## SPEC CPU®2017 Integer Speed Result

**Dell Inc.**

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

<table>
<thead>
<tr>
<th>SPECspeed®2017_int_base</th>
<th>SPECspeed®2017_int_peak</th>
</tr>
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<tbody>
<tr>
<td>8.43</td>
<td>8.56</td>
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</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 4214R
- **Max MHz:** 3500
- **Nominal:** 2400
- **Enabled:** 24 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:** 16.5 MB I+D on chip per chip
- **Other:** None
- **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
  - 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 2.7.7 released May-2020
- **File System:** xfs
- **System State:** Run level 3 (multi-user)
- **Base Pointers:** 64-bit
- **Peak Pointers:** 64-bit
- **Other:** jemalloc memory allocator V5.0.1
- **Power Management:** BIOS set to prefer performance at the cost of additional power usage

### Thread Results

<table>
<thead>
<tr>
<th>Test</th>
<th>Threads</th>
<th>SPECspeed®2017_int_base</th>
<th>SPECspeed®2017_int_peak</th>
</tr>
</thead>
<tbody>
<tr>
<td>perlbench_s</td>
<td>24</td>
<td>5.81</td>
<td>8.56</td>
</tr>
<tr>
<td>gcc_s</td>
<td>24</td>
<td>8.17</td>
<td>10.8</td>
</tr>
<tr>
<td>mcf_s</td>
<td>24</td>
<td>10.9</td>
<td>11.7</td>
</tr>
<tr>
<td>omnetpp_s</td>
<td>24</td>
<td>6.00</td>
<td>9.57</td>
</tr>
<tr>
<td>xalancbmk_s</td>
<td>24</td>
<td>5.87</td>
<td>4.89</td>
</tr>
<tr>
<td>x264_s</td>
<td>24</td>
<td>9.57</td>
<td>14.2</td>
</tr>
<tr>
<td>deepsjeng_s</td>
<td>24</td>
<td>4.01</td>
<td>19.0</td>
</tr>
<tr>
<td>leela_s</td>
<td>24</td>
<td>19.3</td>
<td></td>
</tr>
<tr>
<td>exchange2_s</td>
<td>24</td>
<td></td>
<td></td>
</tr>
<tr>
<td>xz_s</td>
<td>24</td>
<td></td>
<td></td>
</tr>
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</table>

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Page 1 Standard Performance Evaluation Corporation (info@spec.org) https://www.spec.org/
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---

**Results Table**

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Base</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Peak</th>
<th>Seconds</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>600.prlbench_s</td>
<td>24</td>
<td>307</td>
<td>5.78</td>
<td>305</td>
<td>5.82</td>
<td>306</td>
<td>5.81</td>
<td>24</td>
</tr>
<tr>
<td>602.gcc_s</td>
<td>24</td>
<td>487</td>
<td>8.17</td>
<td>491</td>
<td>8.11</td>
<td>486</td>
<td>8.19</td>
<td>24</td>
</tr>
<tr>
<td>605.mcf_s</td>
<td>24</td>
<td>436</td>
<td>10.8</td>
<td>441</td>
<td>10.7</td>
<td>438</td>
<td>10.8</td>
<td>24</td>
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<tr>
<td>620.omnetpp_s</td>
<td>24</td>
<td>272</td>
<td>5.99</td>
<td>270</td>
<td>6.04</td>
<td>272</td>
<td>6.00</td>
<td>24</td>
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<tr>
<td>625.x264_s</td>
<td>24</td>
<td>151</td>
<td>11.7</td>
<td>151</td>
<td>11.7</td>
<td>151</td>
<td>11.7</td>
<td>24</td>
</tr>
<tr>
<td>631.deepsjeng_s</td>
<td>24</td>
<td>293</td>
<td>4.89</td>
<td>293</td>
<td>4.89</td>
<td>294</td>
<td>4.88</td>
<td>24</td>
</tr>
<tr>
<td>641.leela_s</td>
<td>24</td>
<td>426</td>
<td>4.01</td>
<td>426</td>
<td>4.01</td>
<td>426</td>
<td>4.00</td>
<td>24</td>
</tr>
<tr>
<td>648.exchange2_s</td>
<td>24</td>
<td>207</td>
<td>14.2</td>
<td>207</td>
<td>14.2</td>
<td>207</td>
<td>14.2</td>
<td>24</td>
</tr>
<tr>
<td>657.xz_s</td>
<td>24</td>
<td>326</td>
<td>19.0</td>
<td>325</td>
<td>19.0</td>
<td>327</td>
<td>18.9</td>
<td>24</td>
</tr>
</tbody>
</table>

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**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:
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.

