**Dell Inc.**

PowerEdge T440 (Intel Xeon Silver 4214R, 2.40 GHz)

<table>
<thead>
<tr>
<th>SPECrate®2017_int_base</th>
<th>157</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECrate®2017_int_peak</td>
<td>163</td>
</tr>
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</table>

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

| Copies | 0 | 15 | 30 | 45 | 60 | 75 | 90 | 105 | 120 | 135 | 150 | 165 | 180 | 195 | 210 | 225 | 240 | 255 | 270 | 285 | 300 | 315 | 330 | 345 | 360 |
|--------|---|----|----|----|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 500.perlbench_r | 48 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 502.gcc_r | 48 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 505.mcf_r | 48 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 520.omnetpp_r | 48 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 523.xalancbmk_r | 48 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 525.x264_r | 48 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 531.deepsjeng_r | 48 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 541.leela_r | 48 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 548.exchange2_r | 48 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 557.xz_r | 48 | | | | | | | | | | | | | | | | | | | | | | | | | |

**Hardware**

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<tbody>
<tr>
<td>Max MHz:</td>
<td>3500</td>
</tr>
<tr>
<td>Nominal:</td>
<td>2400</td>
</tr>
<tr>
<td>Enabled:</td>
<td>48 cores, 2 chips</td>
</tr>
<tr>
<td>Orderable:</td>
<td>1.2 chips</td>
</tr>
<tr>
<td>Cache L1:</td>
<td>32 KB I + 32 KB D on chip per core</td>
</tr>
<tr>
<td>L2:</td>
<td>1 MB I+D on chip per core</td>
</tr>
<tr>
<td>L3:</td>
<td>16.5 MB I+D on chip per chip</td>
</tr>
<tr>
<td>Other:</td>
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</tr>
<tr>
<td>Memory:</td>
<td>384 GB (24 x 16 GB 2Rx8 PC4-2933V-R, running at 2933)</td>
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<tr>
<td>Storage:</td>
<td>1 x 1.92 TB SATA SSD</td>
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<td>Other:</td>
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**Software**

<table>
<thead>
<tr>
<th>OS:</th>
<th>Red Hat Enterprise Linux 8.1</th>
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<tbody>
<tr>
<td>Parallel:</td>
<td>No</td>
</tr>
<tr>
<td>Firmware:</td>
<td>Version 2.7.7 released May-2020</td>
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<tr>
<td>File System:</td>
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</tr>
<tr>
<td>System State:</td>
<td>Run level 3 (multi-user)</td>
</tr>
<tr>
<td>Base Pointers:</td>
<td>64-bit</td>
</tr>
<tr>
<td>Peak Pointers:</td>
<td>32/64-bit</td>
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<tr>
<td>Other:</td>
<td>None</td>
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<tr>
<td>Power Management:</td>
<td>jemalloc memory allocator V5.0.1</td>
</tr>
</tbody>
</table>

**Power Management:** BIOS set to prefer performance at the cost of additional power usage.
## Dell Inc. PowerEdge T440 (Intel Xeon Silver 4214R, 2.40 GHz)

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

**Results Table**

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<th>Seconds</th>
<th>Ratio</th>
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<td>548.exchange2_r</td>
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<td>557.xz_r</td>
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<td>538</td>
<td>96.3</td>
<td>48</td>
<td>539</td>
<td>96.2</td>
<td>538</td>
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</table>

**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

**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:  
LD_LIBRARY_PATH = 
"/home/cpu2017/lib/intel64:/home/cpu2017/lib/ia32:/home/cpu2017/je5.0.1-32"  
MALLOC_CONF = "retain:true"
SPEC CPU®2017 Integer Rate Result

Dell Inc.

