### Dell Inc.

**PowerEdge M640 (Intel Xeon Gold 6230R, 2.10 GHz)**

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

### Hardware

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<tr>
<td>554.roms_r</td>
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</table>

### 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:** No  
**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:** None  
**jemalloc memory allocator V5.0.1**

**Power Management:** BIOS set to prefer performance at the cost of additional power usage.
SPEC CPU® 2017 Floating Point Rate Result

Dell Inc.

PowerEdge M640 (Intel Xeon Gold 6230R, 2.10 GHz)

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

Dell Inc.

PowerEdge M640 (Intel Xeon Gold 6230R, 2.10 GHz)

SPECrate® 2017_fp_base = 241
SPECrate® 2017_fp_peak = 256

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

Results Table

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</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:

```
LD_LIBRARY_PATH = 
  "/dev/shm/cpu2017-ic19.1u1/lib/intel64:/dev/shm/cpu2017-ic19.1u1/je5.0.1-64"
MALLOCONF = "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.

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 295195f888a3d7ed6e6e46a485a0011
running on localhost.localdomain Tue May 26 23:56:08 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
SPEC CPU® 2017 Floating Point Rate Result

Dell Inc.

PowerEdge M640 (Intel Xeon Gold 6230R, 2.10 GHz)

SPECrate®2017_fp_base = 241
SPECrate®2017_fp_peak = 256

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

Platform Notes (Continued)

From /proc/cpuinfo
model name : Intel(R) Xeon(R) Gold 6230R CPU @ 2.10GHz
  2 "physical id"s (chips)
  104 "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 : 26
siblings : 52
physical 0: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 16 17 18 19 20 21 22 24 25 26 27 28 29
physical 1: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 16 17 18 19 20 21 22 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): 104
On-line CPU(s) list: 0-103
Thread(s) per core: 2
Core(s) per socket: 26
Socket(s): 2
NUMA node(s): 4
Vendor ID: GenuineIntel
CPU family: 6
Model: 85
Model name: Intel(R) Xeon(R) Gold 6230R CPU @ 2.10GHz
Stepping: 7
CPU MHz: 2343.711
CPU max MHz: 4000.0000
CPU min MHz: 1000.0000
BogoMIPS: 4200.00
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 36608K
NUMA node0 CPU(s):
  0,4,8,12,16,20,24,28,32,36,40,44,48,52,56,60,64,68,72,76,80,84,88,92,96,100
NUMA node1 CPU(s):
  1,5,9,13,17,21,25,29,33,37,41,45,49,53,57,61,65,69,73,77,81,85,89,93,97,101
NUMA node2 CPU(s):
  2,6,10,14,18,22,26,30,34,38,42,46,50,54,58,62,66,70,74,78,82,86,90,94,98,102
NUMA node3 CPU(s):
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

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

---

**Dell Inc.**

PowerEdge M640 (Intel Xeon Gold 6230R, 2.10 GHz)

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<td>Apr-2020</td>
</tr>
</tbody>
</table>

---

**Platform Notes (Continued)**

```
| lm constant_tsc art arch_perfmon pews bts rep_good nopl xtology nonstop_tsc cpuid aperfmpref perf pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 sse3 sdbg fma cx16 xtptr 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_pfin ssbd mba ibps ibpb stibp ibrs_enhanced tpr_shadow vnum flexpriority ept vpid fsqsbase tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid rtm cqm mpix rdt_a avx512f avx512dq rdseed adx smap clflushopt clwb intel_pt avx512cd avx512bw avx512vl xsaveopt xsaveopt xsaveopt xsaves cqm_llc cqm_occup_llc cqm_mbb_total cqm_mbb_local dtherm ida arat pln pts pkp ospeke avx512_vnni md_clear flush_ll1d arch_capabilities |
```

