SPEC CPU®2017 Floating Point Speed Result

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Lenovo Global Technology

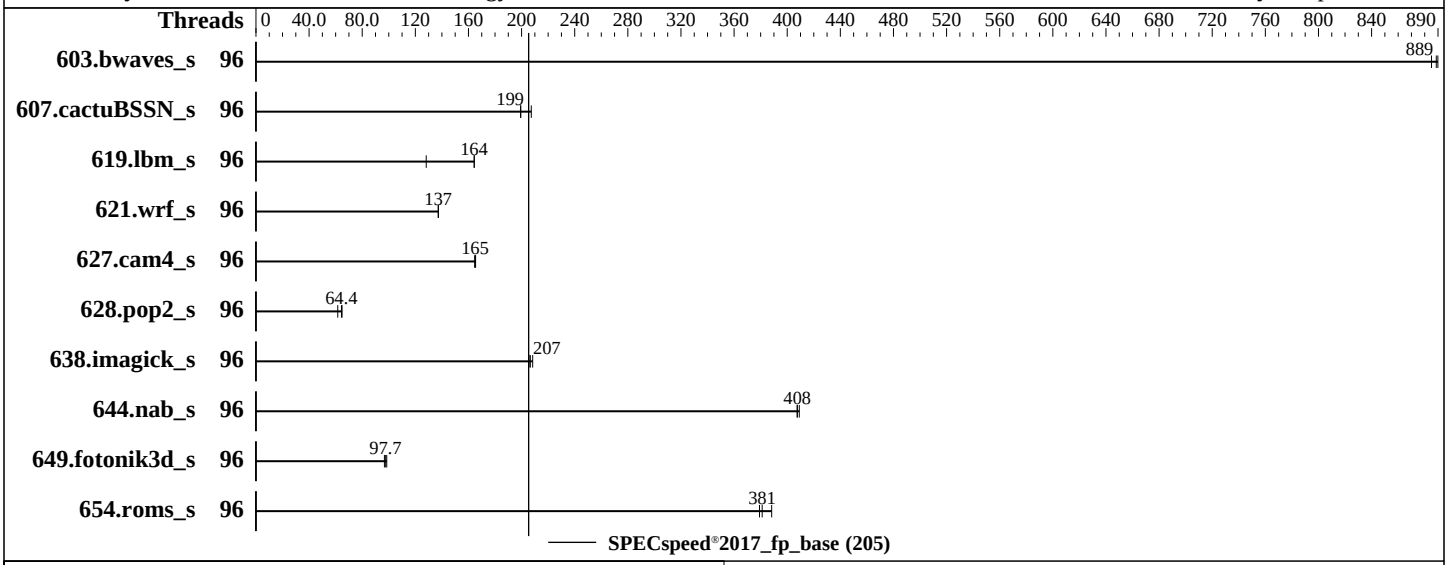
ThinkSystem SR850 V2
(2.00 GHz, Intel Xeon Gold 6330H)

SPECspeed®2017_fp_base = 205

SPECspeed®2017_fp_peak = Not Run

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

Test Date: Dec-2020
Hardware Availability: Nov-2020
Software Availability: Apr-2020



Hardware

CPU Name:	Intel Xeon Gold 6330H
Max MHz:	3700
Nominal:	2000
Enabled:	96 cores, 4 chips
Orderable:	2,4 chips
Cache L1:	32 KB I + 32 KB D on chip per core
L2:	1 MB I+D on chip per core
L3:	33 MB I+D on chip per chip
Other:	None
Memory:	1536 GB (48 x 32 GB 2Rx8 PC4-3200AA-R, running at 2933)
Storage:	1 x 960 GB SATA SSD
Other:	None

