Dell Inc.

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

<table>
<thead>
<tr>
<th>SPECrate®2017_int_base</th>
<th>SPECrate®2017_int_peak</th>
</tr>
</thead>
<tbody>
<tr>
<td>83.9</td>
<td>86.5</td>
</tr>
</tbody>
</table>

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

### Hardware

- **CPU Name:** Intel Xeon Silver 4209T
- **Max MHz:** 3200
- **Nominal:** 2200
- **Enabled:** 32 cores, 2 chips
- **Orderable:** 1.2 chips
- **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
- **Memory:** 384 GB (12 x 32 GB 2Rx8 PC4-2933V-R, running at 2933)
- **Storage:** 1 x 1.92 TB SATA SSD
- **Other:** None

### Software

- **OS:** Red Hat Enterprise Linux 8.1
- **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
- **Firmware:** Version 2.5.4 released Jan-2020
- **System State:** Run level 3 (multi-user)
- **Base Pointers:** 64-bit
- **Peak Pointers:** 32/64-bit
- **Other:** None
- **Power Management:** BIOS set to prefer performance at the cost of additional power usage

- **jemalloc memory allocator V5.0.1**
# Dell Inc.

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

## SPEC CPU®2017 Integer Rate Result

**Dell Inc.**

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

**Tested by:** Dell Inc.  
**Hardware Availability:** Feb-2020

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### Results Table

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<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
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<td>877</td>
<td>58.1</td>
<td>880</td>
<td>57.9</td>
<td>32</td>
<td>749</td>
<td>68.0</td>
<td>753</td>
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<td>gcc_r</td>
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<td>71.3</td>
<td>635</td>
<td>71.4</td>
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<td>mcf_r</td>
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<td>107</td>
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</tr>
</tbody>
</table>

**SPECrate®2017_int_base = 83.9**  
**SPECrate®2017_int_peak = 86.5**

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

## 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"
```

## 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.

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

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:
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 295195f8088a3d7ed6b6e46a485a0011
running on localhost.localdomain Sat Apr 25 20:39:27 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)
  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
siblings : 16
```

(Continued on next page)
Dell Inc.

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

SPEC CPU®2017 Integer Rate Result

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SPECrate®2017_int_base = 83.9

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

---

Platform Notes (Continued)

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 4209T CPU @ 2.20GHz
Stepping: 6
CPU MHz: 2499.878
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): 0,2,4,6,8,10,12,14,16,18,20,22,24,26,28,30
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 pdelpgb rdtscp
lm constant_tsc art arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc cpuid
aperfmpref pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg fma cx16
xtrr 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_ppin ssbd mba ibrs ibpb stibp ibrs_enhanced tpr_shadow vnum
flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid rtm
cqm mxpx rdt_a avx512f avx512dq rdseed adx smap clflushopt clwb intel_pt avx512cd
avx512bw avx512vl xsaveopt xsaveas xsavec xsaveopt cqm_llc cqm_occup_llc cqm_mbm_total
cqm_mbm_local dtherm ida arat pln pts pkup ospke avx512_vnni md_clear flush_lld
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.
Dell Inc.

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

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECrate\textsuperscript{\textregistered}2017\textsubscript{int} peak</td>
<td>86.5</td>
</tr>
<tr>
<td>SPECrate\textsuperscript{\textregistered}2017\textsubscript{int} base</td>
<td>83.9</td>
</tr>
</tbody>
</table>

CPU2017 License: 55
Test Sponsor: Dell Inc.
Hardware Availability: Feb-2020
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Platform Notes (Continued)

available: 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: 192049 MB
node 0 free: 191277 MB
node 1 cpus: 1 3 5 7 9 11 13 15 17 19 21 23 25 27 29 31
node 1 size: 193532 MB
node 1 free: 192310 MB
node distances:
node 0: 10 21
node 1: 21 10

From /proc/meminfo
MemTotal: 394835328 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 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
pointers sanitization
CVE-2017-5715 (Spectre variant 2): Mitigation: Enhanced IBRS, IBPB: conditional, RSB filling

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

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

SPECrate®2017_int_base = 83.9
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Test Date: Apr-2020
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Platform Notes (Continued)

run-level 3 Apr 25 20:35 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
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

(End of data from sysinfo program)

Compiler Version Notes

==============================================================================
| C       | 502.gcc_r(peak) |
---|---|
Intel(R) C Compiler for applications running on IA-32, Version 19.0.5 NextGen
Technology Build 20190729
Copyright (C) 1985-2019 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 19.0.5
NextGen Technology Build 20190729
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

==============================================================================
| C       | 500.perlbench_r(peak) 557.xz_r(peak) |
---|---|
(Continued on next page)
Compiler Version Notes (Continued)

Intel(R) C 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 | 502.gcc_r(peak)
------------------------------------------------------------------

