### Dell Inc.

PowerEdge R650xs (Intel Xeon Gold 5318Y, 2.10 GHz)

<table>
<thead>
<tr>
<th>SPECrate®2017_int_base = 312</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECrate®2017_int_peak = 323</td>
</tr>
</tbody>
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**CPU2017 License:** 55  
**Test Sponsor:** Dell Inc.  
**Tested by:** Dell Inc.  
**Test Date:** Aug-2021  
**Hardware Availability:** Jul-2021  
**Software Availability:** Dec-2020

<table>
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<th>SPECrate®2017_int_base (312)</th>
<th>SPECrate®2017_int_peak (323)</th>
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<tbody>
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<td>500.perlbench_r 96</td>
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<tr>
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<td>523.xalancbmk_r 96</td>
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<tr>
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<td>531.deepsjeng_r 96</td>
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<td>541.leela_r 96</td>
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<tr>
<td>548.exchange2_r 96</td>
<td>626</td>
</tr>
<tr>
<td>557.xz_r 96</td>
<td>177</td>
</tr>
</tbody>
</table>

#### Hardware

- **CPU Name:** Intel Xeon Gold 5318Y  
- **Max MHz:** 3400  
- **Nominal:** 2100  
- **Enabled:** 48 cores, 2 chips, 2 threads/core  
- **Orderable:** 1.2 chips  
- **Cache L1:** 32 KB I + 48 KB D on chip per core  
- **L2:** 1.25 MB I+D on chip per core  
- **L3:** 36 MB I+D on chip per chip  
- **Other:** None  
- **Memory:** 512 GB (16 x 32 GB 2Rx4 PC4-3200AA-R, running at 2933)  
- **Storage:** 225 GB on tmpfs  
- **Other:** None

#### Software

- **OS:** Red Hat Enterprise Linux 8.3 (Ootpa)  
- **Compiler:** C/C++: Version 2021.1 of Intel oneAPI DPC++/C++ Compiler Build 20201113 for Linux;  
  Fortran: Version 2021.1 of Intel Fortran Compiler Classic Build 20201112 for Linux;  
  C/C++: Version 2021.1 of Intel C/C++ Compiler Classic Build 20201112 for Linux  
- **Parallel:** No  
- **Firmware:** Version 1.2.1 released May-2021  
- **File System:** tmpfs  
- **System State:** Run level 3 (multi-user)  
- **Base Pointers:** 64-bit  
- **Peak Pointers:** 32/64-bit  
- **Other:** jemalloc memory allocator V5.0.1  
- **Power Management:** BIOS and OS set to prefer performance at the cost of additional power usage.
Dell Inc.
PowerEdge R650xs (Intel Xeon Gold 5318Y, 2.10 GHz)

CPU2017 License: 55
Test Sponsor: Dell Inc.
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RESULTS TABLE

<table>
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SPECrater®2017_int_base = 312
SPECrater®2017_int_peak = 323

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"

Environment Variables Notes
Environment variables set by runcpu before the start of the run:
MALLOC_CONF = "retain:true"

General Notes
Binaries compiled on a system with 1x Intel Core i9-7980XE CPU + 64GB RAM memory using Red Hat Enterprise Linux 8.1
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

(Continued on next page)
Dell Inc.

PowerEdge R650xs (Intel Xeon Gold 5318Y, 2.10 GHz)

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CPU2017 License: 55
Test Sponsor: Dell Inc.
Tested by: Dell Inc.
Test Date: Aug-2021
Hardware Availability: Jul-2021
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**General Notes (Continued)**

runcpu command invoked through numactl i.e.:
numactl --interleave=all runcpu <etc>
jemalloc, a general purpose malloc implementation
built with the RedHat Enterprise 7.5, and the system compiler gcc 4.8.5

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) 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.

