Dell Inc.

PowerEdge FC830 (Intel Xeon E5-4628L v4, 1.80 GHz)

**SPECfp®2006 = 90.8**  
**SPECfp_base2006 = 87.0**

**CPU2006 license:** 55  
**Test date:** Apr-2016  
**Test sponsor:** Dell Inc.  
**Hardware Availability:** Jun-2016  
**Tested by:** Dell Inc.  
**Software Availability:** Mar-2016

<table>
<thead>
<tr>
<th>Software</th>
<th>Hardware</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating System: SUSE Linux Enterprise Server 12 SP1 3.12.49-11-default</td>
<td>CPU Name: Intel Xeon E5-4628L v4</td>
</tr>
<tr>
<td>Compiler: 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>
<td>CPU Characteristics: Intel Turbo Boost Technology up to 2.20 GHz</td>
</tr>
<tr>
<td>Auto Parallel: Yes</td>
<td>CPU MHz: 1800</td>
</tr>
<tr>
<td>File System: btrfs</td>
<td>FPU: Integrated</td>
</tr>
<tr>
<td>System State: Run level 3 (multi-user)</td>
<td>CPU(s) enabled: 56 cores, 4 chips, 14 cores/chip, 2 threads/core</td>
</tr>
<tr>
<td></td>
<td>CPU(s) orderable: 2,4 chip</td>
</tr>
<tr>
<td></td>
<td>Primary Cache: 32 KB I + 32 KB D on chip per core</td>
</tr>
<tr>
<td></td>
<td>Secondary Cache: 256 KB I+D on chip per core</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>SPECfp2006</th>
<th>SPECfp_base2006</th>
</tr>
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<tbody>
<tr>
<td>410.bwaves</td>
<td>28.2</td>
<td>24.7</td>
</tr>
<tr>
<td>416.gamess</td>
<td>53.5</td>
<td></td>
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<tr>
<td>433.milc</td>
<td>150</td>
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<tr>
<td>434.zeusmp</td>
<td>33.3</td>
<td></td>
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<tr>
<td>435.gromacs</td>
<td>610</td>
<td></td>
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<tr>
<td>436.cactusADM</td>
<td></td>
<td></td>
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<tr>
<td>437.leslie3d</td>
<td>212</td>
<td></td>
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<tr>
<td>441.namd</td>
<td>20.0</td>
<td></td>
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<tr>
<td>447.dealII</td>
<td>43.7</td>
<td></td>
</tr>
<tr>
<td>450.soplex</td>
<td>34.6</td>
<td></td>
</tr>
<tr>
<td>453.povray</td>
<td>42.7</td>
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<tr>
<td>454.calculix</td>
<td>37.7</td>
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<tr>
<td>459.GemsFDTD</td>
<td></td>
<td></td>
</tr>
<tr>
<td>465.tonto</td>
<td>39.4</td>
<td></td>
</tr>
<tr>
<td>470.lbm</td>
<td>53.4</td>
<td></td>
</tr>
<tr>
<td>481.wrf</td>
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<tr>
<td>482.sphinx3</td>
<td>36.1</td>
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</tr>
</tbody>
</table>

Continued on next page
SPEC CFP2006 Result

Dell Inc.

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SPECfp2006 = 90.8
SPECfp_base2006 = 87.0

CPU2006 license: 55
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Tested by: Dell Inc.

L3 Cache: 35 MB I+D on chip per chip
Other Cache: None
Memory: 512 GB (32 x 16 GB 2Rx8 PC4-2400T-R, running at 2133 MHz)
Disk Subsystem: 1 x 800 GB SATA SSD
Other Hardware: None

