Lenovo Global Technology
ThinkSystem SR550
(2.40 GHz, Intel Xeon Silver 4210R)

**SPEC CPU®2017 Floating Point Speed Result**

CPU2017 License: 9017  Test Date: Mar-2020
Test Sponsor: Lenovo Global Technology  Hardware Availability: Mar-2020
Tested by: Lenovo Global Technology  Software Availability: Sep-2019

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**Threads**

<table>
<thead>
<tr>
<th>SPECspeed®2017_fp_base</th>
<th>SPECspeed®2017_fp_peak</th>
</tr>
</thead>
<tbody>
<tr>
<td>82.6</td>
<td>Not Run</td>
</tr>
</tbody>
</table>

---

**Hardware**

- **CPU Name:** Intel Xeon Silver 4210R
- **Max MHz:** 3200
- **Nominal:** 2400
- **Enabled:** 20 cores, 2 chips
- **Orderable:** 1,2 chips
- **Cache L1:** 32 KB I + 32 KB D on chip per core
- **L2:** 1 MB I+D on chip per core
- **L3:** 13.75 MB I+D on chip per chip
- **Memory:** 384 GB (12 x 32 GB 2Rx4 PC4-2933Y-R, running at 2400)
- **Storage:** 1 x 960 GB SATA SSD
- **Other:** None

**Software**

- **OS:** SUSE Linux Enterprise Server 15 SP1 (x86_64)
  Kernel 4.12.14-195-default
- **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 TEE152L 2.51 released Feb-2020
  tested as TEE151L 2.51 Jan-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
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Results Table

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<tr>
<th>Benchmark</th>
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<tr>
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</tbody>
</table>

SPECspeed®2017_fp_base = 82.6  
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/lib/intel64"
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.  
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)

(Continued on next page)
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Hardware Availability: Mar-2020
Software Availability: Sep-2019

General Notes (Continued)

is mitigated in the system as tested and documented.

Platform Notes

BIOS configuration:
Choose Operating Mode set to Maximum Performance and then set it to Custom Mode
MONITOR/MWAIT set to Enable
Hyper-Threading set to Disable

Sysinfo program /home/cpu2017-1.1.0-ic19.0u5/bin/sysinfo
Rev: r6365 of 2019-08-21 295195f888a3d7ed6e66e46a485a0011

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) Silver 4210R CPU @ 2.40GHz
  2 "physical id"s (chips)
  20 "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: 10
siblings: 10
  physical 0: cores 0 1 2 3 4 8 9 10 11 12
  physical 1: cores 0 1 2 3 4 8 9 10 11 12

From lscpu:
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
Address sizes: 46 bits physical, 48 bits virtual
CPU(s): 20
On-line CPU(s) list: 0-19
Thread(s) per core: 1
Core(s) per socket: 10
Socket(s): 2
NUMA node(s): 2
Vendor ID: GenuineIntel
CPU family: 6
Model: 85
Model name: Intel(R) Xeon(R) Silver 4210R CPU @ 2.40GHz
Stepping: 7
CPU MHz: 2400.000
CPU max MHz: 3200.0000

(Continued on next page)
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Platform Notes (Continued)

CPU min MHz: 1000.0000
BogoMIPS: 4800.00
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 14080K
NUMA node0 CPU(s): 0-9
NUMA node1 CPU(s): 10-19
 Flags: fpu vme de pse tsc msr pae 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 cpuid
aperfmpref pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg fma cx16
xtrp 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_l3 cdp_l3
invpcid_single intel_pppin ssbd mba ibrs ibpb 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 intel_pt avx512cd
avx512bw avx512vl xsaveopt xsaves xsavec xgetbv1 xsavec cqm_llc cqm_occup_llc cqm_mbb_total

cqm_mbb_local dtherm ida arat pln pts pku ospke avx512_vnni md_clear flush_l1d
arch_capabilities

/proc/cpuinfo cache data
 cache size : 14080 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
 node 0 size: 193123 MB
 node 0 free: 192447 MB
 node 1 cpus: 10 11 12 13 14 15 16 17 18 19
 node 1 size: 193533 MB
 node 1 free: 193337 MB
 node distances:
 node 0 1
 0: 10 21
 1: 21 10

From /proc/meminfo
 MemTotal: 395937200 kB
 HugePages_Total: 0
 Hugepagesize: 2048 kB

From /etc/*release* /etc/*version*
 os-release:
 NAME="SLES"

(Continued on next page)
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Platform Notes (Continued)

VERSION="15-SP1"
VERSION_ID="15.1"
PRETTY_NAME="SUSE Linux Enterprise Server 15 SP1"
ID="sles"
ID_LIKE="suse"
ANSI_COLOR="0;32"
CPE_NAME="cpe:/o:suse:sles:15:sp1"

uname -a:
   Linux linux-h3af 4.12.14-195-default #1 SMP Tue May 7 10:55:11 UTC 2019 (8fba516)
x86_64 x86_64 x86_64 GNU/Linux

Kernel self-reported vulnerability status:
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: __user pointer sanitization
CVE-2017-5715 (Spectre variant 2): Mitigation: Enhanced IBRS, IBFB: conditional, RSB filling

run-level 3 Mar 25 13:42

SPEC is set to: /home/cpu2017-1.1.0-ic19.0u5

<table>
<thead>
<tr>
<th>Filesystem</th>
<th>Type</th>
<th>Size</th>
<th>Used</th>
<th>Avail</th>
<th>Use%</th>
<th>Mounted on</th>
</tr>
</thead>
<tbody>
<tr>
<td>/dev/sda3</td>
<td>xfs</td>
<td>743G</td>
<td>32G</td>
<td>711G</td>
<td>5%</td>
<td>/</td>
</tr>
</tbody>
</table>

From /sys/devices/virtual/dmi/id
BIOS: Lenovo -[Tee151L-2.51]- 01/13/2020
Vendor: Lenovo
Product: ThinkSystem SR550 -[7X03RCZ000]-
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:
   12x Samsung M393A4K40CB2-CVF 32 GB 2 rank 2933

(End of data from sysinfo program)
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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,
Version 19.0.5.281 Build 20190815
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------

==============================================================================
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,
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------------------------------------------------------------------------------

Base Compiler Invocation

C benchmarks:
icc

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### SPECspeed®2017 fp_base = 82.6

**SPECspeed®2017 fp_peak = Not Run**

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### Base Compiler Invocation (Continued)

**Fortran benchmarks:**

```bash
ifort
```

**Benchmarks using both Fortran and C:**

```bash
ifort icc
```

**Benchmarks using Fortran, C, and C++:**

```bash
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`

---

### Base Optimization Flags

**C benchmarks:**

```bash
-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:**

```bash
-m64 -DSPEC_OPENMP -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 both Fortran and C:**

```bash
-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++:**

```bash
-m64 -std=c11 -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP
```

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</tbody>
</table>

**SPECspeed®2017_fp_base = 82.6**

**SPECspeed®2017_fp_peak = Not Run**

**Base Optimization Flags (Continued)**

Benchmarks using Fortran, C, and C++ (continued):

-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/Intel-ic19.0u5-official-linux64_rev0.xml

http://www.spec.org/cpu2017/flags/lenovo-platform-speccpu2017-flags-v1.2-CLX-F.xml

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