



SPEC[®] CFP2006 Result

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Dell Inc.

SPECfp[®]2006 = 45.0

PowerEdge R715 (AMD Opteron 6220, 3.00 GHz)

SPECfp_base2006 = 38.2

CPU2006 license: 55

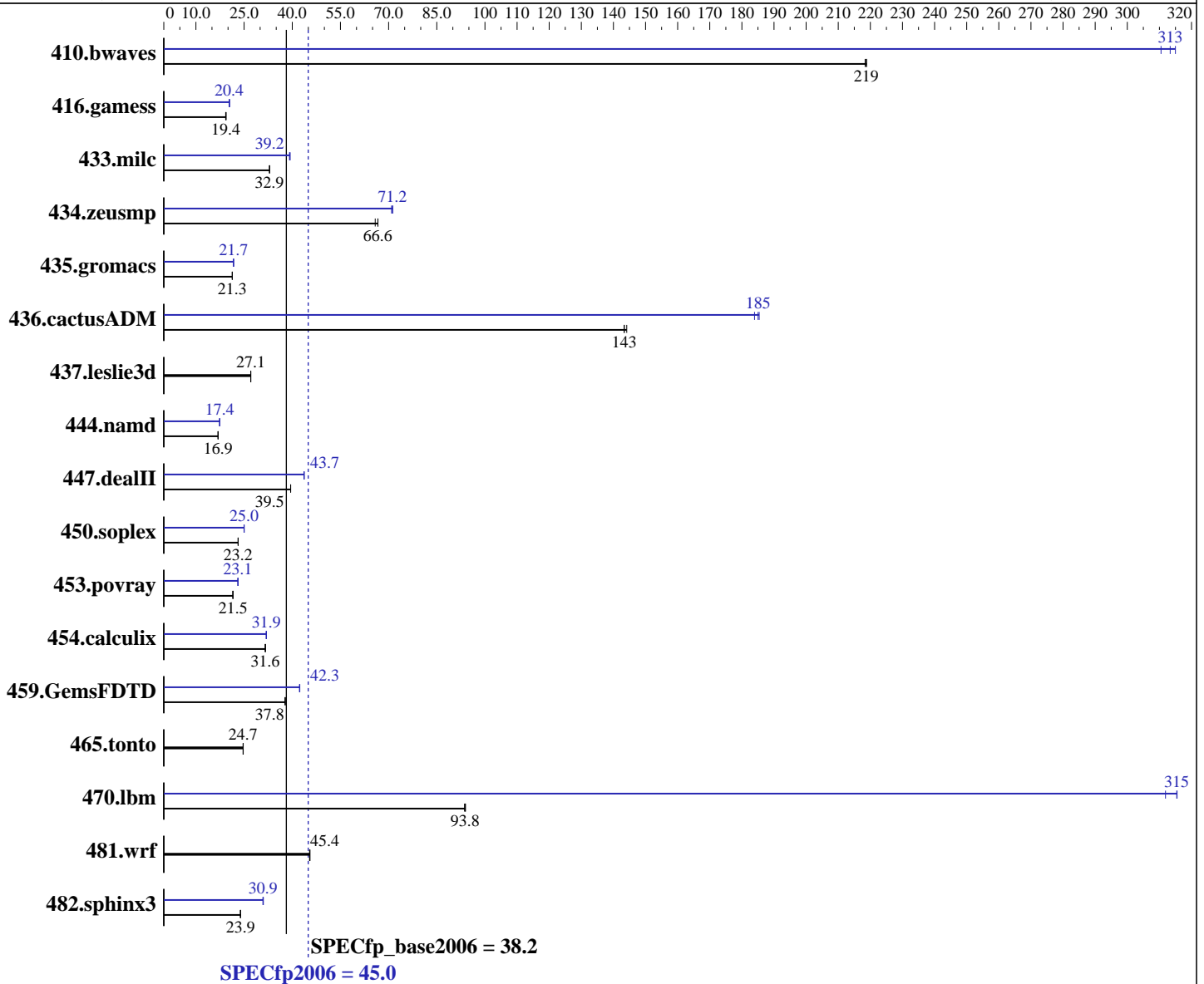
Test date: Jul-2012

Test sponsor: Dell Inc.