PowerEdge T440 (Intel Xeon Silver 4214R, 2.40 GHz)

SPECrate®2017_int_peak = 163
SPECrate®2017_int_base = 157

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

Test Date: May-2020
Hardware Availability: Feb-2020
Software Availability: Apr-2020

General Notes

Binaries compiled on a system with 1x Intel Core i9-9900K 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) 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
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

Platform Notes

BIOS settings:
Sub NUMA Cluster enabled
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 disabled
Logical Processor disabled
CPU Interconnect Bus Link Power Management disabled
PCI ASPM L1 Link Power Management disabled
UPI Prefetch enabled
LLC Prefetch disabled
Dead Line LLC Alloc enabled
Directory AtoS disabled
Sysinfo program /home/cpu2017/bin/sysinfo
Rev: r6365 of 2019-08-21 295195f888a3d7ed1e6e46a485a0011
running on poweredge-sut-rhel8-1 Sun May 31 00:58:48 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

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

**Dell Inc.**

**PowerEdge T440 (Intel Xeon Silver 4214R, 2.40 GHz)**

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<td>Feb-2020</td>
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<tr>
<td>Software Availability:</td>
<td>Apr-2020</td>
</tr>
</tbody>
</table>

**SPECrate®2017_int_base** = 157

**SPECrate®2017_int_peak** = 163

---

## Platform Notes (Continued)

From /proc/cpuinfo:

- **model name**: Intel(R) Xeon(R) Silver 4214R CPU @ 2.40GHz
- 2 "physical id"s (chips)
- 48 "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: 12
  - siblings: 24
  - physical 0: cores 0 1 2 3 4 5 8 9 10 11 12 13
  - physical 1: cores 0 1 2 3 4 5 8 9 10 11 12 13

From lscpu:

- **Architecture**: x86_64
- **CPU op-mode(s)**: 32-bit, 64-bit
- **Byte Order**: Little Endian
- **CPU(s)**: 48
- **On-line CPU(s) list**: 0-47
- **Thread(s) per core**: 2
- **Core(s) per socket**: 12
- **Socket(s)**: 2
- **NUMA node(s)**: 4
- **Vendor ID**: GenuineIntel
- **CPU family**: 6
- **Model**: 85
- **Model name**: Intel(R) Xeon(R) Silver 4214R CPU @ 2.40GHz
- **Stepping**: 7
- **CPU MHz**: 3024.859
- **CPU max MHz**: 3500.0000
- **CPU min MHz**: 1000.0000
- **BogoMIPS**: 4800.00
- **Virtualization**: VT-x
- **L1d cache**: 32K
- **L1i cache**: 32K
- **L2 cache**: 1024K
- **L3 cache**: 16896K
- **NUMA node0 CPU(s)**: 0,4,8,12,16,20,24,28,32,36,40,44
- **NUMA node1 CPU(s)**: 1,5,9,13,17,21,25,29,33,37,41,45
- **NUMA node2 CPU(s)**: 2,6,10,14,18,22,26,30,34,38,42,46
- **NUMA node3 CPU(s)**: 3,7,11,15,19,23,27,31,35,39,43,47
- **Flags**: fpu vme de pse tsc msr pae mce 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 xtrm 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 cdp lp0 l1d tsc_strどの error bit48 bit alignment fmsb rbni subcounter virtboy mda bitto persecuted stibp ibrs ibrs enhanced tpr_shadow vnmi flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erms invvpcid rtm

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

Dell Inc.
PowerEdge T440 (Intel Xeon Silver 4214R, 2.40 GHz)

Dell Inc.

SPECrate®2017_int_base = 157
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CPU2017 License: 55
Test Sponsor: Dell Inc.
Tested by: Dell Inc.
Test Date: May-2020
Hardware Availability: Feb-2020
Software Availability: Apr-2020

Platform Notes (Continued)

cqm mpx rdt_a avx512f avx512dq rdseed adx smap clflushopt clwb intel_pt avx512cd
avx512bw avx512vl xsaveopt xsavexc xgetbv1 xsaves cqm_llc cqm_occup_llc cqm_mbm_total
cqm_mbm_local dtherm ida arat pln pts pku ospke avx512_vnni md_clear flush_l1d
arch_capabilities

