Lenovo Global Technology
ThinkSystem SR860 V2
(2.50 GHz, Intel Xeon Gold 5318H)

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

Threads

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
</tr>
</thead>
<tbody>
<tr>
<td>603.bwaves_s</td>
<td>72</td>
</tr>
<tr>
<td>607.cactuBSSN_s</td>
<td>72</td>
</tr>
<tr>
<td>619.lbm_s</td>
<td>72</td>
</tr>
<tr>
<td>621.wrf_s</td>
<td>72</td>
</tr>
<tr>
<td>627.cam4_s</td>
<td>72</td>
</tr>
<tr>
<td>628.pop2_s</td>
<td>72</td>
</tr>
<tr>
<td>638.imagick_s</td>
<td>72</td>
</tr>
<tr>
<td>644.nab_s</td>
<td>72</td>
</tr>
<tr>
<td>649.fotonik3d_s</td>
<td>72</td>
</tr>
<tr>
<td>654.roms_s</td>
<td>72</td>
</tr>
</tbody>
</table>

Hardware

CPU Name: Intel Xeon Gold 5318H
Max MHz: 3800
Nominal: 2500
Enabled: 72 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: 24.75 MB I+D on chip per chip
Other: None
Memory: 768 GB (48 x 16 GB 2Rx8 PC4-3200AA-R, running at 2666)
Storage: 1 x 960 GB SATA SSD
Other: None

Software

OS: Red Hat Enterprise Linux 8.2 (Ootpa)
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 M5E107H 1.00 released Oct-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

SPECspeed®2017_fp_base = 197
SPECspeed®2017_fp_peak = Not Run
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<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Base</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Base</th>
<th>Seconds</th>
<th>Ratio</th>
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<tr>
<td>603.bwaves_s</td>
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<td>74.3</td>
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<tr>
<td>627.cam4_s</td>
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<td>56.8</td>
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<tr>
<td>628.pop2_s</td>
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<td>182</td>
<td>65.2</td>
<td>179</td>
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<tr>
<td>644.nab_s</td>
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<td>649.fotonik3d_s</td>
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<td>654.roms_s</td>
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<td>254</td>
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<td>252</td>
<td>62.3</td>
<td>253</td>
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<td></td>
</tr>
</tbody>
</table>

**SPECspeed®2017_fp_base = 197**
**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.
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SPECSpeed®2017_fp_base = 197
SPECSpeed®2017_fp_peak = Not Run

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 295195f888a3d7ed3e6e6a485a0011
running on localhost.localdomain Mon Nov 16 00:33:09 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 5318H CPU @ 2.50GHz
 4 "physical id"s (chips)
 72 "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 : 18
siblings : 18
physical 0: cores 0 1 2 3 4 8 9 10 11 16 17 18 19 20 24 25 26 27
physical 1: cores 0 1 2 3 4 8 9 10 11 16 17 18 19 20 24 25 26 27
physical 2: cores 0 1 2 3 4 8 9 10 11 16 17 18 19 20 24 25 26 27
physical 3: cores 0 1 2 3 4 8 9 10 11 16 17 18 19 20 24 25 26 27

From lscpu:
Architecture:          x86_64
CPU op-mode(s):       32-bit, 64-bit
Byte Order:           Little Endian
CPU(s):               72
On-line CPU(s) list: 0-71
Thread(s) per core:  1
Core(s) per socket:  18
Socket(s):            4
NUMA node(s):         4
Vendor ID:            GenuineIntel
CPU family:           6
Model:                85
Model name:           Intel(R) Xeon(R) Gold 5318H CPU @ 2.50GHz
Stepping:             11
CPU MHz:              2098.229
CPU max MHz:          3800.0000
CPU min MHz:          1000.0000
BogoMIPS:             5000.00
Virtualization:       VT-x

(Continued on next page)
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Test Date: Nov-2020
Hardware Availability: Nov-2020
Software Availability: Apr-2020

Platform Notes (Continued)

L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 25344K
NUMA node0 CPU(s): 0-17
NUMA node1 CPU(s): 18-35
NUMA node2 CPU(s): 36-53
NUMA node3 CPU(s): 74-71

Flags: fpu vme de pse tsc msr pae mce cmov pat pse36 clflush dts acpi mmx fxsr sse sse2 ss ht tm pbe syscall nx pdelg nd tsc def tsc_brightness

Flags: aperfmperf pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg fma cx16 xtrn pdcm pcid dca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave avx f16c rdrand lahf_lm abm 3nowprefetch cpuid_fault epb cat_13 cd l3

invlvd_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 invlvd rtm cmx mx rdt_a avx512f avx512dq rdseed adx smap clflushopt clwb intel_pt avx512cd avx512bw avx512vl xsaveopt xsaves cqm_lxc cqm_occup_lxc cqm mbm_total cqm mbm_local avx512 bfi dtherm ida arat pin pts pku ospke avx512 vnni md clean flush lld arch capabilities

/proc/cpuinfo cache data
cache size: 25344 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 16 17
node 0 size: 193121 MB
node 0 free: 192873 MB
node 1 cpus: 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35
node 1 size: 193504 MB
node 1 free: 193263 MB
node 2 cpus: 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53
node 2 size: 193531 MB
node 2 free: 193355 MB
node 3 cpus: 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71
node 3 size: 193531 MB
node 3 free: 192984 MB
node distances:

node 0 1 2 3
0: 10 20 20 20
1: 20 10 20 20
2: 20 20 10 20
3: 20 20 20 10

From /proc/meminfo

(Continued on next page)
# SPEC CPU®2017 Floating Point Speed Result

## Lenovo Global Technology

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</tbody>
</table>

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### Platform Notes (Continued)

```
MemTotal:       792257172 kB  
HugePages_Total:       0  
Hugepagesize:       2048 kB

/usr/bin/lsb_release -d  
Red Hat Enterprise Linux release 8.2 (Ootpa)

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  
  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 Nov 16 00:30

SPEC is set to: /home/cpu2017-1.1.0-ic19.0u5-2  
  Filesystem Type Size Used Avail Use% Mounted on  
  /dev/sda3 xfs 892G 40G 853G 5% /

From /sys/devices/virtual/dmi/id  
  BIOS: Lenovo M5E107H-1.00 10/18/2020
```

(Continued on next page)
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Hardware Availability: Nov-2020
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Platform Notes (Continued)

Vendor: Lenovo
Product: ThinkSystem SR860 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 SK Hynix HMA82GR7CJR8N-XN 16 GB 2 rank 3200

(End of data from sysinfo program)
Memory on this system run at 2666 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,
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,
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Compiler Version Notes (Continued)

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

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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

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

Tested with SPEC CPU®2017 v1.1.0 on 2020-11-15 11:33:09-0500.
Report generated on 2020-12-08 15:19:56 by CPU2017 PDF formatter v6255.
Originally published on 2020-12-08.