## Dell Inc.  
**PowerEdge T440 (Intel Xeon Silver 4209T, 2.20 GHz)**

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

<table>
<thead>
<tr>
<th>Component</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU Name:</td>
<td>Intel Xeon Silver 4209T</td>
</tr>
<tr>
<td>Max MHz:</td>
<td>3200</td>
</tr>
<tr>
<td>Nominal:</td>
<td>2200</td>
</tr>
<tr>
<td>Enabled:</td>
<td>16 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>11 MB I+D on chip per chip</td>
</tr>
<tr>
<td>Memory:</td>
<td>384 GB (12 x 32 GB 2Rx8 PC4-2933V-R, running at 2933)</td>
</tr>
<tr>
<td>Storage:</td>
<td>1 x 1.92 TB SATA SSD</td>
</tr>
<tr>
<td>Other:</td>
<td>None</td>
</tr>
</tbody>
</table>

**Software**

- OS: Red Hat Enterprise Linux 8.1  
  kernel 4.18.0-147.el8.x86_64
- Compiler: C/C++: Version 19.0.5.281 of Intel C/C++ Compiler for Linux;  
  Fortran: Version 19.0.5.281 of Intel Fortran Compiler for Linux
- Parallel: Yes
- Firmware: Version 2.5.4 released Jan-2020
- File System: xfs
- System State: Run level 3 (multi-user)
- Base Pointers: 64-bit
- Peak Pointers: 64-bit
- Other: None
- jemalloc memory allocator V5.0.1

**Power Management:**  
BIOS set to prefer performance at the cost of additional power usage.

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

**SPECspeed®2017_int_base = 7.48**  
**SPECspeed®2017_int_peak = 7.60**  

| Test Date: | Apr-2020 |
| Hardware Availability: | Feb-2020 |
| Software Availability: | Nov-2019 |

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**Dell Inc.**  
**PowerEdge T440 (Intel Xeon Silver 4209T, 2.20 GHz)**

**CPU2017 License:** 55  
**Test Sponsor:** Dell Inc.  
**Tested by:** Dell Inc.  
**Test Date:** Apr-2020  
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**Software Availability:** Nov-2019

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**600.perlbench_s**  
**602.gcc_s**  
**605.mcf_s**  
**620.omnetpp_s**  
**623.xalancbmk_s**  
**625.x264_s**  
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**641.leela_s**  
**648.exchange2_s**  
**657.xz_s**

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Dell Inc.

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Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
</tr>
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<tbody>
<tr>
<td>600.perlbench_s</td>
<td>16</td>
<td>345</td>
<td>5.15</td>
<td>342</td>
<td>5.19</td>
<td>343</td>
<td>5.18</td>
<td>16</td>
<td>307</td>
<td>5.79</td>
<td>308</td>
<td>5.76</td>
<td>309</td>
<td>5.75</td>
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<td>602.gcc_s</td>
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<td>7.18</td>
<td>551</td>
<td>7.22</td>
<td>556</td>
<td>7.16</td>
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<td>544</td>
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<td>8.43</td>
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<td>8.43</td>
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<tr>
<td>625.x264_s</td>
<td>16</td>
<td>159</td>
<td>11.1</td>
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<td>11.1</td>
<td>158</td>
<td>11.2</td>
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<td>11.2</td>
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<td>631.deepsjeng_s</td>
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<td>16</td>
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<td>4.49</td>
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<td>4.49</td>
</tr>
<tr>
<td>641.leela_s</td>
<td>16</td>
<td>467</td>
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<td>3.65</td>
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<td>3.65</td>
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<td>3.65</td>
</tr>
<tr>
<td>648.exchange2_s</td>
<td>16</td>
<td>228</td>
<td>12.9</td>
<td>227</td>
<td>13.0</td>
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<td>13.0</td>
<td>16</td>
<td>228</td>
<td>12.9</td>
<td>227</td>
<td>13.0</td>
<td>227</td>
<td>13.0</td>
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<tr>
<td>657.xz_s</td>
<td>16</td>
<td>395</td>
<td>15.7</td>
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<td>15.6</td>
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<td>16</td>
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<td>16.1</td>
<td>384</td>
<td>16.1</td>
<td>384</td>
<td>16.1</td>
</tr>
</tbody>
</table>

