Dell Inc.

PowerEdge R830 (Intel Xeon E5-4650 v4, 2.20 GHz)  

<table>
<thead>
<tr>
<th>SPECfp®2006 = 111</th>
<th>SPECfp_base2006 = 105</th>
</tr>
</thead>
</table>

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<tr>
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</tr>
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<tbody>
<tr>
<td>111</td>
<td>105</td>
</tr>
</tbody>
</table>

CPU2006 license: 55  
Test date: Apr-2016  
Tested by: Dell Inc.

Hardware

<table>
<thead>
<tr>
<th>Operating System:</th>
<th>SUSE Linux Enterprise Server 12 SP1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compiler:</td>
<td>C/C++: Version 16.0.0.101 of Intel C++ Studio XE for Linux; Fortran: Version 16.0.0.101 of Intel Fortran Studio XE for Linux</td>
</tr>
</tbody>
</table>

Software

<table>
<thead>
<tr>
<th>Auto Parallel:</th>
<th>Yes</th>
</tr>
</thead>
<tbody>
<tr>
<td>File System:</td>
<td>btrfs</td>
</tr>
<tr>
<td>System State:</td>
<td>Run level 3 (multi-user)</td>
</tr>
</tbody>
</table>

Continued on next page
## SPEC CFP2006 Result

**Dell Inc.**

PowerEdge R830 (Intel Xeon E5-4650 v4, 2.20 GHz)

**SPECfp2006 = 111**

**SPECfp_base2006 = 105**

<table>
<thead>
<tr>
<th>CPU2006 license: 55</th>
<th>Test date:</th>
<th>Apr-2016</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test sponsor: Dell Inc.</td>
<td>Hardware Availability:</td>
<td>Jun-2016</td>
</tr>
<tr>
<td>Tested by: Dell Inc.</td>
<td>Software Availability:</td>
<td>Dec-2015</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>L3 Cache: 35 MB I+D on chip per chip</th>
<th>Base Pointers: 64-bit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other Cache: None</td>
<td>Peak Pointers: 32/64-bit</td>
</tr>
<tr>
<td>Memory: 512 GB (32 x 16 GB 2Rx8 PC4-2400T-R)</td>
<td>Other Software: None</td>
</tr>
<tr>
<td>Disk Subsystem: 1 x 800 GB SATA SSD</td>
<td></td>
</tr>
<tr>
<td>Other Hardware: None</td>
<td></td>
</tr>
</tbody>
</table>

### Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>410.bwaves</td>
<td>15.4</td>
<td>883</td>
<td>14.7</td>
<td>927</td>
<td>14.7</td>
<td>928</td>
<td></td>
<td></td>
</tr>
<tr>
<td>416.gamess</td>
<td>627</td>
<td>31.2</td>
<td>625</td>
<td>31.3</td>
<td>625</td>
<td>31.3</td>
<td>524</td>
<td>37.4</td>
</tr>
<tr>
<td>433.milc</td>
<td>153</td>
<td>59.9</td>
<td>148</td>
<td>62.2</td>
<td>142</td>
<td>64.6</td>
<td>153</td>
<td>59.9</td>
</tr>
<tr>
<td>434.zeusmp</td>
<td>54.5</td>
<td>167</td>
<td>55.1</td>
<td>165</td>
<td>54.7</td>
<td>166</td>
<td>54.5</td>
<td>167</td>
</tr>
<tr>
<td>435.gromacs</td>
<td>171</td>
<td>41.8</td>
<td>171</td>
<td>41.6</td>
<td>171</td>
<td>41.6</td>
<td>171</td>
<td>41.8</td>
</tr>
<tr>
<td>436.cactusADM</td>
<td>16.1</td>
<td>741</td>
<td>16.8</td>
<td>710</td>
<td>16.6</td>
<td><strong>722</strong></td>
<td>16.1</td>
<td>741</td>
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<tr>
<td>437.leslie3d</td>
<td>38.6</td>
<td>243</td>
<td>37.8</td>
<td>249</td>
<td>38.5</td>
<td>244</td>
<td>38.6</td>
<td>243</td>
</tr>
<tr>
<td>444.namd</td>
<td>326</td>
<td>24.6</td>
<td>326</td>
<td>24.6</td>
<td>326</td>
<td>24.6</td>
<td>316</td>
<td><strong>25.4</strong></td>
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<tr>
<td>447.dealII</td>
<td>208</td>
<td>55.0</td>
<td><strong>208</strong></td>
<td>55.1</td>
<td>207</td>
<td>55.3</td>
<td>208</td>
<td>55.0</td>
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<tr>
<td>450.soplex</td>
<td>198</td>
<td>42.2</td>
<td>201</td>
<td>41.5</td>
<td><strong>198</strong></td>
<td>42.2</td>
<td>198</td>
<td>42.2</td>
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<tr>
<td>453.povray</td>
<td>104</td>
<td>51.2</td>
<td>107</td>
<td>49.9</td>
<td><strong>106</strong></td>
<td>50.2</td>
<td>94.1</td>
<td>56.6</td>
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<tr>
<td>454.calculix</td>
<td>182</td>
<td>45.3</td>
<td>182</td>
<td>45.4</td>
<td><strong>182</strong></td>
<td>45.4</td>
<td>166</td>
<td>49.6</td>
</tr>
<tr>
<td>459.GemsFDTD</td>
<td>49.5</td>
<td>214</td>
<td><strong>51.5</strong></td>
<td>206</td>
<td>51.6</td>
<td>206</td>
<td>39.5</td>
<td>269</td>
</tr>
<tr>
<td>465.tonto</td>
<td>269</td>
<td>36.5</td>
<td>271</td>
<td>36.3</td>
<td><strong>270</strong></td>
<td>36.5</td>
<td>207</td>
<td>47.4</td>
</tr>
<tr>
<td>470.lbm</td>
<td>8.92</td>
<td>1540</td>
<td>9.66</td>
<td>1420</td>
<td><strong>9.53</strong></td>
<td><strong>1440</strong></td>
<td>8.92</td>
<td>1540</td>
</tr>
<tr>
<td>481.wrf</td>
<td>102</td>
<td>109</td>
<td><strong>103</strong></td>
<td>108</td>
<td>103</td>
<td>108</td>
<td>102</td>
<td>109</td>
</tr>
<tr>
<td>482.sphinx3</td>
<td><strong>302</strong></td>
<td><strong>64.6</strong></td>
<td>301</td>
<td>64.8</td>
<td>302</td>
<td>64.5</td>
<td><strong>302</strong></td>
<td><strong>64.6</strong></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 custom
- CPU Power Management set to Maximum Performance
- C States set to Autonomous
- C1E disabled
- Energy Efficient Turbo disabled
- Uncore Frequency set to Dynamic
- Energy Efficiency Policy set to Performance
Dell Inc.
PowerEdge R830 (Intel Xeon E5-4650 v4, 2.20 GHz)

