# SPEC CPU® 2017 Floating Point Speed Result

**Dell Inc.**

**PowerEdge XR11 (Intel Xeon Silver 4309Y, 2.80 GHz)**

<table>
<thead>
<tr>
<th>SPECspeed®2017_fp_base</th>
<th>59.3</th>
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<td>SPECspeed®2017_fp_peak</td>
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CPU2017 License: 55  
Test Sponsor: Dell Inc.  
Tested by: Dell Inc.  
Test Date: May-2021  
Hardware Availability: Jul-2021  
Software Availability: Feb-2021

## Hardware

**CPU Name:** Intel Xeon Silver 4309Y  
**Max MHz:** 3600  
**Nominal:** 2800  
**Enabled:** 8 cores, 1 chip  
**Orderable:** 1 chip  
**Cache L1:** 32 KB I + 48 KB D on chip per core  
**Cache L2:** 1.25 MB I+D on chip per core  
**Cache L3:** 12 MB I+D on chip per chip  
**Other:** None  
**Memory:** 512 GB (8 x 64 GB 2Rx4 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.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 0.9.0 released May-2021  
**File System:** tmpfs  
**System State:** Run level 5 (graphical 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.
Dell Inc.  
PowerEdge XR11 (Intel Xeon Silver 4309Y, 2.80 GHz)

**Results Table**

| Benchmark         | Base |             |             |             |             |          |     |             |             |             |             |          |     |             |             |             |             |          |     |             |             |             |             |
|-------------------|------|-------------|-------------|-------------|-------------|----------|-----|-------------|-------------|-------------|-------------|----------|-----|-------------|-------------|-------------|-------------|----------|-----|-------------|-------------|-------------|
|                   | Threads | Seconds | Ratio | Seconds | Ratio | Seconds | Ratio | Threads | Seconds | Ratio | Seconds | Ratio | Threads | Seconds | Ratio | Seconds | Ratio | Threads | Seconds | Ratio | Seconds | Ratio | Threads | Seconds | Ratio | Seconds | Ratio |
| 603.bwaves_s      | 8     | 271       | 218     | 271   | 217   | 273    | 216    | 8       | 271    | 218    | 272    | 217    | 271    | 217    |
| 607.cactuBSSN_s   | 8     | 220       | 75.7    | 221   | 75.4   | 220    | 75.6    | 8       | 220    | 75.7   | 221    | 75.4   | 220    | 75.6   |
| 619.lbm_s         | 8     | 120       | 43.7    | 120   | 43.6   | 120    | 43.6    | 8       | 120    | 43.7   | 120    | 43.6   | 120    | 43.6   |
| 621.wrf_s         | 8     | 201       | 65.7    | 202   | 65.5   | 201    | 65.8    | 8       | 186    | 71.1   | 187    | 70.7   | 187    | 70.9   |
| 627.cam4_s        | 8     | 277       | 32.0    | 277   | 32.0   | 277    | 32.1    | 8       | 277    | 32.0   | 277    | 32.0   | 276    | 32.1   |
| 628.pop2_s        | 8     | 219       | 54.3    | 219   | 54.2   | 219    | 54.3    | 8       | 219    | 54.3   | 219    | 54.2   | 219    | 54.3   |
| 638.imagick_s     | 8     | 404       | 35.7    | 404   | 35.7   | 404    | 35.7    | 8       | 404    | 35.7   | 404    | 35.7   | 404    | 35.7   |
| 644.nab_s         | 8     | 232       | 75.3    | 232   | 75.2   | 232    | 75.2    | 8       | 212    | 82.4   | 212    | 82.4   | 212    | 82.3   |
| 649.fotonik3d_s   | 8     | 183       | 49.8    | 183   | 49.7   | 183    | 49.7    | 8       | 183    | 49.8   | 183    | 49.7   | 183    | 49.7   |
| 654.roms_s        | 8     | 319       | 49.4    | 320   | 49.3   | 319    | 49.4    | 8       | 319    | 49.4   | 320    | 49.3   | 319    | 49.4   |

**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"
- 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.
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

NA: The test sponsor attests, as of date of publication, that CVE-2017-5754 (Meltdown) is mitigated in the system as tested and documented.
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**Test Date:** May-2021

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**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"

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**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 Thu May 27 08:26:34 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) Silver 4309Y CPU @ 2.80GHz
 1 "physical id"s (chips)
 8 "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
```

From `lscpu`