SPECspeed®2017_int_base = 7.48
SPECspeed®2017_int_peak = 7.60

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"

Environment Variables Notes

Environment variables set by runcpu before the start of the run:
KMP_AFFINITY = "granularity=fine,scatter"
LD_LIBRARY_PATH = "/home/cpu2017/lib/intel64:/home/cpu2017/je5.0.1-64"
OMP_STACKSIZE = "192M"

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
jemalloc, a general purpose malloc implementation
built with the RedHat Enterprise 7.5, and the system compiler gcc 4.8.5
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CPU2017 License: 55
Test Sponsor: Dell Inc.
Tested by: Dell Inc.

Test Date: Apr-2020
Hardware Availability: Feb-2020
Software Availability: Nov-2019

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 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 295195f888a3d7ed6e646a485a0011
running on localhost.localdomain Sun Apr 26 20:44:03 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 4209T CPU @ 2.20GHz
 2 "physical id"s (chips)
16 "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
siblings : 8
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): 16
On-line CPU(s) list: 0-15
Thread(s) per core: 1
Core(s) per socket: 8
Socket(s): 2
NUMA node(s): 2
Vendor ID: GenuineIntel

(Continued on next page)
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**SPECspeed®2017_int_base = 7.48**

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<td>Nov-2019</td>
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</table>

**SPEC CPU® 2017 Integer Speed Result**

Dell Inc.

PowerEdge T440 (Intel Xeon Silver 4209T, 2.20 GHz)

**CPU family:** 6

**Model:** 85

**Model name:** Intel(R) Xeon(R) Silver 4209T CPU @ 2.20GHz

**Stepping:** 6

**CPU MHz:** 2478.183

**CPU max MHz:** 3200.0000

**CPU min MHz:** 1000.0000

**BogoMIPS:** 4400.00

**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

**NUMA node1 CPU(s):** 1,3,5,7,9,11,13,15

**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 ntopology 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_ppnv ssbd mba ibrs ibpb ibrs_enhanced tpr_shadow vnmi flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid rtm cqm mpx rdt_a avx512f avx512dq rdseed adx smap clflushopt clwb intel_pt avx512cd avx512bw avx512vli xsaves xsaveopt xsavec xconj 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 : 11264 KB

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

node 0 size: 192050 MB

node 0 free: 191215 MB

node 1 cpus: 1 3 5 7 9 11 13 15

node 1 size: 193533 MB

node 1 free: 192579 MB

node distances:

node 0 1

0: 10 21

1: 21 10

From /proc/meminfo

MemTotal: 394838336 KB

(Continued on next page)
 Platform Notes (Continued)

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 localhost.localdomain 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, RSB filling

run-level 3 Apr 26 20:43 last=5

SPEC is set to: /home/cpu2017
  Filesystem Type Size Used Avail Use% Mounted on
  /dev/mapper/rhel-home xfs 1.7T 20G 1.7T 2% /home

From /sys/devices/virtual/dmi/id
  BIOS: Dell Inc. 2.5.4 01/14/2020
  Vendor: Dell Inc.
  Product: PowerEdge T440
  Product Family: PowerEdge
  Serial: FBLH613

Additional information from dmidecode follows. WARNING: Use caution when you interpret
Platform Notes (Continued)

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 SM BIOS" 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

