## Dell Inc.

PowerEdge R650xs (Intel Xeon Platinum 8358P, 2.60 GHz)

| Test Date: | Aug-2021 |
| Hardware Availability: | Jul-2021 |
| Software Availability: | Dec-2020 |

### SPEC CPU 2017 Floating Point Speed Result

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>SPECspeed(^{2017}_fp_base</th>
<th>SPECspeed(^{2017}_fp_peak</th>
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<tbody>
<tr>
<td>603.bwaves_s</td>
<td>64</td>
<td>215</td>
<td>217</td>
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<tr>
<td>607.cactuBSSN_s</td>
<td>64</td>
<td>210</td>
<td>215</td>
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<tr>
<td>619.lbm_s</td>
<td>64</td>
<td>203</td>
<td>205</td>
</tr>
<tr>
<td>621.wrf_s</td>
<td>64</td>
<td>86</td>
<td>161</td>
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<tr>
<td>627.cam4_s</td>
<td>64</td>
<td>204</td>
<td>419</td>
</tr>
<tr>
<td>628.pop2_s</td>
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<td>476</td>
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<tr>
<td>638.imagick_s</td>
<td>64</td>
<td>114</td>
<td>115</td>
</tr>
<tr>
<td>644.nab_s</td>
<td>64</td>
<td>277</td>
<td>734</td>
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<tr>
<td>649.fotonik3d_s</td>
<td>64</td>
<td>277</td>
<td>734</td>
</tr>
<tr>
<td>654.roms_s</td>
<td>64</td>
<td>277</td>
<td>734</td>
</tr>
</tbody>
</table>

### Hardware

- **CPU Name:** Intel Xeon Platinum 8358P
- **Max MHz:** 3400
- **Nominal:** 2600
- **Enabled:** 64 cores, 2 chips
- **Orderable:** 1.2 chips
- **Cache L1:** 32 KB I + 48 KB D on chip per core
- **L2:** 1.25 MB I+D on chip per core
- **L3:** 48 MB I+D on chip per chip
- **Memory:** 512 GB (16 x 32 GB 2Rx4 PC4-3200AA-R)
- **Storage:** 225 GB on tmpfs
- **Other:** None

### Software

- **OS:** Red Hat Enterprise Linux 8.3 (Ootpa) 4.18.0-240.el8.x86_64
- **Compiler:** C/C++: Version 2021.1 of Intel oneAPI DPC++/C++ Compiler Build 20201113 for Linux;
  Fortran: Version 2021.1 of Intel Fortran Compiler Classic Build 20201112 for Linux;
  C/C++: Version 2021.1 of Intel C/C++ Compiler Classic Build 20201112 for Linux
- **Parallel:** Yes
- **Firmware:** Version 1.1.3 released Apr-2021
- **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 and OS set to prefer performance at the cost of additional power usage.
SPEC CPU®2017 Floating Point Speed Result

Dell Inc.
PowerEdge R650xs (Intel Xeon Platinum 8358P, 2.60 GHz)

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

Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
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<td>628.pop2_s</td>
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<td>56.8</td>
<td>277</td>
<td>56.5</td>
<td>279</td>
</tr>
</tbody>
</table>

SPECspeed®2017_fp_base = 215
SPECspeed®2017_fp_peak = 217

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/cpu2017-1.1.8-ic2021.1/lib/intel64:/mnt/ramdisk/cpu2017-1.1.8-ic2021.1/je5.0.1-64"
MALLOCS_CONF = "retain: true"
OMP_STACKSIZE = "192M"

General Notes

Binaries compiled on a system with 1x Intel Core i9-7980XE CPU + 64GB RAM memory using Redhat Enterprise Linux 8.0
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
jemalloc, a general purpose malloc implementation built with the RedHat Enterprise 7.5, and the system compiler gcc 4.8.5

NA: The test sponsor attests, as of date of publication, that CVE-2017-5754 (Meltdown) is mitigated in the system as tested and documented.
Dell Inc.  
PowerEdge R650xs (Intel Xeon Platinum 8358P, 2.60 GHz)  

**SPECspeed®2017_fp_base = 215**  
**SPECspeed®2017_fp_peak = 217**

**General Notes (Continued)**

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.