Benchmark run from a 225 GB ramdisk created with the cmd: "mount -t tmpfs -o size=225G tmpfs /mnt/ramdisk"

**Platform Notes**

BIOS settings:
- Sub NUMA Cluster: 2-Way Clustering
- Virtualization Technology: Disabled
- System Profile: Custom
- CPU Power Management: Maximum Performance
  - C1E: Disabled
  - C States: Autonomous
- Memory Patrol Scrub: Disabled
- Energy Efficiency Policy: Performance
- CPU Interconnect Bus Link
- Power Management: Disabled
- PCI ASPM L1 Link
- Power Management: Disabled

Sysinfo program /mnt/ramdisk/cpu2017-1.1.8-ic2021.1/bin/sysinfo
Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16acafc64d
running on r650xs.1b86kd3.inside.dell.com Sat Aug 28 13:45:38 2021

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 5318Y CPU @ 2.10GHz
  2 "physical id"s (chips)
  96 "processors"
- cores, siblings (Caution: counting these is hw and system dependent. The following

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

**PowerEdge R650xs (Intel Xeon Gold 5318Y, 2.10 GHz)**

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

**SPECrate**

- **SPECrate\textsuperscript{\textregistered}2017\textsubscript{int_base} = 312**  
- **SPECrate\textsuperscript{\textregistered}2017\textsubscript{int_peak} = 323**

<table>
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<th>Platform Notes (Continued)</th>
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<tbody>
<tr>
<td>excerpts from /proc/cpuinfo might not be reliable. Use with caution.)</td>
</tr>
<tr>
<td>cpu cores : 24</td>
</tr>
<tr>
<td>siblings : 48</td>
</tr>
<tr>
<td>physical 0: cores 0 1 10 11 12 13 14 15 16 17 18 19 20 21 22 23</td>
</tr>
<tr>
<td>physical 1: cores 0 1 10 11 12 13 14 15 16 17 18 19 20 21 22 23</td>
</tr>
<tr>
<td>From lscpu from util-linux 2.32.1:</td>
</tr>
<tr>
<td>Architecture: x86_64</td>
</tr>
<tr>
<td>CPU op-mode(s): 32-bit, 64-bit</td>
</tr>
<tr>
<td>Byte Order: Little Endian</td>
</tr>
<tr>
<td>CPU(s): 96</td>
</tr>
<tr>
<td>On-line CPU(s) list: 0-95</td>
</tr>
<tr>
<td>Thread(s) per core: 2</td>
</tr>
<tr>
<td>Core(s) per socket: 24</td>
</tr>
<tr>
<td>Socket(s): 2</td>
</tr>
<tr>
<td>NUMA node(s): 4</td>
</tr>
<tr>
<td>Vendor ID: GenuineIntel</td>
</tr>
<tr>
<td>CPU family: 6</td>
</tr>
<tr>
<td>Model: 106</td>
</tr>
<tr>
<td>Model name: Intel(R) Xeon(R) Gold 5318Y CPU @ 2.10GHz</td>
</tr>
<tr>
<td>Stepping: 6</td>
</tr>
<tr>
<td>CPU MHz: 2488.574</td>
</tr>
<tr>
<td>BogoMIPS: 4200.00</td>
</tr>
<tr>
<td>Virtualization: VT-x</td>
</tr>
<tr>
<td>L1d cache: 48K</td>
</tr>
<tr>
<td>L1i cache: 32K</td>
</tr>
<tr>
<td>L2 cache: 1280K</td>
</tr>
<tr>
<td>L3 cache: 36864K</td>
</tr>
<tr>
<td>NUMA node0 CPU(s): 0,4,8,12,16,20,24,28,32,36,40,44,48,52,56,60,64,68,72,76,80,84,88,92</td>
</tr>
<tr>
<td>NUMA node1 CPU(s): 2,6,10,14,18,22,26,30,34,38,42,46,50,54,58,62,66,70,74,78,82,86,90,94</td>
</tr>
<tr>
<td>NUMA node2 CPU(s): 1,5,9,13,17,21,25,29,33,37,41,45,49,53,57,61,65,69,73,77,81,85,89,93</td>
</tr>
<tr>
<td>Flags: fpu vme de pse tsc msr pae mce cx8 apic sep mtrr pge mca cmov pat pse36 clflush dts acl 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 abm 3dnowprefetch cpuid_fault epb cat_l3 invpcid_single intel_pmap ssbd mba ibrs ibpb stibp ibrs_enabled fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid cqm rdt_a avx512f avx512dq rdseed adx smap avx512ifma clflushopt clwb intel_pt avx512cd sha ni avx512bw avx512vl xsaveopt xsaves xsavec xgetbv1 xsaves cqm_llc cqm_occup_llc cqm_mbb_total cqm_mbb_local split_lock_detect wbinvd dtherm ida arat pln pts avx512vbm i umip pku ospe avx512_vbmi2 gfn i vaes vpclmulqdq</td>
</tr>
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(Continued on next page)
SPEC CPU®2017 Integer Rate Result

