## Lenovo Global Technology

**ThinkSystem SR950**  
(2.70 GHz, Intel Xeon Gold 6226)

### Hardware

<table>
<thead>
<tr>
<th>Component</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU Name</td>
<td>Intel Xeon Gold 6226</td>
</tr>
<tr>
<td>Max MHz</td>
<td>3700</td>
</tr>
<tr>
<td>Nominal</td>
<td>2700</td>
</tr>
<tr>
<td>Enabled</td>
<td>48 cores, 4 chips</td>
</tr>
<tr>
<td>Orderable</td>
<td>2,3,4 chips</td>
</tr>
<tr>
<td>Cache L1</td>
<td>32 KB I + 32 KB D on chip per core</td>
</tr>
<tr>
<td>L2</td>
<td>1 MB I+D on chip per core</td>
</tr>
<tr>
<td>L3</td>
<td>19.25 MB I+D on chip per chip</td>
</tr>
<tr>
<td>Memory</td>
<td>768 GB (48 x 16 GB 2Rx8 PC4-2933Y-R)</td>
</tr>
<tr>
<td>Storage</td>
<td>1 x 800 GB SATA SSD</td>
</tr>
<tr>
<td>Other</td>
<td>None</td>
</tr>
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</table>

### Software

<table>
<thead>
<tr>
<th>Component</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>OS</td>
<td>SUSE Linux Enterprise Server 15 (x86_64)</td>
</tr>
<tr>
<td>Compiler C/C++</td>
<td>Version 19.0.4.227 of Intel</td>
</tr>
<tr>
<td>Compiler C/C++</td>
<td>Compiler for Linux;</td>
</tr>
<tr>
<td>Compiler Fortran</td>
<td>Version 19.0.4.227 of Intel Fortran</td>
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<tr>
<td>Parallel</td>
<td>Yes</td>
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<tr>
<td>Firmware</td>
<td>Lenovo BIOS Version PSE122R 1.53 released Aug-2019 tested as PSE121R 1.53 Jul-2019</td>
</tr>
<tr>
<td>File System</td>
<td>xfs</td>
</tr>
<tr>
<td>System State</td>
<td>Run level 3 (multi-user)</td>
</tr>
<tr>
<td>Base Pointers</td>
<td>64-bit</td>
</tr>
<tr>
<td>Peak Pointers</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>Other</td>
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<td>Power Management</td>
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### SPECspeed®2017 fp_base = 176

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>603.bwaves_s</td>
<td>Not Run</td>
</tr>
<tr>
<td>607.cactuBSSN_s</td>
<td>164</td>
</tr>
<tr>
<td>619.lbm_s</td>
<td>160</td>
</tr>
<tr>
<td>621.wrf_s</td>
<td>137</td>
</tr>
<tr>
<td>627.cam4_s</td>
<td>117</td>
</tr>
<tr>
<td>628.pop2_s</td>
<td>61.8</td>
</tr>
<tr>
<td>638.imagick_s</td>
<td>151</td>
</tr>
<tr>
<td>644.nab_s</td>
<td>296</td>
</tr>
<tr>
<td>649.fotonik3d_s</td>
<td>115</td>
</tr>
<tr>
<td>654.roms_s</td>
<td>264</td>
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</tbody>
</table>

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**Note:** All results are for SPECspeed®2017 fp_base = 176.
Lenovo Global Technology
ThinkSystem SR950
(2.70 GHz, Intel Xeon Gold 6226)

CPU2017 License: 9017  
Test Sponsor: Lenovo Global Technology  
Tested by: Lenovo Global Technology  
Test Date: Aug-2019  
Hardware Availability: Jul-2019  
Software Availability: May-2019

