# SPEC® CPU2017 Floating Point Speed Result

## Dell Inc.

PowerEdge R740xd (Intel Xeon Gold 5217, 3.00GHz)

<table>
<thead>
<tr>
<th>SPECspeed2017_fp_base</th>
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<tbody>
<tr>
<td>SPECspeed2017_fp_peak</td>
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<td>Apr-2019</td>
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<td>Feb-2019</td>
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<thead>
<tr>
<th>Threads</th>
<th>SPECspeed2017_fp_base</th>
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<tbody>
<tr>
<td>16</td>
<td>341</td>
<td>345</td>
</tr>
<tr>
<td>603.bwaves_s</td>
<td>83.5</td>
<td>82.9</td>
</tr>
<tr>
<td>607.cactuBSSN_s</td>
<td>68.7</td>
<td>68.7</td>
</tr>
<tr>
<td>619.lbm_s</td>
<td>76.6</td>
<td>79.0</td>
</tr>
<tr>
<td>621.wrf_s</td>
<td>46.5</td>
<td>79.0</td>
</tr>
<tr>
<td>627.cam4_s</td>
<td>59.3</td>
<td>60.2</td>
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<td>57.5</td>
<td>57.4</td>
</tr>
<tr>
<td>638.imagick_s</td>
<td>65.8</td>
<td>66.0</td>
</tr>
<tr>
<td>644.nab_s</td>
<td>81.0</td>
<td>81.1</td>
</tr>
</tbody>
</table>

### Hardware

- **CPU Name:** Intel Xeon Gold 5217
- **Max MHz.:** 3700
- **Nominal:** 3000
- **Enabled:** 16 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:** 11 MB I+D on chip per core
- **Other:** None
- **Memory:** 768 GB (24 x 32 GB 2Rx4 PC4-2933Y-R, running at 2666)
- **Storage:** 1 x 960 GB SATA SSD
- **Other:** None

### Software

- **OS:** Ubuntu 18.04.2 LTS
- **Compiler:** C/C++: Version 19.0.1.144 of Intel C/C++ Compiler Build 20181018 for Linux;
  Fortran: Version 19.0.1.144 of Intel Fortran Compiler Build 20181018 for Linux
- **Parallel:** Yes
- **Firmware:** Version 2.2.10 released May-2019
- **File System:** ext4
- **System State:** Run level 5 (multi-user)
- **Base Pointers:** 64-bit
- **Peak Pointers:** 64-bit
- **Other:** None
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**SPECspeed2017_fp_base** = 82.0

**SPECspeed2017_fp_peak** = 82.4

---

Results Table

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<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Base</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
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<tr>
<td>603.bwaves_s</td>
<td>16</td>
<td>173</td>
<td>342</td>
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<td></td>
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<td>607.cactuBSSN_s</td>
<td>16</td>
<td>200</td>
<td>83.5</td>
<td>200</td>
<td>83.5</td>
<td></td>
<td></td>
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<tr>
<td>619.lbm_s</td>
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<td>76.2</td>
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<td>68.9</td>
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<td>621.wrf_s</td>
<td>16</td>
<td>171</td>
<td>77.4</td>
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<td>109</td>
<td>161</td>
<td>109</td>
<td></td>
<td></td>
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<tr>
<td>649.fotonik3d_s</td>
<td>16</td>
<td>139</td>
<td>65.8</td>
<td>139</td>
<td>65.8</td>
<td></td>
<td></td>
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<tr>
<td>654.roms_s</td>
<td>16</td>
<td>194</td>
<td>81.2</td>
<td>194</td>
<td>81.0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**SPECspeed2017_fp_base** = 82.0

**SPECspeed2017_fp_peak** = 82.4

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"

---

**General Notes**

Environment variables set by runcpu before the start of the run:
KMP_AFFINITY = "granularity=fine,compact"
LD_LIBRARY_PATH = "/home/cpu2017/lib/ia32:/home/cpu2017/lib/intel64"
OMP_STACKSIZE = "192M"