Dell Inc. PowerEdge R650xs (Intel Xeon Gold 5318Y, 2.10 GHz)

SPECrate®2017_int_base = 312
SPECrate®2017_int_peak = 323

CPU2017 License: 55
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Test Date: Aug-2021
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Platform Notes (Continued)

avx512_vnni avx512_bitalg tme avx512_vpopcntdq la57 rdpid md_clear pconfig flush_l1d arch_capabilities

/proc/cpuinfo cache data
   cache size : 36864 KB

From numactl --hardware
WARNING: a numactl 'node' might or might not correspond to a physical chip.
   available: 4 nodes (0-3)
   node 0 cpus: 0 4 8 12 16 20 24 28 32 36 40 44 48 52 56 60 64 68 72 76 80 84 88 92
   node 0 size: 125495 MB
   node 0 free: 127787 MB
   node 1 cpus: 2 6 10 14 18 22 26 30 34 38 42 46 50 54 58 62 66 70 74 78 82 86 90 94
   node 1 size: 126216 MB
   node 1 free: 128749 MB
   node 2 cpus: 1 5 9 13 17 21 25 29 33 37 41 45 49 53 57 61 65 69 73 77 81 85 89 93
   node 2 size: 126200 MB
   node 2 free: 119541 MB
   node 3 cpus: 3 7 11 15 19 23 27 31 35 39 43 47 51 55 59 63 67 71 75 79 83 87 91 95
   node 3 size: 126488 MB
   node 3 free: 128723 MB
   node distances:
       node   0   1   2   3
       0:  10  11  20  20
       1:  11  10  20  20
       2:  20  20  10  11
       3:  20  20  11  10

From /proc/meminfo
   MemTotal:       527536552 kB
   HugePages_Total:       0
   Hugepagesize:       2048 kB

/sbin/tuned-adm active
   Current active profile: throughput-performance

From /etc/*release* /etc/*version*
   os-release:
       NAME="Red Hat Enterprise Linux"
       VERSION="8.3 (Ootpa)"
       ID="rhel"
       ID_LIKE="fedora"
       VERSION_ID="8.3"
       PLATFORM_ID="platform:el8"
       PRETTY_NAME="Red Hat Enterprise Linux 8.3 (Ootpa)"
       ANSI_COLOR="0;31"
       redhat-release: Red Hat Enterprise Linux release 8.3 (Ootpa)

(Continued on next page)
Dell Inc. PowerEdge R650xs (Intel Xeon Gold 5318Y, 2.10 GHz)

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

Platform Notes (Continued)

system-release: Red Hat Enterprise Linux release 8.3 (Ootpa)
system-release-cpe: cpe:/o:redhat:enterprise_linux:8.3:ga

uname -a:
   Linux r650xs.1b86kd3.inside.dell.com 4.18.0-240.el8.x86_64 #1 SMP Wed Sep 23 05:13:10 EDT 2020 x86_64 x86_64 x86_64 GNU/Linux

Kernel self-reported vulnerability status:

CVE-2018-12207 (iTLB Multihit): Not affected
CVE-2018-3620 (L1 Terminal Fault): Not affected
Microarchitectural Data Sampling: Not affected
CVE-2017-5754 (Meltdown): Mitigation: Speculative Store Bypass disabled via prctl and seccomp
CVE-2018-3639 (Speculative Store Bypass): Mitigation: usercopy/swaps barriers and __user pointer sanitation
CVE-2017-5753 (Spectre variant 1): Mitigation: Enhanced IBRS, IBPB: conditional, RSB filling
CVE-2017-5715 (Spectre variant 2): Not affected
CVE-2020-0543 (Special Register Buffer Data Sampling): Not affected
CVE-2019-11135 (TSX Asynchronous Abort): Not affected

run-level 3 Aug 28 13:40

SPEC is set to: /mnt/ramdisk/cpu2017-1.1.8-ic2021.1
Filesystem     Type   Size  Used Avail Use% Mounted on
tmpfs          tmpfs  225G  4.4G  221G   2% /mnt/ramdisk

