



# SPEC<sup>®</sup> CFP2006 Result

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Dell Inc.

SPECfp<sup>®</sup>\_rate2006 = 142

PowerEdge 2970 (AMD Opteron 2435, 2.60 GHz)

SPECfp\_rate\_base2006 = 128

CPU2006 license: 55

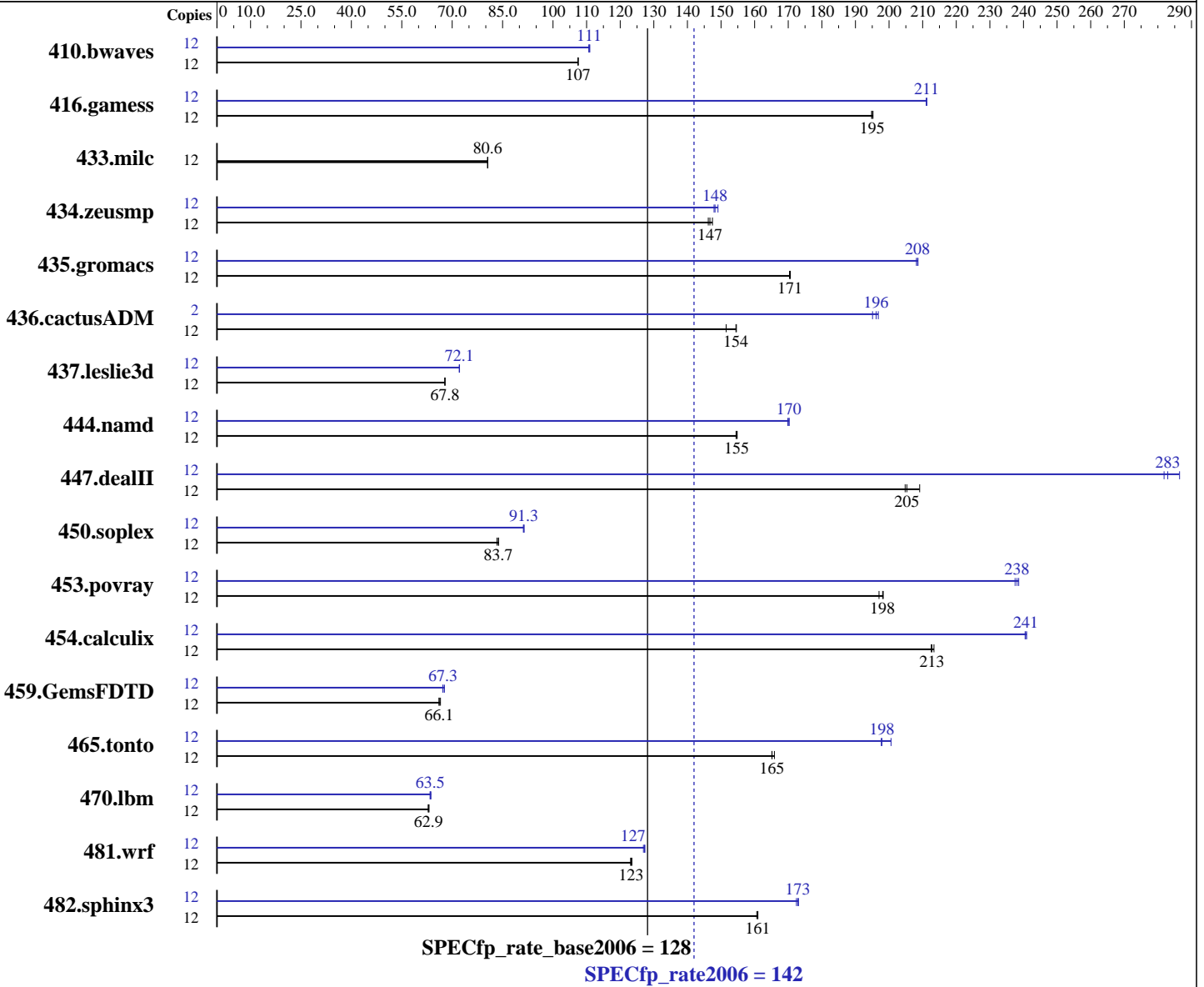
Test date: May-2009

Test sponsor: Dell Inc.

Hardware Availability: Jul-2009

Tested by: Dell Inc.