Hardware Availability: Nov-2011

Tested by: Dell Inc.

Software Availability: Jul-2011



Hardware

CPU Name: AMD Opteron 6220
 CPU Characteristics: AMD Turbo CORE technology up to 3.60 GHz
 CPU MHz: 3000
 FPU: Integrated
 CPU(s) enabled: 16 cores, 2 chips, 8 cores/chip
 CPU(s) orderable: 1,2 chips

Software

Operating System: SUSE Linux Enterprise Server 11 SP2 (x86_64) 3.0.13-0.27-default
 Compiler: C/C++/Fortran: Version 4.2.5.2 of x86 Open64 Compiler Suite (from AMD)
 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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Primary Cache: 256 KB I on chip per chip,
64 KB I shared / 2 cores;
16 KB D on chip per core

Secondary Cache: 8 MB I+D on chip per chip, 2 MB shared / 2 cores

L3 Cache: 16 MB I+D on chip per chip, 8 MB shared / 4 cores

Other Cache: None

Memory: 64 GB (8 x 8 GB 2Rx4 PC3-12800R-11, ECC)

Disk Subsystem: 3 x 146 GB SAS, 15000 RPM

Other Hardware: None

Other Software: None

Results Table

Benchmark	Base						Peak					
	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
410.bwaves	<u>62.1</u>	<u>219</u>	62.1	219	62.2	218	43.1	315	43.8	311	<u>43.4</u>	<u>313</u>
416.gamess	<u>1012</u>	<u>19.4</u>	1016	19.3	1010	19.4	955	20.5	<u>960</u>	<u>20.4</u>	962	20.4
433.milc	279	32.9	279	32.9	<u>279</u>	<u>32.9</u>	235	39.1	<u>234</u>	<u>39.2</u>	233	39.3
434.zeusmp	138	65.8	136	66.7	<u>137</u>	<u>66.6</u>	128	71.3	128	70.9	<u>128</u>	<u>71.2</u>
435.gromacs	<u>335</u>	<u>21.3</u>	335	21.3	335	21.3	<u>329</u>	<u>21.7</u>	329	21.7	329	21.7
436.cactusADM	83.4	143	82.9	144	<u>83.4</u>	<u>143</u>	65.0	184	<u>64.6</u>	<u>185</u>	64.5	185
437.leslie3d	<u>347</u>	<u>27.1</u>	347	27.1	347	27.1	<u>347</u>	<u>27.1</u>	347	27.1	347	27.1
444.namd	<u>475</u>	<u>16.9</u>	475	16.9	474	16.9	461	17.4	<u>461</u>	<u>17.4</u>	461	17.4
447.dealII	290	39.5	<u>290</u>	<u>39.5</u>	290	39.5	262	43.7	262	43.7	<u>262</u>	<u>43.7</u>
450.soplex	361	23.1	<u>360</u>	<u>23.2</u>	360	23.2	334	25.0	333	25.1	<u>334</u>	<u>25.0</u>
453.povray	247	21.6	<u>247</u>	<u>21.5</u>	248	21.5	<u>231</u>	<u>23.1</u>	230	23.1	231	23.1
454.calculix	261	31.6	261	31.7	<u>261</u>	<u>31.6</u>	<u>259</u>	<u>31.9</u>	258	31.9	259	31.9
459.GemsFDTD	281	37.8	<u>281</u>	<u>37.8</u>	280	37.8	251	42.3	<u>251</u>	<u>42.3</u>	251	42.2
465.tonto	399	24.7	398	24.7	<u>398</u>	<u>24.7</u>	399	24.7	398	24.7	<u>398</u>	<u>24.7</u>
470.lbm	<u>146</u>	<u>93.8</u>	147	93.6	146	93.9	43.5	316	<u>43.6</u>	<u>315</u>	44.1	312
481.wrf	245	45.5	<u>246</u>	<u>45.4</u>	246	45.4	245	45.5	<u>246</u>	<u>45.4</u>	246	45.4
482.sphinx3	815	23.9	817	23.9	<u>816</u>	<u>23.9</u>	<u>631</u>	<u>30.9</u>	631	30.9	629	31.0

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 transparent_hugepage=never as a boot parameter in /boot/grub/menu.lst
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Operating System Notes (Continued)

Set kernel/randomize_va_space=0 in /etc/sysctl.conf
cpuspeed stop was used to set the CPU frequency to its maximum.

