Dell Inc.

PowerEdge R650 (Intel Xeon Gold 6338N, 2.20 GHz)

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

SPECspeed®2017_fp_base = 195
SPECspeed®2017_fp_peak = 197

Test Date: Apr-2021
Hardware Availability: May-2021
Software Availability: Feb-2021

Threads

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>SPECspeed®2017_fp_base (195)</th>
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<tbody>
<tr>
<td>603.bwaves_s</td>
<td>64</td>
<td>238</td>
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<tr>
<td>607.cactuBSSN_s</td>
<td>64</td>
<td>238</td>
</tr>
<tr>
<td>619.lbm_s</td>
<td>64</td>
<td>126</td>
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<tr>
<td>621.wrf_s</td>
<td>64</td>
<td>196</td>
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<tr>
<td>627.cam4_s</td>
<td>64</td>
<td>144</td>
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<tr>
<td>628.pop2_s</td>
<td>64</td>
<td>84.4</td>
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<tr>
<td>638.imagick_s</td>
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<td>644.nab_s</td>
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<td>368</td>
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<tr>
<td>649.fotonik3d_s</td>
<td>64</td>
<td>104</td>
</tr>
<tr>
<td>654.roms_s</td>
<td>64</td>
<td>247</td>
</tr>
</tbody>
</table>

Hardware

CPU Name: Intel Xeon Gold 6338N
Max MHz: 3500
Nominal: 2200
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
Other: None
Memory: 512 GB (16 x 32 GB 2Rx8 PC4-3200AA-R, running at 2666)
Storage: 225 GB on tmpfs
Other: None

Software

OS: Red Hat Enterprise Linux 8.3 (Ootpa)
4.18.0-240.15.1.el8_3.x86_64
Compiler: 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 1.1.2 released Apr-2021
tmpfs
System State: Run level 5 (graphical multi-user)
Base Pointers: 64-bit
Peak Pointers: 64-bit
Other: None
jemalloc memory allocator V5.0.1
Power Management: BIOS and OS set to prefer performance
at the cost of additional power usage.

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 R650 (Intel Xeon Gold 6338N, 2.20 GHz)**

- **CPU2017 License:** 55
- **Test Date:** Apr-2021
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- **Hardware Availability:** May-2021
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- **Software Availability:** Feb-2021

### RESULTS TABLE

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
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<tbody>
<tr>
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<td>Peak</td>
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</tr>
</tbody>
</table>

**SPECspeed®2017_fp_base = 195**

**SPECspeed®2017_fp_peak = 197**

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/cpu2017-1.1.5-ic2021.1/lib/intel64:/mnt/ramdisk/cpu2017-1.1.5-ic2021.1/je5.0.1-64"
  - MALLOCONF = "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.

(Continued on next page)
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

Sysinfo program /mnt/ramdisk/cpu2017-1.1.5-ic2021.1/bin/sysinfo
Rev: r6538 of 2020-09-24 e8664e66d2d7080afeaa89d4b38e2f1c
running on localhost.localdomain Mon Apr 12 15:40:35 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) Gold 6338N CPU @ 2.20GHz
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 R650 (Intel Xeon Gold 6338N, 2.20 GHz)

**SPEC CPU®2017 Floating Point Speed Result**

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**SPECspeed®2017_fp_base = 195**

**SPECspeed®2017_fp_peak = 197**

---

**Platform Notes (Continued)**

From **lsfc:**

- **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) Gold 6338N CPU @ 2.20GHz
- **Stepping:** 6
- **CPU MHz:** 2910.622
- **BogoMIPS:** 4400.00
- **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 xcr ms cmov pat pse36 clflush dts acpi mmx fxsr sse sse2 ss ht tm pbe syscall nx pdelgb rdtscp lm constant_tsc art arch_perfmon pebs bts rep_good nopl noopl xtopology nonstop_tsc cpuid aperfmperf pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg fma cx16 xtrm 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 invpcid_single intel_ppin ssbd sbbi ibs ibbp stibp ibrs enhanced fsqsfbase tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid cmqm rdts Di avx512f avx512dq rdseed adx smap avx512ifma clflushopt clwb intel_pt avx512cd sha ni avx512bw avx512vl xsaveopt xsave xgetbv1 xsaves cmqm ldc cmqm_mbb_total cmqm_mbb_local split_lock_detect wbnoinvd tdtherm ida arat p11 pts avx512vmbi umip pku ospe avx512_vmbi gfsi vaes vpclmulqdq avx512_vnni avx512_bitalg tme avx512_vpopcntdq lnsd md_sign pconfig flush_l1d arch_capabilities

/proc/cpuinfo cache data

- cache size : 49152 KB

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

(Continued on next page)
Dell Inc.