/proc/cpuinfo cache data
cache size : 16896 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
node 0 size: 95307 MB
node 0 free: 94995 MB
node 1 cpus: 1 5 9 13 17 21 25 29 33 37 41 45
node 1 size: 96765 MB
node 1 free: 96093 MB
node 2 cpus: 2 6 10 14 18 22 26 30 34 38 42 46
node 2 size: 96739 MB
node 2 free: 96403 MB
node 3 cpus: 3 7 11 15 19 23 27 31 35 39 43 47
node 3 size: 96764 MB
node 3 free: 96528 MB
node distances:
node 0 1 2 3
0: 10 21 11 21
1: 21 10 21 11
2: 11 21 10 21
3: 21 11 21 10

From /proc/meminfo
MemTotal: 394831708 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)

(Continued on next page)
Dell Inc.
PowerEdge T440 (Intel Xeon Silver 4214R, 2.40 GHz)

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

SPECrate®2017_int_base = 157
SPECrate®2017_int_peak = 163

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

Platform Notes (Continued)

system-release-cpe: cpe:/o:redhat:enterprise_linux:8.1:ga

uname -a:
Linux poweredge-sut-rhel8-1 4.18.0-147.8.1.el8_1.x86_64 #1 SMP Wed Feb 26 03:08:15 UTC 2020 x86_64 x86_64 x86_64 GNU/Linux

Kernel self-reported vulnerability status:

itlb_multihit: Processor vulnerable
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, RSB filling
tsx_async_abort: Mitigation: Clear CPU buffers; SMT vulnerable

run-level 3 May 31 00:58 last=5

SPEC is set to: /home/cpu2017
Filesystem Type Size Used Avail Use% Mounted on
/dev/mapper/rhel-home xfs 1.5T 20G 1.4T 2% /home

From /sys/devices/virtual/dmi/id
BIOS: Dell Inc. 2.7.7 05/05/2020
Vendor: Dell Inc.
Product: PowerEdge T640
Product Family: PowerEdge
Serial: 1234567

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.
Memory:
14x 002C069D002C 18ASF2G72PDZ-2G9E1 16 GB 2 rank 2933
2x 00AD00B300AD HMA82GR7CJR8N-WM 16 GB 2 rank 2933
4x 00AD00B300AD HMA82GR7CJR8N-XN 16 GB 2 rank 3200
4x 00AD069D00AD HMA82GR7CJR8N-WM 16 GB 2 rank 2933

(End of data from sysinfo program)
## Dell Inc.

### PowerEdge T440 (Intel Xeon Silver 4214R, 2.40 GHz)

<table>
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### Compiler Version Notes

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<th>Compiler</th>
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<tbody>
<tr>
<td>C</td>
<td>502.gcc_r(peak)</td>
</tr>
<tr>
<td>Intel(R) C Compiler for applications running on IA-32, Version 2021.1 NextGen Build 20200304</td>
<td></td>
</tr>
<tr>
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</tr>
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Dell Inc.

PowerEdge T440 (Intel Xeon Silver 4214R, 2.40 GHz)

SPEC CPU®2017 Integer Rate Result

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

Test Date: May-2020
Hardware Availability: Feb-2020
Software Availability: Apr-2020

SPECrates

SPECrates®2017_int_base = 157
SPECrates®2017_int_peak = 163

Compiler Version Notes (Continued)

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==============================================================================

C       | 502.gcc_r(peak)
Intel(R) C Compiler for applications running on IA-32, Version 2021.1 NextGen
Build 20200304
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)
Intel(R) C Compiler for applications running on Intel(R) 64, Version 2021.1
NextGen Build 20200304
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==============================================================================

C       | 500.perlbench_r(peak) 557.xz_r(peak)
Intel(R) C Compiler for applications running on Intel(R) 64, Version 19.1.1.217 Build 20200306
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==============================================================================

C++     | 520.omnetpp_r(base, peak) 523.xalancbmk_r(base, peak)
| 531.deepsjeng_r(base, peak) 541.leela_r(base, peak)
Intel(R) C++ Compiler for applications running on Intel(R) 64, Version 2021.1
NextGen Build 20200304
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==============================================================================

Fortran | 548.exchange2_r(base, peak)
Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R) 64, Version 19.1.1.217 Build 20200306
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Dell Inc.

