec.org/cpu2006/flags/amd421GH-flags.20090713.01.xml>

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