### Dell Inc.

**PowerEdge T640 (Intel Xeon Gold 6240R, 2.40 GHz)**

<table>
<thead>
<tr>
<th>CPU 2017 License: 55</th>
<th>Test Date: May-2020</th>
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<tbody>
<tr>
<td>Test Sponsor: Dell Inc.</td>
<td>Hardware Availability: Feb-2020</td>
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<tr>
<td>Tested by: Dell Inc.</td>
<td>Software Availability: Apr-2020</td>
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#### SPECspeed®2017_int_base = 11.3

#### SPECspeed®2017_int_peak = 11.5

<table>
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<tr>
<th>SPECspeed®2017_int_base</th>
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#### Threads

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<th>SPECspeed®2017_int_peak (11.5)</th>
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<tr>
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<td>602.gcc_s 48</td>
<td>9.77</td>
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<td>605.mcf_s 48</td>
<td>10.8</td>
<td>18.2</td>
</tr>
<tr>
<td>620.omnetpp_s 48</td>
<td>13.7</td>
<td>16.4</td>
</tr>
<tr>
<td>623.xalancbmk_s 48</td>
<td>17.0</td>
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<tr>
<td>625.x264_s 48</td>
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<tr>
<td>631.deepsjeng_s 48</td>
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<td>641.leela_s 48</td>
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<tr>
<td>648.exchange2_s 48</td>
<td>16.9</td>
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</tr>
<tr>
<td>657.xz_s 48</td>
<td>23.8</td>
<td>23.8</td>
</tr>
</tbody>
</table>

#### Hardware

- **CPU Name:** Intel Xeon Gold 6240R
- **Max MHz:** 4000
- **Nominal:** 2400
- **Enabled:** 48 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:** 35.75 MB I+D on chip per core
- **Other:** None
- **Memory:** 384 GB (24 x 16 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 19.1.1.217 of Intel C/C++ Compiler for Linux;
  Fortran: Version 19.1.1.217 of Intel Fortran Compiler for Linux
- **Parallel:** Yes
- **File System:** xfs
- **System State:** Run level 3 (multi-user)
- **Base Pointers:** 64-bit
- **Peak Pointers:** 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 T640 (Intel Xeon Gold 6240R, 2.40 GHz)

