# SPEC CPU®2017 Floating Point Speed Result

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## Lenovo Global Technology

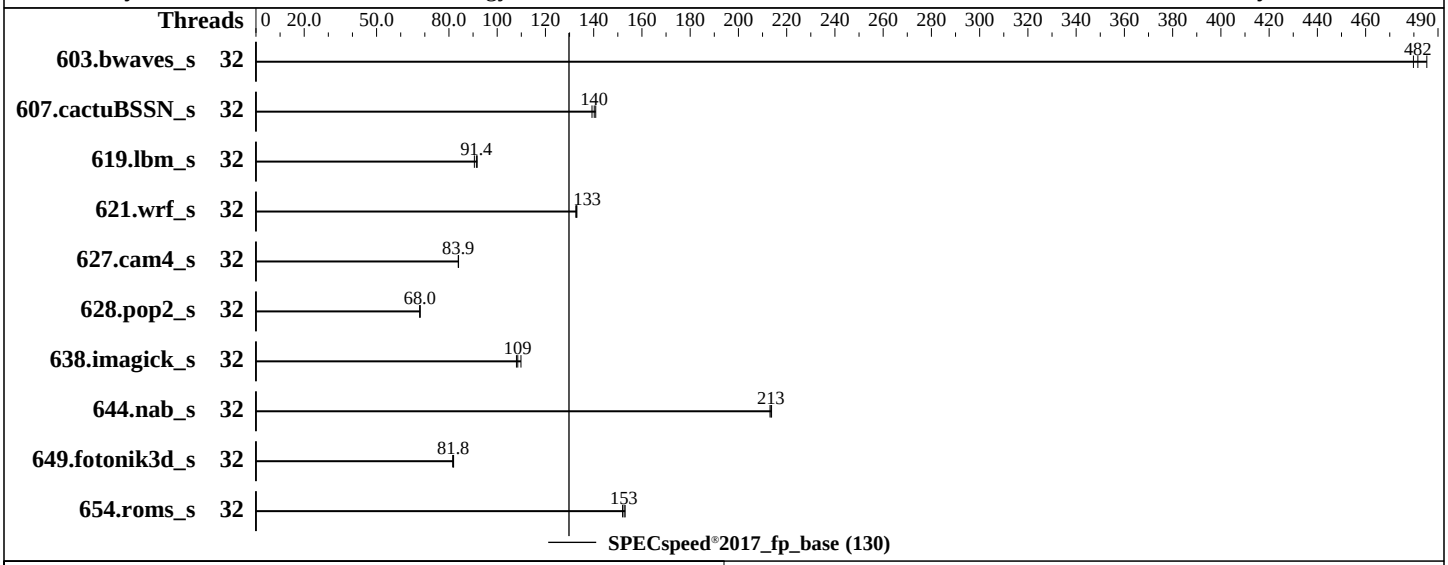
ThinkSystem SD530
(2.90 GHz, Intel Xeon Gold 6226R)

SPECspeed®2017_fp_base = 130

SPECspeed®2017_fp_peak = Not Run

**CPU2017 License:** 9017
**Test Sponsor:** Lenovo Global Technology
**Tested by:** Lenovo Global Technology

**Test Date:** Jun-2020
**Hardware Availability:** Mar-2020
**Software Availability:** Nov-2019




## Hardware

| | |
|---|---|
| CPU Name: | Intel Xeon Gold 6226R |
| Max MHz: | 3900 |
| Nominal: | 2900 |
| Enabled: | 32 cores, 2 chips, 2 threads/core |
| 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: | 22 MB I+D on chip per chip |
| Other: | None |
| Memory: | 192 GB (12 x 16 GB 2Rx8 PC4-2933Y-R) |
| Storage: | 1 x 800 GB SATA SSD |
| Other: | None |

## Software

| | |
|---|---|
| OS: | Red Hat Enterprise Linux 8.1 (Ootpa)<br>Kernel 4.18.0-147.el8.x86_64 |
| Compiler: | C/C++: Version 19.0.5.281 of Intel C/C++ Compiler for Linux;<br>Fortran: Version 19.0.5.281 of Intel Fortran Compiler for Linux |
| Parallel: | Yes |
| Firmware: | Lenovo BIOS Version TEE155L 2.61 released May-2020 |
| File System: | xfs |
| System State: | Run level 3 (multi-user) |
| Base Pointers: | 64-bit |
| Peak Pointers: | Not Applicable |
| Other: | None |
| Power Management: | BIOS set to prefer performance at the cost of additional power usage |