PowerEdge T440 (Intel Xeon Silver 4214R, 2.40 GHz)

SPEC CPU®2017 Integer Rate Result

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SPECrate®2017_int_base = 157
SPECrate®2017_int_peak = 163

CPU2017 License: 55

Test Sponsor: Dell Inc.

Test Date: May-2020

Hardware Availability: Feb-2020

Tested by: Dell Inc.

Software Availability: Apr-2020

Base Compiler Invocation

C benchmarks:
icc

C++ benchmarks:
icpc

Fortran benchmarks:
ifort

Base Portability Flags

500.perlbench_r: -DSPEC_LP64 -DSPEC_LINUX_X64
502.gcc_r: -DSPEC_LP64
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

(Continued on next page)
Dell Inc. PowerEdge T440 (Intel Xeon Silver 4214R, 2.40 GHz)

SPEC CPU®2017 Integer Rate Result

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Base Optimization Flags (Continued)

Fortran benchmarks (continued):
-nostandard-realloc-lhs -align array32byte -auto
-mbranches-within-32B-boundaries
-L/usr/local/IntelCompiler19/compilers_and_libraries_2020.1.217/linux/compiler/lib/intel64_lin
-lqkmalloc

Peak Compiler Invocation

C benchmarks:
icc

C++ benchmarks:
icpc

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

Peak Optimization Flags

C benchmarks:
500.perlbench_r: -Wl, -z, muldefs -prof-gen(pass 1) -prof-use(pass 2)
-xCORE-AVX2 -ipo -O3 -no-prec-div
-qopt-mem-layout-trans=4 -fno-strict-overflow
-mbranches-within-32B-boundaries
-L/usr/local/IntelCompiler19/compilers_and_libraries_2020.1.217/linux/compiler/lib/intel64_lin
-lqkmalloc

(Continued on next page)
Dell Inc.
PowerEdge T440 (Intel Xeon Silver 4214R, 2.40 GHz)

SPEC CPU®2017 Integer Rate Result
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PECrate®2017_int_base = 157
PECrate®2017_int_peak = 163

Test Date: May-2020
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Peak Optimization Flags (Continued)

502.gcc_r: -m32
-L/usr/local/IntelCompiler19/compilers_and_libraries_2020.1.217/linux/compiler/lib/ia32_lin
-std=gnu89
-Wl, -plugin-opt=-x86-branches-within-32B-boundaries
-Wl, -z, multefs -fprofile-generate(pass 1)
-fprofile-use=default.profdata(pass 2) -xCORE-AVX2 -flto
-Ofast(pass 1) -O3 -ffast-math -qnextgen -fuse-ld=gold
-qopt-mem-layout-trans=4 -L/usr/local/jemalloc32-5.0.1/lib
-ljemalloc

505.mcf_r: basepeak = yes

525.x264_r: -m64 -qnextgen -std=c11
-Wl, -plugin-opt=-x86-branches-within-32B-boundaries
-Wl, -z, multefs -xCORE-AVX2 -flto -O3 -ffast-math
-fuse-ld=gold -qopt-mem-layout-trans=4 -fno-alias
-L/usr/local/IntelCompiler19/compilers_and_libraries_2020.1.217/linux/compiler/lib/intel64_lin
-lqkmalloc

557.xz_r: -Wl, -z, multefs -xCORE-AVX2 -ipo -O3 -no-prec-div
-qopt-mem-layout-trans=4 -mbranches-within-32B-boundaries
-L/usr/local/IntelCompiler19/compilers_and_libraries_2020.1.217/linux/compiler/lib/intel64_lin
-lqkmalloc

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 T440 (Intel Xeon Silver 4214R, 2.40 GHz)

<table>
<thead>
<tr>
<th>SPECrate®2017_int_peak = 163</th>
<th>SPECrate®2017_int_base = 157</th>
</tr>
</thead>
</table>

| CPU2017 License: 55 | Test Date: May-2020 |
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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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Tested with SPEC CPU®2017 v1.1.0 on 2020-05-31 01:58:48-0400.
Originally published on 2020-06-23.