Results Table

<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>48</td>
<td>71.8</td>
<td>822</td>
<td>72.1</td>
<td>819</td>
<td>72.2</td>
<td>817</td>
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<tr>
<td>607.cactuBSSN_s</td>
<td>48</td>
<td>102</td>
<td>164</td>
<td>102</td>
<td>164</td>
<td>103</td>
<td>162</td>
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<tr>
<td>619.lbm_s</td>
<td>48</td>
<td>32.7</td>
<td>160</td>
<td>32.6</td>
<td>160</td>
<td>32.7</td>
<td>160</td>
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<tr>
<td>621.wrf_s</td>
<td>48</td>
<td>96.8</td>
<td>137</td>
<td>96.0</td>
<td>138</td>
<td>97.2</td>
<td>136</td>
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<tr>
<td>627.cam4_s</td>
<td>48</td>
<td>76.1</td>
<td>117</td>
<td>75.7</td>
<td>117</td>
<td>76.0</td>
<td>117</td>
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<tr>
<td>628.pop2_s</td>
<td>48</td>
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<td>62.3</td>
<td>193</td>
<td>61.4</td>
<td>192</td>
<td>61.8</td>
</tr>
<tr>
<td>638.imagick_s</td>
<td>48</td>
<td>95.7</td>
<td>151</td>
<td>95.4</td>
<td>151</td>
<td>95.8</td>
<td>151</td>
</tr>
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<td>644.nab_s</td>
<td>48</td>
<td>59.1</td>
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<td>59.1</td>
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<tr>
<td>649.fotonik3d_s</td>
<td>48</td>
<td>79.3</td>
<td>115</td>
<td>79.4</td>
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<tr>
<td>654.roms_s</td>
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<td>59.7</td>
<td>264</td>
<td>59.6</td>
<td>264</td>
<td>59.8</td>
<td>263</td>
</tr>
</tbody>
</table>

SPECspeed®2017_fp_base = 176  
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"

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-ic19.0u4/lib/intel64"
OMP_STACKSIZE = "192M"

Binaries compiled on a system with 1x Intel Core i9-799X CPU + 32GB RAM
memory using Redhat Enterprise Linux 7.5
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.
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.
## Lenovo Global Technology

ThinkSystem SR950  
(2.70 GHz, Intel Xeon Gold 6226)

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

<table>
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<th>9017</th>
</tr>
</thead>
<tbody>
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<td>Test Sponsor:</td>
<td>Lenovo Global Technology</td>
</tr>
<tr>
<td>Tested by:</td>
<td>Lenovo Global Technology</td>
</tr>
<tr>
<td>Test Date:</td>
<td>Aug-2019</td>
</tr>
<tr>
<td>Hardware Availability:</td>
<td>Jul-2019</td>
</tr>
<tr>
<td>Software Availability:</td>
<td>May-2019</td>
</tr>
</tbody>
</table>

### Platform Notes

BIOS configuration:
- Choose Operating Mode set to Maximum Performance
- Choose Operating Mode set to Custom Mode
- CPU P-state Control set to Autonomous
- Hyper-Threading set to Disable
- Trusted Execution Technology set to Enable
- DCU Streamer Prefetcher set to Disable
- MONITOR/MWAIT set to Enable

- Sysinfo program /home/cpu2017-1.0.5-ic19.0u4/bin/sysinfo
- Rev: r5974 of 2018-05-19 9bcde8f2999c33d61f64985e45859ea9
- running on linux-ult8 Tue Aug 13 13:16:55 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) Gold 6226 CPU @ 2.70GHz
- 4 "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: 12
  - siblings: 12
  - physical 0: cores 0 2 3 5 6 8 9 10 11 12 13 14
  - physical 1: cores 0 2 3 4 5 8 9 10 11 12 13 14
  - physical 2: cores 0 2 3 4 5 8 9 10 11 12 13 14
  - physical 3: cores 0 1 2 3 4 5 6 8 9 11 12 13

From lscpu:
- Architecture: x86_64
- CPU op-mode(s): 32-bit, 64-bit
- Byte Order: Little Endian
- CPU(s): 48
- On-line CPU(s) list: 0-47
- Thread(s) per core: 1
- Core(s) per socket: 12
- Socket(s): 4
- NUMA node(s): 4
- Vendor ID: GenuineIntel
- CPU family: 6
- Model: 85
- Model name: Intel(R) Xeon(R) Gold 6226 CPU @ 2.70GHz
- Stepping: 7
- CPU MHz: 2700.000
- BogoMIPS: 5400.00
- Virtualization: VT-x

