Dell Inc.
PowerEdge M830 (Intel Xeon E5-4640 v4, 2.10 GHz)

SPECfp®2006 = 102
SPECfp_base2006 = 97.2

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

Hardware

- CPU Name: Intel Xeon E5-4640 v4
- CPU Characteristics: Intel Turbo Boost Technology up to 2.60 GHz
- CPU MHz: 2100
- FPU: Integrated
- CPU(s) enabled: 48 cores, 4 chips, 12 cores/chip, 2 threads/core
- CPU(s) orderable: 2,4 chip
- Primary Cache: 32 KB I + 32 KB D on chip per core
- Secondary Cache: 256 KB I+D on chip per core

Software

- Operating System: SUSE Linux Enterprise Server 12 SP1
- 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
- Auto Parallel: Yes
- File System: xfs
- System State: Run level 3 (multi-user)
Dell Inc.

PowerEdge M830 (Intel Xeon E5-4640 v4, 2.10 GHz)

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

L3 Cache: 30 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>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>410.bwaves</td>
<td>18.6</td>
<td>732</td>
<td>17.8</td>
<td>762</td>
<td>17.8</td>
<td>763</td>
<td>18.6</td>
<td>732</td>
<td>17.8</td>
<td>762</td>
</tr>
<tr>
<td>416.gamess</td>
<td>657</td>
<td>29.8</td>
<td>658</td>
<td>29.7</td>
<td>658</td>
<td>29.8</td>
<td>566</td>
<td>34.6</td>
<td>564</td>
<td>34.7</td>
</tr>
<tr>
<td>433.milc</td>
<td>150</td>
<td>61.0</td>
<td>149</td>
<td>61.8</td>
<td>153</td>
<td>59.8</td>
<td>150</td>
<td>61.0</td>
<td>149</td>
<td>61.8</td>
</tr>
<tr>
<td>434.zeusmp</td>
<td>58.7</td>
<td>155</td>
<td>58.4</td>
<td>156</td>
<td>59.5</td>
<td>153</td>
<td>58.7</td>
<td>155</td>
<td>58.4</td>
<td>156</td>
</tr>
<tr>
<td>435.gromacs</td>
<td>179</td>
<td>39.8</td>
<td>176</td>
<td>40.6</td>
<td>180</td>
<td>39.7</td>
<td>179</td>
<td>39.8</td>
<td>176</td>
<td>40.6</td>
</tr>
<tr>
<td>436.cactusADM</td>
<td>19.1</td>
<td>626</td>
<td>19.4</td>
<td>615</td>
<td>19.0</td>
<td>629</td>
<td>19.1</td>
<td>626</td>
<td>19.4</td>
<td>615</td>
</tr>
<tr>
<td>437.leslie3d</td>
<td>43.5</td>
<td>216</td>
<td>40.6</td>
<td>233</td>
<td>39.7</td>
<td>237</td>
<td>43.5</td>
<td>216</td>
<td>40.6</td>
<td>233</td>
</tr>
<tr>
<td>444.namd</td>
<td>351</td>
<td>22.9</td>
<td>351</td>
<td>22.9</td>
<td>351</td>
<td>22.8</td>
<td>340</td>
<td>23.6</td>
<td>341</td>
<td>23.5</td>
</tr>
<tr>
<td>447.dealII</td>
<td>224</td>
<td>51.2</td>
<td>224</td>
<td>51.1</td>
<td>223</td>
<td>51.3</td>
<td>224</td>
<td>51.2</td>
<td>224</td>
<td>51.1</td>
</tr>
<tr>
<td>450.soplex</td>
<td>218</td>
<td>38.2</td>
<td>213</td>
<td>39.1</td>
<td>214</td>
<td>39.0</td>
<td>218</td>
<td>38.2</td>
<td>213</td>
<td>39.1</td>
</tr>
<tr>
<td>453.povray</td>
<td>115</td>
<td>46.2</td>
<td>114</td>
<td>46.6</td>
<td>114</td>
<td>46.6</td>
<td>101</td>
<td>52.8</td>
<td>98.9</td>
<td>53.8</td>
</tr>
<tr>
<td>454.calcix</td>
<td>190</td>
<td>43.5</td>
<td>190</td>
<td>43.5</td>
<td>190</td>
<td>43.4</td>
<td>177</td>
<td>46.7</td>
<td>180</td>
<td>45.8</td>
</tr>
<tr>
<td>459.GemsFDTD</td>
<td>52.9</td>
<td>200</td>
<td>51.2</td>
<td>207</td>
<td>53.8</td>
<td>197</td>
<td>41.1</td>
<td>258</td>
<td>41.9</td>
<td>253</td>
</tr>
<tr>
<td>465.tonto</td>
<td>285</td>
<td>34.5</td>
<td>288</td>
<td>34.2</td>
<td>289</td>
<td>34.0</td>
<td>222</td>
<td>44.3</td>
<td>222</td>
<td>44.3</td>
</tr>
<tr>
<td>470.lbm</td>
<td>11.1</td>
<td>1240</td>
<td>10.8</td>
<td>1270</td>
<td>11.1</td>
<td>1240</td>
<td>11.1</td>
<td>1240</td>
<td>10.8</td>
<td>1270</td>
</tr>
<tr>
<td>481.wrf</td>
<td>109</td>
<td>102</td>
<td>109</td>
<td>102</td>
<td>112</td>
<td>99.8</td>
<td>109</td>
<td>102</td>
<td>109</td>
<td>102</td>
</tr>
<tr>
<td>482.sphinx3</td>
<td>311</td>
<td>62.6</td>
<td>312</td>
<td>62.5</td>
<td>312</td>
<td>62.5</td>
<td>311</td>
<td>62.6</td>
<td>312</td>
<td>62.5</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 Cluster on Die
  - Virtualization Technology disabled
  - System Profile set to custom
  - CPU Performance set to Hardware P States
  - C States set to Autonomous
  - C1E disabled
  - Energy Efficient Turbo disabled
  - Uncore Frequency set to Dynamic

