### Dell Inc.

PowerEdge M640 (Intel Xeon Gold 6226R, 2.90 GHz)  

**SPEC CPU®2017 Integer Speed Result**

<table>
<thead>
<tr>
<th>SPECspeed®2017_int_base = 10.5</th>
<th>SPECspeed®2017_int_peak = 10.8</th>
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**Test Date:** Jun-2020  
**Hardware Availability:** Feb-2020  
**Software Availability:** Apr-2020

<table>
<thead>
<tr>
<th>Test Sponsor:</th>
<th>Tested by:</th>
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<td>Dell Inc.</td>
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<table>
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<th>SPECspeed®2017_int_peak (10.8)</th>
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<tr>
<td>600.perlbench_s 64</td>
<td>7.36</td>
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<td>602.gcc_s 64</td>
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<td>605.mcf_s 64</td>
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<td>641.leela_s 64</td>
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</tr>
<tr>
<td>657.xz_s 64</td>
<td>23.3</td>
<td>10.5</td>
</tr>
</tbody>
</table>

### Hardware

- **CPU Name:** Intel Xeon Gold 6226R  
- **Max MHz:** 3900  
- **Nominal:** 2900  
- **Enabled:** 32 cores, 2 chips, 2 threads/core  
- **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:** 22 MB I+D on chip per chip  
- **Memory:** 384 GB (12 x 32 GB 2Rx8 PC4-2933V-R, running at 2933)  
- **Storage:** 1 x 960 GB SATA SSD  
- **Other:** None

### Software

- **OS:** Red Hat Enterprise Linux 8.1  
  - kernel 4.18.0-147.el8.x86_64  
- **Compiler:** C/C++: Version 19.1.1.217 of Intel C/C++ Compiler for Linux; Fortran: Version 19.1.1.217 of Intel Fortran Compiler for Linux  
- **Parallel:** Yes  
- **Firmware:** Version 2.6.3 released Feb-2020  
- **File System:** tmpfs  
- **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
SPEC CPU®2017 Integer Speed Result

Dell Inc.

PowerEdge M640 (Intel Xeon Gold 6226R, 2.90 GHz)

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

SPECspeed®2017_int_base = 10.5
SPECspeed®2017_int_peak = 10.8

Results Table

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<th>Seconds</th>
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<td></td>
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</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:
KMP_AFFINITY = "granularity=fine,scatter"
LD_LIBRARY_PATH = 
"/dev/shm/cpu2017-ic19.1u1/lib/intel64:/dev/shm/cpu2017-ic19.1u1/je5.0.1-64"
MALLOC_CONF = "retain:true"
OMP_STACKSIZE = "192M"
SPEC CPU®2017 Integer Speed Result

Dell Inc.

PowerEdge M640 (Intel Xeon Gold 6226R, 2.90 GHz)

| SPECspeed®2017_int_base = 10.5 |
| SPECspeed®2017_int_peak = 10.8 |

Dell Inc.

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

General Notes

Binaries compiled on a system with 1x Intel Core i9-7900X CPU + 32GB RAM
memory using Redhat Enterprise Linux 7.5
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 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 /dev/shm/cpu2017-ic19.1u1/bin/sysinfo
Rev: r6365 of 2019-08-21 295195f888a3d7ed81e6e46a485a0011
running on localhost.localdomain Thu Jun 4 18:53:23 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

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

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Dell Inc.

PowerEdge M640 (Intel Xeon Gold 6226R, 2.90 GHz)

| SPECspeed®2017_int_base = 10.5 |
| SPECspeed®2017_int_peak = 10.8 |

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

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

Platform Notes (Continued)

From /proc/cpuinfo

model name : Intel(R) Xeon(R) Gold 6226R CPU @ 2.90GHz

  2 "physical id"s (chips)
  64 "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 : 16
siblings : 32
physical 0: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
physical 1: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

From lscpu:

Architecture:           x86_64
CPU op-mode(s):         32-bit, 64-bit
Byte Order:             Little Endian
CPU(s):                 64
On-line CPU(s) list:    0-63
Thread(s) per core:     2
Core(s) per socket:     16
Socket(s):              2
NUMA node(s):           4
Vendor ID:              GenuineIntel
CPU family:             6
Model:                  85
Model name:             Intel(R) Xeon(R) Gold 6226R CPU @ 2.90GHz
Stepping:               7
CPU MHz:                1695.795
CPU max MHz:            3900.0000
CPU min MHz:            1200.0000
BogoMIPS:               5800.00
Virtualization:         VT-x
L1d cache:              32K
L1i cache:              32K
L2 cache:               1024K
L3 cache:               22528K
NUMA node0 CPU(s):      0,4,8,12,16,20,24,28,32,36,40,44,48,52,56,60
NUMA node1 CPU(s):      1,5,9,13,17,21,25,29,33,37,41,45,49,53,57,61
NUMA node2 CPU(s):      2,6,10,14,18,22,26,30,34,38,42,46,50,54,58,62
NUMA node3 CPU(s):      3,7,11,15,19,23,27,31,35,39,43,47,51,55,59,63

Flags:

(Continued on next page)
Dell Inc.

