## Dell Inc.

**PowerEdge C6420 (Intel Xeon Silver 4108, 1.80 GHz)**

| SPECfp®_rate2006 = | 629 |
| SPECfp_rate_base2006 = | 615 |

### CPU2006 license:
- 55

### Test sponsor:
- Dell Inc.

### Tested by:
- Dell Inc.

### CPU Characteristics:
- Intel Turbo Boost Technology up to 3.00 GHz
- 16 cores, 2 chips, 8 cores/chip, 2 threads/core
- 1,2 chip

### Software
- Operating System:
  - SUSE Linux Enterprise Server 12 SP2
  - 4.4.21-69-default
- Compiler:
  - 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
- Auto Parallel:
  - Yes

### File System:
- ext4

### System State:
- Run level 3 (multi-user)

### Hardware

<table>
<thead>
<tr>
<th>Program</th>
<th>Copies</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>410.bwaves</td>
<td>16</td>
<td>504</td>
</tr>
<tr>
<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>435.gromacs</td>
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<td>436.cactusADM</td>
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<td>437.leslie3d</td>
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<td>444.namd</td>
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<td>447.dealII</td>
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<td>450.soplex</td>
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<td>446</td>
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<td>453.povray</td>
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<td>454.calculix</td>
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<td>459.GemsFDTD</td>
<td>32</td>
<td>834</td>
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<tr>
<td>465.tonto</td>
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<td>834</td>
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<tr>
<td>470.lbm</td>
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<td>481.wrf</td>
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<tr>
<td>482.sphinx3</td>
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### Notes
- Test date: Jun-2017
- Hardware Availability: Jul-2017
- Software Availability: Jul-2017

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**Standard Performance Evaluation Corporation**

**info@spec.org**

**http://www.spec.org/**
Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Base</th>
<th>Peak</th>
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<tbody>
<tr>
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<tr>
<td>410.bwaves</td>
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<tr>
<td>482.sphinx3</td>
<td>32</td>
<td>1173</td>
</tr>
</tbody>
</table>

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

Submit Notes

The numactl mechanism was used to bind copies to processors. The config file option 'submit' was used to generate numactl commands to bind each copy to a specific processor. For details, please see the config file.

Operating System Notes

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

Platform Notes

BIOS settings:
Sub NUMA Cluster enabled
Virtualization Technology disabled

Continued on next page
Dell Inc.  
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CPU2006 license: 55  
Test sponsor: Dell Inc.  
Tested by: Dell Inc.  

Test date: Jun-2017  
Hardware Availability: Jul-2017  
Software Availability: Jul-2017

Platform Notes (Continued)

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  
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)  
running on linux-38mh Thu Jun 22 17:36:53 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) Silver 4108 CPU @ 1.80GHz  
- 2 "physical id"s (chips)  
- 32 "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 : 8  
  - siblings : 16  
  - physical 0: cores 0 1 2 3 4 5 6 7  
  - physical 1: cores 0 1 2 3 4 5 6 7  
- cache size : 11264 KB

From /proc/meminfo

- MemTotal: 196687624 kB  
- HugePages_Total: 0  
- Hugepagesize: 2048 kB

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

- SuSE-release:  
  SUSE Linux Enterprise Server 12 (x86_64)  
  VERSION = 12  
  PATCHLEVEL = 2  
  # 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–SP2"  
  VERSION_ID="12.2"  
  PRETTY_NAME="SUSE Linux Enterprise Server 12 SP2"  
  ID="sles"  
  ANSI_COLOR="0;32"

Continued on next page
Platform Notes (Continued)

CPE_NAME="cpe:/o:suse:sles:12:sp2"

uname -a:
    (9464f67) x86_64 x86_64 x86_64 GNU/Linux

run-level 3 Jun 22 05:01

SPEC is set to: /root/cpu2006-1.2_ic17u3
  Filesystem     Type  Size  Used Avail Use% Mounted on
  /dev/sda2      ext4  915G  8.4G  906G   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. 1.1.1 06/05/2017
Memory:
  12x 002C00B3002C 18ASF2G72PDZ-2G6D1 16 GB 2 rank 2666 MHz, configured at 2400
  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:
LD_LIBRARY_PATH = "/root/cpu2006-1.2_ic17u3/lib/ia32:/root/cpu2006-1.2_ic17u3/lib/intel64:/root/cpu2006-1.2_ic17u3/sh10.2"

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
runspec command invoked through numactl i.e.:
numactl --interleave=all runspec <etc>

Base Compiler Invocation

C benchmarks:
  icc -m64

C++ benchmarks:
  icpc -m64

Fortran benchmarks:
  ifort -m64
Dell Inc.
PowerEdge C6420 (Intel Xeon Silver 4108, 1.80 GHz)

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<tr>
<td>Tested by:</td>
<td>Dell Inc.</td>
<td>Jul-2017</td>
</tr>
</tbody>
</table>

**Base Compiler Invocation (Continued)**

Benchmarks using both Fortran and C:

```
icc -m64 ifort -m64
```

**Base Portability Flags**

- 410.bwaves: `--DSPEC_CPU_LP64`
- 416.games: `--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 -qopt-prefetch -auto-p32
-qopt-mem-layout-trans=3
```

**C++ benchmarks:**

```
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -auto-p32
-qopt-mem-layout-trans=3
```

**Fortran benchmarks:**

```
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch
```

**Benchmarks using both Fortran and C:**

```
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -auto-p32
-qopt-mem-layout-trans=3
```

**Peak Compiler Invocation**

**C benchmarks:**

```
icc -m64
```
SPEC CFP2006 Result

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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: -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-iipt32 -qopt-mem-layout-trans=3
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 -qopt-mem-layout-trans=3

Fortran benchmarks:
410.bwaves: -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch
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-

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Peak Optimization Flags (Continued)

434.zeusmp: basepeak = yes
437.leslie3d: Same as 410.bwaves
459.GemsFDTD: basepeak = yes
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) -unroll4 -auto -inline-calloc
            -qopt-malloc-options=3

Benchmarks using both Fortran and C:

435.gromacs: -prof-gen(pass 1) -prof-use(pass 2) -xCORE-AVX2(pass 2)
            -par-num-threads=1(pass 1) -qopt-prefetch -auto-ilp32
            -qopt-mem-layout-trans=3
436.cactusADM: basepeak = yes
454.calculix: basepeak = yes
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
http://www.spec.org/cpu2006/flags/Dell-Platform-Flags-PowerEdge14G-revB.20170725.xml

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

Tested with SPEC CPU2006 v1.2.