### Dell Inc.

PowerEdge FC830 (Intel Xeon E5-4660 v3, 2.10 GHz)

<table>
<thead>
<tr>
<th>Software</th>
<th>SPECfp®2006 =</th>
<th>SPECfp_base2006 =</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>102</td>
<td>95.7</td>
</tr>
</tbody>
</table>

**CPU2006 license:** 55  
**Test sponsor:** Dell Inc.  
**Tested by:** Dell Inc.  
**Test date:** Jan-2015  
**Hardware Availability:** Jun-2015  
**Software Availability:** Jun-2015

#### Hardware

<table>
<thead>
<tr>
<th>Component</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU Name</td>
<td>Intel Xeon E5-4660 v3</td>
</tr>
<tr>
<td>CPU Characteristics</td>
<td>Intel Turbo Boost Technology up to 2.90 GHz</td>
</tr>
<tr>
<td>CPU MHz</td>
<td>2100</td>
</tr>
<tr>
<td>FPU</td>
<td>Integrated</td>
</tr>
<tr>
<td>CPU(s) enabled</td>
<td>56 cores, 4 chips, 14 cores/chip, 2 threads/core</td>
</tr>
<tr>
<td>CPU(s) orderable</td>
<td>4 chip</td>
</tr>
<tr>
<td>Primary Cache</td>
<td>32 KB I + 32 KB D on chip per core</td>
</tr>
<tr>
<td>Secondary Cache</td>
<td>256 KB I+D on chip per core</td>
</tr>
</tbody>
</table>

#### Software

<table>
<thead>
<tr>
<th>Component</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating System</td>
<td>SUSE Linux Enterprise Server 12</td>
</tr>
<tr>
<td>Compiler</td>
<td>C/C++: Version 15.0.0.090 of Intel C++ Studio XE for Linux; Fortran: Version 15.0.0.090 of Intel Fortran Studio XE for Linux</td>
</tr>
<tr>
<td>Auto Parallel</td>
<td>Yes</td>
</tr>
<tr>
<td>File System</td>
<td>ext4</td>
</tr>
<tr>
<td>System State</td>
<td>Run level 3 (multi-user)</td>
</tr>
</tbody>
</table>

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Continued on next page
Dell Inc.

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L3 Cache: 35 MB I+D on chip per chip
Other Cache: None
Memory: 512 GB (32 x 16 GB 2Rx4 PC4-2133P-R)
Disk Subsystem: 1 x 400 GB 7200 RPM SATA
Other Hardware: None

Base Pointers: 64-bit
Peak Pointers: 32/64-bit

Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Seconds</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>410.bwaves</td>
<td>16.3</td>
<td>834</td>
</tr>
<tr>
<td>Base</td>
<td>16.0</td>
<td>851</td>
</tr>
<tr>
<td>416.gamess</td>
<td>642</td>
<td>30.5</td>
</tr>
<tr>
<td>Base</td>
<td>642</td>
<td>30.5</td>
</tr>
<tr>
<td>433.milc</td>
<td>144</td>
<td>64.0</td>
</tr>
<tr>
<td>Base</td>
<td>154</td>
<td>59.6</td>
</tr>
<tr>
<td>434.zeusmp</td>
<td>61.0</td>
<td>149</td>
</tr>
<tr>
<td>Base</td>
<td>60.9</td>
<td>149</td>
</tr>
<tr>
<td>435.gromacs</td>
<td>218</td>
<td>32.8</td>
</tr>
<tr>
<td>Base</td>
<td>218</td>
<td>32.7</td>
</tr>
<tr>
<td>436.cactusADM</td>
<td>16.7</td>
<td>714</td>
</tr>
<tr>
<td>Base</td>
<td>18.4</td>
<td>651</td>
</tr>
<tr>
<td>437.leslie3d</td>
<td>42.2</td>
<td>223</td>
</tr>
<tr>
<td>Base</td>
<td>41.6</td>
<td>226</td>
</tr>
<tr>
<td>444.namd</td>
<td>328</td>
<td>24.4</td>
</tr>
<tr>
<td>Base</td>
<td>327</td>
<td>24.6</td>
</tr>
<tr>
<td>447.dealII</td>
<td>239</td>
<td>47.8</td>
</tr>
<tr>
<td>Base</td>
<td>240</td>
<td>47.6</td>
</tr>
<tr>
<td>450.soplex</td>
<td>218</td>
<td>38.3</td>
</tr>
<tr>
<td>Base</td>
<td>219</td>
<td>38.1</td>
</tr>
<tr>
<td>453.povray</td>
<td>107</td>
<td>49.8</td>
</tr>
<tr>
<td>Base</td>
<td>107</td>
<td>49.9</td>
</tr>
<tr>
<td>454.calculix</td>
<td>197</td>
<td>41.8</td>
</tr>
<tr>
<td>Base</td>
<td>197</td>
<td>41.9</td>
</tr>
<tr>
<td>459.GemsFDTD</td>
<td>55.3</td>
<td>192</td>
</tr>
<tr>
<td>Base</td>
<td>54.1</td>
<td>196</td>
</tr>
<tr>
<td>465.tonto</td>
<td>319</td>
<td>30.8</td>
</tr>
<tr>
<td>Base</td>
<td>315</td>
<td>31.3</td>
</tr>
<tr>
<td>470.lbm</td>
<td>10.6</td>
<td>1300</td>
</tr>
<tr>
<td>Base</td>
<td>9.72</td>
<td>1410</td>
</tr>
<tr>
<td>481.wrf</td>
<td>114</td>
<td>98.4</td>
</tr>
<tr>
<td>Base</td>
<td>114</td>
<td>97.9</td>
</tr>
<tr>
<td>482.sphinx3</td>
<td>334</td>
<td>58.4</td>
</tr>
<tr>
<td>Base</td>
<td>339</td>
<td>57.4</td>
</tr>
</tbody>
</table>