```
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 8
```

(Continued on next page)
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Platform Notes (Continued)

On-line CPU(s) list: 0-7
Thread(s) per core: 1
Core(s) per socket: 8
Socket(s): 1
NUMA node(s): 1
Vendor ID: GenuineIntel
CPU family: 6
Model: 106
Model name: Intel(R) Xeon(R) Silver 4309Y CPU @ 2.80GHz
Stepping: 6
CPU MHz: 2979.162
BogoMIPS: 5600.00
Virtualization: VT-x
L1d cache: 48K
L1i cache: 32K
L2 cache: 1280K
L3 cache: 12288K
NUMA node0 CPU(s): 0-7
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 art 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 xtpr 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 invpmd_single intel_ppga intel_ppln ssbd mba ibrs ibpb stibp ibrs_enhanced fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 3dnow ret Refuge invpcid_single xsaveopt宥 ivc q, aarch_capabilities

/proc/cpuinfo cache data
  cache size: 12288 KB

From numactl --hardware WARNING: a numactl 'node' might or might not correspond to a physical chip.
  available: 1 nodes (0)
  node 0 cpus: 0 1 2 3 4 5 6 7
  node 0 size: 509277 MB
  node 0 free: 492557 MB
  node distances:
    node 0
    0: 10

From /proc/meminfo
  MemTotal: 527820712 KB

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

Platform Notes (Continued)

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):
CVE-2018-3620 (L1 Terminal Fault):
Microarchitectural Data Sampling:
CVE-2017-5754 (Meltdown):
CVE-2018-3639 (Speculative Store Bypass):
CVE-2017-5753 (Spectre variant 1):
CVE-2017-5715 (Spectre variant 2):
CVE-2020-0543 (Special Register Buffer Data Sampling):
CVE-2019-11135 (TSX Asynchronous Abort):
run-level 5 May 27 03:56

SPEC is set to: /mnt/ramdisk/cpu2017-1.1.5-ic2021.1
FS

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

(Continued on next page)
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Tested by: Dell Inc.

Specimen Run Details

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

Platform Notes (Continued)

From /sys/devices/virtual/dmi/id
Vendor: Dell Inc.
Product: PowerEdge XR11
Product Family: PowerEdge
Serial: 09A000N

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:
2x 002C0632002C 36ASF8G72PZ-3G2B2 64 GB 2 rank 3200, configured at 2666
2x 002C069D002C 36ASF8G72PZ-3G2B2 64 GB 2 rank 3200, configured at 2666
1x 00AD063200AD HMAA8GR7AJR4N-XN 64 GB 2 rank 3200, configured at 2666
3x 00CE063200CE M393A8G40AB2-CWE 64 GB 2 rank 3200, configured at 2666

BIOS:
BIOS Vendor: Dell Inc.
BIOS Version: 0.9.0
BIOS Date: 05/10/2021
BIOS Revision: 0.9

(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) 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                  | 619.lbm_s(base, peak) 638.imagick_s(base, peak)
                   | 644.nab_s(base)
==============================================================================
(Continued on next page)
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**Compiler Version Notes (Continued)**

```plaintext
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.
```

```plaintext
C               | 644.nab_s(peak)
```

```plaintext
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.
```

```plaintext
C++, C, Fortran | 607.cactuBSSN_s(base, peak)
```

```plaintext
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.
```

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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.
```

```plaintext
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.
```

```plaintext
Fortran         | 603.bwaves_s(base, peak) 649.fotonik3d_s(base, peak)
```

```plaintext
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.
```

```plaintext
Fortran, C      | 621.wrf_s(base, peak) 627.cam4_s(base, peak)
```

```plaintext
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.
```

```plaintext
Fortran, C      | 628.pop2_s(base, peak)
```

(Continued on next page)
Dell Inc.

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SPECspeed®2017_fp_base = 59.3

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Compiler Version Notes (Continued)

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

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

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Base Optimization Flags (Continued)

Fortran benchmarks (continued):
-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 -nostandard-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 -nostandard-realloc-lhs
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

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

Peak Portability Flags

Same as Base Portability Flags

Peak Optimization Flags

C benchmarks:

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

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) -DPRECISIONlsen -DSPEC.Suppress.OPENMP -DSPEC_OPENMP -ipo -xCORE-AVX512 -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

649. fotoni3d_s: basepeak = yes

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 -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

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

607. cactuBSSN_s: basepeak = yes

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The flags files that were used to format this result can be browsed at


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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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