### SPEC CPU®2017 Integer Rate Result

**Dell Inc.**  
(Test Sponsor: Dell Inc)  

**PowerEdge T440 (Intel Xeon Silver 4215, 2.5 GHz)**

| SPECrate®2017_int_base = 106 | SPECrate®2017_int_peak = 110 |

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

#### Hardware

- **CPU Name:** Intel Xeon Silver 4215  
- **Max MHz:** 3500  
- **Nominal:** 2500  
- **Enabled:** 16 cores, 2 chips, 2 threads/core  
- **Orderable:** 1, 2  
- **Cache L1:** 32 KB I + 32 KB D on chip per core  
- **L2:** 1 MB I+D on chip per core  
- **L3:** 11 MB I+D on chip per chip  
- **Other:** None  
- **Memory:** 384 GB (12 x 32 GB 2Rx4 PC4-2933Y-R, running at 2400)  
- **Storage:** 1 x 480 GB SATA SSD  
- **Other:** None  

#### Software

- **OS:** Red Hat Enterprise Linux 8.2  
  - kernel 4.18.0-193.el8.x86_64  
- **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:** No  
- **Firmware:** Version 2.8.1 released Jun-2020  
- **File System:** xfs  
- **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 set to prefer performance at the cost of additional power usage

---

### SPECrate®2017_int_base vs SPECrate®2017_int_peak

<table>
<thead>
<tr>
<th>Test</th>
<th>SPECrate®2017_int_base</th>
<th>SPECrate®2017_int_peak</th>
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<td>exchange2_r</td>
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<td>xz_r</td>
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**Copies**

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Dell Inc.  
(Test Sponsor: Dell Inc)

PowerEdge T440 (Intel Xeon Silver 4215, 2.5 GHz)

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

Results Table

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<th>Benchmark</th>
<th>Base</th>
<th>Peak</th>
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<td>523.xalancbmk_r</td>
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<td>525.x264_r</td>
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<td>531.deepsjeng_r</td>
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<td>541.leela_r</td>
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<td>548.exchange2_r</td>
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<td>428</td>
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<tr>
<td>557.xz_r</td>
<td>32</td>
<td>553</td>
</tr>
</tbody>
</table>

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.

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-ic19.1u1/lib/intel64:/home/cpu2017-ic19.1u1/lib/ia32:/home/cpu2017-ic19.1u1/je5.0.1-32"
MALLOC_CONF = "retain:true"
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) 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.

Platform Notes

BIOS settings:
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 enabled
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-ic19.1u1/bin/sysinfo
Rev: r6365 of 2019-08-21 295195f888a3d7edbe6e46a485a0011
running on RHEL-8-2-SUT Mon Sep 14 15:39:29 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) Silver 4215 CPU @ 2.50GHz
  2 "physical id"s (chips)
  32 "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 : 8

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

### Dell Inc.
(Test Sponsor: Dell Inc)

**PowerEdge T440 (Intel Xeon Silver 4215, 2.5 GHz)**

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

**SPECrate®2017_int_base = 106**

**SPECrate®2017_int_peak = 110**

---

### Platform Notes (Continued)

```
siblings : 16
physical 0: cores 0 1 2 3 4 5 6 7
physical 1: cores 0 1 2 3 4 5 6 7
```

From `lscpu`:

