Dell Inc.

PowerEdge M640 (Intel Xeon Platinum 8176, 2.10 GHz)

**SPECfp®2006 = 140**

**SPECfp_base2006 = 133**

<table>
<thead>
<tr>
<th>Test sponsor:</th>
<th>Dell Inc.</th>
<th>Test date:</th>
<th>Aug-2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tested by:</td>
<td>Dell Inc.</td>
<td>Hardware Availability:</td>
<td>Sep-2017</td>
</tr>
<tr>
<td>CPU2006 license:</td>
<td>55</td>
<td>Software Availability:</td>
<td>Nov-2016</td>
</tr>
</tbody>
</table>

### Hardware

<table>
<thead>
<tr>
<th>CPU Name:</th>
<th>Intel Xeon Platinum 8176</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU Characteristics:</td>
<td>Intel Turbo Boost Technology up to 3.80 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, 2 chips, 28 cores/chip, 2 threads/core</td>
</tr>
<tr>
<td>CPU(s) orderable:</td>
<td>1,2 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>1 MB I+D on chip per core</td>
</tr>
</tbody>
</table>

### Software

<table>
<thead>
<tr>
<th>Operating System:</th>
<th>SUSE Linux Enterprise Server 12 SP3 (x86_64) 4.4.70-2-default</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compiler:</td>
<td>C/C++: Version 17.0.3.191 of Intel C/C++ Compiler for Linux; Fortran: Version 17.0.3.191 of Intel Fortran Compiler for Linux</td>
</tr>
<tr>
<td>Auto Parallel:</td>
<td>Yes</td>
</tr>
<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**
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CPU2006 license: 55
test_sponsor: Dell Inc.
tested_by: Dell Inc.

L3 Cache: 38.5 MB I+D on chip per chip
Other Cache: None
Memory: 192 GB (12 x 16 GB 2Rx8 PC4-2666V-R)
Disk Subsystem: 1 x 960 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>
</tr>
</thead>
<tbody>
<tr>
<td>410.bwaves</td>
<td>13.4</td>
<td>1020</td>
<td>13.0</td>
<td>1040</td>
<td>13.4</td>
<td>1010</td>
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<tr>
<td>416.gameess</td>
<td>391</td>
<td>50.1</td>
<td>391</td>
<td>50.1</td>
<td>391</td>
<td>50.1</td>
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<td>433.milc</td>
<td>117</td>
<td>78.5</td>
<td>114</td>
<td>80.5</td>
<td>115</td>
<td>80.0</td>
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<tr>
<td>434.zeusmp</td>
<td>35.3</td>
<td>258</td>
<td>35.5</td>
<td>256</td>
<td>35.6</td>
<td>256</td>
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<tr>
<td>435.gromacs</td>
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<td>45.9</td>
<td>155</td>
<td>46.1</td>
<td>156</td>
<td>45.9</td>
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<tr>
<td>436.cactusADM</td>
<td>16.6</td>
<td>722</td>
<td>17.4</td>
<td>685</td>
<td>16.6</td>
<td>721</td>
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<tr>
<td>437.leslie3d</td>
<td>27.4</td>
<td>343</td>
<td>28.9</td>
<td>325</td>
<td>25.6</td>
<td>367</td>
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<tr>
<td>444.namd</td>
<td>220</td>
<td>36.4</td>
<td>220</td>
<td>36.5</td>
<td>220</td>
<td>36.5</td>
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<tr>
<td>447.dealII</td>
<td>153</td>
<td>74.8</td>
<td>154</td>
<td>74.2</td>
<td>153</td>
<td>74.8</td>
</tr>
<tr>
<td>450.soplex</td>
<td>152</td>
<td>54.8</td>
<td>160</td>
<td>52.1</td>
<td>153</td>
<td>54.6</td>
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<tr>
<td>453.povray</td>
<td>74.4</td>
<td>71.5</td>
<td>74.7</td>
<td>71.2</td>
<td>73.5</td>
<td>72.4</td>
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<td>454.calculix</td>
<td>115</td>
<td>71.6</td>
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<td>71.5</td>
<td>115</td>
<td>71.5</td>
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<tr>
<td>459.GemsFDTD</td>
<td>44.9</td>
<td>237</td>
<td>44.5</td>
<td>238</td>
<td>44.9</td>
<td>236</td>
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<tr>
<td>465.tonto</td>
<td>212</td>
<td>46.3</td>
<td>213</td>
<td>46.2</td>
<td>215</td>
<td>45.8</td>
</tr>
<tr>
<td>470.lbm</td>
<td>10.3</td>
<td>1340</td>
<td>9.52</td>
<td>1440</td>
<td>9.25</td>
<td>1480</td>
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<tr>
<td>481.wrf</td>
<td>80.0</td>
<td>140</td>
<td>81.2</td>
<td>138</td>
<td>81.1</td>
<td>138</td>
</tr>
<tr>
<td>482.sphinx3</td>
<td>301</td>
<td>64.7</td>
<td>314</td>
<td>62.1</td>
<td>298</td>
<td>65.4</td>
</tr>
</tbody>
</table>

