## Lenovo Global Technology

### SPEC CPU®2017 Floating Point Speed Result

**ThinkSystem SR650 V2**  
(2.10 GHz, Intel Xeon Gold 5318N)

<table>
<thead>
<tr>
<th>SPECspeed®2017_fp_base</th>
<th>170</th>
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</thead>
<tbody>
<tr>
<td>SPECspeed®2017_fp_peak</td>
<td>Not Run</td>
</tr>
</tbody>
</table>

**CPU2017 License:** 9017  
**Test Date:** Jul-2021  
**Test Sponsor:** Lenovo Global Technology  
**Hardware Availability:** Jul-2021  
**Tested by:** Lenovo Global Technology  
**Software Availability:** Dec-2020

<table>
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<tr>
<th>Threads</th>
<th>SPECspeed®2017_fp_base (170)</th>
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<tbody>
<tr>
<td>603.bwaves_s</td>
<td>48</td>
</tr>
<tr>
<td>607.cactuBSSN_s</td>
<td>48</td>
</tr>
<tr>
<td>619.lbm_s</td>
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</tr>
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</tr>
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<td>48</td>
</tr>
<tr>
<td>638.imagick_s</td>
<td>48</td>
</tr>
<tr>
<td>644.nab_s</td>
<td>48</td>
</tr>
<tr>
<td>649.fotonik3d_s</td>
<td>48</td>
</tr>
<tr>
<td>654.roms_s</td>
<td>48</td>
</tr>
</tbody>
</table>

### Hardware

**CPU Name:** Intel Xeon Gold 5318N  
**Max MHz:** 3400  
**Nominal:** 2100  
**Enabled:** 48 cores, 2 chips  
**Orderable:** 1.2 chips  
**Cache L1:** 32 KB I + 48 KB D on chip per core  
**Cache L2:** 1.25 MB I+D on chip per core  
**Cache L3:** 36 MB I+D on chip per core  
**Other:** None  
**Memory:** 1 TB (32 x 32 GB 2Rx8 PC4-3200AA-R, running at 2666)  
**Storage:** 1 x 960 GB SATA SSD  
**Other:** None

### Software

**OS:** SUSE Linux Enterprise Server 15 SP2 (x86_64)  
**Kernel:** 5.3.18-22-default  
**Compiler:** Fortran: Version 2021.1 of Intel Fortran Compiler  
**Parallel:** Yes  
**File System:** xfs  
**System State:** Run level 3 (multi-user)  
**Base Pointers:** 64-bit  
**Peak Pointers:** Not Applicable  
**Other:** jemalloc memory allocator V5.0.1  
**Power Management:** BIOS and OS set to prefer performance at the cost of additional power usage
### Lenovo Global Technology

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<table>
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<tr>
<th>Benchmark</th>
<th>Base Threads</th>
<th>Base Seconds</th>
<th>Base Ratio</th>
<th>Peak Threads</th>
<th>Peak Seconds</th>
<th>Peak Ratio</th>
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<tbody>
<tr>
<td>603.bwaves_s</td>
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<td>98.4</td>
<td>600</td>
<td>99.6</td>
<td>593</td>
<td>98.9</td>
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<tr>
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<td>75.7</td>
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<td>214</td>
<td>77.3</td>
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<tr>
<td>619.lbm_s</td>
<td>48</td>
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<td>118</td>
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<td>621.wrf_s</td>
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<td>98.5</td>
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<td>98.6</td>
<td>134</td>
<td>99.0</td>
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<tr>
<td>627.cam4_s</td>
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<td>73.0</td>
<td>121</td>
<td>74.3</td>
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<td>628.pop2_s</td>
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<td>73.6</td>
<td>159</td>
<td>74.5</td>
<td>160</td>
</tr>
<tr>
<td>638.imagick_s</td>
<td>48</td>
<td>77.8</td>
<td>185</td>
<td>77.4</td>
<td>186</td>
<td>77.6</td>
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<tr>
<td>644.nab_s</td>
<td>48</td>
<td>58.5</td>
<td>299</td>
<td>58.5</td>
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<td>58.5</td>
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<td>649.fotonik3d_s</td>
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<td>100</td>
<td>91.8</td>
<td>99.3</td>
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<tr>
<td>654.roms_s</td>
<td>48</td>
<td>77.5</td>
<td>203</td>
<td>77.8</td>
<td>202</td>
<td>77.4</td>
</tr>
</tbody>
</table>

