Dell Inc.

PowerEdge M915 (AMD Opteron 6176, 2.3 GHz)

**SPECfp®_rate2006 = 635**

**SPECfp_rate_base2006 = 586**

- **CPU2006 license:** 55
- **Test sponsor:** Dell Inc.
- **Tested by:** Dell Inc.
- **Test date:** May-2011
- **Hardware Availability:** May-2011
- **Software Availability:** Jul-2010

### Hardware

- **CPU Name:** AMD Opteron 6176
- **CPU Characteristics:**
  - CPU MHz: 2300
  - FPU: Integrated
  - CPU(s) enabled: 48 cores, 4 chips, 12 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

### Software

- **Operating System:** SUSE Linux Enterprise Server 11 (x86_64), Kernel 2.6.27.19-5-default
- **Compiler:** x86 Open64 4.2.4 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
- **Other Software:** None

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**Continued on next page**
## Dell Inc.

PowerEdge M915 (AMD Opteron 6176, 2.3 GHz)

**CPU2006 license:** 55  
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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 (32 x 4 GB 2Rx4 PC3-10600R-9, ECC)  
| Disk Subsystem: | 1 x 146 GB 10000 RPM SAS  
| Other Hardware: | None

### Results Table

<table>
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</tbody>
</table>

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=21600 in /etc/sysctl.conf  
mount -t hugetlbfs nodev /mnt/hugepages
Dell Inc. PowerEdge M915 (AMD Opteron 6176, 2.3 GHz)

\[
\begin{align*}
\text{SPECfp\_rate2006} &= 635 \\
\text{SPECfp\_rate\_base2006} &= 586
\end{align*}
\]

CPU2006 license: 55
Test sponsor: Dell Inc.
Tested by: Dell Inc.
Test date: May-2011
Hardware Availability: May-2011
Software Availability: Jul-2010

**General Notes**

- environment variables set by runspec before the start of the run:
  - HUGETLB\_LIMIT = "450"
  - LD\_LIBRARY\_PATH = "/root/cpu2006-1.1/amd1002-rate-libs-revC/64:/root/cpu2006-1.1/amd1002-rate-libs-revC/32"
  - OMP\_NUM\_THREADS = "6"

  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
- 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
- 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
Dell Inc.  
PowerEdge M915 (AMD Opteron 6176, 2.3 GHz)  

**SPEC fp_rate2006 = 635**  
**SPEC fp_rate_base2006 = 586**

<table>
<thead>
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<tr>
<td>Tested by:</td>
<td>Dell Inc.</td>
<td>Software Availability: Jul-2010</td>
</tr>
</tbody>
</table>

### 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**:
  - `opencc`

- **C++ benchmarks**:
  - `openCC`

- **Fortran benchmarks**:
  - `openf95`

- **Benchmarks using both Fortran and C**:
  - `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 -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  
  -ms -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  
  -ms -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  
  -ms -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  
  -ms -Ofast -static  
  -INLINE:aggressive=on  
  -LNO:opt=0  
  -fno-emit-exceptions -m32  
  -OPT:unroll_times_max=8  
  -OPT:unroll_size=256  
  -LNO:blocking=0  
  -LNO:prefetch=0  
  -OPT:ro=3  
  -OPT:unroll_size=256  
  -CG:load_exe=0  
  -fno-exceptions -m32  
  -HP:bdt=2m  
  -GRA:unspill=on

450.soplex:  
- march=barcelona  
  -ms -fb_create fbdata(pass 1)  
  -fb_opt fbdata(pass 2)  
  -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  
  -CG:cmp_peep=on  
  -TENV:frame_pointer=off

453.povray:  
- march=barcelona  
  -ms -fb_create fbdata(pass 1)  
  -fb_opt fbdata(pass 2)  
  -Ofast -INLINE:aggressive=on

**Fortran benchmarks:**

410.bwaves:  
- march=barcelona  
  -ms -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  
  -ms -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  
  -ms -Ofast -LNO:blocking=off  
  -LNO:interchange=off -OPT:treeheight=on -OPT:unroll_size=256  
  -CG:cmp_peep=on -GRA:prioritize_by_density=on -HP

Continued on next page
**Dell Inc.**

PowerEdge M915 (AMD Opteron 6176, 2.3 GHz)

<table>
<thead>
<tr>
<th>SPECfp_rate2006</th>
<th>635</th>
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**CPU2006 license:** 55  
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**Hardware Availability:** May-2011  
**Software Availability:** Jul-2010

**Peak Optimization Flags (Continued)**

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

- **459.GemsFDTD:**  
  -march=barcelona -ms -Ofast -LNO:fission=2  
  -LNO:prefetchAhead=1 -CG:load_exe=0 -CG:local_sched_alg=1  
  -HP

- **465.tonto:**  
  -march=barcelona -ms -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 -ms -Ofast -OPT:rsqrt=2  
  -HP:bdt=2m:heap=2m

- **436.cactusADM:**  
  -march=barcelona -ms -fb_create fbdata(pass 1)  
  -fb_opt fbdata(pass 2) -Ofast -apo -LNO:prefetchAhead=1  
  -HP:bdt=2m:heap=2m -LNO:blocking=off  
  -LANG:heap_allocation_threshold=100

- **454.calculix:**  
  -march=barcelona -ms -Ofast -CG:load_exe=0  
  -CG:ptr_load_use=0 -CG:local_sched_alg=2 -CG:compute_to=on  
  -LNO:prefetchAhead=30 -WOPT:unroll=2  
  -GRA:optimize_boundary=on -HP:bdt=2m:heap=2m

- **481.wrf:**  
  -march=barcelona -ms -Ofast -LNO:blocking=off  
  -LNO:prefetchAhead=10 -LANG:copyinout=off  
  -IPA:callee_limit=5000 -GRA:prioritize_by_density=on -m3dnow

- **m3dnow**

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

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

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For other inquiries, please contact webmaster@spec.org.

**Tested with SPEC CPU2006 v1.1.**  
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