Results appear in the order in which they were run. Bold underlined text indicates a median measurement.

Operating System Notes

Stack size set to unlimited using "ulimit -s unlimited"

Platform Notes

BIOS settings:
Snoop Mode set to Home Snoop
Virtualization Technology disabled
System Profile set to Performance
Sysinfo program /root/cpu2006-1.2/config/sysinfo.rev6914
$Rev: 6914 $ $Date:: 2014-06-25 #$ e3fbb8667b5a285932ceab81e28219e1
running on linux-3aq4 Tue Jan 20 23:42:12 2015

This section contains SUT (System Under Test) info as seen by some common utilities. To remove or add to this section, see:
Continued on next page
**SPEC CFP2006 Result**

**Dell Inc.**

PowerEdge FC830 (Intel Xeon E5-4660 v3, 2.10 GHz)

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**Platform Notes (Continued)**

http://www.spec.org/cpu2006/Docs/config.html#sysinfo

From /proc/cpuinfo

```
  model name : Intel(R) Xeon(R) CPU E5-4660 v3 @ 2.10GHz
  4 "physical id"s (chips)
  112 "processors"
  cores, siblings (Caution: counting these is hw and system dependent. The
  following excerpts from /proc/cpuinfo might not be reliable. Use with
  caution.)
  cpu cores : 14
  siblings : 28
  physical 0: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14
  physical 1: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14
  physical 2: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14
  physical 3: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14
  cache size : 35840 KB
```

From /proc/meminfo

```
  MemTotal: 529334376 kB
  HugePages_Total: 0
  Hugepagesize: 2048 kB
```

```
  /usr/bin/lsb_release -d
  SUSE Linux Enterprise Server 12
```

From /etc/*release* /etc/*version*

```
  SuSE-release:
  SUSE Linux Enterprise Server 12 (x86_64)
  VERSION = 12
  PATCHLEVEL = 0
  # This file is deprecated and will be removed in a future service pack or
  # release.
  # Please check /etc/os-release for details about this release.
  os-release:
  NAME="SLES"
  VERSION="12"
  VERSION_ID="12"
  PRETTY_NAME="SUSE Linux Enterprise Server 12"
  ID="sles"
  ANSI_COLOR="0;32"
  CPE_NAME="cpe:/o:suse:sles:12"
```

```
  uname -a:
  Linux linux-3aq4 3.12.28-4-default #1 SMP Thu Sep 25 17:02:34 UTC 2014
  (9879bd4) x86_64 x86_64 x86_64 GNU/Linux
```

```
  run-level 3 Jan 20 17:25
```

```
  SPEC is set to: /root/cpu2006-1.2
  Filesystem   Type  Size  Used Avail Use% Mounted on
  /dev/sda2    ext4  267G  13G  253G  5% /
```

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Dell Inc.  

PowerEdge FC830 (Intel Xeon E5-4660 v3, 2.10 GHz)  

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---

**Platform Notes (Continued)**

Warning: Use caution when you interpret this section. The 'dmidecode' program reads system data which is "intended to allow hardware to be accurately determined", but the intent may not be met, as there are frequent changes to hardware, firmware, and the "DMTF SMBIOS" standard.

BIOS Dell Inc. 0.4.0 01/08/2015  
Memory:  
3x 00AD063200AD HMA42GR7MFR4N-TF 16 GB 2 rank 2133 MHz  
29x 00CE00B300CE M393A2G40DB0-CPB 16 GB 2 rank 2133 MHz  
16x Not Specified Not Specified

(End of data from sysinfo program)

---

**General Notes**

Environment variables set by runspec before the start of the run:  
KMP_AFFINITY = "granularity=fine,compact,1,0"  
LD_LIBRARY_PATH = "/root/cpu2006-1.2/libs/32:/root/cpu2006-1.2/libs/64:/root/cpu2006-1.2/sh"  
OMP_NUM_THREADS = "56"

Binaries compiled on a system with 1x Core i5-4670K CPU + 16GB memory using RedHat EL 7.0  
Transparent Huge Pages enabled with:  
echo always > /sys/kernel/mm/transparent_hugepage/enabled

---

**Base Compiler Invocation**

C benchmarks:  
```bash  
icc -m64
```

C++ benchmarks:  
```bash  
icpc -m64
```

Fortran benchmarks:  
```bash  
ifort -m64
```

Benchmarks using both Fortran and C:  
```bash  
icc -m64 ifort -m64
```

---

**Base Portability Flags**

410.bwaves: -DSPEC_CPU_LP64  
416.gamess: -DSPEC_CPU_LP64  
433.milc: -DSPEC_CPU_LP64  
434.zeusmp: -DSPEC_CPU_LP64

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Dell Inc.

