



# SPEC® CPU2017 Floating Point Speed Result

Copyright 2017-2019 Standard Performance Evaluation Corporation

## Lenovo Global Technology

ThinkSystem SR950  
(3.80 GHz, Intel Xeon Platinum 8256)

SPECspeed2017\_fp\_base = 147

SPECspeed2017\_fp\_peak = Not Run

CPU2017 License: 9017

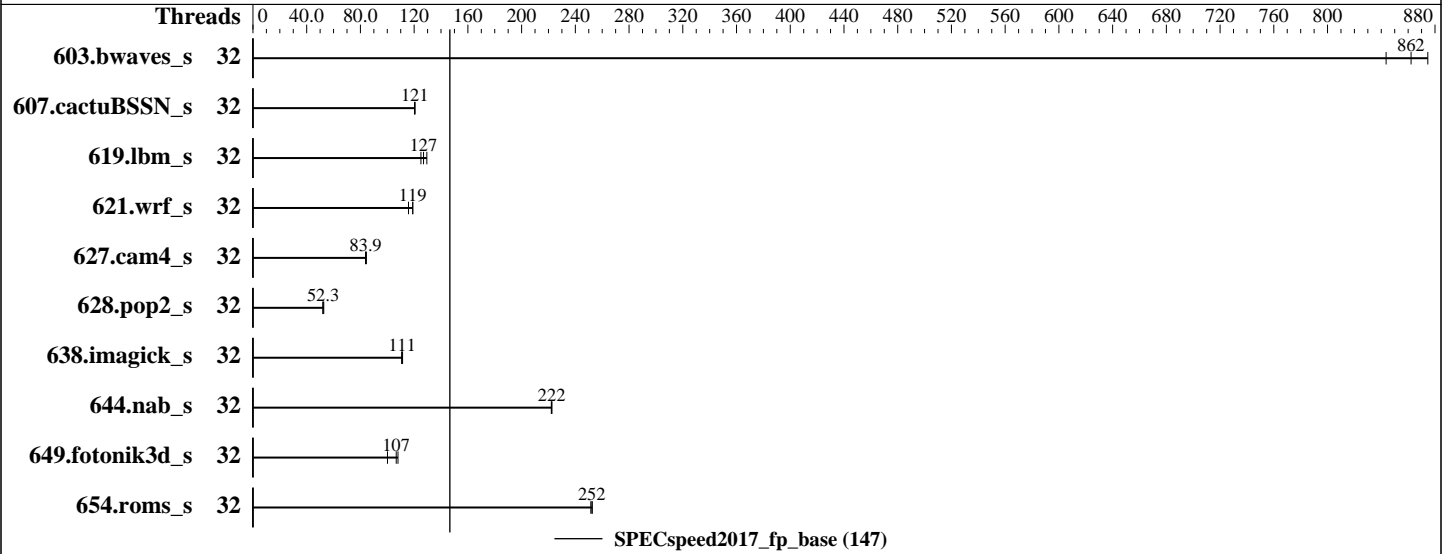
Test Sponsor: Lenovo Global Technology

Tested by: Lenovo Global Technology

Test Date: Apr-2019

Hardware Availability: Apr-2019

Software Availability: Nov-2018



### Hardware

CPU Name: Intel Xeon Platinum 8256  
 Max MHz.: 3900  
 Nominal: 3800  
 Enabled: 32 cores, 8 chips  
 Orderable: 2,3,4,6,8 chips  
 Cache L1: 32 KB I + 32 KB D on chip per core  
 L2: 1 MB I+D on chip per core  
 L3: 16.5 MB I+D on chip per chip  
 Other: None  
 Memory: 3 TB (96 x 32 GB 2Rx4 PC4-2933Y-R)  
 Storage: 1 x 960 GB SATA SSD  
 Other: None

### Software

OS: Red Hat Enterprise Linux Server release 7.6 (Maipo)  
 Kernel 3.10.0-957.el7.x86\_64  
 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 PSE121C 1.50 released Jan-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	32	69.9	844	67.5	875	<b>68.4</b>	<b>862</b>							
607.cactuBSSN_s	32	<b>138</b>	<b>121</b>	139	120	138	121							
619.lbm_s	32	40.5	129	41.9	125	<b>41.2</b>	<b>127</b>							
621.wrf_s	32	<b>111</b>	<b>119</b>	111	119	114	116							
627.cam4_s	32	105	84.5	<b>106</b>	<b>83.9</b>	106	83.9							
628.pop2_s	32	228	52.0	225	52.7	<b>227</b>	<b>52.3</b>							
638.imagick_s	32	<b>130</b>	<b>111</b>	130	111	130	111							
644.nab_s	32	78.7	222	<b>78.5</b>	<b>222</b>	78.5	222							
649.fotonik3d_s	32	91.0	100	<b>85.5</b>	<b>107</b>	84.4	108							
654.roms_s	32	62.3	253	62.6	252	<b>62.4</b>	<b>252</b>							

