# SPEC CPU®2017 Integer Speed Result

## Dell Inc.

**PowerEdge R740xd (Intel Xeon Gold 5218R, 2.10 GHz)**

<table>
<thead>
<tr>
<th>Test Sponsor:</th>
<th>Dell Inc.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tested by:</td>
<td>Dell Inc.</td>
</tr>
<tr>
<td>CPU2017 License:</td>
<td>55</td>
</tr>
<tr>
<td>Test Date:</td>
<td>Jul-2020</td>
</tr>
<tr>
<td>Hardware Availability:</td>
<td>Jul-2020</td>
</tr>
<tr>
<td>Software Availability:</td>
<td>Apr-2020</td>
</tr>
</tbody>
</table>

### Threads

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
</tr>
</thead>
<tbody>
<tr>
<td>600.perlbench_s</td>
<td>40</td>
</tr>
<tr>
<td>602.gcc_s</td>
<td>40</td>
</tr>
<tr>
<td>605.mcf_s</td>
<td>40</td>
</tr>
<tr>
<td>620.omnetpp_s</td>
<td>40</td>
</tr>
<tr>
<td>623.xalancbmk_s</td>
<td>40</td>
</tr>
<tr>
<td>625.x264_s</td>
<td>40</td>
</tr>
<tr>
<td>631.deepsjeng_s</td>
<td>40</td>
</tr>
<tr>
<td>641.leela_s</td>
<td>40</td>
</tr>
<tr>
<td>648.exchange2_s</td>
<td>40</td>
</tr>
<tr>
<td>657.xz_s</td>
<td>40</td>
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</table>

### SPECspeed®2017_int_base = 11.3

<table>
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<tr>
<th>Benchmark</th>
<th>Spec Engine</th>
</tr>
</thead>
<tbody>
<tr>
<td>600.perlbench_s</td>
<td>6.88</td>
</tr>
<tr>
<td>602.gcc_s</td>
<td>10.4</td>
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<tr>
<td>605.mcf_s</td>
<td>11.0</td>
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<tr>
<td>620.omnetpp_s</td>
<td>9.87</td>
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<tr>
<td>623.xalanchbmk_s</td>
<td>13.9</td>
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<tr>
<td>625.x264_s</td>
<td>16.3</td>
</tr>
<tr>
<td>631.deepsjeng_s</td>
<td>5.92</td>
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<tr>
<td>641.leela_s</td>
<td>4.91</td>
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<tr>
<td>648.exchange2_s</td>
<td>16.9</td>
</tr>
<tr>
<td>657.xz_s</td>
<td>22.9</td>
</tr>
</tbody>
</table>

### SPECspeed®2017_int_peak = 11.6

### Hardware

- **CPU Name:** Intel Xeon Gold 5218R
- **Max MHz:** 4000
- **Nominal:** 2100
- **Enabled:** 40 cores, 2 chips
- **Orderable:** 1.2 chips
- **Cache L1:** 32 KB I + 32 KB D on chip per core
- **Cache L2:** 1 MB I+D on chip per core
- **Cache L3:** 27.5 MB I+D on chip per chip
- **Memory:** 768 GB (24 x 32 GB 2Rx4 PC4-2933Y-R, running at 2666)
- **Storage:** 1 x 1.92 TB SATA SSD
- **OS:** Red Hat Enterprise Linux 8.1
- **Compiler:** C/C++: Version 19.1.1.217 of Intel C/C++ Compiler for Linux;
  Fortran: Version 19.1.1.217 of Intel Fortran Compiler for Linux
- **Parallel:** Yes
- **Firmware:** Version 2.7.7 released May-2020
- **File System:** tmpfs
- **System State:** Run level 3 (multi-user)
- **Base Pointers:** 64-bit
- **Peak Pointers:** 64-bit
- **Power Management:** BIOS set to prefer performance at the cost of additional power usage

