



SPEC CPU®2017 Floating Point Speed Result

Copyright 2017-2021 Standard Performance Evaluation Corporation

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

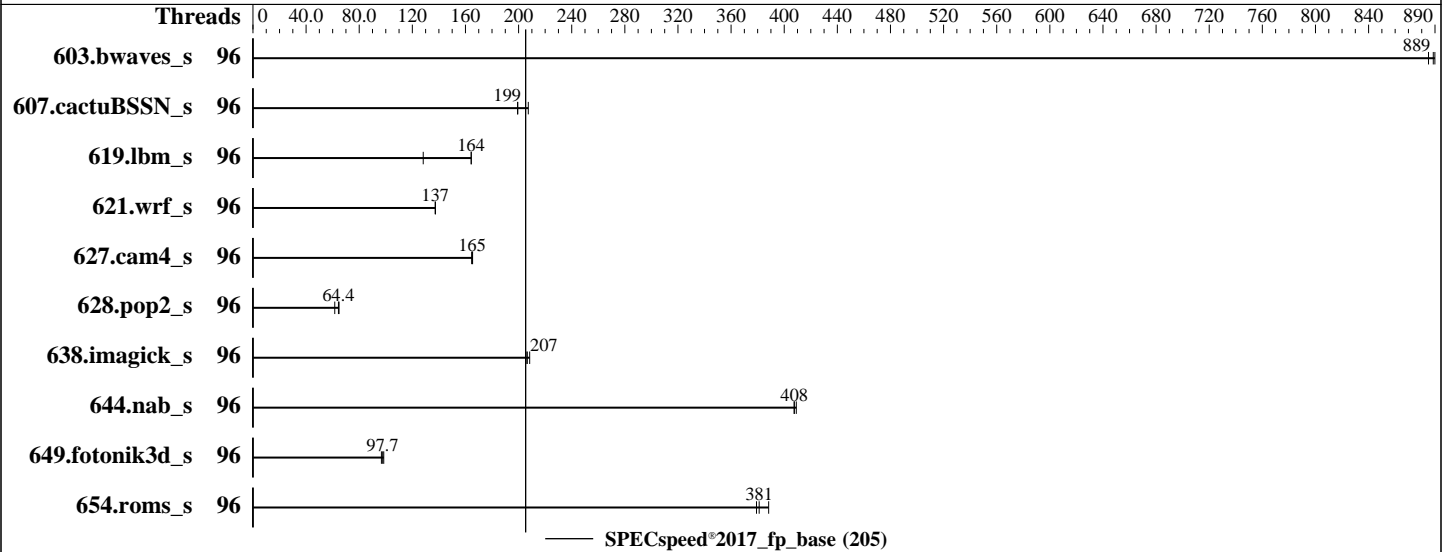
Test Sponsor: Lenovo Global Technology

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



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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							

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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.



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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 295195f888a3d7edble6e46a485a0011
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
aperfmpperf 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
xsavesopt 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

```

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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,
  
```

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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
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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



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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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