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

Specspeed®2017_int_base = 11.3
Specspeed®2017_int_peak = 11.5

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

Results Table

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<th>Benchmark</th>
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<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
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<th>Ratio</th>
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<td>6.87</td>
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<tr>
<td>620.omnetpp_s</td>
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<td>625.x264_s</td>
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<td>631.deepsjeng_s</td>
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<td>4.90</td>
<td>348</td>
<td>4.90</td>
<td>48</td>
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</tr>
<tr>
<td>657.xz_s</td>
<td>48</td>
<td>260</td>
<td>23.8</td>
<td>260</td>
<td>23.8</td>
<td>48</td>
<td>260</td>
</tr>
</tbody>
</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:
KMP_AFFINITY = "granularity=fine,scatter"
LD_LIBRARY_PATH = "/home/cpu2017/lib/intel64:/home/cpu2017/je5.0.1-64"
MALLOC_CONF = "retain:true"
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
```

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
- Logical Processor disabled

Sysinfo program /home/cpu2017/bin/sysinfo

Rev: r6365 of 2019-08-21 295195f888a3d7eddee6e46a485a0011

running on poweredge-sut-rhel8-1 Wed Jun 3 06:40:38 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
Dell Inc. 

PowerEdge T640 (Intel Xeon Gold 6240R, 2.40 GHz) 

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

SPECspeed®2017_int_base = 11.3  
SPECspeed®2017_int_peak = 11.5  

Platform Notes (Continued) 

From /proc/cpuinfo 

model name : Intel(R) Xeon(R) Gold 6240R 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 : 24  
siblings : 24  
physical 0: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 16 17 18 19 20 21 25 26 27 28 29  
physical 1: cores 0 1 2 3 4 5 6 9 10 11 12 13 16 17 18 19 20 21 24 25 26 27 28 29 

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: 1  
Core(s) per socket: 24  
Socket(s): 2  
NUMA node(s): 2  
Vendor ID: GenuineIntel 
CPU family: 6  
Model: 85  
Model name: Intel(R) Xeon(R) Gold 6240R CPU @ 2.40GHz 
Stepping: 7  
CPU MHz: 1159.043  
CPU max MHz: 4000.0000  
CPU min MHz: 1000.0000  
BogoMIPS: 4800.00  
Virtualization: VT-x  
L1d cache: 32K  
L1i cache: 32K  
L2 cache: 1024K  
L3 cache: 36608K  
NUMA node0 CPU(s): 
0,2,4,6,8,10,12,14,16,18,20,22,24,26,28,30,32,34,36,38,40,42,44,46  
NUMA node1 CPU(s): 
1,3,5,7,9,11,13,15,17,19,21,23,25,27,29,31,33,35,37,39,41,43,45,47  
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 arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc 
cpuid aperfmperf pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg 
fxma f16c rdrand lahf_lm abm 3dnowprefetch cpuid_fault epb cat_l3 cdp_l3 
invpcid_single intel_ppine 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 
invpcl_single intel_ppin ssebd mba ibrs ibpb stibp ibrs_enhanced tpr_shadow vmmi 

(Continued on next page)
Platform Notes (Continued)

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 xsaves 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

/cproc/p/cpuinfo cache data
cache size : 36608 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 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46
node 0 size: 192073 MB
node 0 free: 191598 MB
node 1 cpus: 1 3 5 7 9 11 13 15 17 19 21 23 25 27 29 31 33 35 37 39 41 43 45 47
node 1 size: 193505 MB
node 1 free: 192289 MB
node distances:
node 0 1
0: 10 21
1: 21 10

From /proc/meminfo
MemTotal:       394832380 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 poweredge-sut-rhel8-1 4.18.0-147.8.1.el8.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:

(Continued on next page)
Dell Inc. PowerEdge T640 (Intel Xeon Gold 6240R, 2.40 GHz)

SPECspeed®2017_int_base = 11.3
SPECspeed®2017_int_peak = 11.5

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)

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 sanitation
CVE-2017-5715 (Spectre variant 2): Mitigation: Enhanced IBRS, IBPB: conditional, RSB filling
tsx_async_abort: Mitigation: Clear CPU buffers; SMT disabled

run-level 3 Jun 3 06:40 last=5

SPEC is set to: /home/cpu2017
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 18a5f2g72pdz-2g9e1 16 GB 2 rank 2933
2x 00ad00b300ad hma82gr7cjr8n-wm 16 GB 2 rank 3200
4x 00ad069d00ad hma82gr7cjr8n-xn 16 GB 2 rank 2933
4x 00ad069d00ad hma82gr7cjr8n-wm 16 GB 2 rank 2933

(End of data from sysinfo program)

Compiler Version Notes

==============================================================================
<table>
<thead>
<tr>
<th>C</th>
<th>600.perlbench_s(base) 602.gcc_s(base, peak) 605.mcf_s(base, peak)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>625.x264_s(base, peak) 657.xz_s(base, peak)</td>
</tr>
</tbody>
</table>
==============================================================================

Intel(R) C Compiler for applications running on Intel(R) 64, Version 2021.1
NextGen Build 20200304

(Continued on next page)
Dell Inc.

PowerEdge T640 (Intel Xeon Gold 6240R, 2.40 GHz)

SPECspeed®2017_int_base = 11.3
SPECspeed®2017_int_peak = 11.5

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

Compiler Version Notes (Continued)

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==============================================================================
<table>
<thead>
<tr>
<th>C</th>
<th>600.perlbench_s(peak)</th>
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<tr>
<td>Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,</td>
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<td>Version 19.1.1.217 Build 20200306</td>
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<td>Copyright (C) 1985-2020 Intel Corporation. All rights reserved.</td>
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<tr>
<td>C</td>
<td>600.perlbench_s(base) 602.gcc_s(base, peak) 605.mcf_s(base, peak)</td>
</tr>
<tr>
<td>625.x264_s(base, peak) 657.xz_s(base, peak)</td>
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<td>Intel(R) C Compiler for applications running on Intel(R) 64, Version 2021.1</td>
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<tr>
<td>C</td>
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<tr>
<td>C++</td>
<td>620.omnetpp_s(base, peak) 623.xalancbmk_s(base, peak)</td>
</tr>
<tr>
<td>631.deepsjeng_s(base, peak) 641.leela_s(base, peak)</td>
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<tr>
<td>Fortran</td>
<td>648.exchange2_s(base, peak)</td>
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<tr>
<td>Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)</td>
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<tr>
<td>Copyright (C) 1985-2020 Intel Corporation. All rights reserved.</td>
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</tr>
</tbody>
</table>
==============================================================================
SPEC CPU®2017 Integer Speed Result

Dell Inc.
PowerEdge T640 (Intel Xeon Gold 6240R, 2.40 GHz)

SPECspeed®2017_int_base = 11.3
SPECspeed®2017_int_peak = 11.5

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

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

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

(Continued on next page)
### Dell Inc.

PowerEdge T640 (Intel Xeon Gold 6240R, 2.40 GHz)

| SPECspeed®2017_int_base | 11.3 |
| SPECspeed®2017_int_peak | 11.5 |

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

---

### Base Optimization Flags (Continued)

Fortran benchmarks (continued):
- `-mbranches-within-32B-boundaries`

---

### Peak Compiler Invocation

**C benchmarks**:
- `icc`

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

**Fortran benchmarks**:
- `ifort`

---

### Peak Portability Flags

- `600.perlbench_s`: `-DSPEC_LP64 -DSPEC_LINUX_X64`
- `602.gcc_s`: `-DSPEC_LP64(*) -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`

(*) Indicates a portability flag that was found in a non-portability variable.

---

### Peak Optimization Flags

**C benchmarks**:
- `600.perlbench_s`: `-Wl,` -z, multdefs -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/jemalloc64-5.0.1/lib -ljemalloc

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

602.gcc_s: -m64 -qnextgen -std=c11 -fuse-ld=gold
-W1,-plugin-opt=-x86-branches-within-32B-boundaries
-W1,-z,muldefs -fprofile-generate(pass 1)
-fprofile-use=default.profdata(pass 2) -xCORE-AVX512 -flto
-Ofast(pass 1) -O3 -ffast-math -gopt-mem-layout-trans=4
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

605.mcf_s: basepeak = yes

625.x264_s: -m64 -qnextgen -std=c11
-W1,-plugin-opt=-x86-branches-within-32B-boundaries
-W1,-z,muldefs -xCORE-AVX512 -flto -O3 -ffast-math
-fuse-ld=gold -gopt-mem-layout-trans=4 -fno-alias
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

657.xz_s: basepeak = yes

C++ benchmarks:
620.omnetpp_s: basepeak = yes
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:
http://www.spec.org/cpu2017/flags/Intel-ic19.1u1-official-linux64_revA.xml