PowerEdge R650 (Intel Xeon Gold 6338N, 2.20 GHz)

**SPEC Speed®2017_fp_base = 195**

**SPEC Speed®2017_fp_peak = 197**

<table>
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<tr>
<th>Specification</th>
<th>Value</th>
</tr>
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<tbody>
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<tr>
<td>Test Sponsor</td>
<td>Dell Inc.</td>
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<td>Dell Inc.</td>
</tr>
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<tr>
<td>Hardware Availability</td>
<td>May-2021</td>
</tr>
<tr>
<td>Software Availability</td>
<td>Feb-2021</td>
</tr>
</tbody>
</table>

**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: 245523 MB
node 0 free: 240661 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: 246462 MB
node 1 free: 251071 MB
node distances:
node 0 1
0: 10 20
1: 20 10

From /proc/meminfo
MemTotal: 527808648 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 localhost.localdomain 4.18.0-240.15.1.el8_3.x86_64 #1 SMP Wed Feb 3 03:12:15 EST 2021 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)*
SPEC CPU®2017 Floating Point Speed Result

Dell Inc.

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SPECspeed®2017_fp_base = 195
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CPU2017 License: 55
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Software Availability: Feb-2021

Platform Notes (Continued)

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

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

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

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

run-level 5 Apr 12 11:46
SPEC is set to: /mnt/ramdisk/cpu2017-1.1.5-ic2021.1

Filesystem     Type   Size  Used Avail Use% Mounted on
tmpfs          tmpfs  225G   13G  213G   6% /mnt/ramdisk

From /sys/devices/virtual/dmi/id
Vendor:         Dell Inc.
Product:        PowerEdge R650
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:
7x 00AD00B300AD HMMA4GR7AJ8R8N-XN 32 GB 2 rank 3200, configured at 2666
9x 00AD063200AD HMMA4GR7AJ8R8N-XN 32 GB 2 rank 3200, configured at 2666
16x Not Specified Not Specified

BIOS:
BIOS Vendor: Dell Inc.
BIOS Version: 1.1.2
BIOS Date: 04/09/2021
BIOS Revision: 1.1

(End of data from sysinfo program)

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)

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Dell Inc.

PowerEdge R650 (Intel Xeon Gold 6338N, 2.20 GHz)

<table>
<thead>
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<th>Test Date:</th>
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<td>Software Availability: Feb-2021</td>
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**Compiler Version Notes (Continued)**

<table>
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<th>64, Version 2021.1 Build 20201112_000000</th>
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<tr>
<th>Compiler</th>
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<tbody>
<tr>
<td>Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2021.1 Build 20201113</td>
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<tbody>
<tr>
<td>Fortran</td>
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Dell Inc.

PowerEdge R650 (Intel Xeon Gold 6338N, 2.20 GHz)

SPECspeed®2017_fp_base = 195
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Compiler Version Notes (Continued)

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

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.ibm_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

(Continued on next page)
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Software Availability: Feb-2021

Base Portability Flags (Continued)

654.roms_s: -DSPEC_LP64

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
-lijemalloc

Benchmarks using both Fortran and C:
-m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div
-qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp
-DSPEC_OPENMP -mbranches-within-32B-boundaries -nostandard-realloc-lhs
-lijemalloc

Benchmarks using Fortran, C, and C++:
-m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div
-qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp
-DSPEC_OPENMP -mbranches-within-32B-boundaries -nostandard-realloc-lhs
-lijemalloc

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

(Continued on next page)
Dell Inc.
PowerEdge R650 (Intel Xeon Gold 6338N, 2.20 GHz)

<table>
<thead>
<tr>
<th>SPECspeed\textsuperscript{2017}_fp_base</th>
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<tr>
<th>SPECspeed\textsuperscript{2017}_fp_peak</th>
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CPU2017 License: 55
Test Sponsor: Dell Inc.
Tested by: Dell Inc.

Test Date: Apr-2021
Hardware Availability: May-2021
Software Availability: Feb-2021

Peak Compiler Invocation (Continued)
Benchmarks using Fortran, C, and C++:
\texttt{icpc icc ifort}

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-prec-div -qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4 -gopenmp -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=c11 -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 -gopenmp -DSPEC\_OPENMP -mbranches-within-32B-boundaries -nostandard-realloc-lhs

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### Dell Inc.

**PowerEdge R650 (Intel Xeon Gold 6338N, 2.20 GHz)**

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### Peak Optimization Flags (Continued)

621.wrf_s (continued):
- `-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc`

627.cam4_s: `basepeak = yes`

628.pop2_s: `basepeak = yes`

**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:

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For questions about this result, please contact the tester. For other inquiries, please contact info@spec.org.

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