PowerEdge M640 (Intel Xeon Gold 6226R, 2.90 GHz)

SPECspeed®2017_int_base = 10.5

SPECspeed®2017_int_peak = 10.8

Platform Notes (Continued)

cqm mpx rdt_a avx512f avx512dq rdseed adx smap clflushopt clwb intel_pt avx512cd
avx512bw avx512vl xsaveopt xsaves cqm_llc cqm_occupp_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 : 22528 KB

From numactl --hardware WARNING: a numactl 'node' might or might not correspond to a
physical chip.

available: 4 nodes (0-3)
node 0 cpus: 0 4 8 12 16 20 24 28 32 36 40 44 48 52 56 60
node 0 size: 95280 MB
node 0 free: 94575 MB
node 1 cpus: 1 5 9 13 17 21 25 29 33 37 41 45 49 53 57 61
node 1 size: 96764 MB
node 1 free: 87525 MB
node 2 cpus: 2 6 10 14 18 22 26 30 34 38 42 46 50 54 58 62
node 2 size: 96764 MB
node 2 free: 96393 MB
node 3 cpus: 3 7 11 15 19 23 27 31 35 39 43 47 51 55 59 63
node 3 size: 96764 MB
node 3 free: 96144 MB
node distances:

node 0 1 2 3
0: 10 21 11 21
1: 21 10 21 11
2: 11 21 10 21
3: 21 11 21 10

From /proc/meminfo

MemTotal: 394827932 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)
Dell Inc. PowerEdge M640 (Intel Xeon Gold 6226R, 2.90 GHz)

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

SPEC CPU®2017 Integer Speed Result

SPECspeed®2017_int_base = 10.5
SPECspeed®2017_int_peak = 10.8

**Platform Notes (Continued)**

```
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 Jun 3 14:31
SPEC is set to: /dev/shm/cpu2017-ic19.1u1
    Filesystem     Type   Size  Used Avail Use% Mounted on
tmpfs          tmpfs  189G  4.2G  185G   3% /dev/shm

From /sys/devices/virtual/dmi/id
    BIOS:    Dell Inc. 2.6.3 02/03/2020
    Vendor:  Dell Inc.
    Product: PowerEdge M640
    Product Family: PowerEdge

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:
    5x 00AD00B300AD HMA84GR7CJR4N-WM 32 GB 2 rank 2933
    4x 00AD063200AD HMA84GR7CJR4N-WM 32 GB 2 rank 2933
    3x 00AD069D00AD 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) 602.gcc_s(base, peak) 605.mcf_s(base, peak)
```

(Continued on next page)
### Dell Inc. PowerEdge M640 (Intel Xeon Gold 6226R, 2.90 GHz)

<table>
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<tr>
<th>SPECspeed®2017_int_base</th>
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<tr>
<td>SPECspeed®2017_int_peak</td>
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#### Compiler Version Notes (Continued)

<table>
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<th>Compiler</th>
<th>Benchmark(s)</th>
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<tbody>
<tr>
<td>C</td>
<td>625.x264_s(base, peak) 657.xz_s(base, peak)</td>
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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.

<table>
<thead>
<tr>
<th>C</th>
<th>600.perlbench_s(peak)</th>
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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.

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

<table>
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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.

<table>
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Intel(R) Fortran 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.

(Continued on next page)
Dell Inc.

PowerEdge M640 (Intel Xeon Gold 6226R, 2.90 GHz)  SPECspeed®2017_int_base = 10.5
SPECspeed®2017_int_peak = 10.8

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

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

Compiler Version Notes (Continued)

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 -qnextgen -std=c11
-Wl,-plugin-opt=-x86-branches-within-32B-boundaries -Wl,-z,muldefs
-xCORE-AVX2 -O3 -ffast-math -flto -mfpmath=sse -funroll-loops
-fuse-ld=gold -qopt-mem-layout-trans=4 -fopenmp -DSPEC_OPENMP
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

C++ benchmarks:
-m64 -qnextgen -Wl,-plugin-opt=-x86-branches-within-32B-boundaries
-Wl,-z,muldefs -xCORE-AVX2 -O3 -ffast-math -flto -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

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

Fortran benchmarks:
-m64 -Wl,-plugin-opt=-x86-branches-within-32B-boundaries -xCORE-AVX2
-O3 -ipo -no-prec-div -qopt-mem-layout-trans=4
-nostandard-realloc-lhs -align array32byte
-mbranches-within-32B-boundaries

Peak Compiler Invocation

C benchmarks:
icc

C++ benchmarks:
icpc

Fortran benchmarks:
ifort

Peak Portability Flags

600.perlbmch_s: -DSPEC_LP64 -DSPEC_LINUX_X64
602.ccs_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.leelal_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.perlbmch_s: -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2)
-xCORE-AVX2 -ipo -O3 -no-prec-div

(Continued on next page)
spec

SPEC CPU®2017 Integer Speed Result

Copyright 2017-2020 Standard Performance Evaluation Corporation

Dell Inc.

PowerEdge M640 (Intel Xeon Gold 6226R, 2.90 GHz)

SPECspeed®2017_int_base = 10.5
SPECspeed®2017_int_peak = 10.8

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

Peak Optimization Flags (Continued)

600.perlbench_s (continued):
-qopt-mem-layout-trans=4 -fno-strict-overflow
-mbranches-within-32B-boundaries
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

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-AVX2 -flto
-Ofast(pass 1) -O3 -ffast-math -qopt-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-AVX2 -flto -O3 -ffast-math
-CORE-AVX2 -flto
-Ofast(pass 1) -O3 -ffast-math -qopt-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
### SPEC CPU®2017 Integer Speed Result

**Dell Inc.**

**PowerEdge M640 (Intel Xeon Gold 6226R, 2.90 GHz)**

<table>
<thead>
<tr>
<th>SPECspeed®2017_int_base</th>
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<tr>
<td>SPECspeed®2017_int_peak</td>
<td>10.8</td>
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</tbody>
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**CPU2017 License:** 55

**Test Sponsor:** Dell Inc.

**Test Date:** Jun-2020

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**Tested by:** Dell Inc.

**Software Availability:** Apr-2020

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