Dell Inc.

PowerEdge R640 (Intel Xeon Gold 6230R, 2.10 GHz)

SPECspeed®2017_fp_base = 146
SPECspeed®2017_fp_peak = 147

Hardware

CPU Name: Intel Xeon Gold 6230R
Max MHz: 4000
Nominal: 2100
Enabled: 52 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 chip
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
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 2.5.4 released Jan-2020
File System: tmpfs
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.
SPEC CPU®2017 Floating Point Speed Result

Dell Inc.
PowerEdge R640 (Intel Xeon Gold 6230R, 2.10 GHz)

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

SPECspeed®2017_fp_base = 146
SPECspeed®2017_fp_peak = 147

Test Date: May-2020
Hardware Availability: Feb-2020
Software Availability: Nov-2019

Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
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<td>542</td>
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<td>627.cam4_s</td>
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<td>107</td>
<td>147</td>
<td>107</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

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,compact"
- LD_LIBRARY_PATH = "/mnt/ramdisk/cpu2017/lib/intel64"
- 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"
Benchmark run from a 225 GB ramdisk created with the cmd; "mount -t tmpfs -o size=225G tmpfs /mnt/ramdisk"
SPEC CPU®2017 Floating Point Speed Result

Dell Inc.

PowerEdge R640 (Intel Xeon Gold 6230R, 2.10 GHz)

SPECspeed®2017_fp_base = 146
SPECspeed®2017_fp_peak = 147

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

BIOS settings:
Sub NUMA Cluster disabled
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 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 /mnt/ramdisk/cpu2017/bin/sysinfo
Rev: r6365 of 2019-08-21 295195f888a3d7edbe6e46a485a0011
running on rhel-8-1-sut Fri May 1 15:33:26 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) Gold 6230R CPU @ 2.10GHz
      2 "physical id"s (chips)
      52 "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 : 26
        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):           52
   On-line CPU(s) list: 0-51
   Thread(s) per core: 1
   Core(s) per socket: 26

(Continued on next page)
Dell Inc. PowerEdge R640 (Intel Xeon Gold 6230R, 2.10 GHz)

| SPECspeed®2017_fp_base = 146 |
| SPECspeed®2017_fp_peak = 147 |

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

Platform Notes (Continued)

- Socket(s): 2
- NUMA node(s): 2
- Vendor ID: GenuineIntel
- CPU family: 6
- Model: 85
- Model name: Intel(R) Xeon(R) Gold 6230R CPU @ 2.10GHz
- Stepping: 7
- CPU MHz: 3201.136
- 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):
  - 0,2,4,6,8,10,12,14,16,18,20,22,24,26,28,30,32,34,36,38,40,42,44,46,48,50
- NUMA node1 CPU(s):
  - 1,3,5,7,9,11,13,15,17,19,21,23,25,27,29,31,33,35,37,39,41,43,45,47,49,51
- Flags: fpu vme de pse tsc msr pae mce cx8 apic sep mtrr pge mca cmov
- 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 48 50
  node 0 size: 192046 MB
  node 0 free: 190779 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 49 51
  node 1 size: 193530 MB
  node 1 free: 171486 MB
  node distances:
  node 0 1

(Continued on next page)
Dell Inc.

PowerEdge R640 (Intel Xeon Gold 6230R, 2.10 GHz)

**SPEC speed**

SPECspeed\textsuperscript{®}2017\textsubscript{fp}_peak = 147

SPECspeed\textsuperscript{®}2017\textsubscript{fp}_base = 146

---

**Platform Notes (Continued)**

```
0:  10  21
1:  21  10
```

From `/proc/meminfo`

- MemTotal: 394831056 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 rhel-8-1-sut 4.18.0-147.el8.x86_64 #1 SMP Thu Sep 26 15:52:44 UTC 2019 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 swapping barriers and __user pointer sanitization
- CVE-2017-5715 (Spectre variant 2): Mitigation: Enhanced IBRS, IBPB: conditional, RSB filling

run-level 3 May 1 11:48 last=5

**SPEC is set to**: /mnt/ramdisk/cpu2017

```
Filesystem  Type     Size  Used Avail Use% Mounted on
  tmpfs    tmpfs     225G   14G  212G   6%  /mnt/ramdisk
```

From `/sys/devices/virtual/dmi/id`

- BIOS: Dell Inc. 2.5.4 01/13/2020
- Vendor: Dell Inc.
## Dell Inc.