Benchmark run from a 225 GB ramdisk created with the cmd: "mount -t tmpfs -o size=225G tmpfs /mnt/ramdisk"

**Platform Notes**

BIOS settings:
- Logical Processor: Disabled
- Virtualization Technology: Disabled
- System Profile: Custom
- CPU Power Management: Maximum Performance
- C1E: Disabled
- C States: Autonomous
- Memory Patrol Scrub: Disabled
- Energy Efficiency Policy: Performance
- CPU Interconnect Bus Link Power Management: Disabled
- PCI ASPM L1 Link Power Management: Disabled

Sysinfo program /mnt/ramdisk/cpu2017-1.1.8-ic2021.1/bin/sysinfo
Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16aca6c64d running on r650xs.3vfttd3.inside.dell.com Tue Aug 10 13:47:16 2021

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) Platinum 8358P CPU @ 2.60GHz
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: 32
siblings: 32
physical 0: cores 0 1 2 3 4 5 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
physical 1: cores 0 1 2 3 4 5 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31

(Continued on next page)
Dell Inc.
PowerEdge R650xs (Intel Xeon Platinum 8358P, 2.60 GHz)

Platform Notes (Continued)

From lscpu from util-linux 2.32.1:
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: 1
Core(s) per socket: 32
Socket(s): 2
NUMA node(s): 2
Vendor ID: GenuineIntel
CPU family: 6
Model: 106
Model name: Intel(R) Xeon(R) Platinum 8358P CPU @ 2.60GHz
Stepping: 6
CPU MHz: 2688.816
BogoMIPS: 5200.00
Virtualization: VT-x
L1d cache: 48K
L1i cache: 32K
L2 cache: 1280K
L3 cache: 49152K
NUMA node0 CPU(s):
0,2,4,6,8,10,12,14,16,18,20,22,24,26,28,30,32,34,36,38,40,42,44,46,48,50,52,54,56,58
,60,62
NUMA node1 CPU(s):
1,3,5,7,9,11,13,15,17,19,21,23,25,27,29,31,33,35,37,39,41,43,45,47,49,51,53,55,57,59
,61,63
Flags: fpu vme de pse tsc msr pae mce cmov pat pse36 clflush dts  epx sax或是 sse sse2 ss ht tm pbe syscall nx pdelpgbd rdtscp lm constant_tsc art arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc cpuid aperfmperf pni pclmulqdq dtes64 iReit mtm2 ssse3 sdbg fma cx16 xtrpr pdcm pcd pcid dca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave avx f16c rdrand lahf_lm abm 3nowprefetch cpuid_fault epb cat_l3 invpcid_single intel_pni ssbd mbz ibrs ibpb stibp ibrs_endhd fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid cqm rdt_a avx512f avx512dq rdseed adx smap avx512ifma clflushopt clwb intel_pt avx512cd sha_hwi avx512bw avx512vl xsaves cgmm llc cgm_occup_llc cgm_mbb_total cgm_mbb_local split_lock_detect wbnoinvd dtherm idar pln pt avx512vmbi umip pku ospe avx512_vmbi gfni vaes vclmulqdq avx512_vnni avx512_bitalg tme avx512_vpopcntdq la57 rdpid md_clear pconfig flush_l1d arch_capabilities

/proc/cpuinfo cache data

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

(Continued on next page)
Dell Inc.

PowerEdge R650xs (Intel Xeon Platinum 8358P, 2.60 GHz)

SPECspeed®2017_fp_base = 215
SPECspeed®2017_fp_peak = 217

Platform Notes (Continued)

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 52 54 56 58 60 62
node 0 size: 243091 MB
node 0 free: 252813 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 53 55 57 59 61 63
node 1 size: 244632 MB
node 1 free: 245563 MB
node distances:
node 0 1
 0: 10 20
 1: 20 10

From /proc/meminfo
MemTotal: 527543688 kB
HugePages_Total: 0
Hugepagesize: 2048 kB

/sbin/tuned-adm active
  Current active profile: throughput-performance

From /etc/*release* /etc/*version*
  os-release:
    NAME="Red Hat Enterprise Linux"
    VERSION="8.3 (Ootpa)"
    ID="rhel"
    ID_LIKE="fedora"
    VERSION_ID="8.3"
    PLATFORM_ID="platform:el8"
    PRETTY_NAME="Red Hat Enterprise Linux 8.3 (Ootpa)"
    ANSI_COLOR="0;31"
  redhat-release: Red Hat Enterprise Linux release 8.3 (Ootpa)
  system-release: Red Hat Enterprise Linux release 8.3 (Ootpa)
  system-release-cpe: cpe:/o:redhat:enterprise_linux:8.3:ga

uname -a:
  Linux r650xs.3vfttd3.inside.dell.com 4.18.0-240.el8.x86_64 #1 SMP Wed Sep 23 05:13:10 EDT 2020 x86_64 x86_64 x86_64 GNU/Linux

Kernel self-reported vulnerability status:

