## SPEC® CPU2017 Integer Speed Result

### Dell Inc.

**PowerEdge C6420 (Intel Xeon Platinum 8160, 2.10 GHz)**

<table>
<thead>
<tr>
<th>Thread</th>
<th>SPECspeed2017_int_base</th>
<th>SPECspeed2017_int_peak</th>
</tr>
</thead>
<tbody>
<tr>
<td>600.perlbench_s</td>
<td>8.97</td>
<td>9.25</td>
</tr>
<tr>
<td>602.gcc_s</td>
<td>9.44</td>
<td>11.8</td>
</tr>
<tr>
<td>605.mcf_s</td>
<td>11.0</td>
<td>11.1</td>
</tr>
<tr>
<td>620.omnetpp_s</td>
<td>7.96</td>
<td>7.31</td>
</tr>
<tr>
<td>623.xalancbmk_s</td>
<td>7.38</td>
<td>9.34</td>
</tr>
<tr>
<td>625.x264_s</td>
<td>11.0</td>
<td>10.1</td>
</tr>
<tr>
<td>631.deepsjeng_s</td>
<td>4.39</td>
<td>4.33</td>
</tr>
<tr>
<td>641.leela_s</td>
<td>4.34</td>
<td>4.34</td>
</tr>
<tr>
<td>648.exchange2_s</td>
<td>11.8</td>
<td>11.8</td>
</tr>
<tr>
<td>657.xz_s</td>
<td>23.2</td>
<td>23.3</td>
</tr>
</tbody>
</table>

### Hardware

- **CPU Name:** Intel Xeon Platinum 8160
- **Max MHz.:** 3700
- **Nominal:** 2100
- **Enabled:** 48 cores, 2 chips, 2 threads/core
- **Orderable:** 1.2 chips
- **Cache L1:** 32 KB I + 32 KB D on chip per core
- **L2:** 1 MB I+D on chip per core
- **L3:** 33 MB I+D on chip per chip
- **Memory:** 192 GB (12 x 16 GB 2Rx8 PC4-2666V-R)
- **Storage:** 1 TB SATA SSD
- **Other:** None

### Software

- **OS:** SUSE Linux Enterprise Server 12 SP3 (x86_64)
  - 4.4.114-94.11-default
- **Compiler:** C/C++: Version 18.0.0.128 of Intel C/C++
  - Compiler for Linux:
    - Fortran: Version 18.0.0.128 of Intel Fortran
  - Compiler for Linux
- **Parallel:** Yes
- **Firmware:** Version 1.3.7 released Feb-2018
- **File System:** xfs
- **System State:** Run level 3 (multi-user)
- **Base Pointers:** 64-bit
- **Peak Pointers:** 32/64-bit
- **Other:** jemalloc memory allocator library V5.0.1
### SPEC CPU2017 Integer Speed Result

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<table>
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<tr>
<th>Benchmark</th>
<th>Threads</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>
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<tbody>
<tr>
<td>605.mcf_s</td>
<td>96</td>
<td>428</td>
<td>11.0</td>
<td>434</td>
<td>10.9</td>
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<td>11.0</td>
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<td>620.omnetpp_s</td>
<td>96</td>
<td>231</td>
<td>7.06</td>
<td>227</td>
<td>7.19</td>
<td>235</td>
<td>6.93</td>
<td>96</td>
<td>232</td>
<td>7.03</td>
<td>223</td>
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<td>623.xalanchmk_s</td>
<td>96</td>
<td>148</td>
<td>9.55</td>
<td>151</td>
<td>9.36</td>
<td>150</td>
<td>9.44</td>
<td>96</td>
<td>140</td>
<td>10.0</td>
<td>141</td>
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<tr>
<td>625.x264_s</td>
<td>96</td>
<td>150</td>
<td>11.7</td>
<td>149</td>
<td>11.8</td>
<td>149</td>
<td>11.8</td>
<td>96</td>
<td>150</td>
<td>11.8</td>
<td>149</td>
</tr>
<tr>
<td>631.deepsjeng_s</td>
<td>96</td>
<td>286</td>
<td>5.02</td>
<td>287</td>
<td>4.99</td>
<td>285</td>
<td>5.03</td>
<td>96</td>
<td>287</td>
<td>5.00</td>
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<td>641.leelaw_s</td>
<td>96</td>
<td>394</td>
<td>4.34</td>
<td>394</td>
<td>4.33</td>
<td>394</td>
<td>4.33</td>
<td>96</td>
<td>393</td>
<td>4.34</td>
<td>392</td>
</tr>
<tr>
<td>648.exchange2_s</td>
<td>96</td>
<td>221</td>
<td>13.3</td>
<td>221</td>
<td>13.3</td>
<td>220</td>
<td>13.4</td>
<td>96</td>
<td>220</td>
<td>13.4</td>
<td>219</td>
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<tr>
<td>657.xz_s</td>
<td>96</td>
<td>267</td>
<td>23.2</td>
<td>267</td>
<td>23.1</td>
<td>265</td>
<td>23.4</td>
<td>96</td>
<td>264</td>
<td>23.4</td>
<td>265</td>
</tr>
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</table>