Continued on next page
Dell Inc.

PowerEdge M830 (Intel Xeon E5-4640 v4, 2.10 GHz)

SPECfp2006 = 102
SPECfp_base2006 = 97.2

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

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

Platform Notes (Continued)

Energy Efficiency Policy set to Balanced Performance
Memory Patrol Scrub disabled
Sysinfo program /root/cpu2006-1.2/config/sysinfo.rev6914
$Rev: 6914 $ $Date:: 2014-06-25 #$ e3fbb8667b5a285932ceab81e28219e1
running on linux-9j5l Fri Apr 29 00:31:30 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 E5-4640 v4 @ 2.10GHz
4 "physical id"s (chips)
96 "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 : 12
siblings : 24
physical 0: cores 0 1 2 3 4 5 8 9 10 11 12 13
physical 1: cores 0 1 2 3 4 5 8 9 10 11 12 13
physical 2: cores 0 1 2 3 4 5 8 9 10 11 12 13
physical 3: cores 0 1 2 3 4 5 8 9 10 11 12 13
cache size : 30720 KB

From /proc/meminfo
MemTotal: 529326752 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:

Continued on next page
Dell Inc.  
PowerEdge M830 (Intel Xeon E5-4640 v4, 2.10 GHz)  

SPECfp2006 = 102  
SPECfp_base2006 = 97.2

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

Platform Notes (Continued)

(8d714a0) x86_64 x86_64 x86_64 GNU/Linux  
run-level 3 Apr 28 18:13  
SPEC is set to: /root/cpu2006-1.2  
Filesystem Type Size Used Avail Use% Mounted on  
/dev/sda2 xfs 225G 11G 215G 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. 2.0.1 03/31/2016  
Memory:  
16x 00AD00B300AD HMA82GR7MFR8N-UH 16 GB 2 rank 2400 MHz, configured at 2133 MHz  
16x 00CE00B300CE M393A2K43BB1-CRC 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 = "48"  

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/enabled

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
SPEC CFP2006 Result

Dell Inc.

PowerEdge M830 (Intel Xeon E5-4640 v4, 2.10 GHz)

SPECfp2006 = 102
SPECfp_base2006 = 97.2

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

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

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: -nofor_main
437.leslie3d: -DSPEC_CPU_LP64
444.namd: -nofor_main
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
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.  
PowerEdge M830 (Intel Xeon E5-4640 v4, 2.10 GHz)  

SPECfp2006 = 102  
SPECfp_base2006 = 97.2

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

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

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

C++ benchmarks:

- 444.namd: -xCORE-AVX2(pass 2) -prof-genc:threadsafe(pass 1)  
  -ipo(pass 2) -03(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-genc:threadsafe(pass 1)  
  -ipo(pass 2) -03(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-genc:threadsafe(pass 1)  
  -ipo(pass 2) -03(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.

PowerEdge M830 (Intel Xeon E5-4640 v4, 2.10 GHz)

SPECfp2006 = 102
SPECfp_base2006 = 97.2

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

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

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-call
-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

SPEC and SPECfp are registered trademarks of the Standard Performance Evaluation Corporation. All other brand and product names appearing in this result are trademarks or registered trademarks of their respective holders.

For questions about this result, please contact the tester.
For other inquiries, please contact webmaster@spec.org.

Tested with SPEC CPU2006 v1.2.
Report generated on Tue Jun 28 17:30:10 2016 by SPEC CPU2006 PS/PDF formatter v6932.
Originally published on 28 June 2016.