Lenovo Global Technology
ThinkSystem SR950
(3.80 GHz, Intel Xeon Platinum 8256)

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

Threads

<table>
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<th>Benchmark</th>
<th>Threads</th>
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<tr>
<td>603.bwaves_s</td>
<td>16</td>
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<tr>
<td>607.cactusBSSN_s</td>
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<tr>
<td>619.lbm_s</td>
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<tr>
<td>621.wrf_s</td>
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<tr>
<td>627.cam4_s</td>
<td>16</td>
</tr>
<tr>
<td>628.pop2_s</td>
<td>16</td>
</tr>
<tr>
<td>638.imagick_s</td>
<td>16</td>
</tr>
<tr>
<td>644.nab_s</td>
<td>16</td>
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<tr>
<td>649.fotonik3d_s</td>
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<tr>
<td>654.roms_s</td>
<td>16</td>
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</table>

SPECspeed®2017_fp_base = 100
SPECspeed®2017_fp_peak = Not Run

Hardware

CPU Name: Intel Xeon Platinum 8256
Max MHz: 3900
Nominal: 3800
Enabled: 16 cores, 4 chips
Orderable: 2,3,4 chips
Cache L1: 32 KB I + 32 KB D on chip per core
L2: 1 MB I+D on chip per core
L3: 16.5 MB I+D on chip per chip
Other: None
Memory: 768 GB (48 x 16 GB 2Rx8 PC4-2933Y-R)
Storage: 1 x 800 GB SATA SSD
Other: None

Software

OS: SUSE Linux Enterprise Server 15 (x86_64)
Compiler: C/C++: Version 19.0.4.227 of Intel
C/C++ Compiler for Linux;
Fortran: Version 19.0.4.227 of Intel Fortran
Compiler for Linux
Parallel: Yes
Firmware: Lenovo BIOS Version PSE122R 1.53 released Aug-2019
tested as PSE121R 1.53 Jul-2019
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

Test Date: Nov-2019
Hardware Availability: Apr-2019
Software Availability: May-2019
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SPECspeed®2017_fp_base = 100
SPECspeed®2017_fp_peak = Not Run

Test Date: Nov-2019
Hardware Availability: Apr-2019
Software Availability: May-2019

Results Table

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<td>88.8</td>
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<td>123</td>
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<td>121</td>
<td>128</td>
<td>123</td>
</tr>
</tbody>
</table>

SPECspeed®2017_fp_base = 100
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-ic19.0u4/lib/intel64"
OMP_STACKSIZE = "192M"

General Notes

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
Filesysten 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)

(Continued on next page)
Lenovo Global Technology
ThinkSystem SR950
(3.80 GHz, Intel Xeon Platinum 8256)

SPECSpeed®2017_fp_base = 100
SPECSpeed®2017_fp_peak = Not Run

General Notes (Continued)

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.

Platform Notes

BIOS configuration:
Choose Operating Mode set to Maximum Performance and then set it 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
SNC set to Enable

Sysinfo program /home/cpu2017-1.1.0-ic19.0u4/bin/sysinfo
Rev: r6365 of 2019-08-21 295195f888a3d7ed1b6e64a485a0011
running on linux-u1b8 Fri Nov 22 20:49:31 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) Platinum 8256 CPU @ 3.80GHz
  4 "physical id"s (chips)
  16 "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 : 4
siblings : 4
physical 0: cores 1 5 9 13
physical 1: cores 1 2 5 13
physical 2: cores 4 8 9 13
physical 3: cores 2 5 9 13

From lscpu:
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 16
On-line CPU(s) list: 0-15
Thread(s) per core: 1
Core(s) per socket: 4
Socket(s): 4
NUMA node(s): 4

(Continued on next page)
**Lenovo Global Technology**  
ThinkSystem SR950  
(3.80 GHz, Intel Xeon Platinum 8256)

<table>
<thead>
<tr>
<th>CPU2017 License:</th>
<th>9017</th>
<th>Test Date:</th>
<th>Nov-2019</th>
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<tbody>
<tr>
<td>Test Sponsor:</td>
<td>Lenovo Global Technology</td>
<td>Hardware Availability:</td>
<td>Apr-2019</td>
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<tr>
<td>Tested by:</td>
<td>Lenovo Global Technology</td>
<td>Software Availability:</td>
<td>May-2019</td>
</tr>
</tbody>
</table>