```
/proc/cpuinfo cache data
  cache size : 36608 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 64 68 72 76 80 84 88 92 96 100
  node 0 size: 95304 MB
  node 0 free: 94849 MB
  node 1 cpus: 1 5 9 13 17 21 25 29 33 37 41 45 49 53 57 61 65 69 73 77 81 85 89 93 97 101
  node 1 size: 96762 MB
  node 1 free: 95952 MB
  node 2 cpus: 2 6 10 14 18 22 26 30 34 38 42 46 50 54 58 62 66 70 74 78 82 86 90 94 98 102
  node 2 size: 96762 MB
  node 2 free: 96511 MB
  node 3 cpus: 3 7 11 15 19 23 27 31 35 39 43 47 51 55 59 63 67 71 75 79 83 87 91 95 99 103
  node 3 size: 96736 MB
  node 3 free: 87272 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: 394820400 kB
  HugePages_Total: 0
  Hugepagesize: 2048 kB
```

From /etc/*release* /etc/*version*
```
  os-release:
```

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

**Dell Inc.**

PowerEdge M640 (Intel Xeon Gold 6230R, 2.10 GHz)

<table>
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<tr>
<td>Software Availability:</td>
<td>Apr-2020</td>
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**Platform Notes (Continued)**

```plaintext
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
```

```plaintext
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 May 26 15:03
- 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 HMA84GR7CJ4N-WM 32 GB 2 rank 2933
  - 4x 00AD063200AD HMA84GR7CJ4N-WM 32 GB 2 rank 2933
```

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

**Dell Inc.**

PowerEdge M640 (Intel Xeon Gold 6230R, 2.10 GHz)

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**Test Sponsor:** Dell Inc.  
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**Hardware Availability:** Feb-2020  
**Tested by:** Dell Inc.  
**Software Availability:** Apr-2020

**Platform Notes (Continued)**

3x 00AD069D00AD HMA84GR7CJR4N-WM 32 GB 2 rank 2933  
4x Not Specified Not Specified

(End of data from sysinfo program)

**Compiler Version Notes**

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<th>519.lbm_r(base, peak) 538.imagick_r(base, peak)</th>
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<tr>
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<tr>
<td>NextGen Build 20200304</td>
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<td>Copyright (C) 1985-2020 Intel Corporation. All rights reserved.</td>
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(Continued on next page)
Dell Inc.

PowerEdge M640 (Intel Xeon Gold 6230R, 2.10 GHz)

| SPECrate®2017_fp_base = 241 |
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CPU2017 License: 55
Test Sponsor: Dell Inc.
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Test Date: May-2020
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Compiler Version Notes (Continued)

==============================================================================
C++, C          | 511.povray_r(base) 526.blender_r(base, peak)
-----------------------------------------------------------------------------
Intel(R) C++ Compiler for applications running on Intel(R) 64, Version 2021.1
  NextGen Build 20200304
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Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
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Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
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C++, C, Fortran | 507.cactuBSSN_r(base, peak)
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Intel(R) C++ Compiler for applications running on Intel(R) 64, Version 2021.1
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  NextGen Build 20200304
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
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.
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Fortran         | 503.bwaves_r(base, peak) 549.fotonik3d_r(base, peak)
| 554.roms_r(base, peak)
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Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
==============================================================================
Fortran, C      | 521.wrf_r(base) 527.cam4_r(base, peak)
(Continued on next page)
Compiler Version Notes (Continued)

Fortran, C       | 521.wrf_r (peak)

Fortran, C       | 521.wrf_r (base) 527.cam4_r (base, peak)

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Base Compiler Invocation

C benchmarks:
- icc

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

**PowerEdge M640 (Intel Xeon Gold 6230R, 2.10 GHz)**

<table>
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<th>CPU2017 License: 55</th>
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**Test Date:** May-2020  