Operating System Notes

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

Platform Notes

BIOS settings:
Sub NUMA Cluster disabled
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
Energy Efficiency Policy set to Performance

Continued on next page
### Platform Notes (Continued)

Memory Patrol Scrub disabled
Logical Processor enabled
CPU Interconnect Bus Link Power Management disabled
PCI ASPM L1 Link Power Management disabled
Sysinfo program /root/cpu2006-1.2_ic17u3/config/sysinfo.rev6993
Revision 6993 of 2015-11-06 (b5e8d4b4eb51ed28d7f98696cbe290c1)
rung on linux-287k Thu Aug 31 22:54:31 2017

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) Platinum 8176 CPU @ 2.10GHz
- 2 "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 : 28
- siblings : 56
- physical 0: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14 16 17 18 19 20 21 22 24 25 26 27 28 29 30
- physical 1: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14 16 17 18 19 20 21 22 24 25 26 27 28 29 30
- cache size : 39424 KB

From /proc/meminfo
- MemTotal:       196682072 kB
- HugePages_Total:       0
- Hugepagesize:       2048 kB

From /etc/*release* /etc/*version*
- SuSE-release:
- SUSE Linux Enterprise Server 12 (x86_64)
- VERSION = 12
- PATCHLEVEL = 3
- # 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-SP3"
- VERSION_ID="12.3"
- PRETTY_NAME="SUSE Linux Enterprise Server 12 SP3"
- ID="sles"
- ANSI_COLOR="0;32"
- CPE_NAME="cpe:/o:suse:sles:12:sp3"

uname -a:
- Linux linux-287k 4.4.70-2-default #1 SMP Wed Jun 7 15:12:06 UTC 2017
- (4502c76) x86_64 x86_64 x86_64 GNU/Linux

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SPEC CFP2006 Result

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Software Availability: Nov-2016

Platform Notes (Continued)

run-level 3 Aug 31 18:38
SPEC is set to: /root/cpu2006-1.2_ic17u3
Filesystem     Type   Size  Used Avail Use% Mounted on
/dev/sda3      btrfs  928G  9.0G  916G   1% /
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. 1.0.0 08/10/2017
Memory:
12x 002C00B3002C 18ASF2G72PDZ-2G6D1 16 GB 2 rank 2666 MHz
4x 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_ic17u3/lib/ia32;/root/cpu2006-1.2_ic17u3/lib/intel64;/root/cpu2006-1.2_ic17u3/sh10.2"
OMP_NUM_THREADS = "56"

Binaries compiled on a system with 1x Intel Core i7-4790 CPU + 32GB RAM memory using Redhat Enterprise Linux 7.2
Transparent Huge Pages enabled by default.
Filesystem page cache cleared with:
shell invocation of 'sync; echo 3 > /proc/sys/vm/drop_caches' prior to run

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 -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:
-xCORE-AVX2 -ipo -O3 -no-prec-div -parallel -qopt-prefetch

C++ benchmarks:
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch

Fortran benchmarks:
-xCORE-AVX2 -ipo -O3 -no-prec-div -parallel -qopt-prefetch

Benchmarks using both Fortran and C:
-xCORE-AVX2 -ipo -O3 -no-prec-div -parallel -qopt-prefetch

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
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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: -prof-gen(pass 1) -prof-use(pass 2) -xCORE-AVX2(pass 2)
            -par-num-threads=1(pass 1) -ipo(pass 2) -O3(pass 2)
            -no-prec-div(pass 2) -fno-alias -auto-iiip32
447.dealII: basepeak = yes
450.soplex: basepeak = yes
453.povray: -prof-gen(pass 1) -prof-use(pass 2) -xCORE-AVX2(pass 2)
            -par-num-threads=1(pass 1) -ipo(pass 2) -O3(pass 2)
            -no-prec-div(pass 2) -unroll4 -ansi-alias

Fortran benchmarks:
410.bwaves: basepeak = yes
416.gamess: -prof-gen(pass 1) -prof-use(pass 2) -xCORE-AVX2(pass 2)
            -par-num-threads=1(pass 1) -ipo(pass 2) -O3(pass 2)
            -no-prec-div(pass 2) -unroll2 -inline-level=0 -scalar-rep-
434.zeusmp: basepeak = yes
437.leslie3d: basepeak = yes
459.GemsFDTD: -prof-gen(pass 1) -prof-use(pass 2) -xCORE-AVX2(pass 2)
            -par-num-threads=1(pass 1) -ipo(pass 2) -O3(pass 2)
            -no-prec-div(pass 2) -unroll2 -inline-level=0
            -qopt-prefetch -parallel
465.tonto: -prof-gen(pass 1) -prof-use(pass 2) -xCORE-AVX2(pass 2)
            -par-num-threads=1(pass 1) -ipo(pass 2) -O3(pass 2)
            -no-prec-div(pass 2) -inline-calloc -qopt-malloc-options=3
            -auto -unroll4

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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
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-ic17.0-official-linux64-revF.html

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2006/flags/Intel-ic17.0-official-linux64-revF.xml

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

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