Base Pointers: 64-bit
Peak Pointers: 32/64-bit
Other Software: None

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>
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<tbody>
<tr>
<td>410.bwaves</td>
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<td>416.gamess</td>
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<td>433.milc</td>
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<td>434.zeusmp</td>
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<td>444.namd</td>
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<td>43.7</td>
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<td>43.6</td>
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<tr>
<td>450.soplex</td>
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<td>34.6</td>
<td>247</td>
<td>33.7</td>
<td>236</td>
<td>35.3</td>
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<td>453.povray</td>
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<td>37.4</td>
<td>140</td>
<td>37.9</td>
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<td>454.calculix</td>
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<td>36.3</td>
<td>227</td>
<td>36.4</td>
<td>226</td>
<td>36.5</td>
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<tr>
<td>459.GemsFDTD</td>
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<td>53.6</td>
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<tr>
<td>465.tonto</td>
<td>335</td>
<td>29.4</td>
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<td>29.4</td>
<td>341</td>
<td>28.9</td>
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<tr>
<td>470.lbm</td>
<td>12.1</td>
<td>1140</td>
<td>12.0</td>
<td>1150</td>
<td>11.5</td>
<td>1200</td>
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<tr>
<td>481.wrf</td>
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<td>90.5</td>
<td>127</td>
<td>88.1</td>
<td>123</td>
<td>91.0</td>
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<tr>
<td>482.sphinx3</td>
<td>368</td>
<td>52.9</td>
<td>364</td>
<td>53.5</td>
<td>365</td>
<td>53.4</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 Opportunistic Snoop Broadcast
Virtualization Technology disabled
System Profile set to custom
CPU Performance set to Maximum Performance
C States set to Autonomous
C1E disabled
Energy Efficient Turbo disabled
Uncore Frequency set to Dynamic
SPEC CFP2006 Result

Dell Inc.

PowerEdge FC830 (Intel Xeon E5-4628L v4, 1.80 GHz)

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CPU2006 license: 55
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Platform Notes (Continued)

Energy Efficiency Policy set to Performance
Memory Patrol Scrub disabled
Sysinfo program /root/cpu2006-1.2/config/sysinfo.rev6914
$Rev: 6914 $ $Date:: 2014-06-25 #$ e3fbb8667b5a285932ceab81e28219e1
running on linux-4pvp Thu Apr 28 17:27:47 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 E5-4628L v4 @ 1.80GHz
  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: 529326748 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:

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Dell Inc.
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Platform Notes (Continued)

(8d714a0) x86_64 x86_64 x86_64 GNU/Linux
run-level 3 Apr 28 10:17
SPEC is set to: /root/cpu2006-1.2
Filesystem Type Size Used Avail Use% Mounted on
/dev/sda2 xfs 271G 13G 258G 5% /

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. 2.0.2 04/14/2016
Memory:
5x 002C00B3002C 18ASF2G72PDZ-2G3A1 16 GB 2 rank 2400 MHz, configured at 2133
MHz
19x 00AD00B300AD HMA82GR7MFR8N-UH 16 GB 2 rank 2400 MHz, configured at 2133
MHz
8x 00AD063200AD HMA82GR7MFR8N-UH 16 GB 2 rank 2400 MHz, configured at 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 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

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Base Compiler Invocation (Continued)

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.mlci:  -DSPEC_CPU_LP64
434.zeusmp:  -DSPEC_CPU_LP64
435.gromacs:  -DSPEC_CPU_LP64  -nofor_main
436.cactusADM:  -DSPEC_CPU_LP64  -nofor_main
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  -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:

```bash
-xCORE-AVX2  -ipo  -O3  -no-prec-div  -parallel  -opt-prefetch
-ansi-alias
```

C++ benchmarks:

```bash
-xCORE-AVX2  -ipo  -O3  -no-prec-div  -opt-prefetch  -ansi-alias
```

Fortran benchmarks:

```bash
-xCORE-AVX2  -ipo  -O3  -no-prec-div  -parallel  -opt-prefetch
```

Benchmarks using both Fortran and C:

```bash
-xCORE-AVX2  -ipo  -O3  -no-prec-div  -parallel  -opt-prefetch
-ansi-alias
```

Peak Compiler Invocation

C benchmarks:

```bash
icc  -m64
```

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Test date: Apr-2016
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Software Availability: Mar-2016

Peak Compiler Invocation (Continued)

C++ benchmarks:
icpc  -m64

Fortran benchmarks:
ifort -m64

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-

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SPEC CFP2006 Result

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Peak Optimization Flags (Continued)

434.zeusmp: basepeak = yes
437.leslie3d: basepeak = yes
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 questions about this result, please contact the tester.
For other inquiries, please contact webmaster@spec.org.

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