



SPEC[®] CFP2006 Result

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Dell Inc.

SPECfp[®]_rate2006 = 1310

PowerEdge C6145 (AMD Opteron 6180 SE, 2.50 GHz)

SPECfp_rate_base2006 = 1200

CPU2006 license: 55

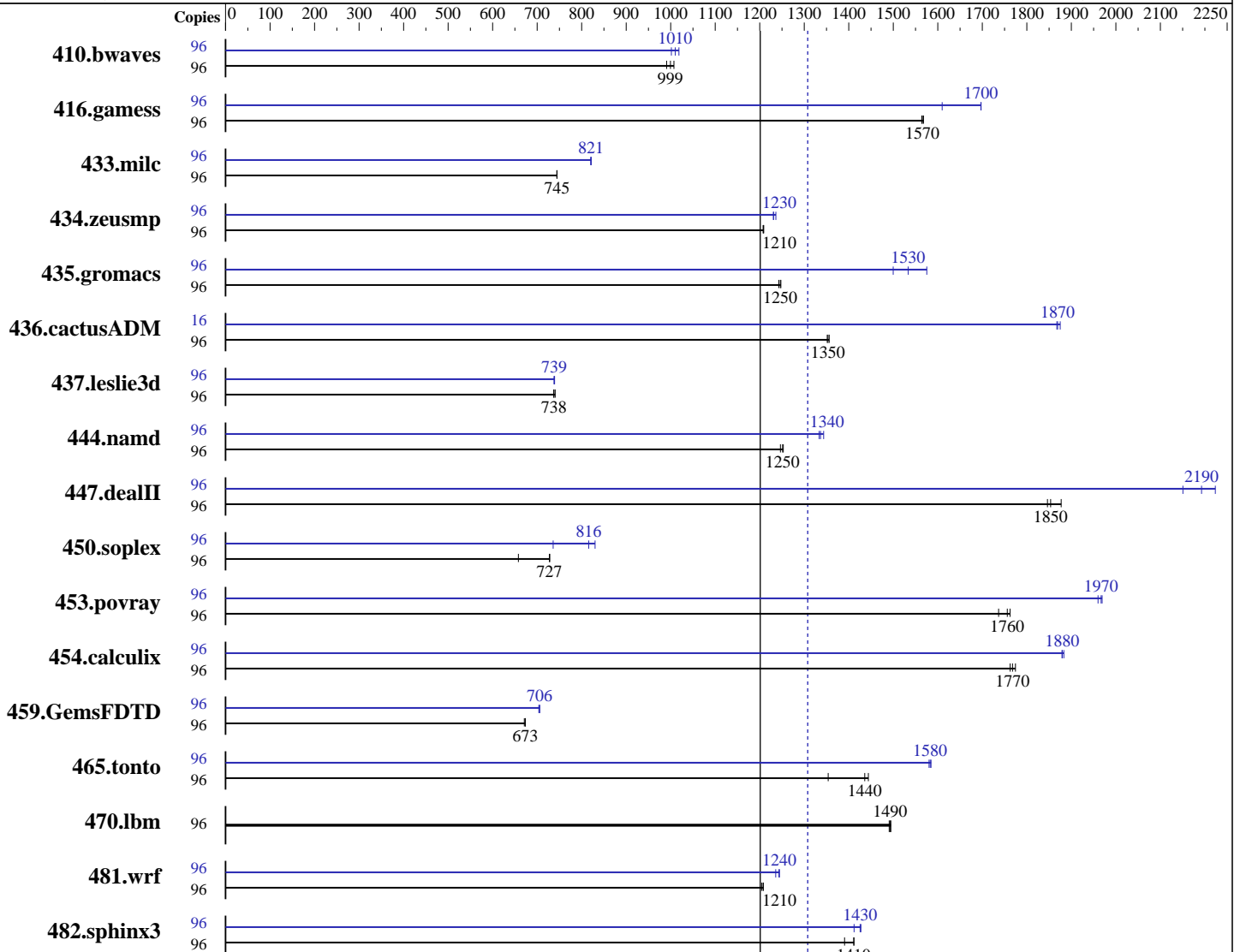
Test date: Feb-2011

Test sponsor: Dell Inc.