(Continued on next page)
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---

**General Notes (Continued)**

- 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 ASM 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 295195f888a3d7edbla6e46a485a0011

running on localhost.localdomain Thu May 21 23:51:05 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 4214R CPU @ 2.40GHz
  2 "physical id"s (chips)
  24 "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 : 12
```

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

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

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SPECspeed®2017_int_base = 8.43
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Test Date: Apr-2020
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Platform Notes (Continued)

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): 24
On-line CPU(s) list: 0-23
Thread(s) per core: 1
Core(s) per socket: 12
Socket(s): 2
NUMA node(s): 2
Vendor ID: GenuineIntel
CPU family: 6
Model: 85
Model name: Intel(R) Xeon(R) Silver 4214R CPU @ 2.40GHz
Stepping: 7
CPU MHz: 2954.125
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): 0,2,4,6,8,10,12,14,16,18,20,22
NUMA node1 CPU(s): 1,3,5,7,9,11,13,15,17,19,21,23
Flags: fpu vme de pse tsc msr pae mce cx8 apic sep mtrr pge mca cmov
pat pse36 clflush dtc ds long fnx mmx fxsr sse sse2 ss ht tm pbe syscall nx pdpe1gb
rdtscp lm constant tsd arch_perfmon pebs bts rep_good nopl x topology nonstop tsc
cpuid aperfmperf pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg fma
cx16 xtpr pdcm pcd dca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes
xsave fnal64 rdarand lahf_lm abm 3dnowprefetch cpuid_fault epb cat_1 cdp_l3
invpcid_single intel_pni ssbd mba ibrs ibpb stibp 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 avx512vl xsaveopt xsavec xgetbv1 xsavecas cqm_llc cqm_occum_llc
cqm_mb_total cqm_mb_local dtherm ida arat pln pts pku ospke avx512_vnni md_clear
flush_lld 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.

(Continued on next page)
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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
node 0 size: 192049 MB
node 0 free: 191089 MB
node 1 cpus: 1 3 5 7 9 11 13 15 17 19 21 23
node 1 size: 193532 MB
node 1 free: 192721 MB
node distances:
node 0 1
  0:  10  21
  1:  21  10

From /proc/meminfo
MemTotal: 394836832 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/swapsgs barriers and __user pointer sanitization
CVE-2017-5715 (Spectre variant 2): Mitigation: Enhanced IBRS, IBPB: conditional, RSB filling

(Continued on next page)
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</table>

**Platform Notes (Continued)**

run-level 3 May 21 23:49 last=5

SPEC is set to: /home/cpu2017

Filesystem Type Size Used Avail Use% Mounted on
/dev/mapper/rhel-home xfs 1.7T 28G 1.7T 2% /home

From /sys/devices/virtual/dmi/id

BIOS: Dell Inc. 2.7.7 05/06/2020
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       | 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)
```

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.Compiler Version Notes (Continued)

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
```

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
```

---

(Continued on next page)
Base Optimization Flags (Continued)

C++ benchmarks (continued):
- 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
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 -gopenmp -DSPEC_OPENMP
-fno-strict-overflow -L/usr/local/je5.0.1-64/lib
-ljemalloc

602.gcc_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

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SPEC CPU®2017 Integer Speed Result

Peak Optimization Flags (Continued)

605.mcf_s: -m64 -std=c11 -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 -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) -O2 -xCORE-AVX2
-qopt-mem-layout-trans=4 -ipo -O3 -no-prec-div
-DSPEC_SUPPRESS_OPENMP -qopenmp -DSPEC_OPENMP
-DSPEC_OPENMP -L/usr/local/je5.0.1-64/lib -ljemalloc

C++ benchmarks:

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

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:

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

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