### Dell Inc.

**PowerEdge R540 (Intel Xeon Gold 5218R, 2.10 GHz)**

**SPECspeed®2017_fp_base** = 122  
**SPECspeed®2017_fp_peak** = 123

<table>
<thead>
<tr>
<th>Threads</th>
<th>SPECspeed®2017_fp_base (122)</th>
<th>SPECspeed®2017_fp_peak (123)</th>
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<tbody>
<tr>
<td>603.bwaves_s</td>
<td></td>
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<tr>
<td>607.cactuBSSN_s</td>
<td></td>
<td></td>
</tr>
<tr>
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<td></td>
</tr>
<tr>
<td>654.roms_s</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Hardware**

- **CPU Name:** Intel Xeon Gold 5218R  
  - **Max MHz:** 4000  
  - **Nominal:** 2100  
  - **Enabled:** 40 cores, 2 chips  
  - **Orderable:** 1.2 chips  
  - **Cache L1:** 32 KB I + 32 KB D on chip per core  
  - **Cache L2:** 1 MB I+D on chip per core  
  - **Cache L3:** 27.5 MB I+D on chip per chip  
  - **Memory:** 384 GB (12 x 32 GB 2Rx4 PC4-2933V-R, running at 2666)  
  - **Storage:** 1 x 480 GB SATA SSD  
  - **Other:** None

**Software**

- **OS:** Red Hat Enterprise Linux 8.2  
  - **kernel:** 4.18.0-193.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 2.7.7 released May-2020
- **File System:** xfs
- **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
## Results Table

| Benchmark          | Threads | Base         |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |
|--------------------|---------|--------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
|                    |         | Base Seconds | Base Ratio |          |          | Peak Seconds | Peak Ratio |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |
| 603.bwaves_s       | 40      | 129          | 48       | 127      | 465      | 129       | 457      | 40       | 128      | 460      | 129      | 456      | 126      | 467      |
| 607.cactuBSSN_s    | 40      | 114          | 146      | 115      | 145      | 112       | 149      | 40       | 114      | 146      | 115      | 145      | 112      | 149      |
| 619.lbm_s          | 40      | 61.8         | 84.8     | 58.2     | 90.0     | 58.1      | 90.2     | 40       | 61.8     | 84.8     | 58.2     | 90.0     | 58.1     | 90.2     |
| 621.wrf_s          | 40      | 113          | 118      | 112      | 118      | 112       | 118      | 40       | 107      | 124      | 106      | 125      |          |          |          |
| 627.cam4_s         | 40      | 95.7         | 92.7     | 95.8     | 92.5     | 95.6      | 92.7     | 40       | 95.7     | 92.7     | 95.8     | 92.5     | 95.6     | 92.7     |
| 628.pop2_s         | 40      | 182          | 65.2     | 184      | 64.6     | 183       | 65.1     | 40       | 182      | 65.2     | 184      | 64.6     | 183       | 65.1     |
| 638.imagick_s      | 40      | 173          | 83.5     | 174      | 83.1     | 173       | 83.4     | 40       | 173      | 83.5     | 173      | 83.4     | 174      | 83.1     |
| 644.nab_s          | 40      | 82.1         | 213      | 82.2     | 213      | 82.1      | 213      | 40       | 78.9     | 221      | 78.8     | 222      | 78.8     | 222     |
| 649.fotonik3d_s    | 40      | 113          | 80.9     | 110      | 83.0     | 110       | 82.8     | 40       | 113      | 80.8     | 110      | 83.1     | 113      | 80.7     |
| 654.roms_s         | 40      | 132          | 119      | 131      | 120      | 132       | 119      | 40       | 132      | 119      | 131      | 120      | 132      | 119     |

### 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 = "/home/cpu2017-ic19.1u1/lib/intel64:/home/cpu2017-ic19.1u1/je5.0.1-64"
- `MALLOC_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