### Software
## Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
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<th>Ratio</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
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</thead>
<tbody>
<tr>
<td>600.perlbench_s</td>
<td>40</td>
<td>260</td>
<td>6.84</td>
<td>258</td>
<td>6.88</td>
<td>257</td>
<td>6.90</td>
<td>40</td>
<td>226</td>
<td>7.87</td>
<td>225</td>
<td>7.88</td>
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<tr>
<td>602.gcc_s</td>
<td>40</td>
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<td>10.4</td>
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<td>605.mcf_s</td>
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<td>18.7</td>
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<tr>
<td>623.xalanchmk_s</td>
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<td>13.9</td>
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<td>13.9</td>
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<td>102</td>
<td>13.9</td>
<td>102</td>
<td>13.9</td>
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<tr>
<td>625.x264_s</td>
<td>40</td>
<td>109</td>
<td>16.2</td>
<td>108</td>
<td>16.3</td>
<td>108</td>
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<td>631.deepsjeng_s</td>
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<td>40</td>
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<td>5.92</td>
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<td>641.leela_s</td>
<td>40</td>
<td>348</td>
<td>4.91</td>
<td>348</td>
<td>4.91</td>
<td>348</td>
<td>4.90</td>
<td>40</td>
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<td>4.91</td>
<td>348</td>
<td>4.90</td>
</tr>
<tr>
<td>657.xz_s</td>
<td>40</td>
<td>270</td>
<td>22.9</td>
<td>270</td>
<td>22.9</td>
<td>269</td>
<td>23.0</td>
<td>40</td>
<td>270</td>
<td>22.9</td>
<td>270</td>
<td>22.9</td>
<td>269</td>
<td>23.0</td>
</tr>
</tbody>
</table>

**SPECspeed®2017_int_base** = 11.3

**SPECspeed®2017_int_peak** = 11.6

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

## Compiler Notes

The inconsistent Compiler version information under Compiler Version section is due to a discrepancy in Intel Compiler.

The correct version of C/C++ compiler is: Version 19.1.1.217 Build 20200306 Compiler for Linux

The correct version of Fortran compiler is: Version 19.1.1.217 Build 20200306 Compiler for Linux

## Operating System Notes

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

## Environment Variables Notes

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

- KMP_AFFINITY = "granularity=fine,scatter"
- LD_LIBRARY_PATH = "/mnt/ramdisk/cpu2017-ic19.1ul/lib/intel64:/mnt/ramdisk/cpu2017-ic19.1ul/je5.0.1-64"
- MALLOC_CONF = "retain:true"
- OMP_STACKSIZE = "192M"

## General Notes

Binaries compiled on a system with 1x Intel Core i9-7980XE CPU + 64GB RAM memory using Redhat Enterprise Linux 8.0

NA: 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)
Spec CPU®2017 Integer Speed Result

Dell Inc.

PowerEdge R740xd (Intel Xeon Gold 5218R, 2.10 GHz)

Specspeed®2017_int_base = 11.3
Specspeed®2017_int_peak = 11.6

CPU2017 License: 55
Test Sponsor: Dell Inc.
Test Date: Jul-2020
Tested by: Dell Inc.
Hardware Availability: Jul-2020
Software Availability: Apr-2020

General Notes (Continued)

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.
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
Benchmark run from a 225 GB ramdisk created with the cmd; "mount -t tmpfs -o size=225G tmpfs /mnt/ramdisk"
jemalloc, a general purpose malloc implementation
built with the RedHat Enterprise 7.5, and the system compiler gcc 4.8.5

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
Uncore Frequency set to Dynamic
Energy Efficiency Policy set to Performance
Memory Patrol Scrub set to standard
Logical Processor disabled
CPU Interconnect Bus Link Power Management disabled
PCI ASPM L1 Link Power Management disabled
UPI Prefetch disabled
LLC Prefetch disabled
Dead Line LLC Alloc enabled
Directory AtoS disabled

Sysinfo program /mnt/ramdisk/cpu2017-ic19.1u1/bin/sysinfo
Rev: r6365 of 2019-08-21 295195f888a3d7edbl6e46a485a0011
running on user-pc.spa.lab Thu Jul 16 06:56:39 2020

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) Gold 5218R CPU @ 2.10GHz
  2 "physical id"s (chips)
  40 "processors"
  cores, siblings (Caution: counting these is hw and system dependent. The following excerpts from /proc/cpuinfo might not be reliable. Use with caution.)