Hardware Availability: Feb-2011

Tested by: Dell Inc.

Software Availability: Jul-2010



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Hardware

CPU Name: AMD Opteron 6180 SE
 CPU Characteristics:
 CPU MHz: 2500
 FPU: Integrated
 CPU(s) enabled: 96 cores, 8 chips, 12 cores/chip
 CPU(s) orderable: 2,4 chips per node
 Primary Cache: 64 KB I + 64 KB D on chip per core
 Secondary Cache: 512 KB I+D on chip per core

Software

Operating System: SUSE Linux Enterprise Server 11 SP1 (x86_64)
 Kernel 2.6.32.12-0.7-default
 Compiler: x86 Open64 4.2.4 Compiler Suite (from AMD)
 Auto Parallel: Yes
 File System: NFSv3
 System State: Run level 3 (Full multiuser with network)
 Base Pointers: 64-bit
 Peak Pointers: 32/64-bit
 Other Software: None

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L3 Cache: 12 MB I+D on chip per chip, 6 MB shared / 6 cores
 Other Cache: None
 Memory: 128 GB (16 x 8 GB 2Rx4 PC3L-10600R-9, ECC, per node)
 Disk Subsystem: 1 x 500 GB 7200 RPM SATA local; PowerEdge C2100 via NFS (See additional details below)
 Other Hardware: None

Results Table

Benchmark	Base								Peak							
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio		
410.bwaves	96	1317	991	<u>1305</u>	<u>999</u>	1295	1010	96	1281	1020	1303	1000	<u>1291</u>	<u>1010</u>		
416.gamess	96	1202	1560	<u>1201</u>	<u>1570</u>	1199	1570	96	1107	1700	1168	1610	<u>1108</u>	<u>1700</u>		
433.milc	96	1184	744	1183	745	<u>1183</u>	<u>745</u>	96	<u>1074</u>	<u>821</u>	1073	821	1074	821		
434.zeusmp	96	<u>723</u>	<u>1210</u>	723	1210	723	1210	96	<u>710</u>	<u>1230</u>	707	1240	710	1230		
435.gromacs	96	549	1250	551	1240	<u>550</u>	<u>1250</u>	96	435	1580	457	1500	<u>447</u>	<u>1530</u>		
436.cactusADM	96	849	1350	846	1360	<u>848</u>	<u>1350</u>	16	102	1870	<u>102</u>	<u>1870</u>	102	1870		
437.leslie3d	96	1219	741	1224	737	<u>1223</u>	<u>738</u>	96	<u>1222</u>	<u>739</u>	1221	739	1223	738		
444.namd	96	618	1250	<u>615</u>	<u>1250</u>	614	1250	96	577	1330	<u>576</u>	<u>1340</u>	573	1340		
447.dealII	96	585	1880	<u>593</u>	<u>1850</u>	595	1850	96	<u>501</u>	<u>2190</u>	511	2150	494	2220		
450.soplex	96	1217	658	<u>1101</u>	<u>727</u>	1099	728	96	1088	736	<u>981</u>	<u>816</u>	964	830		
453.povray	96	294	1740	290	1760	<u>291</u>	<u>1760</u>	96	261	1960	<u>260</u>	<u>1970</u>	259	1970		
454.calculix	96	446	1770	<u>448</u>	<u>1770</u>	449	1760	96	422	1880	421	1880	<u>421</u>	<u>1880</u>		
459.GemsFDTD	96	1512	673	1518	671	<u>1513</u>	<u>673</u>	96	1444	706	<u>1444</u>	<u>706</u>	1447	704		
465.tonto	96	<u>658</u>	<u>1440</u>	698	1350	654	1440	96	596	1580	<u>597</u>	<u>1580</u>	598	1580		
470.lbm	96	883	1490	<u>883</u>	<u>1490</u>	885	1490	96	883	1490	<u>883</u>	<u>1490</u>	885	1490		
481.wrf	96	888	1210	890	1200	<u>888</u>	<u>1210</u>	96	868	1240	862	1240	<u>863</u>	<u>1240</u>		
482.sphinx3	96	1346	1390	1325	1410	<u>1326</u>	<u>1410</u>	96	1325	1410	1311	1430	<u>1313</u>	<u>1430</u>		