PowerEdge R640 (Intel Xeon Gold 6230R, 2.10 GHz)  

<table>
<thead>
<tr>
<th>SPECspeed(^{2017}) fp_base = 146</th>
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<td>Tested by: Dell Inc.</td>
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</tr>
</tbody>
</table>

---

### Platform Notes (Continued)

- **Product:** PowerEdge R640
- **Product Family:** PowerEdge
- **Serial:** FPFXCH2

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:**
- 10x 002C069D002C 18ASF2GDZ-2G9E1 16 GB 2 rank 2933
- 4x 00AD0B300AD HMA82GR7CJR8N-WM 16 GB 2 rank 2933
- 8x 00AD0B300AD HMA82GR7CJR8N-XN 16 GB 2 rank 3200
- 2x 00AD063200AD HMA82GR7CJR8N-WM 16 GB 2 rank 2933

(End of data from sysinfo program)

---

### Compiler Version Notes

```
<table>
<thead>
<tr>
<th>C</th>
<th>619.lbm_s(base, peak) 638.imagick_s(base, peak) 644.nab_s(base, peak)</th>
</tr>
</thead>
</table>

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.

```

```
<table>
<thead>
<tr>
<th>C++, C, Fortran</th>
<th>607.cactuBSSN_s(base, peak)</th>
</tr>
</thead>
</table>

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.

```

```
<table>
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<tr>
<th>Fortran</th>
<th>603.bwaves_s(base, peak) 649.fotonik3d_s(base, peak) 654.roms_s(base, peak)</th>
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</thead>
</table>

Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)
```

(Continued on next page)
Dell Inc. PowerEdge R640 (Intel Xeon Gold 6230R, 2.10 GHz)

| SPECspeed®2017_fp_base = 146 |
| SPECspeed®2017_fp_peak = 147 |

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

**Compiler Version Notes (Continued)**

64, Version 19.0.5.281 Build 20190815
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

-------------------------------------------------------------------

Fortran, C
| 621.wrf_s(base, peak) 627.cam4_s(base, peak) |
| 628.pop2_s(base, peak) |

-------------------------------------------------------------------

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.
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.

-------------------------------------------------------------------

**Base Compiler Invocation**

C benchmarks:
`icc`

Fortran benchmarks:
`ifort`

Benchmarks using both Fortran and C:
`ifort icc`

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

**Base Portability Flags**

603.bwaves_s: -DSPEC_LP64
607.cactuBSSN_s: -DSPEC_LP64
619.lbm_s: -DSPEC_LP64
621.wrf_s: -DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian
627.cam4_s: -DSPEC_LP64 -DSPEC_CASE_FLAG
628.pop2_s: -DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian
   -assume byterecl
638.imagick_s: -DSPEC_LP64
644.nab_s: -DSPEC_LP64
649.fotonik3d_s: -DSPEC_LP64
654.roms_s: -DSPEC_LP64
# SPEC CPU®2017 Floating Point Speed Result

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

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## Base Optimization Flags

C benchmarks:
- `-m64 -std=c11 -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch`  
- `-ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP`  

Fortran benchmarks:
- `-m64 -DSPEC_OPENMP -xCORE-AVX512 -ipo -O3 -no-prec-div`  
- `-qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp`  
- `-nostandard-realloc-lhs`  

Benchmarks using both Fortran and C:
- `-m64 -std=c11 -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch`  
- `-ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP`  
- `-nostandard-realloc-lhs`  

Benchmarks using Fortran, C, and C++:
- `-m64 -std=c11 -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch`  
- `-ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP`  
- `-nostandard-realloc-lhs`  

## Peak Compiler Invocation

C benchmarks:
- `icc`  

Fortran benchmarks:
- `ifort`  

Benchmarks using both Fortran and C:
- `ifort icc`  

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

## Peak Portability Flags

Same as Base Portability Flags
Dell Inc.

PowerEdge R640 (Intel Xeon Gold 6230R, 2.10 GHz)

| SPECspeed®2017_fp_base = 146 |
| SPECspeed®2017_fp_peak = 147 |

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

Test Date: May-2020
Hardware Availability: Feb-2020
Software Availability: Nov-2019

Peak Optimization Flags

C benchmarks:

619.lbm_s: basepeak = yes
638.imagick_s: basepeak = yes
644.nab_s: basepeak = yes

Fortran benchmarks:

603.bwaves_s: basepeak = yes
649.fotonik3d_s: basepeak = yes
654.roms_s: basepeak = yes

Benchmarks using both Fortran and C:

621.wrf_s: -m64 -std=c11 -prof-gen(pass 1) -prof-use(pass 2) -O2 -xCORE-AVX512 -qopt-prefetch -ipo -O3 -ffinite-math-only -no-prec-div -qopt-mem-layout-trans=4 -DSPEC_SUPPRESS_OPENMP -qopenmp -DSPEC_OPENMP -nostandard-realloc-lhs

627.cam4_s: -m64 -std=c11 -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP -nostandard-realloc-lhs

628.pop2_s: Same as 621.wrf_s

Benchmarks using Fortran, C, and C++:

607.cactuBSSN_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:
Dell Inc.

PowerEdge R640 (Intel Xeon Gold 6230R, 2.10 GHz)

SPECspeed\textsuperscript{\textregistered}2017\_fp\_base = 146

SPECspeed\textsuperscript{\textregistered}2017\_fp\_peak = 147

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