## Results Table

| Benchmark | Base | | | | | | | Peak | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Threads | Seconds | Ratio | Seconds | Ratio | Seconds | Ratio | Threads | Seconds | Ratio | Seconds | Ratio | Seconds | Ratio |
| 603.bwaves_s | 32 | 122 | 485 | **122** | **482** | 123 | 480 | | | | | | | |
| 607.cactuBSSN_s | 32 | **119** | **140** | 118 | 141 | 120 | 139 | | | | | | | |
| 619.lbm_s | 32 | **57.3** | **91.4** | 57.9 | 90.5 | 57.1 | 91.7 | | | | | | | |
| 621.wrf_s | 32 | 99.8 | 133 | 99.4 | 133 | **99.5** | **133** | | | | | | | |
| 627.cam4_s | 32 | 106 | 83.9 | **106** | **83.9** | 106 | 84.0 | | | | | | | |
| 628.pop2_s | 32 | 175 | 68.0 | 175 | 67.9 | **175** | **68.0** | | | | | | | |
| 638.imagick_s | 32 | 131 | 110 | **133** | **109** | 134 | 108 | | | | | | | |
| 644.nab_s | 32 | 82.0 | 213 | 81.7 | 214 | **81.8** | **213** | | | | | | | |
| 649.fotonik3d_s | 32 | **111** | **81.8** | 111 | 81.9 | 112 | 81.5 | | | | | | | |
| 654.roms_s | 32 | 103 | 153 | 104 | 152 | **103** | **153** | | | | | | | |

**SPECspeed®2017_fp_base = 130**

**SPECspeed®2017_fp_peak = Not Run**

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,1,0"
LD_LIBRARY_PATH = "/home/cpu2017-1.1.0-ic19.0u5/lib/intel64"
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.
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.
Yes: The test sponsor attests, as of date of publication, that CVE-2018-3640 (Spectre variant 3a)
is mitigated in the system as tested and documented.
Yes: The test sponsor attests, as of date of publication, that CVE-2018-3639 (Spectre variant 4)
```

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## General Notes (Continued)

```
is mitigated in the system as tested and documented.
```

## Platform Notes

```
BIOS configuration:
Choose Operating Mode set to Maximum Performance and then set it to Custom Mode
C-States set to Legacy
C1 Enhanced Mode set to Enable
Adjacent Cache Prefetch set to Disable

 Sysinfo program /home/cpu2017-1.1.0-ic19.0u5/bin/sysinfo
 Rev: r6365 of 2019-08-21 295195f888a3d7edb1e6e46a485a0011
 running on localhost.localdomain Tue Jun  2 15:07:26 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 6226R CPU @ 2.90GHz
       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 : 16
       siblings  : 32
       physical 0: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
       physical 1: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

 From lscpu:
      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:  2
      Core(s) per socket:  16
      Socket(s):           2
      NUMA node(s):        2
      Vendor ID:           GenuineIntel
      CPU family:          6
      Model:               85
      Model name:          Intel(R) Xeon(R) Gold 6226R CPU @ 2.90GHz
      Stepping:            7
      CPU MHz:             3309.120
      CPU max MHz:         3900.0000
```

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## Platform Notes (Continued)

```
      CPU min MHz:           1200.0000
      BogoMIPS:              5800.00
      Virtualization:        VT-x
      L1d cache:             32K
      L1i cache:             32K
      L2 cache:              1024K
      L3 cache:              22528K
      NUMA node0 CPU(s):     0-15,32-47
      NUMA node1 CPU(s):     16-31,48-63
      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 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 cdp_l3
      invpcid_single intel_ppin 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 xsavec xgetbv1 xsaves cqm_llc cqm_occup_llc cqm_mbm_total
      cqm_mbm_local dtherm ida arat pln pts pku ospke avx512_vnni md_clear flush_l1d
      arch_capabilities