Binaries compiled on a system with 1x Intel Core i9-7900X CPU + 32GB RAM memory using Redhat Enterprise Linux 7.5
NA: The test sponsor attests, as of date of publication, that CVE-2017-5754 (Meltdown) is mitigated in the system as tested and documented.
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

---

**Platform Notes**

BIOS settings:
ADDC setting disabled
Sub NUMA Cluster disabled

(Continued on next page)
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Dell Inc.
PowerEdge R740xd (Intel Xeon Gold 5217, 3.00GHz)

SPECspeed2017_fp_peak = 82.4
SPECspeed2017_fp_base = 82.0

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

Platform Notes (Continued)

Virtualization Technology disabled
DCU IP Prefetcher disabled
DCU Streamer Prefetcher 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 disabled
Logical Processor disabled
CPU Interconnect Bus Link Power Management disabled
PCI ASPM L1 Link Power Management disabled
Sysinfo program /home/cpu2017/bin/sysinfo
Rev: r5974 of 2018-05-19 9bcede8f2999c33d61f64985e45859ea9
running on intel-sut Tue May 28 13:38:24 2019

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 5217 CPU @ 3.00GHz
  2 "physical id"'s (chips)
  16 "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 : 8
siblings : 8
physical 0: cores 0 1 2 3 4 5 6 7
physical 1: cores 0 1 2 3 4 5 6 7

From lscpu:
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 16
On–line CPU(s) list: 0-15
Thread(s) per core: 1
Core(s) per socket: 8
Socket(s): 2
NUMA node(s): 2
Vendor ID: GenuineIntel
CPU family: 6
Model: 85
Model name: Intel(R) Xeon(R) Gold 5217 CPU @ 3.00GHz
Stepping: 6

(Continued on next page)
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CPU2017 License: 55
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SPECspeed2017_fp_base = 82.0
SPECspeed2017_fp_peak = 82.4

CPU MHz: 1267.863
BogoMIPS: 6000.00
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 11264K
NUMA node0 CPU(s): 0,2,4,6,8,10,12,14
NUMA node1 CPU(s): 1,3,5,7,9,11,13,15
Flags: fpu vme de pse tsc msr pae mce 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 aperfmperf pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg fma cx16 xtrr pdcm pcid dca sse4_1 sse4_2 x2apic movbe popcnt tsc msr aarch64 bigendian smep bmi1 bmi2 aarch64_64bit cpu_mathfutex rdtscp aisor aon smm cmov stercis ds_cpl vmx smx est tm2 ssse3 sdbg fma cx16 xtrr pdcm pcid dca sse4_1 sse4_2 x2apic movbe popcnt tsc msr aarch64 bigendian smep bmi1 bmi2 aarch64_64bit cpu_mathfutex rdtscp aisor aon smm cmov stercis
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
  node 0 size: 385452 MB
  node 0 free: 382232 MB
  node 1 cpus: 1 3 5 7 9 11 13 15
  node 1 size: 387048 MB
  node 1 free: 382201 MB
  node distances:
    node 0: 10 21
    node 1: 21 10

From /proc/meminfo
  MemTotal: 791041680 kB
  HugePages_Total: 0
  Hugepagesize: 2048 kB

From /usr/bin/lsb_release -d
  Ubuntu 18.04.2 LTS

(Continued on next page)
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**CPU2017 License:** 55  
**Test Sponsor:** Dell Inc.  
**Test Date:** May-2019  
**Hardware Availability:** Apr-2019  
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**Software Availability:** Feb-2019

---

### Platform Notes (Continued)

- `debian_version: buster/sid`
- `os-release:
  NAME="Ubuntu"
  VERSION="18.04.2 LTS (Bionic Beaver)"
  ID=ubuntu
  ID_LIKE=debian
  PRETTY_NAME="Ubuntu 18.04.2 LTS"
  VERSION_ID="18.04"
  HOME_URL="https://www.ubuntu.com/
  SUPPORT_URL="https://help.ubuntu.com/"