**SPECspeed2017_int_base = 8.97**  
**SPECspeed2017_int_peak = 9.25**

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"

### General Notes

Environment variables set by runcpu before the start of the run:

- KMP_AFFINITY = "granularity=fine,scatter"
- OMP_STACKSIZE = "192M"

Binaries compiled on a system with 1x Intel Core i7-4790 CPU + 32GB RAM memory using Redhat Enterprise Linux 7.4.  

Yes: The test sponsor attests, as of date of publication, that CVE-2017-5754 (Meltdown) is mitigated in the system as tested and documented.  

Yes: The test sponsor attests, as of date of publication, that CVE-2017-5753 (Spectre variant 1) is mitigated in the system as tested and documented.  

Yes: The test sponsor attests, as of date of publication, that CVE-2017-5715 (Spectre variant 2) is mitigated in the system as tested and documented.  

jemalloc: configured and built at default for 32bit (i686) and 64bit (x86_64) targets;  
jemalloc: built with the RedHat Enterprise 7.4, and the system compiler gcc 4.8.5;  
jemalloc: sources available via jemalloc.net

Transparent Huge Pages enabled by default  
Prior to runcpu invocation  
Filesystem page cache synced and cleared with:

```bash
sync; echo 3 > /proc/sys/vm/drop_caches
```
SPEC CPU2017 Integer Speed Result

Dell Inc.
PowerEdge C6420 (Intel Xeon Platinum 8160, 2.10 GHz)

SPECspeed2017_int_base = 8.97
SPECspeed2017_int_peak = 9.25

CPU2017 License: 55
Test Sponsor: Dell Inc.
Tested by: Dell Inc.

Test Date: Feb-2018
Hardware Availability: Sep-2017
Software Availability: Sep-2017

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
C1EE 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/cpu2017/bin/sysinfo
Rev: r5797 of 2017-06-14 96c45e4568ad54c135fd618bcc091c0f
running on linux-5j67 Fri Feb 23 17:00:03 2018

SUT (System Under Test) info as seen by some common utilities.
For more information on this section, see
https://www.spec.org/cpu2017/Docs/config.html#sysinfo

From /proc/cpuinfo
model name : Intel(R) Xeon(R) Platinum 8160 CPU @ 2.10GHz
  2 "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 caution.)
cpu cores : 24
siblings : 48
physical 0: cores 0 1 2 3 4 5 8 9 10 11 12 13 16 17 18 19 20 21 24 25 26 27 28 29
physical 1: cores 0 1 2 3 4 5 8 9 10 11 12 13 16 17 18 19 20 21 24 25 26 27 28 29

From lscpu:
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 96
On-line CPU(s) list: 0-95
Thread(s) per core: 2
Core(s) per socket: 24
Socket(s): 2
NUMA node(s): 2
Vendor ID: GenuineIntel
CPU family: 6
Model: 85
Model name: Intel(R) Xeon(R) Platinum 8160 CPU @ 2.10GHz
Stepping: 4

(Continued on next page)
SPEC CPU2017 Integer Speed Result

Dell Inc.
PowerEdge C6420 (Intel Xeon Platinum 8160, 2.10 GHz)

| SPECspeed2017_int_base | 8.97 |
| SPECspeed2017_int_peak | 9.25 |

CPU2017 License: 55
Test Sponsor: Dell Inc.
Tested by: Dell Inc.