Set vm/nr_hugepages=4000 in /etc/sysctl.conf
mount -t hugetlbfs nodev /mnt/hugepages

General Notes

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

```
HUGETLB_LIMIT = "4000"
LD_LIBRARY_PATH = "/root/cpu2006/amd1104-speed-libs-revA/32:/root/cpu2006/amd1104-speed-libs-revA/64"
O64_OMP_AFFINITY_MAP = "0,1,2,3,4,5,6,7,8,9,10,11,12,13,14,15"
O64_OMP_SPIN_COUNT = "800000"
O64_OMP_SPIN_USER_LOCK = "true"
```

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

Binaries were compiled on a system with 2x AMD Opteron 6220 chips + 64GB Memory using RHEL 6.1

Base Compiler Invocation

C benchmarks:
openc

C++ benchmarks:
openCC

Fortran benchmarks:
openf95

Benchmarks using both Fortran and C:
openc 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
437.leslie3d: -DSPEC_CPU_LP64
444.namd: -DSPEC_CPU_LP64
447.dealII: -DSPEC_CPU_LP64
450.soplex: -DSPEC_CPU_LP64
```

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Base Portability Flags (Continued)

```

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=bdver1 -Ofast -HP:bdt=2m:heap=2m -apo -mso
-OPT:alias=restricted -OPT:malloc_alg=2 -LNO:parallel_overhead=10000

```

C++ benchmarks:

```

-march=bdver1 -Ofast -static -CG:load_exe=0 -CG:p2align=0
-INLINE:aggressive=on -HP:bdt=2m:heap=2m -D__OPEN64_FAST_SET

```

Fortran benchmarks:

```

-march=bdver1 -Ofast -LNO:blocking=off -LNO:fusion_peeling_limit=0
-LNO:parallel_overhead=10000 -OPT:rsqrt=2 -OPT:unroll_size=256
-HP:bdt=2m:heap=2m -apo

```

Benchmarks using both Fortran and C:

```

-march=bdver1 -Ofast -HP:bdt=2m:heap=2m -apo -mso
-OPT:alias=restricted -OPT:malloc_alg=2 -LNO:parallel_overhead=10000
-LNO:blocking=off -LNO:fusion_peeling_limit=0 -OPT:rsqrt=2
-OPT:unroll_size=256

```

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
447.dealII: -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=bdver1 -Ofast -CG:movnti=1 -CG:locs_best=on
-HP:bdt=2m:heap=2m -IPA:plimit=7000 -IPA:callee_limit=1200
-OPT:struct_array_copy=2 -OPT:alias=field_sensitive

470.lbm: -march=bdver1 -Ofast -mso -apo -CG:sse_cse_regs=0
-LNO:prefetch_ahead=4 -CG:locs_shallow_depth=1
-CG:cmp_peep=on -CG:compute_to=on -OPT:unroll_times_max=8
-OPT:unroll_size=256 -OPT:unroll_level=2 -OPT:keep_ext=on
-OPT:alias=restricted -m3dnow -IPA:inline=off

482.sphinx3: -march=bdver1 -fb_create fbdata(pass 1)
-fb_opt fbdata(pass 2) -Ofast -LNO:loop_model_simd=on
-LNO:simd_rm_unity_remainder=on -OPT:malloc_alg=2
-CG:cmp_peep=on -CG:local_sched_alg=2 -CG:use_incdec=off
-INLINE:aggressive=on -WOPT:sib=on -HP