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, along with submit.pl to distribute jobs to the two nodes of the PowerEdge C6145. See the configuration file and flags file for details.

Operating System Notes

The following environment settings were set in the test user's .bashrc on each system

```

ulimit -s unlimited
ulimit -l 2097152
LD_LIBRARY_PATH=/cpu2006/amd1002-rate-libs-revC/64:/cpu2006/amd1002-rate-libs-revC/32
HUGETLB_LIMIT=450
OMP_NUM_THREADS=6

```

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Operating System Notes (Continued)

SLES 11 SP1 was installed on the local drive of each of the two nodes of the PowerEdge C6145
Set `vm/nr_hugepages=21600` in `/etc/sysctl.conf` on each system node
`mount -t hugetlbfs nodev /mnt/hugepages` on each system node
`MaxSessions = 1000` set in `/etc/ssh/sshd_config` on each system node
`ClientAliveCountMax = 100` set in `/etc/ssh/sshd_config` on each system node
`MaxStartups = 1000` set in `/etc/ssh/sshd_config` on each system node

Platform Notes

Storage Configuration for Disk Subsystem:
PowerEdge C2100 has 24 x 600 GB
10000 RPM SAS 6Gb disks under RAID-1 configuration
mounted over 1GbE network interface with these options
`"rw,noacl,hard,intr,rsiz=65536,wsiz=65536"` in the `/etc/fstab`.

General Notes

The x86 Open64 Compiler Suite is only available from (and supported by) AMD at
<http://developer.amd.com/cpu/open64>

Binaries were compiled on SLES10 SP2 with `binutils 2.18`

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`

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Base Portability Flags (Continued)

```

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
459.GemsFDTD: -DSPEC_CPU_LP64
465.tonto: -DSPEC_CPU_LP64
470.lbm: -DSPEC_CPU_LP64
481.wrf: -DSPEC_CPU_LP64 -DSPEC_CPU_LINUX -DSPEC_CPU_CASE_FLAG
      -fno-second-underscore
482.sphinx3: -DSPEC_CPU_LP64

```

Base Optimization Flags

C benchmarks:

-march=barcelona -mso -Ofast -OPT:malloc_alg=1 -HP:bdt=2m

C++ benchmarks:

-march=barcelona -mso -Ofast -static -INLINE:aggressive=on
-OPT:malloc_alg=1 -HP:bdt=2m

Fortran benchmarks:

-march=barcelona -mso -Ofast -HP

Benchmarks using both Fortran and C:

-march=barcelona -mso -Ofast -OPT:malloc_alg=1 -HP:bdt=2m -HP

Peak Compiler Invocation

C benchmarks:

openc

C++ benchmarks:

openCC

Fortran benchmarks:

openf95

Benchmarks using both Fortran and C:

openc openf95



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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 -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_LP64 -DSPEC_CPU_LINUX -DSPEC_CPU_CASE_FLAG
-fno-second-underscore
482.sphinx3: -DSPEC_CPU_LP64

```

Peak Optimization Flags

C benchmarks:

```

433.milc: -march=barcelona -mso -Ofast -CG:movnti=1
-CG:local_sched_alg=1 -CG:locs_shallow_depth=1
-HP:bdt=2m:heap=2m -LNO:prefetch=3