SPECfp2006 = 111
SPECfp_base2006 = 105

CPU2006 license: 55
Test sponsor: Dell Inc.
Tested by: Dell Inc.

Test date: Apr-2016
Hardware Availability: Jun-2016
Software Availability: Dec-2015

Platform Notes (Continued)

Memory Patrol Scrub disabled
Sysinfo program /root/cpu2006-1.2/config/sysinfo.rev6914
$Rev: 6914 $ $Date:: 2014-06-25 #$ e3fbb8667b5a285932ceab81e28219e1
running on linux-t2sb Mon Apr 25 07:09:45 2016

This section contains SUT (System Under Test) info as seen by
some common utilities. To remove or add to this section, see:
http://www.spec.org/cpu2006/Docs/config.html#sysinfo

From /proc/cpuinfo
model name : Intel(R) Xeon(R) CPU E5-4650 v4 @ 2.20GHz
  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
cautions.)
  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:       529325584 kB
HugePages_Total:       0
Hugepagesize:       2048 kB

/usr/bin/lsb_release -d
SUSE Linux Enterprise Server 12 SP1

From /etc/*release* /etc/*version*
SuSE-release:
  SUSE Linux Enterprise Server 12 (x86_64)
  VERSION = 12
  PATCHLEVEL = 1
  # 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-SP1"
  VERSION_ID="12.1"
  PRETTY_NAME="SUSE Linux Enterprise Server 12 SP1"
  ID="sles"
  ANSI_COLOR="0;32"
  CPE_NAME="cpe:/o:suse:sles:12:sp1"

uname -a:
  Linux linux-t2sb 3.12.49-11-default #1 SMP Wed Nov 11 20:52:43 UTC 2015
  (8d714a0) x86_64 x86_64 x86_64 GNU/Linux

Continued on next page
Platform Notes (Continued)

run-level 3 Apr 25 01:18

SPEC is set to: /root/cpu2006-1.2
   Filesystem Type Size Used Avail Use% Mounted on
   /dev/sda3 btrfs 461G 11G 447G 3% /

Additional information from dmidecode:

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. 0.2.4 03/31/2016
Memory:
   32x 00AD063200AD HMA82GR7MFR8N-UH 16 GB 2 rank 2400 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 Intel Core i5-4670K CPU + 32GB
memory using RedHat EL 7.1
Transparent Huge Pages enabled with:
   echo always > /sys/kernel/mm/transparent_hugepage/enable

Base Compiler Invocation

C benchmarks:
   icc -m64

C++ benchmarks:
   icpc -m64

Fortran benchmarks:
   ifort -m64

Benchmarks using both Fortran and C:
   icc -m64 ifort -m64
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### 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
- 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.cactusADM: -DSPEC_CPU_LP64
- 459.GemsFDTD: -DSPEC_CPU_LP64
- 465.tonto: -DSPEC_CPU_LP64
- 481.wrf: -DSPEC_CPU_LP64
- 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

Continued on next page
Dell Inc.

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Tested by: Dell Inc.
Hardware Availability: Jun-2016
Software Availability: Dec-2015

Peak Compiler Invocation (Continued)

Benchmarks using both Fortran and C:

icc -m64 ifort -m64

Peak Portability Flags

Same as Base Portability Flags

Peak Optimization Flags

C benchmarks:

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

C++ benchmarks:

444.namd: -xCORE-AVX2(pass 2) -prof-gen:threadsafe(pass 1)
           -ipo(pass 2) -O3(pass 2) -no-prec-div(pass 2)
           -par-num-threads=1(pass 1) -prof-use(pass 2) -fno-alias
           -auto-ilp32

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

453.povray: -xCORE-AVX2(pass 2) -prof-gen:threadsafe(pass 1)
            -ipo(pass 2) -O3(pass 2) -no-prec-div(pass 2)
            -par-num-threads=1(pass 1) -prof-use(pass 2) -unroll4
            -ansi-alias

Fortran benchmarks:

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

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

Continued on next page
Dell Inc.

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Peak Optimization Flags (Continued)

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

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

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-ic16.0-official-linux64.html

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2006/flags/Intel-ic16.0-official-linux64.xml
http://www.spec.org/cpu2006/flags/Dell-Platform-Settings-V1.2-revD.20151006.xml

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

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