**Lenovo Global Technology**

**ThinkSystem SR650 V2**  
(2.60 GHz, Intel Xeon Platinum 8358)

### SPECspeed®2017_fp_base = 227

**SPECspeed®2017_fp_peak = Not Run**

<table>
<thead>
<tr>
<th>Hardware</th>
<th>Software</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CPU Name:</strong> Intel Xeon Platinum 8358</td>
<td></td>
</tr>
<tr>
<td><strong>Max MHz:</strong> 3400</td>
<td></td>
</tr>
<tr>
<td><strong>Nominal:</strong> 2600</td>
<td></td>
</tr>
<tr>
<td><strong>Enabled:</strong> 64 cores, 2 chips</td>
<td></td>
</tr>
<tr>
<td><strong>Orderable:</strong> 1.2 chips</td>
<td></td>
</tr>
<tr>
<td><strong>Cache L1:</strong> 32 KB I + 48 KB D on chip per core</td>
<td></td>
</tr>
<tr>
<td><strong>L2:</strong> 1.25 MB I+D on chip per core</td>
<td></td>
</tr>
<tr>
<td><strong>L3:</strong> 48 MB I+D on chip per core</td>
<td></td>
</tr>
<tr>
<td><strong>Other:</strong> None</td>
<td></td>
</tr>
<tr>
<td><strong>Memory:</strong> 1 TB (32 x 32 GB 2Rx8 PC4-3200AA-R)</td>
<td></td>
</tr>
<tr>
<td><strong>Storage:</strong> 1 x 960 GB SATA SSD</td>
<td></td>
</tr>
<tr>
<td><strong>Power Management:</strong> BIOS and OS set to prefer performance at the cost of additional power usage</td>
<td></td>
</tr>
</tbody>
</table>

| **OS:** SUSE Linux Enterprise Server 15 SP2 (x86_64)  |
| **Kernel:** 5.3.18-22-default  |
| **Compiler:** C/C++: Version 2021.1 of Intel oneAPI DPC++/C++ Compiler Build 20201113 for Linux; Fortran: Version 2021.1 of Intel Fortran Compiler Classic Build 20201112 for Linux; C/C++: Version 2021.1 of Intel C/C++ Compiler Classic Build 20201112 for Linux |
| **Parallel:** Yes |
| **Firmware:** Lenovo BIOS Version AFE109PT1 1.00 released Apr-2021 |
| **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 |

---

| Threads | 0 | 30 | 60 | 90 | 120 | 150 | 180 | 210 | 240 | 270 | 300 | 330 | 360 | 390 | 420 | 450 | 480 | 510 | 540 | 570 | 600 | 630 | 660 | 690 | 720 | 750 |
|---------|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 603.bwaves_s | 64 |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| 607.cactuBSSN_s | 64 |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| 619.lbm_s | 64 |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| 621.wrf_s | 64 |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| 627.cam4_s | 64 |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| 628.pop2_s | 64 |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| 638.imagick_s | 64 |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| 644.nab_s | 64 |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| 649.fotonik3d_s | 64 |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| 654.roms_s | 64 |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
### Lenovo Global Technology

ThinkSystem SR650 V2  
(2.60 GHz, Intel Xeon Platinum 8358)

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

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>603.bwaves_s</td>
<td>64</td>
<td>78.9</td>
<td>748</td>
<td>80.2</td>
<td>736</td>
<td>79.5</td>
<td>742</td>
</tr>
<tr>
<td>607.cactuBSSN_s</td>
<td>64</td>
<td>58.8</td>
<td>284</td>
<td>59.9</td>
<td>279</td>
<td>60.0</td>
<td>278</td>
</tr>
<tr>
<td>619.lbm_s</td>
<td>64</td>
<td>35.5</td>
<td>148</td>
<td>37.0</td>
<td>141</td>
<td>35.6</td>
<td>147</td>
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<tr>
<td>621.wrf_s</td>
<td>64</td>
<td>62.6</td>
<td>211</td>
<td>63.1</td>
<td>210</td>
<td><strong>62.9</strong></td>
<td><strong>210</strong></td>
</tr>
<tr>
<td>627.cam4_s</td>
<td>64</td>
<td><strong>52.3</strong></td>
<td><strong>170</strong></td>
<td>52.1</td>
<td>170</td>
<td>53.4</td>
<td>166</td>
</tr>
<tr>
<td>628.pop2_s</td>
<td>64</td>
<td>131</td>
<td>91.0</td>
<td>129</td>
<td>92.2</td>
<td><strong>131</strong></td>
<td><strong>91.0</strong></td>
</tr>
<tr>
<td>638.imagick_s</td>
<td>64</td>
<td>53.0</td>
<td>272</td>
<td><strong>53.1</strong></td>
<td><strong>272</strong></td>
<td>53.3</td>
<td>270</td>
</tr>
<tr>
<td>644.nab_s</td>
<td>64</td>
<td><strong>38.9</strong></td>
<td><strong>450</strong></td>
<td>38.8</td>
<td>450</td>
<td>39.0</td>
<td>448</td>
</tr>
<tr>
<td>649.fotonik3d_s</td>
<td>64</td>
<td>83.1</td>
<td>110</td>
<td>82.8</td>
<td>110</td>
<td><strong>83.0</strong></td>
<td><strong>110</strong></td>
</tr>
<tr>
<td>654.roms_s</td>
<td>64</td>
<td>56.4</td>
<td>279</td>
<td><strong>56.2</strong></td>
<td><strong>280</strong></td>
<td>56.1</td>
<td>281</td>
</tr>
</tbody>
</table>

**SPECspeed®2017_fp_base = 227**  
**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/cpu2017-1.1.5-ic2021.1-revA-update1/lib/intel64:/home/cpu2017-1.1.5-ic2021.1-revA-update1/je5.0.1-64"**
- **MALLOC_CONF = "retain:true"**
- **OMP_STACKSIZE = "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: 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.