SPECspeed\textsuperscript{2017\_fp\_base} = 170  
SPECspeed\textsuperscript{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:

\[
\text{KMP\_AFFINITY} = \text{"granularity=fine,compact"}  
\text{LD\_LIBRARY\_PATH} = 
\text{"/home/cpu2017-1.1.8-ic2021.1-revA-update1/lib/intel64:/home/cpu2017-1.1.8-ic2021.1-revA-update1/je5.0.1-64"}  
\text{MALLOC\_CONF} = \text{"retain:true"}  
\text{OMP\_STACKSIZE} = \text{"192M"}  
\]

### General Notes

Binaries compiled on a system with 1x Intel Core i9-7980XE CPU + 64GB RAM  
memory using Redhat Enterprise Linux 8.0  
Transparent Huge Pages enabled by default  
Prior to runcpu invocation  
Filesystem page cache synced and cleared with:

\[
\text{sync; echo 3> /proc/sys/vm/drop_caches}  
\]

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.
General Notes (Continued)

jemalloc, a general purpose malloc implementation
built with the RedHat Enterprise 7.5, and the system compiler gcc 4.8.5

Platform Notes

BIOS configuration:
Choose Operating Mode set to Maximum Performance and then set it to Custom Mode
C-States set to Legacy
Adjacent Cache Prefetch set to Disabled
Hyper-Threading set to Disabled
LLC Prefetch set to Enable

Sysinfo program /home/cpu2017-1.1.8-ic2021.1-revA-update1/bin/sysinfo
Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16acaf64d
running on localhost Thu Jul 1 18:30:07 2021

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 5318N CPU @ 2.10GHz
  2 "physical id"s (chips)
  48 "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 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23
physical 1: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23

From lscpu from util-linux 2.33.1:
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
Address sizes: 46 bits physical, 57 bits virtual
CPU(s): 48
On-line CPU(s) list: 0-47
Thread(s) per core: 1
Core(s) per socket: 24
Socket(s): 2
NUMA node(s): 2
Vendor ID: GenuineIntel
CPU family: 6
Model: 106
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Model name: Intel(R) Xeon(R) Gold 5318N CPU @ 2.10GHz
Stepping: 6
CPU MHz: 2465.110
BogoMIPS: 4200.00
Virtualization: VT-x
L1d cache: 48K
L1i cache: 32K
L2 cache: 1280K
L3 cache: 36864K
NUMA node0 CPU(s): 0-23
NUMA node1 CPU(s): 24-47
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 pdpe1gb rdtscp lm constant_tsc arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc aperfmperf 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 cpuid_fault epb cat_13 invpcid_single ssbd mba ibrs ibpb stibp ibrs_enhanced tpr_shadow vnmi flexpriority ept vpid ept_ad fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 ersed revpcid rtm cqm rdt_a avx512f avx512dq rdseed adx smap avx512ifma clflushopt clwb intel_pt avx512cd sha_ni avx512bw avx512vl xsaveopt xasave xsavec xax64 xsavecf cmqm_l1c cmqm_occup_l1c cmqm_mbb_total cmqm_mbb_local wbnoinvd dtherm ida arat pfn pt avx512vdcl umip pku ospke avx512_vbmi2 gfni vaes vpclmulqdq avx512_vnni avx512_bitalg tme avx512_vpopcntdq la57 rdrpid md_clear pconfig flush_l1d arch_capabilities

From /proc/cpuinfo cache data
  cache size : 36864 KB

From numactl --hardware
WARNING: a numactl 'node' might or might not correspond to a physical chip.
  available: 2 nodes (0-1)
  node 0 cpus: 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23
  node 0 size: 515680 MB
  node 0 free: 515219 MB
  node 1 cpus: 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47
  node 1 size: 516053 MB
  node 1 free: 515407 MB
  node distances:
    node 0 1
    0: 10 20
    1: 20 10

From /proc/meminfo
MemTotal: 1056495480 kB
HugePages_Total: 0
Hugepagesize: 2048 kB

(Continued on next page)
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SPECSPEED®2017_fp_peak = Not Run  
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Platform Notes (Continued)