(Continued on next page)
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SPECspeed®2017_fp_base = 176
SPECspeed®2017_fp_peak = Not Run

Platform Notes (Continued)

L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 19712K
NUMA node0 CPU(s): 0-11
NUMA node1 CPU(s): 12-23
NUMA node2 CPU(s): 24-35
NUMA node3 CPU(s): 36-47

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  cpuid
    aperfmperf  pni  pclmulqdq  dtes64  monitor  ds_cpl  vmx  smx  est
    tm2  ssse3  sdbg  fma  cx16
    xtrcm  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  cd
    invpcid_single  ssbd  mba  ibrs  ibpb  stibp  tpr_shadow  vnmi  flexpriority  ept
    fsgsbase  tsc_adjust  bmi1  hle  avx2  smep  bmi2  erms  invpcid  rtc
    avx512dq  rdseed  adx  smap  clflushopt
    clwb  intel_pt  avx512cd
    avx512bw
    avx512vl
    xsaves  xsaveopt  xsavec  xgetbv1  xsave  cr3  occurr

/proc/cpuinfo cache data
    cache size : 19712 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
    node 0 size: 193118 MB
    node 0 free: 189791 MB
    node 1 cpus: 12 13 14 15 16 17 18 19 20 21 22 23
    node 1 size: 193486 MB
    node 1 free: 192603 MB
    node 2 cpus: 24 25 26 27 28 29 30 31 32 33 34 35
    node 2 size: 193515 MB
    node 2 free: 193292 MB
    node 3 cpus: 36 37 38 39 40 41 42 43 44 45 46 47
    node 3 size: 193512 MB
    node 3 free: 192889 MB
    node distances:
        node 0 1 2 3
        0: 10 21 21 21
        1: 21 10 21 21
        2: 21 21 10 21
        3: 21 21 21 10

From /proc/meminfo
    MemTotal: 792200076 KB

(Continued on next page)
Platform Notes (Continued)

```
HugePages_Total:       0
Hugepagesize:       2048 kB

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

uname -a:
  Linux linux-u1b8 4.12.14-25.13-default #1 SMP Tue Aug 14 15:07:35 UTC 2018 (947aa51)
  x86_64 x86_64 x86_64 GNU/Linux

Kernel self-reported vulnerability status:

CVE-2017-5754 (Meltdown): Not affected
CVE-2017-5753 (Spectre variant 1): Mitigation: __user pointer sanitization
CVE-2017-5715 (Spectre variant 2): Mitigation: Indirect Branch Restricted Speculation, IBPB, IBRS_FW

run-level 3 Aug 13 10:50

SPEC is set to: /home/cpu2017-1.0.5-ic19.0u4
  Filesystem  Type  Size  Used Avail Use% Mounted on
  /dev/sda2    xfs   744G   45G  700G   6% /

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 -[PSE121R-1.53]- 07/03/2019
  Memory:
    48x NO DIMM NO DIMM
    48x Samsung M393A2K43CB2-CVF 16 GB 2 rank 2933

(End of data from sysinfo program)
```
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Hardware Availability: Jul-2019
Software Availability: May-2019

SPECSpeed®2017_fp_base = 176
SPECSpeed®2017_fp_peak = Not Run

Compiler Version Notes (Continued)

Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
Version 19.0.4.227 Build 20190416
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 19.0.4.227 Build 20190416
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.
Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
Version 19.0.4.227 Build 20190416
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.
Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)
64, Version 19.0.4.227 Build 20190416
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------
Fortran         | 603.bwaves_s(base) 649.fotonik3d_s(base) 654.roms_s(base)
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Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)
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------------------------------------------------------------------------------
Fortran, C      | 621.wrf_s(base) 627.cam4_s(base) 628.pop2_s(base)
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Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
Version 19.0.4.227 Build 20190416
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

Base Compiler Invocation

C benchmarks:
icc -m64 -std=c11

Fortran benchmarks:
ifort -m64
Base Compiler Invocation (Continued)

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.cactusBSSN_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 bytelencl
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
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The flags files that were used to format this result can be browsed at

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

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

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Tested with SPEC CPU\textsuperscript{\textcopyright}2017 v1.0.5 on 2019-08-13 01:16:55-0400.


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