PowerEdge FC830 (Intel Xeon E5-4660 v3, 2.10 GHz)

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### Base Portability Flags (Continued)

- 435.gromacs: `-DSPEC_CPU_LP64 -nofor_main`
- 436.cactusADM: `-DSPEC_CPU_LP64 -nofor_main`
- 437.leslie3d: `-DSPEC_CPU_LP64`
- 444.namd: `-DSPEC_CPU_LP64 -nofor_main`
- 447.dealII: `-DSPEC_CPU_LP64`
- 450.soplex: `-DSPEC_CPU_LP64`
- 453.povray: `-DSPEC_CPU_LP64`
- 454.calculix: `-DSPEC_CPU_LP64 -nofor_main`
- 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:**
  - `-xCORE-AVX2`  
  - `-ipo -O3 -no-prec-div -parallel -opt-prefetch`
  - `-ansi-alias`

- **C++ benchmarks:**
  - `-xCORE-AVX2`  
  - `-ipo -O3 -no-prec-div -opt-prefetch -ansi-alias`

- **Fortran benchmarks:**
  - `-xCORE-AVX2`  
  - `-ipo -O3 -no-prec-div -parallel -opt-prefetch`

- **Benchmarks using both Fortran and C:**
  - `-xCORE-AVX2`  
  - `-ipo -O3 -no-prec-div -parallel -opt-prefetch`  
  - `-ansi-alias`

### Peak Compiler Invocation

- **C benchmarks:**
  - `icc -m64`

- **C++ benchmarks:**
  - `icpc -m64`

- **Fortran benchmarks:**
  - `ifort -m64`

- **Benchmarks using both Fortran and C:**
  - `icc -m64 ifort -m64`
Dell Inc.
PowerEdge FC830 (Intel Xeon E5-4660 v3, 2.10 GHz)

SPEC CFP2006 Result

SPECfp2006 = 102
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CPU2006 license: 55
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Tested by: Dell Inc.

Test date: Jan-2015
Hardware Availability: Jun-2015
Software Availability: Jun-2015

Peak Portability Flags
Same as Base Portability Flags

Peak Optimization Flags

C benchmarks:
433.milc: -xCORE-AVX2(pass 2) -prof-gen(pass 1) -ipo(pass 2)
          -O3(pass 2) -no-prec-div(pass 2) -prof-use(pass 2)
          -auto-ilp32 -ansi-alias

470.lbm: basepeak = yes
482.sphinx3: basepeak = yes

C++ benchmarks:
444.namd: -xCORE-AVX2(pass 2) -prof-gen(pass 1) -ipo(pass 2)
          -O3(pass 2) -no-prec-div(pass 2) -prof-use(pass 2)
          -fno-alias -auto-ilp32

447.dealII: basepeak = yes
450.soplex: basepeak = yes

Fortran benchmarks:
410.bwaves: basepeak = yes
416.gamess: -xCORE-AVX2(pass 2) -prof-gen(pass 1) -ipo(pass 2)
             -O3(pass 2) -no-prec-div(pass 2) -prof-use(pass 2) -unroll2
             -inline-level=0 -scalar-rep-

434.zeusmp: basepeak = yes
437.leslie3d: basepeak = yes

459.GemsFDTD: -xCORE-AVX2(pass 2) -prof-gen(pass 1) -ipo(pass 2)
               -O3(pass 2) -no-prec-div(pass 2) -prof-use(pass 2) -unroll2
               -inline-level=0 -opt-prefetch -parallel

465.tonto: -xCORE-AVX2(pass 2) -prof-gen(pass 1) -ipo(pass 2)
           -O3(pass 2) -no-prec-div(pass 2) -prof-use(pass 2)
           -inline-calloc -opt-malloc-options=3 -auto -unroll4

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### Dell Inc.

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</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td>95.7</td>
</tr>
</tbody>
</table>

**Peak Optimization Flags (Continued)**

Benchmarks using both Fortran and C:

- 435.gromacs: basepeak = yes
- 436.cactusADM: basepeak = yes
- 454.calculix: -xCORE-AVX2 -ipo -O3 -no-prec-div -auto-ilp32 -ansi-alias
- 481.wrf: basepeak = yes

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

- [http://www.spec.org/cpu2006/flags/Intel-ic15.0-official-linux64.html](http://www.spec.org/cpu2006/flags/Intel-ic15.0-official-linux64.html)

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

- [http://www.spec.org/cpu2006/flags/Intel-ic15.0-official-linux64.xml](http://www.spec.org/cpu2006/flags/Intel-ic15.0-official-linux64.xml)

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

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