CVE-2018-12207 (iTLB Multihit): Not affected
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

(Continued on next page)
## Platform Notes (Continued)

CPE-2017-5753 (Spectre variant 1):
- Bypass disabled via `prctl` and `seccomp`
- Mitigation: `usercopy/swapgs` barriers and `__user pointer` sanitation

CPE-2017-5715 (Spectre variant 2):
- Mitigation: Enhanced IBRS, IBPB: conditional, RSB filling

CPE-2020-0543 (Special Register Buffer Data Sampling):
- Not affected

CPE-2019-11135 (TSX Asynchronous Abort):
- Not affected

run-level 3 Aug 10 11:01

SPEC is set to: `/mnt/ramdisk/cpu2017-1.1.8-ic2021.1`

<table>
<thead>
<tr>
<th>Filesystem</th>
<th>Type</th>
<th>Size</th>
<th>Used</th>
<th>Avail</th>
<th>Use%</th>
<th>Mounted on</th>
</tr>
</thead>
<tbody>
<tr>
<td>tmpfs</td>
<td>tmpfs</td>
<td>225G</td>
<td>11G</td>
<td>215G</td>
<td>5%</td>
<td>/mnt/ramdisk</td>
</tr>
</tbody>
</table>

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

- **Vendor:** Dell Inc.
- **Product:** PowerEdge R650xs
- **Product Family:** PowerEdge
- **Serial:** 3VFTTD3

Additional information from `dmidecode 3.2` 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:**
  - 16x 00AD063200AD HMA84GR7DJR4N-XN 32 GB 2 rank 3200

- **BIOS:**
  - **BIOS Vendor:** Dell Inc.
  - **BIOS Version:** 1.1.3
  - **BIOS Date:** 04/27/2021
  - **BIOS Revision:** 1.1

(End of data from `sysinfo` program)

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## Compiler Version Notes

```
C          | 619.lbm_s(base, peak) 638.imagick_s(base, peak)
           | 644.nab_s(base)
```

Intel(R) C Intel(R) 64 Compiler Classic for applications running on Intel(R) 64, Version 2021.1 Build 20201112_000000

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(Continued on next page)
Dell Inc.

PowerEdge R650xs (Intel Xeon Platinum 8358P, 2.60 GHz)

SPEC CPU®2017 Floating Point Speed Result

Copyright 2017-2021 Standard Performance Evaluation Corporation

Specspeed®2017_fp_base = 215
Specspeed®2017_fp_peak = 217

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

Test Date: Aug-2021
Hardware Availability: Jul-2021
Software Availability: Dec-2020

Compiler Version Notes (Continued)

------------------------------------------------------------------------------
| C   | 644.nab_s(peak) |
-----------------------------------------------------------------------------
| Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, |
| Version 2021.1 Build 20201113                                              |
| Copyright (C) 1985-2020 Intel Corporation. All rights reserved.            |
------------------------------------------------------------------------------

------------------------------------------------------------------------------
| C               | 619.lbm_s(base, peak) 638.imagick_s(base, peak) 644.nab_s(base) |
------------------------------------------------------------------------------
| Intel(R) C Intel(R) 64 Compiler Classic for applications running on Intel(R) |
| 64, Version 2021.1 Build 20201112_000000                                  |
| Copyright (C) 1985-2020 Intel Corporation. All rights reserved.            |
------------------------------------------------------------------------------

------------------------------------------------------------------------------
| C   | 644.nab_s(peak) |
-----------------------------------------------------------------------------
| Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, |
| Version 2021.1 Build 20201113                                              |
| Copyright (C) 1985-2020 Intel Corporation. All rights reserved.            |
------------------------------------------------------------------------------

------------------------------------------------------------------------------
| C++, C, Fortran | 607.cactuBSSN_s(base, peak) |
------------------------------------------------------------------------------
| Intel(R) C++ Intel(R) 64 Compiler Classic for applications running on Intel(R) |
| 64, Version 2021.1 Build 20201112_000000                                  |
| Copyright (C) 1985-2020 Intel Corporation. All rights reserved.            |
| Intel(R) C Intel(R) 64 Compiler Classic for applications running on Intel(R) |
| 64, Version 2021.1 Build 20201112_000000                                  |
| Copyright (C) 1985-2020 Intel Corporation. All rights reserved.            |
| Intel(R) Fortran Intel(R) 64 Compiler Classic for applications running on Intel(R) |
| 64, Version 2021.1 Build 20201112_000000                                  |
| Copyright (C) 1985-2020 Intel Corporation. All rights reserved.            |
------------------------------------------------------------------------------