(Continued on next page)
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**Dell Inc.**

PowerEdge R740xd (Intel Xeon Gold 5218R, 2.10 GHz)

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**Test Sponsor:** Dell Inc.  
**Tested by:** Dell Inc.

**Test Date:** Jul-2020  
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**Software Availability:** Apr-2020

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**Platform Notes (Continued)**

```
cpu cores : 20
siblings : 20
  physical 0: cores 0 1 2 3 4 8 9 10 11 12 16 17 18 19 20 24 25 26 27 28
  physical 1: cores 0 1 2 3 4 8 9 10 11 12 16 17 18 19 20 24 25 26 27 28

From lscpu:
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 40
On-line CPU(s) list: 0-39
Thread(s) per core: 1
Core(s) per socket: 20
Socket(s): 2
NUMA node(s): 2
Vendor ID: GenuineIntel
CPU family: 6
Model: 85
Model name: Intel(R) Xeon(R) Gold 5218R CPU @ 2.10GHz
Stepping: 7
CPU MHz: 1675.094
CPU max MHz: 4000.0000
CPU min MHz: 800.0000
BogoMIPS: 4200.00
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 28160K
NUMA node0 CPU(s): 0,2,4,6,8,10,12,14,16,18,20,22,24,26,28,30,32,34,36,38
NUMA node1 CPU(s): 1,3,5,7,9,11,13,15,17,19,21,23,25,27,29,31,33,35,37,39
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 cpuid aperfmperf pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg fma cx16 xtpr pdcm pcid dca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave avx f16c rdrand lahf_lm abtm 3nowprefetch cpuid_fault ebpx cat_l3 cdp_l3 invpcid_single intel_pinned sbd bts ibs ibpb stibp ibrs_enhanced tpr_shadow vnmi flexpriority ept vpid fsbegbase tsc_adjust bmi1 hle avx2 smep bmi2 3d now invpcid rtm cqm mxp rt tx a avx512f avx512dq rdseed adx smap clflushopt clwb intel_pmm_avx512cd avx512bw avx512vl xsaves xsaveopt xsave xsetbv xsavecs cqm_llc cqm_occurs_llc cqm_mbb_total cqm_mbb_local dtherm ida arat pln pts pkus ospke avx512_vnni md_clear flush_l1d arch_capabilities
```

(Continued on next page)
Dell Inc. PowerEdge R740xd (Intel Xeon Gold 5218R, 2.10 GHz)

SPEC CPU®2017 Integer Speed Result
Copyright 2017-2020 Standard Performance Evaluation Corporation

SPECspeed®2017_int_base = 11.3
SPECspeed®2017_int_peak = 11.6

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

Test Date: Jul-2020
Hardware Availability: Jul-2020
Software Availability: Apr-2020

Platform Notes (Continued)

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
node 0 size: 385582 MB
node 0 free: 384659 MB
node 1 cpus: 1 3 5 7 9 11 13 15 17 19 21 23 25 27 29 31 33 35 37 39
node 1 size: 387067 MB
node 1 free: 377112 MB
node distances:
node 0 1
 0: 10 21
 1: 21 10

From /proc/meminfo
MemTotal: 791193504 kB
HugePages_Total: 0
Hugepagesize: 2048 kB