Software

OS:	Red Hat Enterprise Linux 8.2 (Ootpa) Kernel 4.18.0-193.el8.x86_64
Compiler:	C/C++: Version 19.0.5.281 of Intel C/C++ Compiler for Linux; Fortran: Version 19.0.5.281 of Intel Fortran Compiler for Linux
Parallel:	Yes
Firmware:	Lenovo BIOS Version M5E107I 1.01 released Nov-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	96	**66.4**	**889**	66.7	885	66.3	890							
607.cactuBSSN_s	96	80.4	207	**83.6**	**199**	83.7	199							
619.lbm_s	96	31.9	164	**31.9**	**164**	40.9	128							
621.wrf_s	96	96.3	137	96.3	137	**96.3**	**137**							
627.cam4_s	96	53.6	165	53.8	165	**53.7**	**165**							
628.pop2_s	96	193	61.6	183	64.8	**184**	**64.4**							
638.imagick_s	96	**69.8**	**207**	69.2	208	70.1	206							
644.nab_s	96	**42.9**	**408**	42.7	409	42.9	407							
649.fotonik3d_s	96	92.6	98.5	94.3	96.7	**93.3**	**97.7**							
654.roms_s	96	40.5	388	**41.3**	**381**	41.5	379							

SPECspeed®2017_fp_base = 205

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"
LD_LIBRARY_PATH = "/home/cpu2017-1.1.0-ic19.0u5-2/lib/intel64"
OMP_STACKSIZE = "192M"
```

General Notes

```
 Binaries compiled on a system with 1x Intel Core i9-9900K CPU + 64GB RAM
 memory using Redhat Enterprise Linux 8.0
 Transparent Huge Pages disabled by default
 echo never > /sys/kernel/mm/transparent_hugepage/enabled
 echo never > /sys/kernel/mm/transparent_hugepage/defrag
 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.
```

Platform Notes

```
BIOS configuration:
Choose Operating Mode set to Maximum Performance and then set it to Custom Mode
MONITOR/MWAIT set to Enabled
Hyper-Threading set to Disabled
Adjacent Cache Prefetch set to Disabled

 Sysinfo program /home/cpu2017-1.1.0-ic19.0u5-2/bin/sysinfo
 Rev: r6365 of 2019-08-21 295195f888a3d7edb1e6e46a485a0011
 running on localhost.localdomain Thu Dec 31 22:30:20 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 6330H CPU @ 2.00GHz
       4  "physical id"s (chips)
       96 "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 : 24
       siblings  : 24
       physical 0: cores 0 1 2 3 4 5 8 9 10 11 12 13 16 17 18 19 20 21 24 25 26 27 28 29
       physical 1: cores 0 1 2 3 4 5 8 9 10 11 12 13 16 17 18 19 20 21 24 25 26 27 28 29
       physical 2: cores 0 1 2 3 4 5 8 9 10 11 12 13 16 17 18 19 20 21 24 25 26 27 28 29
       physical 3: cores 0 1 2 3 4 5 8 9 10 11 12 13 16 17 18 19 20 21 24 25 26 27 28 29

 From lscpu:
      Architecture:        x86_64
      CPU op-mode(s):      32-bit, 64-bit
      Byte Order:          Little Endian
      CPU(s):              96
      On-line CPU(s) list: 0-95
      Thread(s) per core:  1
      Core(s) per socket:  24
      Socket(s):           4
      NUMA node(s):        8
      Vendor ID:           GenuineIntel
      CPU family:          6
      Model:               85
      Model name:          Intel(R) Xeon(R) Gold 6330H CPU @ 2.00GHz
      Stepping:            11
      CPU MHz:             2799.973
      CPU max MHz:         3700.0000
      CPU min MHz:         1000.0000
      BogoMIPS:            4000.00
      Virtualization:      VT-x
```

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Platform Notes (Continued)

```
      L1d cache:             32K
      L1i cache:             32K
      L2 cache:              1024K
      L3 cache:              33792K
      NUMA node0 CPU(s):     0-2,6-8,12-14,18-20
      NUMA node1 CPU(s):     3-5,9-11,15-17,21-23
      NUMA node2 CPU(s):     24-26,30-32,36-38,42-44
      NUMA node3 CPU(s):     27-29,33-35,39-41,45-47
      NUMA node4 CPU(s):     48-50,54-56,60-62,66-68
      NUMA node5 CPU(s):     51-53,57-59,63-65,69-71
      NUMA node6 CPU(s):     72-74,78-80,84-86,90-92
      NUMA node7 CPU(s):     75-77,81-83,87-89,93-95
      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 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
      avx512_bf16 dtherm ida arat pln pts pku ospke avx512_vnni md_clear flush_l1d
      arch_capabilities