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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

```
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
```

Yes: 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 Cooperative

MONITORMWAIT set to Enable

Hyper-Threading set to Disable

Intel Virtualization Technology set to Disable

Adjacent Cache Prefetch set to Disable

Uncore Frequency Scaling set to Disable

SNC set to Disable

Stale AtoS set to Enable

Sysinfo program /home/cpu2017-1.0.5-ic19.0u1/bin/sysinfo

Rev: r5974 of 2018-05-19 9bcde8f2999c33d61f64985e45859ea9

running on redhat7.6.lenovo.com Sun Apr 14 23:55:40 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) Platinum 8256 CPU @ 3.80GHz

8 "physical id"s (chips)

32 "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 : 4

siblings : 4

physical 0: cores 1 5 9 13

physical 1: cores 1 2 5 13

physical 2: cores 2 5 9 13

physical 3: cores 4 8 9 13

physical 4: cores 1 2 4 13

physical 5: cores 5 8 9 13

physical 6: cores 2 5 9 13

physical 7: cores 5 8 9 12

From lscpu:

Architecture: x86\_64

CPU op-mode(s): 32-bit, 64-bit

Byte Order: Little Endian

CPU(s): 32

On-line CPU(s) list: 0-31

Thread(s) per core: 1

Core(s) per socket: 4

Socket(s): 8

NUMA node(s): 16

Vendor ID: GenuineIntel

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### Platform Notes (Continued)

```

CPU family:           6
Model:                85
Model name:           Intel(R) Xeon(R) Platinum 8256 CPU @ 3.80GHz
Stepping:             6
CPU MHz:              1200.024
CPU max MHz:          3900.0000
CPU min MHz:          1200.0000
BogoMIPS:             7600.00
Virtualization:       VT-x
L1d cache:            32K
L1i cache:            32K
L2 cache:             1024K
L3 cache:             16896K
NUMA node0 CPU(s):   0,2
NUMA node1 CPU(s):   1,3
NUMA node2 CPU(s):   4,5
NUMA node3 CPU(s):   6,7
NUMA node4 CPU(s):   8,10
NUMA node5 CPU(s):   9,11
NUMA node6 CPU(s):   12,15
NUMA node7 CPU(s):   13,14
NUMA node8 CPU(s):   16,17
NUMA node9 CPU(s):   18,19
NUMA node10 CPU(s):  20,23
NUMA node11 CPU(s):  21,22
NUMA node12 CPU(s):  24,26
NUMA node13 CPU(s):  25,27
NUMA node14 CPU(s):  28,31
NUMA node15 CPU(s):  29,30

```

```

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
aperfperf eagerfpu 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 epb cat_l3 cdp_l3 intel_pt 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 avx512cd avx512bw avx512vl xsaveopt xsavec xgetbv1
cqm_llc cqm_occup_llc cqm_mbm_total cqm_mbm_local dtherm ida arat pln pts hwp
hwp_act_window hwp_epp hwp_pkg_req pku ospke avx512_vnni spec_ctrl intel_stibp
flush_lld arch_capabilities

```

```

/proc/cpuinfo cache data
cache size : 16896 KB

```

```

From numactl --hardware WARNING: a numactl 'node' might or might not correspond to a
physical chip.

```

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### Platform Notes (Continued)

```

available: 16 nodes (0-15)
node 0 cpus: 0 2
node 0 size: 196259 MB
node 0 free: 191699 MB
node 1 cpus: 1 3
node 1 size: 196608 MB
node 1 free: 192238 MB
node 2 cpus: 4 5
node 2 size: 196608 MB
node 2 free: 192330 MB
node 3 cpus: 6 7
node 3 size: 196608 MB
node 3 free: 192307 MB
node 4 cpus: 8 10
node 4 size: 196608 MB
node 4 free: 192332 MB
node 5 cpus: 9 11
node 5 size: 196608 MB
node 5 free: 192313 MB
node 6 cpus: 12 15
node 6 size: 196608 MB
node 6 free: 192333 MB
node 7 cpus: 13 14
node 7 size: 196608 MB
node 7 free: 191666 MB
node 8 cpus: 16 17
node 8 size: 196608 MB
node 8 free: 192313 MB
node 9 cpus: 18 19
node 9 size: 196608 MB
node 9 free: 192209 MB
node 10 cpus: 20 23
node 10 size: 196608 MB
node 10 free: 192331 MB
node 11 cpus: 21 22
node 11 size: 196608 MB
node 11 free: 192316 MB
node 12 cpus: 24 26
node 12 size: 196608 MB
node 12 free: 192326 MB
node 13 cpus: 25 27
node 13 size: 196608 MB
node 13 free: 192331 MB
node 14 cpus: 28 31
node 14 size: 196608 MB
node 14 free: 192331 MB
node 15 cpus: 29 30

