SPEC® CPU2017 Floating Point Speed Result

Copyright 2017-2019 Standard Performance Evaluation Corporation

Lenovo Global Technology

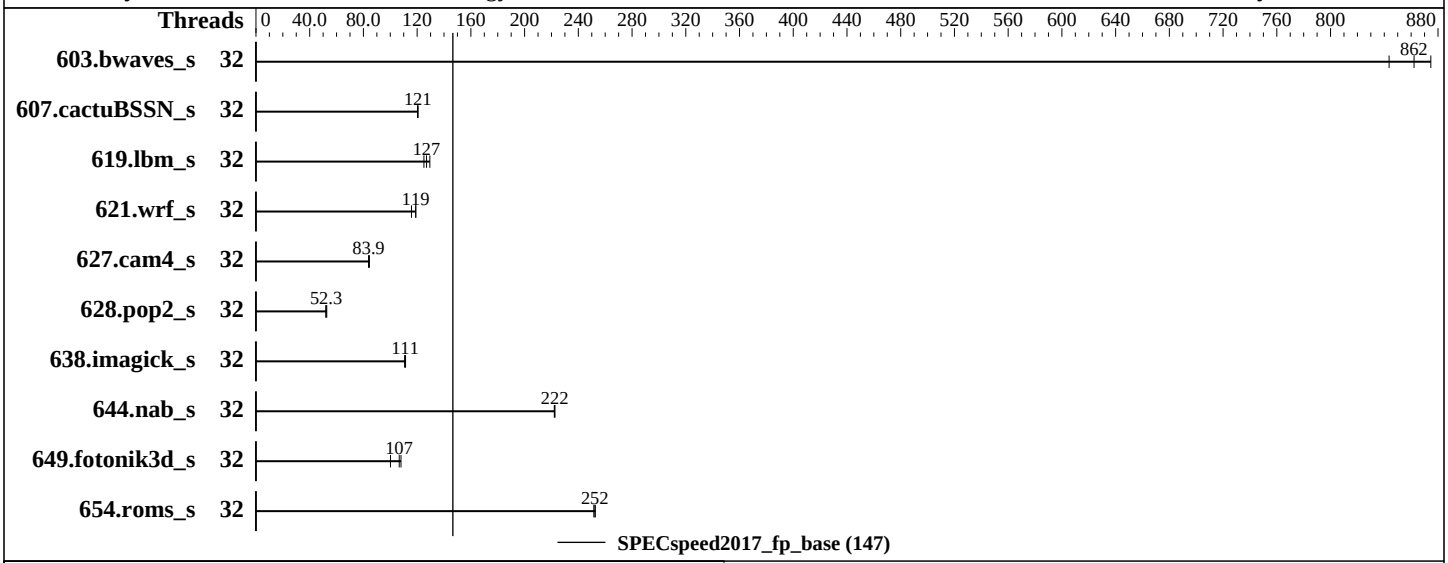
ThinkSystem SR950
(3.80 GHz, Intel Xeon Platinum 8256)

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

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	**68.4**	**862**							
607.cactuBSSN_s	32	**138**	**121**	139	120	138	121							
619.lbm_s	32	40.5	129	41.9	125	**41.2**	**127**							
621.wrf_s	32	**111**	**119**	111	119	114	116							
627.cam4_s	32	105	84.5	**106**	**83.9**	106	83.9							
628.pop2_s	32	228	52.0	225	52.7	**227**	**52.3**							
638.imagick_s	32	**130**	**111**	130	111	130	111							
644.nab_s	32	78.7	222	**78.5**	**222**	78.5	222							
649.fotonik3d_s	32	91.0	100	**85.5**	**107**	84.4	108							
654.roms_s	32	62.3	253	62.6	252	**62.4**	**252**							

SPECspeed2017_fp_base = 147

SPECspeed2017_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"
```

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.
```

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
```

(Continued on next page)

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
      aperfmperf 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_l1d 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.
```


(Continued on next page)

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
```

(Continued on next page)

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
```

(Continued on next page)

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


(Continued on next page)

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

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

SPEC is a registered trademark of the Standard Performance Evaluation Corporation. All other brand and product names appearing in this result are trademarks or registered trademarks of their respective holders.

For questions about this result, please contact the tester. For other inquiries, please contact info@spec.org.

Tested with SPEC CPU2017 v1.0.5 on 2019-04-14 11:55:39-0400.
Report generated on 2019-04-30 17:41:03 by CPU2017 PS formatter v6067.
Originally published on 2019-04-30.