From /sys/devices/virtual/dmi/id
Vendor:        Dell Inc.
Product:       PowerEdge R650xs
Product Family: PowerEdge
Serial:        1B86KD3

Additional information from dmidecode 3.2 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 SMI BIOS" standard.
Memory:
16x 00AD063200AD HMA84GR7DJR4N-XN 32 GB 2 rank 3200, configured at 2933

BIOS:
   BIOS Vendor: Dell Inc.
   BIOS Version: 1.2.1
   BIOS Date: 05/28/2021

(Continued on next page)
Dell Inc. PowerEdge R650xs (Intel Xeon Gold 5318Y, 2.10 GHz)

SPEC CPU®2017 Integer Rate Result

SPECrate®2017_int_base = 312
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Test Date: Aug-2021
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Platform Notes (Continued)

BIOS Revision: 1.2

(End of data from sysinfo program)

Compiler Version Notes

==============================================================================
C | 500.perlbench_r(peak)
---------------------------------------------------------------
Intel(R) C Intel(R) 64 Compiler Classic for applications running on Intel(R) 64, Version 2021.1 Build 20201112_000000
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

==============================================================================
C | 502.gcc_r(peak)
---------------------------------------------------------------
Intel(R) oneAPI DPC++/C++ Compiler for applications running on IA-32, Version 2021.1 Build 20201113
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

==============================================================================
C | 500.perlbench_r(base) 502.gcc_r(base) 505.mcf_r(base, peak)
525.x264_r(base, peak) 557.xz_r(base, peak)
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** Compiler Version Notes (Continued) **

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| Copyright (C) 1985-2020 Intel Corporation. All rights reserved. |

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**Dell Inc.**  
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**Compiler Version Notes (Continued)**

Intel(R) Fortran Intel(R) 64 Compiler Classic for applications running on  
Intel(R) 64, Version 2021.1 Build 20201112_000000  
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

Base Compiler Invocation

C benchmarks:
- icx

C++ benchmarks:
- icpx

Fortran benchmarks:
- ifort

Base Portability Flags

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Flags</th>
</tr>
</thead>
<tbody>
<tr>
<td>500.perlbench_r</td>
<td>-DSPEC_LP64 -DSPEC_LINUX_X64</td>
</tr>
<tr>
<td>502.gcc_r</td>
<td>-DSPEC_LP64</td>
</tr>
<tr>
<td>505.mcf_r</td>
<td>-DSPEC_LP64</td>
</tr>
<tr>
<td>520.omnetpp_r</td>
<td>-DSPEC_LP64</td>
</tr>
<tr>
<td>523.xalancbmk_r</td>
<td>-DSPEC_LP64 -DSPEC_LINUX</td>
</tr>
<tr>
<td>525.x264_r</td>
<td>-DSPEC_LP64</td>
</tr>
<tr>
<td>531.deepsjeng_r</td>
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</tr>
<tr>
<td>541.leela_r</td>
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</tr>
<tr>
<td>548.exchange2_r</td>
<td>-DSPEC_LP64</td>
</tr>
<tr>
<td>557.xz_r</td>
<td>-DSPEC_LP64</td>
</tr>
</tbody>
</table>

Base Optimization Flags

C benchmarks:
- -w -std=c11 -m64 -Wl,-z,muldefs -xCORE-AVX512 -O3 -ffast-math  
- -fлист -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4  
- -mbranches-within-32B-boundaries  
- -L/opt/intel/oneapi/compiler/2021.1.1/linux/compiler/lib/intel64_lin  
- -lqkmalloc

C++ benchmarks:
- -w -m64 -Wl,-z,muldefs -xCORE-AVX512 -O3 -ffast-math -flto  
- -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4

(Continued on next page)
**SPEC CPU®2017 Integer Rate Result**

**Dell Inc.**

PowerEdge R650xs (Intel Xeon Gold 5318Y, 2.10 GHz)  

