



SPEC® CPU2017 Floating Point Speed Result

Copyright 2017-2019 Standard Performance Evaluation Corporation

Lenovo Global Technology

ThinkSystem SR950
(2.30 GHz, Intel Xeon Gold 5218)

SPECspeed2017_fp_base = 149

SPECspeed2017_fp_peak = Not Run

CPU2017 License: 9017

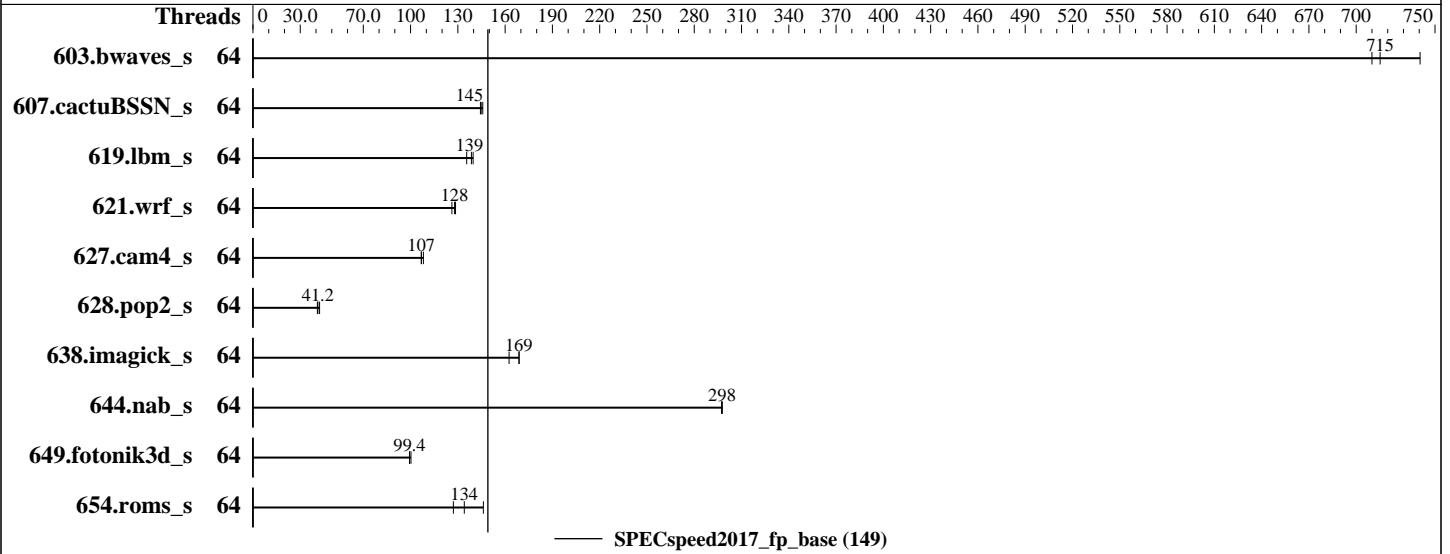
Test Sponsor: Lenovo Global Technology

Tested by: Lenovo Global Technology

Test Date: May-2019

Hardware Availability: Apr-2019

Software Availability: Nov-2018



Hardware

CPU Name: Intel Xeon Gold 5218
 Max MHz.: 3900
 Nominal: 2300
 Enabled: 64 cores, 4 chips
 Orderable: 2,3,4 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: 768 GB (48 x 16 GB 2Rx8 PC4-2666V-R)
 Storage: 1 x 800 GB SATA SSD
 Other: None

Software

OS: SUSE Linux Enterprise Server 15 (x86_64)
 Kernel 4.12.14-25.13-default
 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: Lenovo BIOS Version PSE122N 1.50 released May-2019 tested as PSE1211 1.50 Mar-2019
 File System: xfs
 System State: Run level 3 (multi-user)
 Base Pointers: 64-bit
 Peak Pointers: Not Applicable
 Other: None



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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	64	79.7	741	<u>82.5</u>	<u>715</u>	83.1	710							
607.cactuBSSN_s	64	114	146	<u>115</u>	<u>145</u>	115	144							
619.lbm_s	64	<u>37.8</u>	<u>139</u>	37.5	140	38.6	136							
621.wrf_s	64	103	129	105	126	<u>103</u>	<u>128</u>							
627.cam4_s	64	83.0	107	<u>82.9</u>	<u>107</u>	82.0	108							
628.pop2_s	64	290	40.9	281	42.3	<u>288</u>	<u>41.2</u>							
638.imagick_s	64	85.4	169	88.8	163	<u>85.5</u>	<u>169</u>							
644.nab_s	64	58.7	298	<u>58.7</u>	<u>298</u>	58.8	297							
649.fotonik3d_s	64	<u>91.7</u>	<u>99.4</u>	91.8	99.3	90.9	100							
654.roms_s	64	124	127	108	146	<u>117</u>	<u>134</u>							

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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"

General Notes

Environment variables set by runcpu before the start of the run:

KMP_AFFINITY = "granularity=fine,compact"

LD_LIBRARY_PATH = "/home/cpu2017-1.0.5-ic19.0u1/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

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.