### Platform Notes (Continued)

- **Vendor ID:** GenuineIntel  
- **CPU family:** 6  
- **Model:** 85  
- **Model name:** Intel(R) Xeon(R) Platinum 8256 CPU @ 3.80GHz  
- **Stepping:** 6  
- **CPU MHz:** 3800.000  
- **CPU max MHz:** 3900.0000  
- **CPU min MHz:** 1200.0000  
- **BogoMIPS:** 7600.00  
- **Virtualization:** VT-x  
- **L1d cache:** 32K  
- **L1i cache:** 32K  
- **L2 cache:** 1024K  
- **L3 cache:** 16896K  
- **NUMA node0 CPU(s):** 0-3  
- **NUMA node1 CPU(s):** 4-7  
- **NUMA node2 CPU(s):** 8-11  
- **NUMA node3 CPU(s):** 12-15  
- **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 rdtsscp 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 pdpct tsc_deadline_timer aes xsave avx f16c rdrand lahf_lm abmonowprefetch cmpd fault epb cat_l3 cdp_l3 invpcid_single ssbd mba ibrs ibpb stibp tpr_shadow vntm flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erts invpcid rtm cqm mpx rdt_a avx512f avx512dq rdseed adx smap clflushopt clwb intel_pt avx512cd avx512bw avx512vl xsaveopt xsaveprec qgetbv1 xsaves cqm_llc cqm_occu_llc cqm_mbb_total cqm_mbb_local dtherm ida arat pln pni pts pku ospke avx512_vnni flush_l1d arch_capabilities

```
/platform/cpuinfo cache data
  cache size : 16896 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  
node 0 size: 193118 MB  
node 0 free: 188657 MB  
node 1 cpus: 4 5 6 7  
node 1 size: 193515 MB  
node 1 free: 193101 MB  
node 2 cpus: 8 9 10 11  
node 2 size: 193486 MB  
node 2 free: 193243 MB  
node 3 cpus: 12 13 14 15  
node 3 size: 193512 MB
Lenovo Global Technology  
ThinkSystem SR950  
(3.80 GHz, Intel Xeon Platinum 8256)  

Platform Notes (Continued)

node 3 free: 193261 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: 792199484 kB  
HugePages_Total: 0  
Hugepagesize: 2048 kB

From /etc/*release* /etc/*version*  
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-2018-3620 (L1 Terminal Fault): Not affected  
Microarchitectural Data Sampling: No status reported  
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: Indirect Branch Restricted Speculation, IBPB, IBRS_FW

run-level 3 Nov 22 18:11

SPEC is set to: /home/cpu2017-1.1.0-ic19.0u4  
Filesystem Type Size Used Avail Use% Mounted on  
/dev/sda2 xfs 744G 75G 670G 10% /

From /sys/devices/virtual/dmi/id  
BIOS: Lenovo -[PSE121R-1.53]- 07/03/2019

(Continued on next page)
Lenovo Global Technology
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SPECTM 2017 Floating Point Speed Result
Copyright 2017-2019 Standard Performance Evaluation Corporation

Lenovo Global Technology

SPECTM 2017_fp_base = 100
SPECTM 2017_fp_peak = Not Run

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

Platform Notes (Continued)

Vendor: Lenovo
Product: ThinkSystem SR950 -[7X12ABC1WW]-
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 NO DIMM NO DIMM
48x Samsung M393A2K43CB2-CVF 16 GB 2 rank 2933

(End of data from sysinfo program)

Compiler Version Notes

==============================================================================
<table>
<thead>
<tr>
<th>C</th>
<th>619.lbm_s(base) 638.imagick_s(base) 644.nab_s(base)</th>
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<tr>
<td>Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,</td>
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<tr>
<td>Version 19.0.4.227 Build 20190416</td>
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<tr>
<td>Copyright (C) 1985-2019 Intel Corporation. All rights reserved.</td>
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SPECSpeed®2017_fp_base = 100
SPECSpeed®2017_fp_peak = Not Run

CPU2017 License: 9017
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Compiler Version Notes (Continued)
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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

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.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
Lenovo Global Technology
ThinkSystem SR950
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| SPECspeed\textsuperscript{\textregistered}2017\(_{\text{fp}}\)\textunderscore base | 100 |
| SPECspeed\textsuperscript{\textregistered}2017\(_{\text{fp}}\)\textunderscore peak | Not Run |

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

**Hardware Availability:** Apr-2019
**Software Availability:** May-2019

**Test Date:** Nov-2019

**Base Optimization Flags**

C benchmarks:
-\texttt{-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch}
-\texttt{-ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC\_OPENMP}

Fortran benchmarks:
-\texttt{-DSPEC\_OPENMP -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch}
-\texttt{-ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp}
-\texttt{-nostandard-realloc-lhs}

Benchmarks using both Fortran and C:
-\texttt{-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch}
-\texttt{-ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC\_OPENMP}
-\texttt{-nostandard-realloc-lhs}

Benchmarks using Fortran, C, and C++:
-\texttt{-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch}
-\texttt{-ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC\_OPENMP}
-\texttt{-nostandard-realloc-lhs}

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-F.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-F.xml