From /etc/*release* /etc/*version*
os-release:
  NAME="Red Hat Enterprise Linux"
  VERSION="8.1 (Ootpa)"
  ID="rhel"
  ID_LIKE="fedora"
  VERSION_ID="8.1"
  PLATFORM_ID="platform:el8"
  PRETTY_NAME="Red Hat Enterprise Linux 8.1 (Ootpa)"
  ANSI_COLOR="0;31"
redhat-release: Red Hat Enterprise Linux release 8.1 (Ootpa)
system-release: Red Hat Enterprise Linux release 8.1 (Ootpa)
system-release-cpe: cpe:/o:redhat:enterprise_linux:8.1:ga

uname -a:
Linux user-pc.spa.lab 4.18.0-147.el8.x86_64 #1 SMP Thu Sep 26 15:52:44 UTC 2019 x86_64
  x86_64 x86_64 GNU/Linux

Kernel self-reported vulnerability status:

CVE-2018-3620 (L1 Terminal Fault): Not affected
Microarchitectural Data Sampling: Not affected
CVE-2017-5754 (Meltdown): Not affected
CVE-2018-3639 (Speculative Store Bypass): Mitigation: Speculative Store Bypass disabled via prctl and seccomp
CVE-2017-5753 (Spectre variant 1): Mitigation: usercopy/swapgs barriers and __user pointer sanitization
CVE-2017-5715 (Spectre variant 2): Mitigation: Enhanced IBRS, IBPB: conditional,

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

**RSB filling**

### Filesystem

- **Filesystem**: tmpfs
- **Type**: tmpfs
- **Size**: 225G
- **Used**: 4.3G
- **Avail**: 221G
- **Use %**: 2%
- **Mounted on**: /mnt/ramdisk

### BIOS, Vendor, Product, Product Family, Serial

- **BIOS**: Dell Inc. 2.7.7 05/04/2020
- **Vendor**: Dell Inc.
- **Product**: PowerEdge R740xd
- **Product Family**: PowerEdge
- **Serial**: F5BMCS2

### Additional information from dmidecode

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.

- **Memory**:
  - 19x 00AD00B300AD HMA84GR7CJR4N-WM 32 GB 2 rank 2933
  - 1x 00AD063200AD HMA84GR7CJR4N-WM 32 GB 2 rank 2933
  - 4x 00AD069D00AD HMA84GR7CJR4N-WM 32 GB 2 rank 2933

(End of data from sysinfo program)

## Compiler Version Notes

```
<table>
<thead>
<tr>
<th>Compiler</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>600.perlbench_s</td>
<td>602.gcc_s(base, peak) 605.mcf_s(base, peak)</td>
</tr>
<tr>
<td>625.x264_s(base, peak)</td>
<td>657.xz_s(base, peak)</td>
</tr>
</tbody>
</table>
```

**Intel(R) C Compiler for applications running on Intel(R) 64, Version 2021.1**

NextGen Build 20200304

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**Intel(R) C**

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### Compiler Version Notes (Continued)

<table>
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<tr>
<th>C</th>
<th>600.perlbench_s(base) 602.gcc_s(base, peak) 605.mcf_s(base, peak) 625.x264_s(base, peak) 657.xz_s(base, peak)</th>
</tr>
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Intel(R) C Compiler for applications running on Intel(R) 64, Version 2021.1
NextGen Build 20200304
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

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<table>
<thead>
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<th>C</th>
<th>600.perlbench_s(peak)</th>
</tr>
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Intel(R) C Compiler for applications running on Intel(R) 64, Version 19.1.1.217 Build 20200306
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

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<table>
<thead>
<tr>
<th>C++</th>
<th>620.omnetpp_s(base, peak) 623.xalancbmk_s(base, peak) 631.deepsjeng_s(base, peak) 641.leela_s(base, peak)</th>
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Intel(R) C++ Compiler for applications running on Intel(R) 64, Version 2021.1
NextGen Build 20200304
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