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) is mitigated in the system as tested and documented.



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Platform Notes

BIOS configuration:

Choose Operating Mode set to Maximum Performance
Choose Operating Mode set to Custom Mode
CPU P-state Control set to Autonomous
Hyper-Threading set to Disable
Trusted Execution Technology set to Enable
DCU Streamer Prefetcher set to Disable
MONITOR/MWAIT set to Enable

Sysinfo program /home/cpu2017-1.0.5-ic19.0ul/bin/sysinfo
Rev: r5974 of 2018-05-19 9bcde8f2999c33d61f64985e45859ea9
running on linux-ulb8 Thu May 30 17:40:29 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 5218 CPU @ 2.30GHz
 4 "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     : 16
 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
 physical 2:   cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
 physical 3:   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: 1
Core(s) per socket: 16
Socket(s):       4
NUMA node(s):   4
Vendor ID:       GenuineIntel
CPU family:      6
Model:          85
Model name:      Intel(R) Xeon(R) Gold 5218 CPU @ 2.30GHz
Stepping:        6
CPU MHz:         2300.000
BogoMIPS:        4600.00
Virtualization:  VT-x
```

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Platform Notes (Continued)

```

L1d cache:          32K
L1i cache:          32K
L2 cache:           1024K
L3 cache:           22528K
NUMA node0 CPU(s):  0-15
NUMA node1 CPU(s):  16-31
NUMA node2 CPU(s):  32-47
NUMA node3 CPU(s):  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
aperfmpperf 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 fl6c rdrand lahf_lm abm 3dnowprefetch cpuid_fault epb cat_l3 cdp_l3
invpcid_single ssbd mba ibrs ibpb stibp 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 hwp_epp pku ospke avx512_vnni flush_lld 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: 4 nodes (0-3)
node 0 cpus: 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
node 0 size: 193118 MB
node 0 free: 189860 MB
node 1 cpus: 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
node 1 size: 193515 MB
node 1 free: 193076 MB
node 2 cpus: 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47
node 2 size: 193486 MB
node 2 free: 192333 MB
node 3 cpus: 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63
node 3 size: 193512 MB
node 3 free: 193286 MB
node distances:
node  0  1  2  3
 0:  10  31  21  21
 1:  31  10  21  21
 2:  21  21  10  31
 3:  21  21  31  10

```

```

From /proc/meminfo
MemTotal:          792200140 kB

```

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Platform Notes (Continued)

HugePages_Total: 0
Hugepagesize: 2048 kB

From /etc/*release* /etc/*version*
os-release:

```
NAME="SLES"  
VERSION="15"  
VERSION_ID="15"  
PRETTY_NAME="SUSE Linux Enterprise Server 15"  
ID="sles"  
ID_LIKE="suse"  
ANSI_COLOR="0;32"  
CPE_NAME="cpe:/o:suse:sles:15"
```

uname -a:

```
Linux linux-ulb8 4.12.14-25.13-default #1 SMP Tue Aug 14 15:07:35 UTC 2018 (947aa51)  
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: Indirect Branch Restricted Speculation,  
IBPB, IBRS_FW
```

run-level 3 May 30 15:17

```
SPEC is set to: /home/cpu2017-1.0.5-ic19.0u1  
Filesystem Type Size Used Avail Use% Mounted on  
/dev/sda2 xfs 744G 23G 722G 3% /
```

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 Lenovo -[PSE121I-1.50]- 03/01/2019  
Memory:  
48x NO DIMM NO DIMM  
48x Samsung M393A2K43BB1-CTD 16 GB 2 rank 2666
```

(End of data from sysinfo program)

Compiler Version Notes

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

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Compiler Version Notes (Continued)

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

```
=====
FC 607.cactuBSSN_s(base)
-----
```

```
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)
-----
```

```
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) 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.
-----
```

Base Compiler Invocation

C benchmarks:

```
icc -m64 -std=c11
```

Fortran benchmarks:

```
ifort -m64
```

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Base Compiler Invocation (Continued)

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 -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP
```

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
```



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

<http://www.spec.org/cpu2017/flags/Intel-ic18.0-official-linux64.2019-04-02.html>

<http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-CLX-D.html>

You can also download the XML flags sources by saving the following links:

<http://www.spec.org/cpu2017/flags/Intel-ic18.0-official-linux64.2019-04-02.xml>

<http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-CLX-D.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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