  /proc/cpuinfo cache data
     cache size : 33792 KB

  From numactl --hardware  WARNING: a numactl 'node' might or might not correspond to a
  physical chip.
    available: 8 nodes (0-7)
    node 0 cpus: 0 1 2 6 7 8 12 13 14 18 19 20
    node 0 size: 193122 MB
    node 0 free: 192980 MB
    node 1 cpus: 3 4 5 9 10 11 15 16 17 21 22 23
    node 1 size: 193533 MB
    node 1 free: 193435 MB
    node 2 cpus: 24 25 26 30 31 32 36 37 38 42 43 44
    node 2 size: 193505 MB
    node 2 free: 193231 MB
    node 3 cpus: 27 28 29 33 34 35 39 40 41 45 46 47
    node 3 size: 193533 MB
    node 3 free: 193416 MB
    node 4 cpus: 48 49 50 54 55 56 60 61 62 66 67 68
    node 4 size: 193533 MB
    node 4 free: 193375 MB
    node 5 cpus: 51 52 53 57 58 59 63 64 65 69 70 71
```

(Continued on next page)

Platform Notes (Continued)

```
   node 5 size: 193533 MB
   node 5 free: 193184 MB
   node 6 cpus: 72 73 74 78 79 80 84 85 86 90 91 92
   node 6 size: 193533 MB
   node 6 free: 193421 MB
   node 7 cpus: 75 76 77 81 82 83 87 88 89 93 94 95
   node 7 size: 193532 MB
   node 7 free: 193427 MB
   node distances:
   node   0   1   2   3   4   5   6   7
     0:  10  11  20  20  20  20  20  20
     1:  11  10  20  20  20  20  20  20
     2:  20  20  10  11  20  20  20  20
     3:  20  20  11  10  20  20  20  20
     4:  20  20  20  20  10  11  20  20
     5:  20  20  20  20  11  10  20  20
     6:  20  20  20  20  20  20  10  11
     7:  20  20  20  20  20  20  11  10

  From /proc/meminfo
     MemTotal:       1584973232 kB
     HugePages_Total:       0
     Hugepagesize:       2048 kB

  From /etc/*release* /etc/*version*
     os-release:
        NAME="Red Hat Enterprise Linux"
        VERSION="8.2 (Ootpa)"
        ID="rhel"
        ID_LIKE="fedora"
        VERSION_ID="8.2"
        PLATFORM_ID="platform:el8"
        PRETTY_NAME="Red Hat Enterprise Linux 8.2 (Ootpa)"
        ANSI_COLOR="0;31"
     redhat-release: Red Hat Enterprise Linux release 8.2 (Ootpa)
     system-release: Red Hat Enterprise Linux release 8.2 (Ootpa)
     system-release-cpe: cpe:/o:redhat:enterprise_linux:8.2:ga

  uname -a:
     Linux localhost.localdomain 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:                          Not affected
  CVE-2018-3620 (L1 Terminal Fault):      Not affected
  Microarchitectural Data Sampling:       Not affected
```

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Platform Notes (Continued)

```
 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
 tsx_async_abort:                          Not affected

 run-level 3 Dec 31 22:27

 SPEC is set to: /home/cpu2017-1.1.0-ic19.0u5-2
    Filesystem     Type  Size  Used Avail Use% Mounted on
    /dev/sda2      xfs   838G   74G  764G   9% /home

 From /sys/devices/virtual/dmi/id
     BIOS:    Lenovo M5E107I-1.01 11/02/2020
     Vendor:  Lenovo
     Product: ThinkSystem SR850 V2
     Product Family: ThinkSystem
     Serial:  none

 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:
     48x Samsung M393A4G43AB3-CWE 32 GB 2 rank 3200

 (End of data from sysinfo program)
Memory on this system run at 2933 MHz due to CPU limitation.
```

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,
```

(Continued on next page)

Compiler Version Notes (Continued)

```
  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.
------------------------------------------------------------------------------
```

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

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-Cooperlake-A.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-Cooperlake-A.xml

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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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