<table>
<thead>
<tr>
<th>SPECrate®2017_int_base = 312</th>
<th>SPECrate®2017_int_peak = 323</th>
</tr>
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| **CPU2017 License**: 55 | **Test Date**: Aug-2021 |
| **Test Sponsor**: Dell Inc. | **Hardware Availability**: Jul-2021 |
| **Tested by**: Dell Inc. | **Software Availability**: Dec-2020 |

### Base Optimization Flags (Continued)

C++ benchmarks (continued):

- `-mbranches-within-32B-boundaries`
- `-L/opt/intel/oneapi/compiler/2021.1.1/linux/compiler/lib/intel64_lin`
- `-lqkmalloc`

Fortran benchmarks:

- `-w -m64 -Wl,-z,muldefs -xCORE-AVX512 -O3 -ipo -no-prec-div`
- `-qopt-mem-layout-trans=4 -nostandard-realloc-lhs -align array32byte`
- `-auto -mbranches-within-32B-boundaries`
- `-L/opt/intel/oneapi/compiler/2021.1.1/linux/compiler/lib/intel64_lin`
- `-lqkmalloc`

### Peak Compiler Invocation

C benchmarks (except as noted below):

`icx`

`500.perlbench_r: icc`

C++ benchmarks:

`icpx`

Fortran benchmarks:

`ifort`

### Peak Portability Flags

500.perlbench_r: `-DSPEC_LP64 -DSPEC_LINUX_X64`
502.gcc_r: `-D_FILE_OFFSET_BITS=64`
505.mcf_r: `-DSPEC_LP64`
520.omnetpp_r: `-DSPEC_LP64`
523.xalancbmk_r: `-DSPEC_LP64 -DSPEC_LINUX`
525.x264_r: `-DSPEC_LP64`
531.deepsjeng_r: `-DSPEC_LP64`
541.leela_r: `-DSPEC_LP64`
548.exchange2_r: `-DSPEC_LP64`
557.xz_r: `-DSPEC_LP64`
Dell Inc.

PowerEdge R650xs (Intel Xeon Gold 5318Y, 2.10 GHz)

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</tbody>
</table>

**SPEC CPU®2017 Integer Rate Result**

**SPECrate®2017_int_base = 312**

**SPECrate®2017_int_peak = 323**

Peak Optimization Flags

C benchmarks:

500.perlbench_r: -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2)
-xCORE-AVX512 -ipo -O3 -no-prec-div
-gopt-mem-layout-trans=4 -fno-strict-overflow
-mbranches-within-32B-boundaries
-L/opt/intel/oneapi/compiler/2021.1.1/linux/compiler/lib/intel64_lin
-lqkmalloc

502.gcc_r: -m32
-L/opt/intel/oneapi/compiler/2021.1.1/linux/compiler/lib/ia32_lin
-std=gnu89 -Wl,-z,muldefs -fprofile-generate(pass 1)
-fprofile-use=default.profdata(pass 2) -xCORE-AVX512 -flto
-Ofast(pass 1) -O3 -ffast-math -gopt-mem-layout-trans=4
-mbranches-within-32B-boundaries
-L/usr/local/jemalloc32-5.0.1/lib -ljemalloc

505.mcf_r: basepeak = yes

525.x264_r: -w -std=c11 -m64 -Wl,-z,muldefs -xCORE-AVX512 -flto
-O3 -ffast-math -gopt-mem-layout-trans=4 -fno-alias
-mbranches-within-32B-boundaries
-L/opt/intel/oneapi/compiler/2021.1.1/linux/compiler/lib/intel64_lin
-lqkmalloc

557.xz_r: basepeak = yes

C++ benchmarks:

520.omnetpp_r: basepeak = yes

523.xalancbmk_r: basepeak = yes

531.deepsjeng_r: basepeak = yes

541.leela_r: basepeak = yes

Fortran benchmarks:

548.exchange2_r: basepeak = yes

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


Dell Inc.  

PowerEdge R650xs (Intel Xeon Gold 5318Y, 2.10 GHz)  

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


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Tested with SPEC CPU\textsuperscript{®}2017 v1.1.8 on 2021-08-28 14:45:38-0400.  
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