- `uname -a:`
  ```
  Linux intel-sut 4.15.0-45-generic #48-Ubuntu SMP Tue Jan 29 16:28:13 UTC 2019 x86_64
  x86_64 x86_64 GNU/Linux
  ```

- **Kernel self-reported vulnerability status:**
  - CVE-2017-5754 (Meltdown): Not affected
  - CVE-2017-5753 (Spectre variant 1): Mitigation: __user pointer sanitization
  - CVE-2017-5715 (Spectre variant 2): Mitigation: Enhanced IBRS, IBPB

- **run-level 5 May 28 09:45**

- **SPEC is set to:** /home/cpu2017

- **Filesystem**
<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>/dev/sda2</td>
<td>ext4</td>
<td>439G</td>
<td>30G</td>
<td>387G</td>
<td>8%</td>
<td>/</td>
</tr>
</tbody>
</table>

- **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.
  - BIOS Dell Inc. 2.2.10 05/15/2019
  - Memory:
    - 24x 00AD00B300AD HMA84GR7CJR4N-WM 32 GB 2 rank 2933, configured at 2666

---

### Compiler Version Notes

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

Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,  
Version 19.0.1.144 Build 20181018  
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
Dell Inc. PowerEdge R740xd (Intel Xeon Gold 5217, 3.00GHz)

SPECspeed2017_fp_base = 82.0
SPECspeed2017_fp_peak = 82.4

CPU2017 License: 55
Test Sponsor: Dell Inc.
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Test Date: May-2019
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Compiler Version Notes (Continued)

==============================================================================
FC 607.cactuBSSN_s(base, peak)

Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64,
  Version 19.0.1.144 Build 20181018
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
  Version 19.0.1.144 Build 20181018
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)
  64, Version 19.0.1.144 Build 20181018
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.

==============================================================================
FC 603.bwaves_s(base) 649.fotonik3d_s(base) 654.roms_s(base, peak)

Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)
  64, Version 19.0.1.144 Build 20181018
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.

==============================================================================
FC 603.bwaves_s(peak) 649.fotonik3d_s(peak)

Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)
  64, Version 19.0.1.144 Build 20181018
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.

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

Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)
  64, Version 19.0.1.144 Build 20181018
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
  Version 19.0.1.144 Build 20181018
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.

==============================================================================
CC 621.wrf_s(peak) 628.pop2_s(peak)

Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)
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Compiler Version Notes (Continued)
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Intel (R) C Intel (R) 64 Compiler for applications running on Intel(R) 64,
Version 19.0.1.144 Build 20181018
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.

Base Compiler Invocation

C benchmarks:
icc -m64 -std=c11

Fortran benchmarks:
ifort -m64

Benchmarks using both Fortran and C:
ifort -m64 icc -m64 -std=c11

Benchmarks using Fortran, C, and C++:
icpc -m64 icc -m64 -std=c11 ifort -m64

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

Base Optimization Flags

C benchmarks:
-xCORE-AVX512 -ipo -03 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP

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

- Fortran benchmarks:
  -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:
  -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++:
  -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 -m64 -std=c11

- Fortran benchmarks:
  ifort -m64

- Benchmarks using both Fortran and C:
  ifort -m64 icc -m64 -std=c11

- Benchmarks using Fortran, C, and C++:
  icpc -m64 icc -m64 -std=c11 ifort -m64

**Peak Portability Flags**

Same as Base Portability Flags

**Peak Optimization Flags**

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

(Continued on next page)
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Test Sponsor: Dell Inc.
Test Date: May-2019
Hardware Availability: Apr-2019
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Fortran benchmarks:

603.bwaves_s: -prof-gen(pass 1) -prof-use(pass 2) -DSPEC_SUPPRESS_OPENMP -DSPEC_OPENMP -O2 -xCORE-AVX512 -qopt-prefetch -ipo -O3 -ffinite-math-only -no-prec-div -qopt-mem-layout-trans=4 -qopenmp -nostandard-realloc-lhs
649.fotonik3d_s: Same as 603.bwaves_s
654.roms_s: -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:

621.wrf_s: -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: -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++:

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

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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