---

<table>
<thead>
<tr>
<th>Fortran</th>
<th>648.exchange2_s(base, peak)</th>
</tr>
</thead>
</table>

Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R) 64, Version 19.1.1.217 Build 20200306
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

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### 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:**  
- -m64 -gnextgen -std=c11  
- -Wl,-plugin-opt=-x86-branches-within-32B-boundaries -Wl,-z,muldefs  
- -xCORE-AVX512 -O3 -ffast-math -flto -mfpmath=sse -funroll-loops  
- -fuse-ld=gold -qopt-mem-layout-trans=4 -fopenmp -DSPEC_OPENMP  
- -L/usr/local/jemalloc64-5.0.1.1/lib -ljemalloc

**C++ benchmarks:**  
- -m64 -gnextgen -Wl,-plugin-opt=-x86-branches-within-32B-boundaries  
- -Wl,-z,muldefs -xCORE-AVX512 -O3 -ffast-math -flto -mfpmath=sse  
- -funroll-loops -fuse-ld=gold -qopt-mem-layout-trans=4  
- -L/usr/local/IntelCompiler19/compilers_and_libraries_2020.1.217/linux/compiler/lib/intel64_lin -lqkmalloc

**Fortran benchmarks:**  
- -m64 -Wl,-plugin-opt=-x86-branches-within-32B-boundaries -xCORE-AVX512  
- -O3 -ipo -no-prec-div -qopt-mem-layout-trans=4  
- -nostandard-realloc-lhs -align array32byte  
- -mbranches-within-32B-boundaries

### Peak Compiler Invocation

**C benchmarks:**  
- icc

**C++ benchmarks:**  
- icpc

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Peak Compiler Invocation (Continued)

Fortran benchmarks:
ifort

Peak Portability Flags

600.perlbench_s: -DSPEC_LP64 -DSPEC_LINUX_X64
602.gcc_s: -DSPEC_LP64(*) -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

(*) Indicates a portability flag that was found in a non-portability variable.

Peak Optimization Flags

C benchmarks:

600.perlbench_s: -Wl, -z, muldefs -prof-gen(pass 1) -prof-use(pass 2)
-xCORE-AVX512 -ipo -O3 -no-prec-div
-qopt-mem-layout-trans=4 -fno-strict-overflow
-mbranches-within-32B-boundaries
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

602.gcc_s: -m64 -qnextgen -std=c11 -fuse-ld=gold
-Wl, -plugin-opt=-x86-branches-within-32B-boundaries
-Wl, -z, muldefs -fprofile-generate(pass 1)
-fprofile-use=default.profdata(pass 2) -xCORE-AVX512 -flto
-Ofast(pass 1) -O3 -ffast-math -qopt-mem-layout-trans=4
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

605.mcf_s: basepeak = yes

625.x264_s: -m64 -qnextgen -std=c11
-Wl, -plugin-opt=-x86-branches-within-32B-boundaries
-Wl, -z, muldefs -xCORE-AVX512 -flto -O3 -ffast-math
-fuse-ld=gold -qopt-mem-layout-trans=4 -fno-alias
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

(Continued on next page)
Dell Inc.
PowerEdge R740xd (Intel Xeon Gold 5218R, 2.10 GHz)

**SPECspeed®2017_int_base = 11.3**

**SPECspeed®2017_int_peak = 11.6**

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

**Test Date:** Jul-2020
**Hardware Availability:** Jul-2020
**Software Availability:** Apr-2020

**Peak Optimization Flags (Continued)**

657.xz_s: basepeak = yes

C++ benchmarks:

620.omnetpp_s: basepeak = yes
623.xalancbmk_s: basepeak = yes
631.deepsjeng_s: basepeak = yes
641.leela_s: basepeak = yes

Fortran benchmarks:

648.exchange2_s: basepeak = yes

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:

http://www.spec.org/cpu2017/flags/Intel-ic19.1u1-official-linux64_revA.xml

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