------------------------------------------------------------------------------
| Fortran | 603.bwaves_s(base, peak) 649.fotonik3d_s(base, peak) 654.roms_s(base, peak) |
------------------------------------------------------------------------------
| Intel(R) Fortran Intel(R) 64 Compiler Classic for applications running on Intel(R) |
| 64, Version 2021.1 Build 20201112_000000                                  |
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(Continued on next page)
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CPU2017 License: 55
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Compiler Version Notes (Continued)

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Fortran, C
\begin{itemize}
\item 621.wrf\_s(base, peak)
\item 627.cam4\_s(base, peak)
\item 628.pop2\_s(base, peak)
\end{itemize}

Intel(R) Fortran Intel(R) 64 Compiler Classic for applications running on
Intel(R) 64, Version 2021.1 Build 20201112_000000

Copyright (C) 1985-2020 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

\begin{itemize}
\item 603.bwaves\_s: -DSPEC\_LP64
\item 607.cactuBSSN\_s: -DSPEC\_LP64
\item 619.\textsc{lbm}\_s: -DSPEC\_LP64
\item 621.wrf\_s: -DSPEC\_LP64 -DSPEC\_CASE\_FLAG -convert big_endian
\item 627.cam4\_s: -DSPEC\_LP64 -DSPEC\_CASE\_FLAG
\item 628.pop2\_s: -DSPEC\_LP64 -DSPEC\_CASE\_FLAG -convert big_endian
\item -assume byterecl
\item 638.imagick\_s: -DSPEC\_LP64
\item 644.nab\_s: -DSPEC\_LP64
\item 649.fotonik3d\_s: -DSPEC\_LP64
\item 654.roms\_s: -DSPEC\_LP64
\end{itemize}
# SPEC CPU®2017 Floating Point Speed Result

## Dell Inc.

PowerEdge R650xs (Intel Xeon Platinum 8358P, 2.60 GHz)  

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</table>

### 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 -mbranches-within-32B-boundaries`

**Fortran benchmarks:**

- `m64`  
- `-Wl,-z,muldefs`  
- `-DSPEC_OPENMP -xCORE-AVX512`  
- `-ipo -O3`  
- `-no-prec-div -qopt-prefetch -ffinite-math-only`  
- `-qopt-mem-layout-trans=4 -qopenmp -nostandard-realloc-lhs -mbranches-within-32B-boundaries -L/usr/local/jemalloc64-5.0.1/lib`  
- `-ljemalloc`

**Benchmarks using both Fortran and C:**

- `m64`  

**Benchmarks using Fortran, C, and C++:**

- `m64`  

### Peak Compiler Invocation

**C benchmarks (except as noted below):**

- `icc`

- `644.nab_s: icx`

**Fortran benchmarks:**

- `ifort`

**Benchmarks using both Fortran and C:**

- `ifort icc`

**Benchmarks using Fortran, C, and C++:**

- `icpc icc ifort`
Dell Inc.
PowerEdge R650xs (Intel Xeon Platinum 8358P, 2.60 GHz)  

SPECspeed®2017_fp_base = 215
SPECspeed®2017_fp_peak = 217

CPU2017 License: 55  
Test Date: Aug-2021  
Test Sponsor: Dell Inc.  
Hardware Availability: Jul-2021  
Tested by: Dell Inc.  
Software Availability: Dec-2020

Peak Portability Flags
Same as Base Portability Flags

Peak Optimization Flags

C benchmarks:

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

Fortran benchmarks:

603.bwaves_s: -m64 -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -DSPEC_SUPPRESS_OPENMP -DSPEC_OPENMP -ipo -xCORE-AVX512 -O3 -no-pref-conv -qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -nostandard-realloc-lhs -mbranches-within-32B-boundaries -L/usr/local/jemalloc64-5.0.1/lib -ljemalloc
649.fotonik3d_s: Same as 603.bwaves_s
654.roms_s: basepeak = yes

Benchmarks using both Fortran and C:

621.wrf_s: -m64 -std=gnu11 -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -ipo -xCORE-AVX512 -O3 -no-prec-div -qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4 -DSPEC_SUPPRESS_OPENMP -qopenmp -DSPEC_OPENMP -mbranches-within-32B-boundaries -nostandard-realloc-lhs -L/usr/local/jemalloc64-5.0.1/lib -ljemalloc
627.cam4_s: basepeak = yes
628.pop2_s: basepeak = yes

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

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:
http://www.spec.org/cpu2017/flags/Intel-ic2021-official-linux64_revA.xml
http://www.spec.org/cpu2017/flags/Dell-Platform-Flags-PowerEdge-Intel-ICX-rev1.4.xml