Intel(R) C Compiler for applications running on IA-32, Version 19.0.5 NextGen Technology Build 20190729
Copyright (C) 1985-2019 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 19.0.5 NextGen Technology Build 20190729
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

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

Intel(R) C Compiler for applications running on IA-32, Version 19.0.5 NextGen Technology Build 20190729
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

------------------------------------------------------------------
C | 502.gcc_r(peak)
------------------------------------------------------------------

Intel(R) C Compiler for applications running on IA-32, Version 19.0.5 NextGen Technology Build 20190729
Copyright (C) 1985-2019 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 19.0.5 NextGen Technology Build 20190729
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Dell Inc. PowerEdge T440 (Intel Xeon Silver 4209T, 2.20 GHz)

SPECrater®2017_int_base = 83.9
SPECrater®2017_int_peak = 86.5

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

---

Compiler Version Notes (Continued)

---

C

<table>
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<tr>
<th>500.perlbench_r(peak) 557.xz_r(peak)</th>
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</thead>
</table>

Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
Version 19.0.5.281 Build 20190815
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---

C++

<table>
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Intel(R) C++ Compiler for applications running on Intel(R) 64, Version 19.0.5
NextGen Technology Build 20190729
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Fortran

<table>
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<th>548.exchange2_r(base, peak)</th>
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</table>

Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R) 64,
Version 19.0.5.281 Build 20190815
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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
502.gcc_r: -DSPEC_LP64
505.mcf_r: -DSPEC_LP64
520.omnetpp_r: -DSPEC_LP64
523.xalancbmk_r: -DSPEC_LP64 -DSPEC_LINUX

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

Dell Inc.

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

**SPECrate®2017_int_base = 83.9**

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<tr>
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<td>Software Availability: Nov-2019</td>
</tr>
</tbody>
</table>

---

**Base Portability Flags (Continued)**

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 -std=c11 -Wl,-z,muldefs -xCORE-AVX2 -Ofast -flto -mfpmath=sse
-funroll-loops -qnextgen -fuse-ld=gold -qopt-mem-layout-trans=4
-L/usr/local/IntelCompiler19/compilers_andibraries_2019.5.281/linux/compiler/lib/intel64_lin
-lqkmalloc

C++ benchmarks:
-m64 -Wl,-z,muldefs -xCORE-AVX2 -Ofast -flto -mfpmath=sse
-funroll-loops -qnextgen -fuse-ld=gold -qopt-mem-layout-trans=4
-L/usr/local/IntelCompiler19/compilers_andibraries_2019.5.281/linux/compiler/lib/intel64_lin
-lqkmalloc

Fortran benchmarks:
-m64 -Wl,-z,muldefs -xCORE-AVX2 -O3 -ipo -no-prec-div
-qopt-mem-layout-trans=4 -nostandard-realloc-lhs
-L/usr/local/IntelCompiler19/compilers_andibraries_2019.5.281/linux/compiler/lib/intel64_lin
-lqkmalloc

---

**Peak Compiler Invocation**

C benchmarks:
icc

C++ benchmarks:
icpc

Fortran benchmarks:
ifort
Dell Inc.

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

SPECrate®2017_int_base = 83.9
SPECrate®2017_int_peak = 86.5

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
-L/usr/local/IntelCompiler19/compilers_and_libraries_2019.5.281/linux/compiler/lib/intel64_lin
-1qkmalloc

502.gcc_r: -std=gnu89 -Wl,-z,muldefs -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/je5.0.1-32/lib
-1jemalloc

505.mcf_r: basepeak = yes

525.x264_r: -std=c11 -Wl,-z,muldefs -xCORE-AVX2 -flto -O3
-ffast-math -qnextgen -fuse-ld=gold
-qopt-mem-layout-trans=4 -fno-alias
-L/usr/local/IntelCompiler19/compilers_and_libraries_2019.5.281/linux/compiler/lib/intel64_lin
-1qkmalloc

557.xz_r: -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
-1qkmalloc

C++ benchmarks:

(Continued on next page)
Dell Inc.

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

SPECrate®2017 int_base = 83.9
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CPU2017 License: 55
Test Sponsor: Dell Inc.
Test Date: Apr-2020
Tested by: Dell Inc.
Hardware Availability: Feb-2020
Software Availability: Nov-2019

Peak Optimization Flags (Continued)

520.omnetpp_r: basepeak = yes
523.xalancbmk_r: basepeak = yes
531.deepsjeng_r: -m64 -Wl,-z,muldefs -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/IntelCompiler19/compilers_and_libraries_2019.5.281/linux/compiler/lib/intel64_lin
                  -lqkmalloc
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:

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For questions about this result, please contact the tester. For other inquiries, please contact info@spec.org.

 Tested with SPEC CPU®2017 v1.1.0 on 2020-04-25 21:39:26-0400.
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