CPU MHz: 2095.176
BogoMIPS: 4190.35
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 33792K

NUMA node0 CPU(s):
0,2,4,6,8,10,12,14,16,18,20,22,24,26,28,30,32,34,36,38,40,42,44,46,48,50,52,54,56,58,60,62,64,66,68,70,72,74,76,78,80,82,84,86,88,90,92,94

NUMA node1 CPU(s):
1,3,5,7,9,11,13,15,17,19,21,23,25,27,29,31,33,35,37,39,41,43,45,47,49,51,53,55,57,59,61,63,65,67,69,71,73,75,77,79,81,83,85,87,89,91,93,95

Flags: fpu vme de pse tsc msr pae mce cx8 apic sep mtrr pge mca cmov pat pse36 clflush dts acpi mmx fxsr sse sse2 ss ht tm pbe syscall nx pdelgb rdtscp lm constant_tsc arch_perfmon pebs bts rep_good ntopology nonstop_tsc aperfmpref eagerfpu pni pclmulqdq dtes64 monitor ds_cpl vmx est tm2 ssse3 sdbg fma cx16 xtpr pdcm pcid dca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave avx fl64 rdrand lahf_lm abm 3nowprefetch ida arat epb invpcid_single pln pts dtherm intel_pt rsb_ctxsw spec_ctrl retpoline kaiser tpr_shadow vmmx flexpriority ept vpid fsgsbase tsc_adjust bts lhe avx2 smep bmi2 ersed invpcid rtm cqm mpx avx512f avx512dq rdseed adx smap clflushopt clwb avx512cd avx512bw avx512vl xsaveopt xsaveopt xsavec xgetbv1 cqm_llc cqm_occup_llc pku ospk

From numactl --hardware WARNING: a numactl 'node' might or might not correspond to a physical chip.

From /proc/cpuinfo cache data
cache size : 33792 KB

From /proc/meminfo
MemTotal: 196704768 kB
HugePages_Total: 0
Hugepagesize: 2048 kB

(Continued on next page)
Dell Inc.
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SPECspeed2017_int_base = 8.97
SPECspeed2017_int_peak = 9.25

CPU2017 License: 55
Test Sponsor: Dell Inc.
Tested by: Dell Inc.

Platform Notes (Continued)

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-5j67 4.4.114-94.11-default #1 SMP Thu Feb 1 19:28:26 UTC 2018 (4309ff9)
x86_64 x86_64 x86_64 GNU/Linux

run-level 3 Feb 23 16:56

SPEC is set to: /root/cpu2017
   Filesystem     Type  Size  Used Avail Use% Mounted on
   /dev/sda2      xfs   928G   25G  903G   3% /

Additional information from dmidecode follows. 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. 1.3.7 02/09/2018
   Memory:
   12x 00CE063200CE M393A2K43BB1-CTD 16 GB 2 rank 2666
   4x Not Specified Not Specified

(End of data from sysinfo program)

Compiler Version Notes
==============================================================================
CC  600.perlbench_s(base) 602.gcc_s(base) 605.mcf_s(base) 625.x264_s(base,
peak) 657.xz_s(base)
------------------------------------------------------------------------------
icc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
(Continued on next page)
## Dell Inc.

**PowerEdge C6420** (Intel Xeon Platinum 8160, 2.10 GHz)

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- **CPU2017 License**: 55
- **Test Sponsor**: Dell Inc.
- **Tested by**: Dell Inc.
- **Test Date**: Feb-2018
- **Hardware Availability**: Sep-2017
- **Software Availability**: Sep-2017

### Compiler Version Notes (Continued)

```plaintext
==============================================================================
CC   600.perlbench_s(peak) 602.gcc_s(peak) 605.mcf_s(peak) 657.xz_s(peak)
icc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
==============================================================================
CXXC 620.omnetpp_s(base) 623.xalancbmk_s(base) 631.deepsjeng_s(base)
     641.leela_s(base)
icpc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
==============================================================================
CXXC 620.omnetpp_s(peak) 623.xalancbmk_s(peak) 631.deepsjeng_s(peak)
     641.leela_s(peak)
icpc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
==============================================================================
FC  648.exchange2_s(base, peak)
ifort (IFORT) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
```

### Base Compiler Invocation

- **C benchmarks**:
  - `icc`
- **C++ benchmarks**:
  - `icpc`
- **Fortran benchmarks**:
  - `ifort`
**SPEC CPU2017 Integer Speed Result**

---

**Dell Inc.**  
PowerEdge C6420 (Intel Xeon Platinum 8160, 2.10 GHz)

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</table>

| CPU2017 License: | 55   |
| Test Sponsor:   | Dell Inc. |
| Tested by:      | Dell Inc. |

---

### Base Portability Flags

- `600.perlbench_s`: -DSPEC_LP64 -DSPEC_LINUX_X64
- `602.gcc_s`: -DSPEC_LP64
- `605.mcf_s`: -DSPEC_LP64
- `620.omnetpp_s`: -DSPEC_LP64
- `623.xalancbmk_s`: -DSPEC_LP64 -DSPEC_LINUX
- `625.x264_s`: -DSPEC_LP64
- `631.deepsjeng_s`: -DSPEC_LP64
- `641.leela_s`: -DSPEC_LP64
- `648.exchange2_s`: -DSPEC_LP64
- `657.xz_s`: -DSPEC_LP64

---

### Base Optimization Flags

C benchmarks:
- `-Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div`
- `-qopt-mem-layout-trans=3 -qopenmp -DSPEC_OPENMP`
- `-L/usr/local/je5.0.1-64/lib -ljemalloc`

C++ benchmarks:
- `-Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div`
- `-qopt-mem-layout-trans=3 -L/usr/local/je5.0.1-64/lib -ljemalloc`

Fortran benchmarks:
- `-Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div`
- `-qopt-mem-layout-trans=3 -nostandard-realloc-lhs -align array32byte`
- `-L/usr/local/je5.0.1-64/lib -ljemalloc`

---

### Base Other Flags

C benchmarks:
- `-m64 -std=c11`

C++ benchmarks:
- `-m64`

Fortran benchmarks:
- `-m64`
## Peak Compiler Invocation

C benchmarks:
- icc

C++ benchmarks:
- icpc

Fortran benchmarks:
- ifort

## Peak Portability Flags

<table>
<thead>
<tr>
<th>Benchmark</th>
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<td>620.omnetpp_s</td>
<td>-DSPEC_LP64</td>
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<tr>
<td>623.xalancbmk_s</td>
<td>-D_FILE_OFFSET_BITS=64 -DSPEC_LINUX</td>
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## Peak Optimization Flags

C benchmarks:

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<tr>
<td>600.perlbench_s</td>
<td>-Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -O2 -xCORE-AVX512 -qopt-mem-layout-trans=3 -ipo -qopt-mem-layout-trans=3 -ipo -no-prec-div -DSPEC_SUPPRESS_OPENMP -qopenmp -DSPEC_OPENMP -fno-strict-overflow -L/usr/local/je5.0.1-64/lib -ljemalloc</td>
</tr>
<tr>
<td>602.gcc_s</td>
<td>-Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -O2 -xCORE-AVX512 -qopt-mem-layout-trans=3 -ipo -no-prec-div -DSPEC_SUPPRESS_OPENMP -qopenmp -DSPEC_OPENMP -L/usr/local/je5.0.1-64/lib -ljemalloc</td>
</tr>
<tr>
<td>605.mcf_s</td>
<td>-Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -ipo -xCORE-AVX512 -qopt-mem-layout-trans=3 -ipo -no-prec-div -DSPEC_SUPPRESS_OPENMP -qopenmp -DSPEC_OPENMP -L/usr/local/je5.0.1-64/lib -ljemalloc</td>
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CPU2017 License: 55
Test Sponsor: Dell Inc.
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Hardware Availability: Sep-2017
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Peak Optimization Flags (Continued)

625.x264_s: -Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div
-qopt-mem-layout-trans=3 -gopenmp -DSPEC_OPENMP
-L/usr/local/je5.0.1-64/lib -ljemalloc

657.xz_s: Same as 602.gcc_s

C++ benchmarks:

620.omnetpp_s: -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -ipo
-xCORE-AVX512 -O3 -no-prec-div -qopt-mem-layout-trans=3
-DSPEC_SUPPRESS_OPENMP -gopenmp -DSPEC_OPENMP
-L/usr/local/je5.0.1-64/lib -ljemalloc

623.xalancbmk_s: -L/opt/intel/compilers_and_libraries_2018/linux/lib/ia32
-Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -ipo
-xCORE-AVX512 -O3 -no-prec-div -qopt-mem-layout-trans=3
-DSPEC_SUPPRESS_OPENMP -gopenmp -DSPEC_OPENMP
-L/usr/local/je5.0.1-32/lib -ljemalloc

631.deepsjeng_s: Same as 620.omnetpp_s

641.leela_s: Same as 620.omnetpp_s

Fortran benchmarks:

-mlong-64 -m64 -std=c11

C++ benchmarks (except as noted below):

-mlong-64

623.xalancbmk_s: -m32

Fortran benchmarks:

-mlong-64

Peak Other Flags

C benchmarks:

-mlong-64

C++ benchmarks (except as noted below):

-mlong-64

623.xalancbmk_s: -m32
## SPEC CPU2017 Integer Speed Result

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**CPU2017 License:** 55  
**Test Sponsor:** Dell Inc.  
**Tested by:** Dell Inc.  
**Test Date:** Feb-2018  
**Hardware Availability:** Sep-2017  
**Software Availability:** Sep-2017

The flags files that were used to format this result can be browsed at:  

You can also download the XML flags sources by saving the following links:  

---

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

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