```

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### Platform Notes (Continued)

```
node 15 size: 196608 MB
node 15 free: 191793 MB
node distances:
node  0  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15
 0:  10 11 21 21 31 31 21 21 21 21 31 31 31 31 31 31
 1:  11 10 21 21 31 31 21 21 21 21 31 31 31 31 31 31
 2:  21 21 10 11 21 21 31 31 31 31 21 21 31 31 31 31
 3:  21 21 11 10 21 21 31 31 31 31 21 21 31 31 31 31
 4:  31 31 21 21 10 11 21 21 31 31 31 31 21 21 31 31
 5:  31 31 21 21 11 10 21 21 31 31 31 31 21 21 31 31
 6:  21 21 31 31 21 21 10 11 31 31 31 31 31 31 21 21
 7:  21 21 31 31 21 21 11 10 31 31 31 31 31 31 21 21
 8:  21 21 31 31 31 31 31 31 10 11 21 21 21 21 31 31
 9:  21 21 31 31 31 31 31 31 11 10 21 21 21 21 31 31
10:  31 31 21 21 31 31 31 31 21 21 10 11 31 31 21 21
11:  31 31 21 21 31 31 31 31 21 21 11 10 31 31 21 21
12:  31 31 31 31 21 21 31 31 21 21 31 31 10 11 21 21
13:  31 31 31 31 21 21 31 31 21 21 31 31 11 10 21 21
14:  31 31 31 31 31 31 21 21 31 31 21 21 21 21 10 11
15:  31 31 31 31 31 31 21 21 31 31 21 21 21 21 11 10
```

```
From /proc/meminfo
MemTotal:          3170316676 kB
HugePages_Total:      0
Hugepagesize:       2048 kB
```

```
From /etc/*release* /etc/*version*
os-release:
NAME="Red Hat Enterprise Linux Server"
VERSION="7.6 (Maipo)"
ID="rhel"
ID_LIKE="fedora"
VARIANT="Server"
VARIANT_ID="server"
VERSION_ID="7.6"
PRETTY_NAME="Red Hat Enterprise Linux Server 7.6 (Maipo)"
redhat-release: Red Hat Enterprise Linux Server release 7.6 (Maipo)
system-release: Red Hat Enterprise Linux Server release 7.6 (Maipo)
system-release-cpe: cpe:/o:redhat:enterprise_linux:7.6:ga:server
```

```
uname -a:
Linux redhat7.6.lenovo.com 3.10.0-957.el7.x86_64 #1 SMP Thu Oct 4 20:48:51 UTC 2018
x86_64 x86_64 x86_64 GNU/Linux
```

```
Kernel self-reported vulnerability status:
CVE-2017-5754 (Meltdown):          Not affected
```

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## Platform Notes (Continued)

CVE-2017-5753 (Spectre variant 1): Mitigation: Load fences, \_\_user pointer sanitization  
CVE-2017-5715 (Spectre variant 2): Mitigation: Enhanced IBRS

run-level 3 Apr 14 21:04

SPEC is set to: /home/cpu2017-1.0.5-ic19.0u1  
Filesystem Type Size Used Avail Use% Mounted on  
/dev/sda2 xfs 838G 22G 817G 3% /home

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 -[PSE121C-1.50]- 01/16/2019  
Memory:  
96x Samsung M393A4K40CB2-CVF 32 GB 2 rank 2933

(End of data from sysinfo program)

## Compiler Version Notes

=====  
CC 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 19.0.1.144 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)  
-----

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## Compiler Version Notes (Continued)

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

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





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## 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
```

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-A.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-A.xml>

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For questions about this result, please contact the tester. For other inquiries, please contact [info@spec.org](mailto:info@spec.org).

Tested with SPEC CPU2017 v1.0.5 on 2019-04-14 11:55:39-0400.

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