 /proc/cpuinfo cache data
    cache size : 22528 KB

 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 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 32 33 34 35 36 37 38 39 40 41 42 43
   44 45 46 47
   node 0 size: 96346 MB
   node 0 free: 95414 MB
   node 1 cpus: 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 48 49 50 51 52 53 54 55 56
   57 58 59 60 61 62 63
   node 1 size: 96761 MB
   node 1 free: 96424 MB
   node distances:
   node   0   1
     0:  10  21
     1:  21  10

 From /proc/meminfo
    MemTotal:       197742712 kB
    HugePages_Total:       0
    Hugepagesize:       2048 kB

 From /etc/*release* /etc/*version*
```


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## Platform Notes (Continued)

```
    os-release:
       NAME="Red Hat Enterprise Linux"
       VERSION="8.1 (Ootpa)"
       ID="rhel"
       ID_LIKE="fedora"
       VERSION_ID="8.1"
       PLATFORM_ID="platform:el8"
       PRETTY_NAME="Red Hat Enterprise Linux 8.1 (Ootpa)"
       ANSI_COLOR="0;31"
    redhat-release: Red Hat Enterprise Linux release 8.1 (Ootpa)
    system-release: Red Hat Enterprise Linux release 8.1 (Ootpa)
    system-release-cpe: cpe:/o:redhat:enterprise_linux:8.1:ga

  uname -a:
     Linux localhost.localdomain 4.18.0-147.el8.x86_64 #1 SMP Thu Sep 26 15:52:44 UTC 2019
     x86_64 x86_64 x86_64 GNU/Linux

  Kernel self-reported vulnerability status:

  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,
                                             RSB filling

  run-level 3 Jun 2 15:07

  SPEC is set to: /home/cpu2017-1.1.0-ic19.0u5
     Filesystem     Type  Size  Used Avail Use% Mounted on
     /dev/sdc5      xfs   689G   17G  672G   3% /home

  From /sys/devices/virtual/dmi/id
      BIOS:    Lenovo -[TEE155L-2.61]- 05/20/2020
      Vendor:  Lenovo
      Product: THINKSYSTEM SD530 -[7X2104Z000]-
      Product Family: ThinkSystem
      Serial:  1234567890

  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:
```

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## Platform Notes (Continued)

```
     4x NO DIMM NO DIMM
     12x SK Hynix HMA82GR7CJR8N-WM 16 GB 2 rank 2933

  (End of data from sysinfo program)
```

## Compiler Version Notes

```
==============================================================================
C               | 619.lbm_s(base) 638.imagick_s(base) 644.nab_s(base)
------------------------------------------------------------------------------
Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
  Version 19.0.5.281 Build 20190815
Copyright (C) 1985-2019 Intel Corporation.  All rights reserved.
------------------------------------------------------------------------------

==============================================================================
C++, C, Fortran | 607.cactuBSSN_s(base)
------------------------------------------------------------------------------
Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64,
  Version 19.0.5.281 Build 20190815
Copyright (C) 1985-2019 Intel Corporation.  All rights reserved.
Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
  Version 19.0.5.281 Build 20190815
Copyright (C) 1985-2019 Intel Corporation.  All rights reserved.
Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)
  64, Version 19.0.5.281 Build 20190815
Copyright (C) 1985-2019 Intel Corporation.  All rights reserved.
------------------------------------------------------------------------------

==============================================================================
Fortran         | 603.bwaves_s(base) 649.fotonik3d_s(base) 654.roms_s(base)
------------------------------------------------------------------------------
Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)
  64, Version 19.0.5.281 Build 20190815
Copyright (C) 1985-2019 Intel Corporation.  All rights reserved.
------------------------------------------------------------------------------

==============================================================================
Fortran, C      | 621.wrf_s(base) 627.cam4_s(base) 628.pop2_s(base)
------------------------------------------------------------------------------
Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)
  64, Version 19.0.5.281 Build 20190815
Copyright (C) 1985-2019 Intel Corporation.  All rights reserved.
Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
  Version 19.0.5.281 Build 20190815
Copyright (C) 1985-2019 Intel Corporation.  All rights reserved.
```

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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

Fortran benchmarks:
-m64 -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)

Benchmarks using both Fortran and C:
-m64 -std=c11 -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++:
-m64 -std=c11 -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
http://www.spec.org/cpu2017/flags/Intel-ic19.0u5-official-linux64_revD.html
http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-CLX-H.html

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2017/flags/Intel-ic19.0u5-official-linux64_revD.xml
http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-CLX-H.xml


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