470.lbm: basepeak = yes

482.sphinx3: -march=barcelona -mso -fb_create fbdata(pass 1)
-fb_opt fbdata(pass 2) -Ofast -OPT:malloc_alg=2
-CG:sse_cse_regs=0 -CG:locs_shallow_depth=1 -CG:cmp_peep=on
-CG:local_sched_alg=1 -INLINE:aggressive=on

```

C++ benchmarks:

```

444.namd: -march=barcelona -mso -fb_create fbdata(pass 1)
-fb_opt fbdata(pass 2) -Ofast -LNO:ignore_feedback=off
-CG:local_sched_alg=2 -CG:load_exe=0 -CG:compute_to=on
-OPT:unroll_size=256 -fno-exceptions -HP:bdt=2m:heap=2m

447.dealII: -march=barcelona -mso -Ofast -static -INLINE:aggressive=on
-LNO:opt=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 -TENV:frame_pointer=off

450.soplex: -march=barcelona -mso -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

```

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Peak Optimization Flags (Continued)

450.soplex (continued):

-CG:load_exe=0 -fno-exceptions -m32 -HP:bdt=2m

453.povray: -march=barcelona -mso -fb_create fbdata(pass 1)

-fb_opt fbdata(pass 2) -Ofast -INLINE:aggressive=on

Fortran benchmarks:

410.bwaves: -march=barcelona -mso -O3 -OPT:Ofast -OPT:treeheight=on

-LNO:blocking=off -LNO:prefetch_ahead=5

-LNO:ignore_feedback=off -WOPT:aggstr=0 -HP:bdt=2m:heap=2m

-CG:cmp_peep=on

416.gamess: -march=barcelona -mso -fb_create fbdata(pass 1)

-fb_opt fbdata(pass 2) -O3 -LNO:fu=6 -LNO:blocking=0

-LNO:prefetch=0 -OPT:Ofast -OPT:ro=3 -OPT:unroll_size=256

-HP:bdt=2m:heap=2m

434.zeusmp: -march=barcelona -mso -Ofast -LNO:blocking=off

-LNO:interchange=off -OPT:treeheight=on -OPT:unroll_size=256

-CG:cmp_peep=on -GRA:prioritize_by_density=on -HP

437.leslie3d: -march=barcelona -mso -Ofast -HP:bdt=2m:heap=2m

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

-LNO:prefetch_ahead=1 -CG:load_exe=0 -CG:local_sched_alg=1

-HP

465.tonto: -march=barcelona -mso -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 -mso -Ofast -OPT:rsqrt=2

-HP:bdt=2m:heap=2m

436.cactusADM: -march=barcelona -mso -fb_create fbdata(pass 1)

-fb_opt fbdata(pass 2) -Ofast -apo -LNO:prefetch_ahead=1

-HP:bdt=2m:heap=2m -LANG:heap_allocation_threshold=100

454.calculix: -march=barcelona -mso -Ofast -CG:load_exe=0

-CG:ptr_load_use=0 -CG:local_sched_alg=2 -CG:compute_to=on

-LNO:prefetch_ahead=30 -WOPT:unroll=2

-GRA:optimize_boundary=on -HP:bdt=2m:heap=2m

481.wrf: -march=barcelona -mso -Ofast -LNO:blocking=off

-LNO:prefetch_ahead=10 -LANG:copyinout=off

-IPA:callee_limit=5000 -GRA:prioritize_by_density=on -m3dnow

-HP



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

- <http://www.spec.org/cpu2006/flags/x86-open64-424-flags-rate-revC.20101109.html>
- <http://www.spec.org/cpu2006/flags/amd-platform-rate-revC.20110119.html>
- <http://www.spec.org/cpu2006/flags/amd-6100-rate-cluster-revA.html>

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

- <http://www.spec.org/cpu2006/flags/x86-open64-424-flags-rate-revC.20101109.xml>
- <http://www.spec.org/cpu2006/flags/amd-platform-rate-revC.20110119.xml>
- <http://www.spec.org/cpu2006/flags/amd-6100-rate-cluster-revA.xml>

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