Software Availability: Apr-2009



### Hardware

CPU Name: AMD Opteron 2435  
 CPU Characteristics: 2600  
 CPU MHz: Integrated  
 FPU: Integrated  
 CPU(s) enabled: 12 cores, 2 chips, 6 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

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### Software

Operating System: Red Hat Enterprise Linux Server release 5.3, Kernel 2.6.18-128.el5  
 Compiler: PGI Server Complete Version 8.0 x86 Open64 4.2.2 Compiler Suite  
 Auto Parallel: Yes  
 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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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 73 GB 15000 RPM SAS  
Other Hardware: None

Other Software: binutils 2.18

## Results Table

Benchmark	Base							Peak						
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
410.bwaves	12	1517	107	<u>1517</u>	<u>107</u>	1518	107	12	1474	111	1470	111	<u>1472</u>	<u>111</u>
416.gamess	12	<u>1205</u>	<u>195</u>	1206	195	1204	195	12	1112	211	1113	211	<u>1112</u>	<u>211</u>
433.milc	12	<u>1367</u>	<u>80.6</u>	1367	80.6	1367	80.6	12	<u>1367</u>	<u>80.6</u>	1367	80.6	1367	80.6
434.zeusmp	12	747	146	<u>744</u>	<u>147</u>	741	147	12	<u>737</u>	<u>148</u>	738	148	732	149
435.gromacs	12	503	170	<u>502</u>	<u>171</u>	502	171	12	411	209	412	208	<u>411</u>	<u>208</u>
436.cactusADM	12	<u>929</u>	<u>154</u>	946	152	928	155	2	123	195	121	197	<u>122</u>	<u>196</u>
437.leslie3d	12	1662	67.9	<u>1663</u>	<u>67.8</u>	1663	67.8	12	<u>1564</u>	<u>72.1</u>	1563	72.2	1564	72.1
444.namd	12	<u>622</u>	<u>155</u>	623	154	622	155	12	567	170	565	170	<u>565</u>	<u>170</u>
447.dealII	12	670	205	<u>669</u>	<u>205</u>	656	209	12	487	282	479	286	<u>485</u>	<u>283</u>
450.soplex	12	1201	83.3	<u>1195</u>	<u>83.7</u>	1194	83.8	12	<u>1096</u>	<u>91.3</u>	1098	91.2	1095	91.4
453.povray	12	<u>322</u>	<u>198</u>	324	197	322	198	12	<u>268</u>	<u>238</u>	268	239	269	238
454.calculix	12	464	213	466	213	<u>465</u>	<u>213</u>	12	<u>411</u>	<u>241</u>	412	240	411	241
459.GemsFDTD	12	<u>1925</u>	<u>66.1</u>	1927	66.1	1914	66.5	12	1894	67.2	<u>1892</u>	<u>67.3</u>	1881	67.7
465.tonto	12	712	166	<u>715</u>	<u>165</u>	715	165	12	597	198	589	201	<u>597</u>	<u>198</u>
470.lbm	12	2612	63.1	2623	62.9	<u>2620</u>	<u>62.9</u>	12	2600	63.4	<u>2597</u>	<u>63.5</u>	2589	63.7
481.wrf	12	<u>1087</u>	<u>123</u>	1086	123	1089	123	12	1053	127	1056	127	<u>1053</u>	<u>127</u>
482.sphinx3	12	<u>1454</u>	<u>161</u>	1456	161	1453	161	12	1356	172	<u>1353</u>	<u>173</u>	1351	173

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 vm/nr\_hugepages=5400 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\_LIMIT = "450"

LD\_LIBRARY\_PATH = "/root/cpu2006-1.1/amd0905is-libs/64:/root/cpu2006-1.1/amd0905is-libs/32"

NCPUS = "6"

PGI\_HUGE\_PAGES = "450"

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:

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.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 -Mfprelaxed -Mipa=fast -Mipa=inline  
-tp shanghai-64 -Bstatic\_pgi

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## Base Optimization Flags (Continued)

C++ benchmarks:

-fastsse -Msmartalloc=huge -Mfprelaxed --zc\_eh -Mipa=fast  
-Mipa=inline -tp shanghai-64 -Bstatic\_pgi

Fortran benchmarks:

-fastsse -Msmartalloc=huge -Mfprelaxed -Mvect=short -Mipa=fast  
-Mipa=inline -tp shanghai-64 -Bstatic\_pgi

Benchmarks using both Fortran and C:

-fastsse -Msmartalloc=huge -Mfprelaxed -Mipa=fast -Mipa=inline  
-tp shanghai-64 -Mvect=short -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):

openCC

444.namd: pgcpp

Fortran benchmarks (except as noted below):

openf95

410.bwaves: pgf95

434.zeusmp: pgf95

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## Peak Compiler Invocation (Continued)