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
jemalloc, a general purpose malloc implementation
```

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

Dell Inc.

PowerEdge R540 (Intel Xeon Gold 5218R, 2.10 GHz)

<table>
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<tr>
<th>SPECspeed®2017_fp_base</th>
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CPU2017 License: 55
Test Sponsor: Dell Inc.
Test Date: Jun-2020
Hardware Availability: Feb-2020
Tested by: Dell Inc.
Software Availability: Apr-2020

General Notes (Continued)

built with the RedHat Enterprise 7.5, and the system compiler gcc 4.8.5

Platform Notes

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 disabled
LLC Prefetch disabled
Dead Line LLC Alloc enabled
Directory AtoS disabled

Sysinfo program /home/cpu2017-ic19.1u1/bin/sysinfo
Rev: r6365 of 2019-08-21 295195f888a3d7eddb1e6e46a485a0011
running on RHEL-8-2-SUT Sun Jun 21 21:11:22 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 5218R CPU @ 2.10GHz
  2 "physical id"s (chips)
  40 "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 : 20
  siblings : 20
  physical 0: cores 0 1 2 3 4 8 9 10 11 12 16 17 18 19 20 24 25 26 27 28
  physical 1: cores 0 1 2 3 4 8 9 10 11 12 16 17 18 19 20 24 25 26 27 28

From lscpu:
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian

(Continued on next page)
Dell Inc.

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SPECspeed®2017_fp_base = 122
SPECspeed®2017_fp_peak = 123

Platform Notes (Continued)

CPU(s): 40
On-line CPU(s) list: 0-39
Thread(s) per core: 1
Core(s) per socket: 20
Socket(s): 2
NUMA node(s): 2
Vendor ID: GenuineIntel
CPU family: 6
Model: 85
Model name: Intel(R) Xeon(R) Gold 5218R CPU @ 2.10GHz
Stepping: 7
CPU MHz: 833.849
CPU max MHz: 4000.0000
CPU min MHz: 800.0000
BogoMIPS: 4200.00
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 28160K
NUMA node0 CPU(s): 0,2,4,6,8,10,12,14,16,18,20,22,24,26,28,30,32,34,36,38
NUMA node1 CPU(s): 1,3,5,7,9,11,13,15,17,19,21,23,25,27,29,31,33,35,37,39
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
lm constant_tsc arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc cpuid
aperfmpref pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg fma cx16
xtpr pdcm 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 cdp_l3
invpcid_single intel_pni ssbd mba ibrs ibpb stibp ibrs_enhanced tpr_shadow vnmi
flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid rtm
cqm mpx rdt_a avx512f avx512dq rdseed adx smap clflushopt clwb intel_pt avx512cd
avx512bw avx512vl xsaveopt xsaves xsavec xgetbv1 xsaves cqm_llc cqm_occpt_llc cqm_mbb_total
cqm_mbb_local dtherm ida arat pln pts pku ospke avx512_vnni md_clear flush_lld
arch_capabilities

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
node 0 size: 192045 MB
node 0 free: 191019 MB
node 1 cpus: 1 3 5 7 9 11 13 15 17 19 21 23 25 27 29 31 33 35 37 39
node 1 size: 193530 MB
node 1 free: 186156 MB

(Continued on next page)
Dell Inc. PowerEdge R540 (Intel Xeon Gold 5218R, 2.10 GHz) SPECspeed®2017_fp_base = 122
SPECspeed®2017_fp_peak = 123

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

Platform Notes (Continued)

node distances:
node 0 1
0: 10 21
1: 21 10

From /proc/meminfo
MemTotal: 394830636 kB
HugePages_Total: 0
Hugepagesize: 2048 kB

From /etc/*release* /etc/*version*
uname -a:
Linux RHEL-8-2-SUT 4.18.0-193.el8.x86_64 #1 SMP Fri Mar 27 14:35:58 UTC 2020 x86_64
x86_64 x86_64 GNU/Linux

kernel self-reported vulnerability status:

itlb_multihit: KVM: Vulnerable
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,
RSP filling
tsx_async_abort: Mitigation: Clear CPU buffers; SMT disabled

run-level 3 Jun 21 17:07 last=5

SPEC is set to: /home/cpu2017-ic19.1u1
Filesystem Type Size Used Avail Use% Mounted on
/dev/mapper/rhel-home xfs 392G 13G 379G 4% /home

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

**Dell Inc.**  
PowerEdge R540 (Intel Xeon Gold 5218R, 2.10 GHz)  

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**CPU2017 License:** 55  
**Test Sponsor:** Dell Inc.  
**Test Date:** Jun-2020  
**Tested by:** Dell Inc.  
**Hardware Availability:** Feb-2020  
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## Platform Notes (Continued)

From /sys/devices/virtual/dmi/id  
- **BIOS:** Dell Inc. 2.7.7 05/06/2020  
- **Vendor:** Dell Inc.  
- **Product:** PowerEdge R540  
- **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:**
- 1x 00AD00B300AD HMA84GR7CJR4N-WM 32 GB 2 rank 2933  
- 6x 00AD063200AD HMA84GR7CJR4N-WM 32 GB 2 rank 2933  
- 5x 00AD069D00AD HMA84GR7CJR4N-WM 32 GB 2 rank 2933  
- 4x Not Specified Not Specified

(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 19.1.1.217 Build 20200306  
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

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

| 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.  
| Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)  
64, Version 19.1.1.217 Build 20200306  
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<table>
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Compiler Version Notes (Continued)

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.

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

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

644.nab_s: -DSPEC_LP64
649.fotonik3d_s: -DSPEC_LP64
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 -nstandard-realloc-lhs
-mbranches-within-32B-boundaries -L/usr/local/jemalloc64-5.0.1/lib
-ljemalloc

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 -nstandard-realloc-lhs
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

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 -nstandard-realloc-lhs
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

Peak Compiler Invocation

C benchmarks:
icc

Fortran benchmarks:
ifort

Benchmarks using both Fortran and C:
ifort icc

(Continued on next page)
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Peak Compiler Invocation (Continued)

Benchmarks using Fortran, C, and C++:
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
644.nab_s: -m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -ipo -O3
-no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=4 -gopenmp -DSPEC_OPENMP
-mbranches-within-32B-boundaries
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

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
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

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Peak Optimization Flags (Continued)

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:
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 2020-06-21 22:11:21-0400.  
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