Compiler Version Notes

```
C       | 600.perlbench_s(base, peak) 602.gcc_s(base, peak) 605.mcf_s(base, peak) 625.x264_s(base, peak) 657.xz_s(base, peak)
---------
Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64, Version 19.0.5.281 Build 20190815
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

C++     | 620.omnetpp_s(base, peak) 623.xalancbmk_s(base, peak) 631.deepsjeng_s(base, peak) 641.leela_s(base, peak)
---------
Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64, Version 19.0.5.281 Build 20190815
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

Fortran | 648.exchange2_s(base, peak)
---------
Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R) 64, Version 19.0.5.281 Build 20190815
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.
```

Base Compiler Invocation

C benchmarks:
icc

C++ benchmarks:
icpc
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Base Compiler Invocation (Continued)

Fortran benchmarks:
ifort

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 -std=c11 -Wl,-z,muldefs -xCORE-AVX2 -ipo -O3 -no-prec-div
-qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP
-L/usr/local/je5.0.1-64/lib -ljemalloc

C++ benchmarks:
-m64 -Wl,-z,muldefs -xCORE-AVX2 -ipo -O3 -no-prec-div
-qopt-mem-layout-trans=4
-L/usr/local/IntelCompiler19/compilers_and_libraries_2019.5.281/linux/compiler/lib/intel64_lin
-lqkmalloc

Fortran benchmarks:
-m64 -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-mem-layout-trans=4
-nostandard-realloc-lhs

Peak Compiler Invocation

C benchmarks:
icc

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

C++ benchmarks:
icpc

Fortran benchmarks:
ifort

Peak Portability Flags

Same as Base Portability Flags

Peak Optimization Flags

C benchmarks:

600.perlbench_s: -m64 -std=c11 -Wl,-z,muldefs -prof-gen(pass 1)
 -prof-use(pass 2) -O2 -xCORE-AVX2
 -qopt-mem-layout-trans=4 -ipo -O3 -no-prec-div
 -DSPEC_SUPPRESS_OPENMP -qopenmp -DSPEC_OPENMP
 -funo-strict-overflow -L/usr/local/je5.0.1-64/lib
 -ljemalloc

602gcc_s: -m64 -std=c11 -Wl,-z,muldefs -prof-gen(pass 1)
 -prof-use(pass 2) -O2 -xCORE-AVX2
 -qopt-mem-layout-trans=4 -ipo -O3 -no-prec-div
 -DSPEC_SUPPRESS_OPENMP -L/usr/local/je5.0.1-64/lib
 -ljemalloc

605.mcf_s: -m64 -std=c11 -Wl,-z,muldefs -prof-gen(pass 1)
 -prof-use(pass 2) -ipo -xCORE-AVX2 -O3 -no-prec-div
 -DSPEC_SUPPRESS_OPENMP -qopenmp -DSPEC_OPENMP
 -L/usr/local/je5.0.1-64/lib -ljemalloc

625.x264_s: basepeak = yes

657.xz_s: -m64 -std=c11 -Wl,-z,muldefs -prof-gen(pass 1)
 -prof-use(pass 2) -ipo -xCORE-AVX2
 -qopt-mem-layout-trans=4 -ipo -O3 -no-prec-div
 -DSPEC_SUPPRESS_OPENMP -qopenmp -DSPEC_OPENMP
 -L/usr/local/je5.0.1-64/lib -ljemalloc

C++ benchmarks:

(Continued on next page)
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**CPU2017 License:** 55  
**Test Sponsor:** Dell Inc.  
**Tested by:** Dell Inc.  
**CPU2017 License:** 55  
**Hardware Availability:** Feb-2020  
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### Peak Optimization Flags (Continued)

```
620.omnetpp_s: -m64 -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2)  
-ipo -xCORE-AVX2 -O3 -no-prec-div  
-qopt-mem-layout-trans=4 -DSPEC_SUPPRESS_OPENMP  
-L/usr/local/IntelCompiler19/compilers_and_libraries_2019.5.281/linux/compiler/lib/intel64_lin  
-lqkmalloc

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: