# SPEC® CPU2017 Integer Speed Result

**Dell Inc.**  
PowerEdge FC640 (Intel Xeon Platinum 8176, 2.10 GHz)  

<table>
<thead>
<tr>
<th>SPECspeed2017_int_base</th>
<th>9.30</th>
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</thead>
<tbody>
<tr>
<td>SPECspeed2017_int_peak</td>
<td>9.57</td>
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</tbody>
</table>

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

## Hardware

- **CPU Name:** Intel Xeon Platinum 8176  
- **Max MHz.:** 3800  
- **Nominal:** 2100  
- **Enabled:** 56 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:** 38.5 MB I+D on chip per chip  
- **Memory:** 176 GB (11 x 16 GB 2Rx8 PC4-2666V-R)  
- **Storage:** 1 TB SATA SSD  
- **Other:** None

## Software

- **OS:** SUSE Linux Enterprise Server 12 SP3 (x86_64)  
- **Compiler:** C/C++: Version 18.0.0.128 of Intel C/C++  
- **Fortran:** Version 18.0.0.128 of Intel Fortran  
- **Parallel:** Yes  
- **Firmware:** Version 1.3.5 released Feb-2018  
- **File System:** btrfs  
- **System State:** Run level 3 (multi-user)  
- **Base Pointers:** 64-bit  
- **Peak Pointers:** 32/64-bit  
- **Other:** jemalloc memory allocator library V5.0.1

## Test Details

<table>
<thead>
<tr>
<th>Threads</th>
<th>SPECspeed2017_int_base (9.30)</th>
<th>SPECspeed2017_int_peak (9.57)</th>
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<tbody>
<tr>
<td>600.perlbench_s 112</td>
<td>6.38</td>
<td>7.60</td>
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<tr>
<td>602.gcc_s 112</td>
<td>5.99</td>
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<td>605.mcf_s 112</td>
<td>7.59</td>
<td>11.3</td>
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<td>620.omnetpp_s 112</td>
<td>7.87</td>
<td>17.2</td>
</tr>
<tr>
<td>623.xalancbmk_s 112</td>
<td>9.70</td>
<td>10.3</td>
</tr>
<tr>
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<tr>
<td>631.deepsjeng_s 112</td>
<td>5.15</td>
<td>8.13</td>
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<tr>
<td>641.leela_s 112</td>
<td>4.45</td>
<td>4.47</td>
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<tr>
<td>648.exchange2_s 112</td>
<td>13.7</td>
<td>13.7</td>
</tr>
<tr>
<td>657.xz_s 112</td>
<td>23.9</td>
<td>24.1</td>
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## Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
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<tr>
<td>600.perlbench_s</td>
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<td>112</td>
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<td>9.71</td>
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<td>11.3</td>
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<td>5.16</td>
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<td>641.leela_s</td>
<td>112</td>
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<td>13.8</td>
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<tr>
<td>657.xz_s</td>
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<td>272</td>
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<td>255</td>
<td>24.2</td>
<td>259</td>
<td>23.9</td>
<td>112</td>
<td>259</td>
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<td>255</td>
</tr>
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</table>

SPECspeed2017_int_base = 9.30  
SPECspeed2017_int_peak = 9.57  

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

SPECspeed2017_int_base = 9.30  
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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 96c45e4568ad54c135fd618bccc091c0f  
running on linux-413n Sat Feb 17 01:33:01 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 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 23 24 25 26 27 28 29 30  

From lscpu:  
Architecture: x86_64  
CPU op-mode(s): 32-bit, 64-bit  
Byte Order: Little Endian  
CPU(s): 112  
On-line CPU(s) list: 0-111  
Thread(s) per core: 2  
Core(s) per socket: 28  
Socket(s): 2  
NUMA node(s): 2  
Vendor ID: GenuineIntel  
CPU family: 6  
Model: 85

(Continued on next page)
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Test Date: Feb-2018
Hardware Availability: Sep-2017
Software Availability: Sep-2017

Platform Notes (Continued)

Model name: Intel(R) Xeon(R) Platinum 8176 CPU @ 2.10GHz
Stepping: 4
CPU MHz: 2100.099
BogoMIPS: 4200.19
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 39424K

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
,60,62,64,66,68,70,72,74,76,78,80,82,84,86,88,90,92,94,96,98,100,102,104,106,108,110

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
,61,63,65,67,69,71,73,75,77,79,81,83,85,87,89,91,93,95,97,99,101,103,105,107,109,111

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 pdpe1gb rdtscp
lm constant_tsc art arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc
aperfmpref eagerpfu pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg
fma cx16 xtrr pdcm pccd dca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes
xsave avx f16c rdrand lahf_lm abm 3dnowprefetch ida arat epb invpcid_single pln pts
dtherm intel_pt rsb_ctxtsw spec_ctrl retpoline kaiser tpr_shadow vmmi flexpriority
epi vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid rtm cqm mpx
avx512f avx512dq rdseed adx smap clflushopt clwb avx512cd avx512bw avx512vl xsaveopt
xsaveopt xsavevc xgetbv1 cmpq_llc cmpq_occup_llc pku ospke

/proc/cpuinfo cache data

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

| available: 2 nodes (0-1) |
| node 0 cpus: 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 |
| node 0 size: 80228 MB |
| node 0 free: 79731 MB |

node 1 cpus: 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 |
| node 1 size: 96743 MB |
| node 1 free: 96131 MB |

node distances:
node 0 1
0: 10 21
1: 21 10

(Continued on next page)
Platform Notes (Continued)

From /proc/meminfo
   MemTotal:       181219788 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-413n 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 17 00:58

SPEC is set to: /root/cpu2017
   Filesystem     Type   Size  Used Avail Use% Mounted on
   /dev/sda7      btrfs  855G   43G  811G   6% /

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. 1.3.5 02/02/2018
   Memory:
      11x 00AD00B300AD HMA82GR7AFR8N-VK 16 GB 2 rank 2666
      5x 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,
**SPEC CPU2017 Integer Speed Result**

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### Compiler Version Notes (Continued)

```
peak) 657.xz_s(base)
```

```
icc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
```

```
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
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### 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
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**Peak Compiler Invocation**

C benchmarks:
- icc

C++ benchmarks:
- icpc

Fortran benchmarks:
- ifort

**Peak 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: -D_FILE_OFFSET_BITS=64 -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

(Continued on next page)

**Peak Optimization Flags**

C benchmarks:

- 600.perlbench_s: -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -O2
- -xCORE-AVX512 -qopt-mem-layout-trans=3 -ipo -O3
- -no-prec-div -DSPEC_SUPPRESS_OPENMP -qopenmp
- -DSPEC_OPENMP -fno-strict-overflow
- -L/usr/local/je5.0.1-64/lib -ljemalloc

- 602.gcc_s: -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -O2
- -xCORE-AVX512 -qopt-mem-layout-trans=3 -ipo -O3
- -no-prec-div -DSPEC_SUPPRESS_OPENMP -qopenmp
- -DSPEC_OPENMP -L/usr/local/je5.0.1-64/lib -ljemalloc

- 605.mcf_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 -qopenmp -DSPEC_OPENMP
- -L/usr/local/je5.0.1-64/lib -ljemalloc

(Continued on next page)
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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 -qopenmp -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 -03 -no-prec-div -qopt-mem-layout-trans=3
-DSPEC_SUPPRESS_OPENMP -qopenmp -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 -03 -no-prec-div -qopt-mem-layout-trans=3
-DSPEC_SUPPRESS_OPENMP -qopenmp -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:

-m64 -std=c11

C++ benchmarks (except as noted below):

-m64

623.xalancbmk_s: -m32

Fortran benchmarks:

-m64

Peak Other Flags

C benchmarks:

C++ benchmarks (except as noted below):

-m64
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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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