- **Architecture:** x86_64
- **CPU op-mode(s):** 32-bit, 64-bit
- **Byte Order:** Little Endian
- **CPU(s):** 32
- **On-line CPU(s) list:** 0-31
- **Thread(s) per core:** 2
- **Core(s) per socket:** 8
- **Socket(s):** 2
- **NUMA node(s):** 2
- **Vendor ID:** GenuineIntel
- **CPU family:** 6
- **Model:** 85
- **Model name:** Intel(R) Xeon(R) Silver 4215 CPU @ 2.50GHz
- **Stepping:** 6
- **CPU MHz:** 2989.577
- **CPU max MHz:** 3500.0000
- **CPU min MHz:** 1000.0000
- **BogoMIPS:** 5000.00
- **Virtualization:** VT-x
- **L1d cache:** 32K
- **L1i cache:** 32K
- **L2 cache:** 1024K
- **L3 cache:** 11264K
- **NUMA node0 CPU(s):** 0,2,4,6,8,10,12,14,16,18,20,22,24,26,28,30
- **NUMA node1 CPU(s):** 1,3,5,7,9,11,13,15,17,19,21,23,25,27,29,31
- **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 abm 3dnowprefetch cpuid_fault epb cat_l3 cdp_l3 invpcid_single intel_pni ssbd mba ibrs ibpb stibp ibrsenhanced tpr_shadow vnmi flexpriority vptid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid rtm cqm mpx rdrcr td_a vvx512f vvx512dq rdsed adx smap clflushopt clwb intel_pt avx512cd avx512bw avx512vl vsxveopt xsaveopt xsavec xgetbv1 xsaveas cqm_llc cqm_occupy_llc cqm_mbb_total cqm_mbb_local dtherm id arat pln pts pku ospke avx512_vnni md_clear flush_lld arch_capabilities
```

/proc/cpuinfo cache data
```
cache size : 11264 KB
```

---

(Continued on next page)
Dell Inc. (Test Sponsor: Dell Inc)
PowerEdge T440 (Intel Xeon Silver 4215, 2.5 GHz)

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

SPEC CPU®2017 Integer Rate Result

Copyright 2017-2020 Standard Performance Evaluation Corporation

SPECrate®2017_int_base = 106
SPECrate®2017_int_peak = 110

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

Platform Notes (Continued)

doalbe: 2 nodes (0-1)
node 0 cpus: 0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30
node 0 size: 192074 MB
node 0 free: 191046 MB
node 1 cpus: 1 3 5 7 9 11 13 15 17 19 21 23 25 27 29 31
node 1 size: 193504 MB
node 1 free: 193062 MB
node distances:
  node 0 1
  0: 10 21
  1: 21 10

From /proc/meminfo
  MemTotal: 394832428 kB
  HugePages_Total: 0
  Hugepagesize: 2048 kB

From /etc/*release* /etc/*version*
os-release:
  NAME="Red Hat Enterprise Linux"
  VERSION="8.2 (Ootpa)"
  ID="rhel"
  ID_LIKE="fedora"
  VERSION_ID="8.2"
  PLATFORM_ID="platform:el8"
  PRETTY_NAME="Red Hat Enterprise Linux 8.2 (Ootpa)"
  ANSI_COLOR="0;31"
  redhat-release: Red Hat Enterprise Linux release 8.2 (Ootpa)
  system-release: Red Hat Enterprise Linux release 8.2 (Ootpa)
  system-release-cpe: cpe:/o:redhat:enterprise_linux:8.2:ga

uname -a:
  Linux RHEL-8-2-SUT 4.18.0-193.el8.x86_64 #1 SMP Fri Mar 27 14:35:58 UTC 2020 x86_64
  x86_64 x86_64 GNU/Linux

Kernel self-reported vulnerability status:

  itlb_multihit: KVM: 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,
Dell Inc.
(Test Sponsor: Dell Inc)

PowerEdge T440 (Intel Xeon Silver 4215, 2.5 GHz)

SPECr\textsuperscript{e\textregistered}2017\textsubscript{int}base = 106

SPECr\textsuperscript{e\textregistered}2017\textsubscript{int}peak = 110

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

Platform Notes (Continued)

rsb filling
Mitigation: Clear CPU buffers; SMT vulnerable

run-level 3 Sep 14 15:38 last=5

SPEC is set to: /home/cpu2017-ic19.1u1

Filesystem Type Size Used Avail Use% Mounted on
/dev/mapper/rhel-home xfs 392G 7.1G 385G 2% /home

From /sys/devices/virtual/dmi/id
BIOS: Dell Inc. 2.8.1 06/30/2020
Vendor: Dell Inc.
Product: PowerEdge T440
Product Family: PowerEdge
Serial: FBLH613

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:
4x 00AD00B300AD HMA84GR7CJR4N-WM 32 GB 2 rank 2933
8x 00AD063200AD HMA84GR7CJR4N-WM 32 GB 2 rank 2933
4x Not Specified Not Specified

Memory running at 2400

Compiler Version Notes

==============================================================================