```

C++ benchmarks:

```

444.namd: -march=bdver1 -fb_create fbdata(pass 1)
-fb_opt fbdata(pass 2) -Ofast -LNO:ignore_feedback=off
-CG:local_sched_alg=2 -CG:load_exe=0 -OPT:unroll_size=256
-fno-exceptions -HP:bdt=2m:heap=2m

447.dealII: -march=bdver1 -Ofast -LNO:simd=0 -D__OPEN64_FAST_SET
-static -INLINE:aggressive=on -OPT:alias=disjoint
-OPT:unroll_times_max=8 -OPT:unroll_size=256
-OPT:unroll_level=2 -HP:bdt=2m:heap=2m

```

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Peak Optimization Flags (Continued)

450.soplex: -march=bdver1 -fb_create fbdata(pass 1)
 -fb_opt fbdata(pass 2) -O3 -INLINE:aggressive=on -OPT:RO=1
 -OPT:IEEE_arith=3 -OPT:IEEE_NaN_Inf=off
 -OPT:fold_unsigned_relops=on -fno-exceptions -CG:p2align=0
 -m32 -HP:bdt=2m:heap=2m -WOPT:sib=on

453.povray: -march=bdver1 -fb_create fbdata(pass 1)
 -fb_opt fbdata(pass 2) -Ofast -CG:pre_local_sched=off
 -INLINE:aggressive=on -HP:bdt=2m:heap=2m -OPT:transform=2
 -OPT:alias=disjoint -WOPT:aggcm=0

Fortran benchmarks:

410.bwaves: -march=bdver1 -fb_create fbdata(pass 1)
 -fb_opt fbdata(pass 2) -Ofast -apo -OPT:Ofast
 -OPT:treeheight=on -LNO:blocking=off -LNO:prefetch=2
 -LNO:pf2=0 -LNO:prefetch_ahead=3 -LNO:ignore_feedback=off
 -LNO:fu=4 -LNO:loop_model_simd=on
 -LNO:simd_rm_unity_remainder=on -WOPT:aggstr=0
 -HP:bdt=2m:heap=2m -CG:cmp_peep=on -CG:p2align=0

416.gamess: -march=bdver1 -fb_create fbdata(pass 1)
 -fb_opt fbdata(pass 2) -O3 -LNO:fu=6 -LNO:blocking=0
 -LNO:simd=0 -OPT:Ofast -OPT:ro=3 -OPT:unroll_size=256
 -OPT:unroll_times_max=2 -CG:local_sched_alg=1
 -HP:bdt=2m:heap=2m -WOPT:sib=on

434.zeusmp: -march=bdver1 -Ofast -apo -LNO:blocking=off
 -LNO:interchange=off -LNO:fusion_peeling_limit=0
 -OPT:treeheight=on -OPT:unroll_size=256 -CG:cmp_peep=on
 -CG:compute_to=on -GRA:prioritize_by_density=on
 -HP:bdt=2m:heap=2m

437.leslie3d: basepeak = yes

459.GemsFDTD: -march=bdver1 -Ofast -OPT:unroll_size=0 -LNO:fission=2
 -CG:load_exe=0 -CG:local_sched_alg=2 -HP -apo

465.tonto: basepeak = yes

Benchmarks using both Fortran and C:

435.gromacs: -march=bdver1 -fb_create fbdata(pass 1)
 -fb_opt fbdata(pass 2) -Ofast -OPT:rsqrt=2
 -HP:bdt=2m:heap=2m

436.cactusADM: -march=bdver1 -fb_create fbdata(pass 1)
 -fb_opt fbdata(pass 2) -Ofast -LNO:blocking=off
 -LNO:prefetch=2 -HP:bdt=2m:heap=2m -CG:locs_shallow_depth=1

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Peak Optimization Flags (Continued)

436.cactusADM (continued):

-CG:load_exe=0 -WOPT:sib=on -apo

454.calculix: -march=bdver1 -Ofast -OPT:unroll_size=256

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

481.wrf: basepeak = yes

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

<http://www.spec.org/cpu2006/flags/x86-open64-425-flags-speed-revA-I.html>

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

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

<http://www.spec.org/cpu2006/flags/x86-open64-425-flags-speed-revA-I.xml>

<http://www.spec.org/cpu2006/flags/amd-platform-speed-revA-I.xml>

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