437.leslie3d: pgf95

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

pgcc pgf95

435.gromacs: 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 -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\_CASE\_FLAG -DSPEC\_CPU\_LINUX  
 482.sphinx3: -DSPEC\_CPU\_LP64

## Peak Optimization Flags

C benchmarks:

433.milc: basepeak = yes

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

482.sphinx3: -Mphi=indirect(pass 1) -Mpfo=indirect(pass 2)  
-Mipa=fast(pass 2) -Mipa=inline(pass 2) -fastsse  
-Mfprelaxed -Msmartalloc -tp shanghai-64 -Bstatic\_pgi

C++ benchmarks:

444.namd: -Mphi(pass 1) -Mpfo(pass 2) -Mipa=fast(pass 2)  
-Mipa=inline(pass 2) -fastsse -Munroll=n:4 -Munroll=m:8  
-Msmartalloc=huge -Mnodepchk -Mfprelaxed --zc\_eh  
-tp shanghai-64 -Bstatic\_pgi

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## Peak Optimization Flags (Continued)

447.dealIII: -march=barcelona -Ofast -static -INLINE:aggressive=on  
-LNO:opt=0 -Wf,-fno-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 -TENV:frame\_pointer=off

450.soplex: -march=barcelona -fb\_create fbdata(pass 1)  
-fb\_opt fbdata(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 -HP:bdt=2m

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

### Fortran benchmarks:

410.bwaves: -fastsse -Msmartalloc -Mprefetch=nta -Mfprelaxed  
-Mipa=fast -Mipa=inline -tp shanghai-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 -HP:bdt=2m:heap=2m

434.zeusmp: -fastsse -Mfprelaxed -Mprefetch=distance:8 -Mprefetch=t0  
-Msmartalloc=huge -Msmartalloc=hugebss -Mipa=fast  
-Mipa=inline -tp shanghai-64 -Bstatic\_pgi

437.leslie3d: -Mpfi=indirect(pass 1) -Mpfo=indirect(pass 2)  
-Mipa=fast(pass 2) -Mipa=inline(pass 2) -fastsse  
-Mvect=fuse -Msmartalloc=huge -Mprefetch=distance:8  
-Mprefetch=t0 -Mfprelaxed -tp shanghai-64 -Bstatic\_pgi

459.GemsFDTD: -march=barcelona -Ofast -LNO:fission=2 -LNO:simd=2  
-LNO:prefetch\_ahead=1 -CG:load\_exe=0 -HP

465.tonto: -march=barcelona -Ofast -OPT:alias=no\_f90\_pointer\_alias  
-LNO:blocking=off -CG:load\_exe=1 -IPA:plimit=525 -HP

### Benchmarks using both Fortran and C:

435.gromacs: -march=barcelona -Ofast -OPT:rsqrt=2 -HP:bdt=2m:heap=2m

436.cactusADM: -fastsse -Mconcur -Msmartalloc=huge -Mfprelaxed -Mipa=fast  
-Mipa=inline -tp shanghai-64 -Bstatic\_pgi

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

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## Peak Optimization Flags (Continued)

481.wrf: -fastsse -Mvect=noaltcode -Msmartalloc=huge  
-Mprefetch=distance:8 -Mfprelaxed -tp shanghai-64  
-Bstatic\_pgi

## Peak Other Flags

C benchmarks:

-Mipa=jobs:4(pass 2)

C++ benchmarks:

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

Fortran benchmarks:

410.bwaves: -Mipa=jobs:4

434.zeusmp: -Mipa=jobs:4

437.leslie3d: -Mipa=jobs:4(pass 2)

Benchmarks using both Fortran and C:

436.cactusADM: -Mipa=jobs:4

454.calculix: -Mipa=jobs:4(pass 2)

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

[http://www.spec.org/cpu2006/flags/pgi80\\_linux\\_flags.20090710.html](http://www.spec.org/cpu2006/flags/pgi80_linux_flags.20090710.html)

<http://www.spec.org/cpu2006/flags/x86-open64-4.2.2-flags.html>

<http://www.spec.org/cpu2006/flags/amd-platform.html>

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

[http://www.spec.org/cpu2006/flags/pgi80\\_linux\\_flags.20090710.xml](http://www.spec.org/cpu2006/flags/pgi80_linux_flags.20090710.xml)

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

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