



# SPEC® CFP2006 Result

Copyright 2006-2014 Standard Performance Evaluation Corporation

Dell Inc.

SPECfp®2006 = 21.1

PowerEdge 2970 (AMD Opteron 2378, 2.40 GHz)

SPECfp\_base2006 = 17.1

CPU2006 license: 55

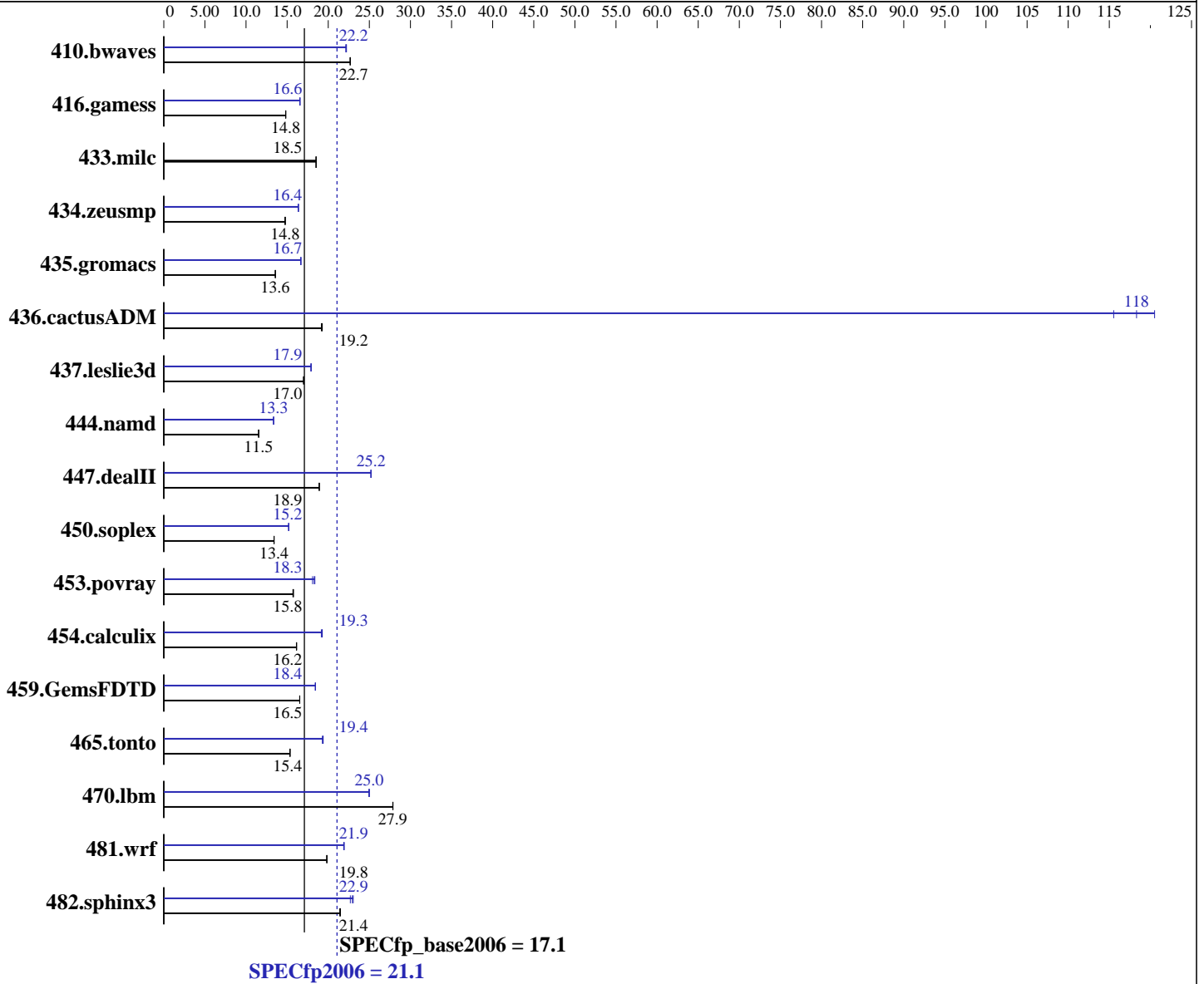
Test date: Dec-2008

Test sponsor: Dell Inc.

Hardware Availability: Nov-2008

Tested by: Dell Inc.

Software Availability: Oct-2008



## Hardware

CPU Name: AMD Opteron 2378  
 CPU Characteristics:  
 CPU MHz: 2400  
 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

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## 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 73 GB 15000 RPM SAS  
Other Hardware: None

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

## Results Table

Benchmark	Base						Peak					
	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
410.bwaves	600	22.7	<b>600</b>	<b>22.7</b>	599	22.7	614	22.1	<b>613</b>	<b>22.2</b>	612	22.2
416.gamess	<b>1321</b>	<b>14.8</b>	1319	14.8	1321	14.8	1183	16.5	<b>1182</b>	<b>16.6</b>	1182	16.6
433.milc	496	18.5	495	18.5	<b>496</b>	<b>18.5</b>	496	18.5	495	18.5	<b>496</b>	<b>18.5</b>
434.zeusmp	618	14.7	615	14.8	<b>616</b>	<b>14.8</b>	556	16.4	<b>556</b>	<b>16.4</b>	556	16.4
435.gromacs	526	13.6	<b>526</b>	<b>13.6</b>	526	13.6	428	16.7	<b>428</b>	<b>16.7</b>	428	16.7
436.cactusADM	620	19.3	<b>621</b>	<b>19.2</b>	624	19.2	99.2	121	<b>101</b>	<b>118</b>	103	116
437.leslie3d	552	17.0	553	17.0	<b>553</b>	<b>17.0</b>	<b>525</b>	<b>17.9</b>	525	17.9	524	17.9
444.namd	695	11.5	695	11.5	<b>695</b>	<b>11.5</b>	<b>601</b>	<b>13.3</b>	600	13.4	601	13.3
447.dealII	606	18.9	<b>605</b>	<b>18.9</b>	604	18.9	454	25.2	454	25.2	<b>454</b>	<b>25.2</b>
450.soplex	622	13.4	<b>622</b>	<b>13.4</b>	622	13.4	<b>549</b>	<b>15.2</b>	549	15.2	549	15.2
453.povray	<b>338</b>	<b>15.8</b>	339	15.7	338	15.8	290	18.4	294	18.1	<b>291</b>	<b>18.3</b>
454.calculix	<b>511</b>	<b>16.2</b>	512	16.1	511	16.2	431	19.2	<b>428</b>	<b>19.3</b>	428	19.3
459.GemsFDTD	<b>642</b>	<b>16.5</b>	641	16.5	642	16.5	576	18.4	<b>575</b>	<b>18.4</b>	575	18.4
465.tonto	642	15.3	640	15.4	<b>641</b>	<b>15.4</b>	508	19.4	<b>508</b>	<b>19.4</b>	510	19.3
470.lbm	493	27.9	<b>493</b>	<b>27.9</b>	493	27.9	551	24.9	<b>550</b>	<b>25.0</b>	550	25.0
481.wrf	563	19.8	564	19.8	<b>563</b>	<b>19.8</b>	509	21.9	511	21.9	<b>510</b>	<b>21.9</b>
482.sphinx3	910	21.4	907	21.5	<b>909</b>	<b>21.4</b>	846	23.0	859	22.7	<b>850</b>	<b>22.9</b>

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=7146 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 = "8"

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

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