**Hardware Availability:** Feb-2020  
**Software Availability:** Apr-2020

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#### Base Compiler Invocation (Continued)

C++ benchmarks:
- icpc

Fortran benchmarks:
- ifort

Benchmarks using both Fortran and C:
- ifort icc

Benchmarks using both C and C++:
- icpc icc

Benchmarks using Fortran, C, and C++:
- icpc icc ifort

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#### Base Portability Flags

- `503.bwaves_r: -DSPEC_LP64`
- `507.cactuBSSN_r: -DSPEC_LP64`
- `508.namd_r: -DSPEC_LP64`
- `510.parest_r: -DSPEC_LP64`
- `511.povray_r: -DSPEC_LP64`
- `519.lbm_r: -DSPEC_LP64`
- `521.wrf_r: -DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian`
- `526.blender_r: -DSPEC_LP64 -DSPEC_LINUX -funsigned-char`
- `527.cam4_r: -DSPEC_LP64 -DSPEC_CASE_FLAG`
- `538.imagick_r: -DSPEC_LP64`
- `544.nab_r: -DSPEC_LP64`
- `549.fotonik3d_r: -DSPEC_LP64`
- `554.roms_r: -DSPEC_LP64`

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#### Base Optimization Flags

C benchmarks:
- `-m64 -mnextgen -std=c11`
- `-Wl,-plugin-opt=-x86-branches-within-32B-boundaries -Wl,-z,muldefs`
- `-fuse-ld=gold -xcORE-AVX512 -Ofast -ffast-math -flto -mfpmath=sse`
- `-funroll-loops -gopt-mem-layout-trans=4`
- `-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc`

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

**C++ benchmarks:**
- `-m64 -qnextgen -Wl,-plugin-opt=-x86-branches-within-32B-boundaries`
- `-Wl,-z,muldefs -fuse-ld=gold -xCORE-AVX512 -Ofast -ffast-math -flto`
- `-mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4`
- `-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc`

**Fortran benchmarks:**
- `-m64 -Wl,-plugin-opt=-x86-branches-within-32B-boundaries -Wl,-z,muldefs`
- `-fuse-ld=gold -xCORE-AVX512 -Ofast -ffast-math -flto -mfpmath=sse -ffinite-math-only -qopt-multiple-gather-scatter-by-shuffles`
- `-align array32byte -auto -mbranches-within-32B-boundaries -L/usr/local/jemalloc64-5.0.1/lib -ljemalloc`

**Benchmarks using both Fortran and C:**
- `-m64 -qnextgen -std=c11`
- `-Wl,-plugin-opt=-x86-branches-within-32B-boundaries -Wl,-z,muldefs`
- `-align array32byte -auto -mbranches-within-32B-boundaries -L/usr/local/jemalloc64-5.0.1/lib -ljemalloc`

**Benchmarks using both C and C++:**
- `-m64 -qnextgen -std=c11`
- `-Wl,-plugin-opt=-x86-branches-within-32B-boundaries -Wl,-z,muldefs`
- `-align array32byte -auto -mbranches-within-32B-boundaries -L/usr/local/jemalloc64-5.0.1/lib -ljemalloc`

**Benchmarks using Fortran, C, and C++:**
- `-m64 -qnextgen -std=c11`
- `-Wl,-plugin-opt=-x86-branches-within-32B-boundaries -Wl,-z,muldefs`
- `-align array32byte -auto -mbranches-within-32B-boundaries -L/usr/local/jemalloc64-5.0.1/lib -ljemalloc`
Dell Inc.

PowerEdge M640 (Intel Xeon Gold 6230R, 2.10 GHz)

**Peak Compiler Invocation**

C benchmarks:
- icc

C++ benchmarks:
- icpc

Fortran benchmarks:
- ifort

Benchmarks using both Fortran and C:
- ifort icc

Benchmarks using both C and C++:
- icpc icc

Benchmarks using Fortran, C, and C++:
- icpc icc ifort

**Peak Portability Flags**

Same as Base Portability Flags

**Peak Optimization Flags**

C benchmarks:
- 519.lbm_r: basepeak = yes
- 538.imagick_r: basepeak = yes
- 544.nab_r: basepeak = yes

C++ benchmarks:
- 508.namd_r: basepeak = yes
- 510.parest_r: -m64 -qnextgen
- -Wl,-plugin-opt=-x86-branches-within-32B-boundaries
- -Wl,-z,muldefs -fuse-ld=gold -xCORE-AVX512 -Ofast
- -ffast-math -flto -mfpmath=sse -funroll-loops
- -qopt-mem-layout-trans=4 -L/usr/local/jemalloc64-5.0.1/lib
- -ljemalloc

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SPEC CPU®2017 Floating Point Rate Result

Dell Inc.

PowerEdge M640 (Intel Xeon Gold 6230R, 2.10 GHz)

| SPECrate®2017_fp_base = 241 |
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Peak Optimization Flags (Continued)

Fortran benchmarks:


549.fotonik3d_r: basepeak = yes

554.roms_r: Same as 503.bwaves_r

Benchmarks using both Fortran and C:


527.cam4_r: basepeak = yes

Benchmarks using both C and C++:


526.blender_r: basepeak = yes

Benchmarks using Fortran, C, and C++:

507.cactuBSSN_r: basepeak = yes

The flags files that were used to format this result can be browsed at
## SPEC CPU®2017 Floating Point Rate Result

**Dell Inc.**

**PowerEdge M640 (Intel Xeon Gold 6230R, 2.10 GHz)**

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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

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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 2020-05-26 23:56:08-0400.


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