/usr/bin/lsb_release -d
SUSE Linux Enterprise Server 15 SP2

From /etc/*release* /etc/*version*
os-release:
NAME="SLES"
VERSION="15-SP2"
VERSION_ID="15.2"
PRETTY_NAME="SUSE Linux Enterprise Server 15 SP2"
ID="sles"
ID_LIKE="suse"
ANSI_COLOR="0;32"
CPE_NAME="cpe:/o:suse:sles:15:sp2"

uname -a:
Linux localhost 5.3.18-22-default #1 SMP Wed Jun 3 12:16:43 UTC 2020 (720aeba) x86_64
x86_64 x86_64 GNU/Linux

Kernel self-reported vulnerability status:

CVE-2018-12207 (iTLB Multihit): Not affected
CVE-2018-3620 (L1 Terminal Fault): Not affected
Microarchitectural Data Sampling: Not affected
CVE-2017-5754 (Meltdown): Mitigation: Speculative Store
CVE-2018-3639 (Speculative Store Bypass): Bypass disabled via prctl and
CVE-2017-5753 (Spectre variant 1): __user pointer
Mitigation: usercopy/swapgs
CVE-2017-5715 (Spectre variant 2): sanitzation
Mitigation: Enhanced IBRS, IBPB:
CVE-2020-0543 (Special Register Buffer Data Sampling): conditional, RSB filling
CVE-2019-11135 (TSX Asynchronous Abort): Not affected

run-level 3 Jul 1 18:24

SPEC is set to: /home/cpu2017-1.1.8-ic2021.1-revA-update1
Filesysten Type Size Used Avail Use% Mounted on
/dev/sdb3 xfs 891G 53G 838G 6% /

From /sys/devices/virtual/dmi/id
Vendor: Lenovo
Product: ThinkSystem SR650 V2 MB
Product Family: ThinkSystem
Serial: 1234567890

(Continued on next page)
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Platform Notes (Continued)

Additional information from dmidecode 3.2 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:
32x Samsung M393A4G43AB3-CWE 32 GB 2 rank 3200, configured at 2666

BIOS:
BIOS Vendor: Lenovo
BIOS Version: AFE111A-1.02
BIOS Date: 05/07/2021
BIOS Revision: 1.2
Firmware Revision: 1.10

(End of data from sysinfo program)

Compiler Version Notes

==============================================================================
C               | 619.lbm_s(base) 638.imagick_s(base) 644.nab_s(base)
------------------------------------------------------------------------------
Intel(R) C Intel(R) 64 Compiler Classic for applications running on Intel(R)
64, Version 2021.1 Build 20201112_000000
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------

C++, C, Fortran | 607.cactuBSSN_s(base)
------------------------------------------------------------------------------
Intel(R) C++ Intel(R) 64 Compiler Classic for applications running on
Intel(R) 64, Version 2021.1 Build 20201112_000000
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
Intel(R) C Intel(R) 64 Compiler Classic for applications running on Intel(R)
64, Version 2021.1 Build 20201112_000000
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
Intel(R) Fortran Intel(R) 64 Compiler Classic for applications running on
Intel(R) 64, Version 2021.1 Build 20201112_000000
Copyright (C) 1985-2020 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 Classic for applications running on
Intel(R) 64, Version 2021.1 Build 20201112_000000
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

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Fortran, C | 621.wrf_s(base) 627.cam4_s(base) 628.pop2_s(base)
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Intel (R) Fortran Intel (R) 64 Compiler Classic for applications running on
Intel (R) 64, Version 2021.1 Build 20201112_000000
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
Intel (R) C Intel (R) 64 Compiler Classic for applications running on Intel (R)
64, Version 2021.1 Build 20201112_000000
Copyright (C) 1985-2020 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-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch  
- ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP  
- mbranches-within-32B-boundaries

**Fortran benchmarks:**
- m64 -Wl,-z,muldefs -DSPEC_OPENMP -xCORE-AVX2 -ipo -O3 -no-prec-div  
- qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp  
- nostandard-realloc-lhs -mbranches-within-32B-boundaries  
- L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

**Benchmarks using both Fortran and C:**
- m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX2 -ipo -O3 -no-prec-div  
- qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp  
- DSPEC_OPENMP -mbranches-within-32B-boundaries -nostandard-realloc-lhs  
- L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

**Benchmarks using Fortran, C, and C++:**
- m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX2 -ipo -O3 -no-prec-div  
- qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp  
- DSPEC_OPENMP -mbranches-within-32B-boundaries -nostandard-realloc-lhs  
- L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

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:

---

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

**Credits:**
- Tested with SPEC CPU®2017 v1.1.8 on 2021-07-01 06:30:07-0400.
- Originally published on 2021-07-20.