(Continued on next page)
Lenovo Global Technology
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SPECspeed®2017_fp_base = 227
SPECspeed®2017_fp_peak = Not Run

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/cpu2017-1.1.5-ic2021.1-revA-update1/bin/sysinfo
Rev: r6538 of 2020-09-24 e8664e66d2d7080afeaa89d4b38e2f1c
running on localhost Fri May 14 17:51:45 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) Platinum 8358 CPU @ 2.60GHz
  2 "physical id"s (chips)
64 "processors"
cores, siblings (Caution: counting these is hw and system dependent. The following
e xcerpts from /proc/cpuinfo might not be reliable. Use with caution.)
cpu cores : 32
siblings : 32
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 24
25 26 27 28 29 30 31
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 24
25 26 27 28 29 30 31

From lscpu:
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): 64
On-line CPU(s) list: 0-63
Thread(s) per core: 1
Core(s) per socket: 32
Socket(s): 2
NUMA node(s): 2
Vendor ID: GenuineIntel

(Continued on next page)
Lenovo Global Technology

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CPU2017 License: 9017
Test Sponsor: Lenovo Global Technology
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SPECspeed®2017_fp_base = 227
SPECspeed®2017_fp_peak = Not Run

CPU family: 6
Model: 106
Model name: Intel(R) Xeon(R) Platinum 8358 CPU @ 2.60GHz
Stepping: 6
CPU MHz: 1763.361
BogoMIPS: 5200.00
Virtualization: VT-x
L1d cache: 48K
L1i cache: 32K
L2 cache: 1280K
L3 cache: 49152K
NUMA node0 CPU(s): 0-31
NUMA node1 CPU(s): 32-63

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 art arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc cpuid 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 stibp iommu enhanced_tpr_shadow vmpreboot vmpre良t vmpinvct vmpcoreless vmcbdiff vmclflush dtes64_64bitmode

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 24 25 26 27 28 29 30 31
node 0 size: 515645 MB
node 0 free: 515046 MB
node 1 cpus: 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63
node 1 size: 516085 MB
node 1 free: 515540 MB
node distances:
node 0 1
  0: 10 20
  1: 20 10

From /proc/meminfo

(Continued on next page)
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Tested by: Lenovo Global Technology
Test Date: May-2021
Hardware Availability: Jul-2021
Software Availability: Feb-2021

Platform Notes (Continued)

MemTotal: 1056491840 kB
HugePages_Total: 0
Hugepagesize: 2048 kB

/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 Bypass disabled via prctl and seccomp
CVE-2018-3639 (Speculative Store Bypass): Mitigation: usercopy/swapgs barriers and __user pointer sanitation
CVE-2017-5753 (Spectre variant 1): Mitigation: Enhanced IBRS, IBPB: conditional, RSB filling
CVE-2017-5715 (Spectre variant 2): Not affected
CVE-2020-0543 (Special Register Buffer Data Sampling): Not affected
CVE-2019-11135 (TSX Asynchronous Abort): Not affected

run-level 3 May 14 17:50

SPEC is set to: /home/cpu2017-1.1.5-ic2021.1-revA-update1
Filesystem Type Size Used Avail Use% Mounted on
/dev/sda2 xfs 893G 82G 812G 10% /

From /sys/devices/virtual/dmi/id
Vendor: Lenovo

(Continued on next page)
Lenovo Global Technology
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SPECspeed®2017_fp_base = 227
SPECspeed®2017_fp_peak = Not Run

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

Platform Notes (Continued)

Product: ThinkSystem SR650 V2 MB
Product Family: ThinkSystem
Serial: 1234567890

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:
32x Samsung M393A4G43AB3-CWE 32 GB 2 rank 3200

BIOS:
BIOS Vendor: Lenovo
BIOS Version: AFE109PT1-1.00
BIOS Date: 04/28/2021
BIOS Revision: 1.0
Firmware Revision: 1.0

(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)
(Continued on next page)
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Tested by: Lenovo Global Technology

Test Date: May-2021
Hardware Availability: Jul-2021
Software Availability: Feb-2021

Compiler Version Notes (Continued)

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, C      | 621.wrf_s(base) 627.cam4_s(base) 628.pop2_s(base)

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

(Continued on next page)
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<table>
<thead>
<tr>
<th>SPECspspeed®2017_fp_base</th>
<th>227</th>
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<tbody>
<tr>
<td>SPECspspeed®2017_fp_peak</td>
<td>Not Run</td>
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</table>

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**Test Date:** May-2021  
**Hardware Availability:** Jul-2021  
**Software Availability:** Feb-2021

### Base Portability Flags (Continued)

654.roms_s: -DSPEC_LP64

### 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:

- [http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-ICElake-D.xml](http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-ICElake-D.xml)

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Tested with SPEC CPU®2017 v1.1.5 on 2021-05-14 05:51:45-0400.  
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Originally published on 2021-06-08.