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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------------------------------------------------------------------------------

(Continued on next page)
Compiler Version Notes (Continued)

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(Test Sponsor: Dell Inc)

PowerEdge T440 (Intel Xeon Silver 4215, 2.5 GHz)

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## Compiler Version Notes (Continued)

NextGen Build 20200304
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C

| 500.perlbench_r(peak) | 557.xz_r(peak) |

Intel(R) C 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.

C++

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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.

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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---

## Base Compiler Invocation

C benchmarks:
  icc

C++ benchmarks:
  icpc

Fortran benchmarks:
  ifort

---

## Base Portability Flags

500.perlbench_r: -DSPEC_LP64 -DSPEC_LINUX_X64

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

**Test Sponsor:** Dell Inc  
**CPU2017 License:** 55  
**Test Date:** Sep-2020  
**Hardware Availability:** Jul-2020  
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**PowerEdge T440 (Intel Xeon Silver 4215, 2.5 GHz)**  
**SPECrate®2017_int_base = 106**  
**SPECrate®2017_int_peak = 110**

---

**Base Portability Flags (Continued)**

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

---

**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`  
- `-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`

**C++ benchmarks:**
- `-m64`  
- `-gnextgen`  
- `-Wl,-plugin-opt=-x86-branches-within-32B-boundaries`  
- `-Wl,-z,muldefs`  
- `-xCORE-AVX512`  
- `-O3`  
- `-ffast-math`  
- `-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`  
- `-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/usr/local/IntelCompiler19/compilers_and_libraries_2020.1.217/linux/compiler/lib/intel64_lin`  
- `-lqkmalloc`

---

**Peak Compiler Invocation**

**C benchmarks:**
- `icc`

**C++ benchmarks:**
- `icpc`

(Continued on next page)
### Peak Compiler Invocation (Continued)

**Fortran benchmarks:**
- ifort

### Peak Portability Flags

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Flags</th>
</tr>
</thead>
<tbody>
<tr>
<td>perlbench_r</td>
<td>-DSPEC_LP64 -DSPEC_LINUX_X64</td>
</tr>
<tr>
<td>gcc_r</td>
<td>-D_FILE_OFFSET_BITS=64</td>
</tr>
<tr>
<td>mcf_r</td>
<td>-DSPEC_LP64</td>
</tr>
<tr>
<td>omnetpp_r</td>
<td>-DSPEC_LP64</td>
</tr>
<tr>
<td>xalancbmk_r</td>
<td>-DSPEC_LP64 -DSPEC_LINUX</td>
</tr>
<tr>
<td>x264_r</td>
<td>-DSPEC_LP64</td>
</tr>
<tr>
<td>deepsjeng_r</td>
<td>-DSPEC_LP64</td>
</tr>
<tr>
<td>leela_r</td>
<td>-DSPEC_LP64</td>
</tr>
<tr>
<td>exchange2_r</td>
<td>-DSPEC_LP64</td>
</tr>
<tr>
<td>xz_r</td>
<td>-DSPEC_LP64</td>
</tr>
</tbody>
</table>

### Peak Optimization Flags

**C benchmarks:**

- perlbench_r: 
  `-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/IntelCompiler19/compilers_and_libraries_2020.1.217/linux/compiler/lib/intel64_lin 
  -lqkmalloc`  

- 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,muldefs -fprofile-generate(pass 1) 
  -fprofile-use=default.profdata(pass 2) -xCORE-AVX512 -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`  

- mcf_r: 
  `basepeak = yes`
**Peak Optimization Flags (Continued)**

525.x264_r: -m64 -qnextgen -std=c11  
-W1,-plugin-opt=-x86-branches-within-32B-boundaries  
-W1,-z,muldefs -xCORE-AVX512 -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: -W1,-z,muldefs -xCORE-AVX512 -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

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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