# Lenovo Global Technology

**ThinkSystem SR650**  
(2.30 GHz, Intel Xeon Gold 5218)

| Threads | 0 | 20 | 40 | 60 | 80 | 100 | 120 | 140 | 160 | 180 | 200 | 220 | 240 | 260 | 280 | 300 | 320 | 340 | 360 | 380 | 400 | 420 | 440 | 460 | 480 |
|---------|---|----|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 603.bwaves_s | 32 | 129 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 607.cactuBSSN_s | 32 | 89.9 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 619.lbm_s | 32 | 112 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 621.wrf_s | 32 | 72.0 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 627.cam4_s | 32 | 64.1 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 628.pop2_s | 32 | 94.7 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 638.imagick_s | 32 | 176 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 644.nab_s | 32 | 80.9 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 649.fotonik3d_s | 32 | 145 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 654.roms_s | 32 | SPECspeed2017_fp_base (119) | | | | | | | | | | | | | | | | | | | | | | | | | | |

## Hardware

- **CPU Name:** Intel Xeon Gold 5218  
- **Max MHz.:** 3900  
- **Nominal:** 2300  
- **Enabled:** 32 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:** 22 MB I+D on chip per chip  
- **Memory:** 384 GB (24 x 16 GB 2Rx8 PC4-2933Y-R, running at 2666)  
- **Storage:** 1 x 800 GB SATA SSD  
- **Other:** None

## Software

- **OS:** Red Hat Enterprise Linux Server release 7.6 (Maipo)  
- **Compiler:** C/C++: Version 19.0.1.144 of Intel C/C++ Compiler Build 20181018 for Linux; Fortran: Version 19.0.1.144 of Intel Fortran Compiler Build 20181018 for Linux  
- **Parallel:** Yes  
- **Firmware:** Lenovo BIOS Version IVE135R 2.10 released Feb-2019  
- **System State:** Run level 3 (multi-user)  
- **Base Pointers:** 64-bit  
- **Peak Pointers:** Not Applicable  
- **Other:** None
Lenovo Global Technology

ThinkSystem SR650
(2.30 GHz, Intel Xeon Gold 5218)

SPECspeed2017_fp_base = 119
SPECspeed2017_fp_peak = Not Run

Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Base</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>603.bwaves_s</td>
<td>32</td>
<td>124</td>
<td>477</td>
<td>123</td>
<td>478</td>
<td>123</td>
<td>479</td>
<td></td>
<td></td>
</tr>
<tr>
<td>607.cactuBSSN_s</td>
<td>32</td>
<td>127</td>
<td>131</td>
<td>129</td>
<td>129</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>619.lbm_s</td>
<td>32</td>
<td>58.9</td>
<td>88.9</td>
<td>58.8</td>
<td>89.1</td>
<td>59.0</td>
<td>88.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>621.wrf_s</td>
<td>32</td>
<td>118</td>
<td>112</td>
<td>118</td>
<td>112</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>627.cam4_s</td>
<td>32</td>
<td>123</td>
<td>72.0</td>
<td>123</td>
<td>72.0</td>
<td>123</td>
<td>72.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>628.pop2_s</td>
<td>32</td>
<td>185</td>
<td>64.1</td>
<td>186</td>
<td>63.7</td>
<td>185</td>
<td>64.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>638.imagick_s</td>
<td>32</td>
<td>164</td>
<td>88.0</td>
<td>150</td>
<td>96.3</td>
<td>152</td>
<td>94.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>644.nab_s</td>
<td>32</td>
<td>99.4</td>
<td>176</td>
<td>99</td>
<td>99.5</td>
<td>99.5</td>
<td>176</td>
<td></td>
<td></td>
</tr>
<tr>
<td>649.fotonik3d_s</td>
<td>32</td>
<td>112</td>
<td>81.3</td>
<td>119</td>
<td>76.7</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>654.roms_s</td>
<td>32</td>
<td>109</td>
<td>144</td>
<td>108</td>
<td>146</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

SPECspeed2017_fp_base = 119
SPECspeed2017_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-ic19.0u1/lib/intel64"
OMP_STACKSIZE = "192M"

Binaries compiled on a system with 1x Intel Core i9-7900X CPU + 32GB RAM
memory using Redhat Enterprise Linux 7.5
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
Yes: 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.
### Platform Notes

BIOS configuration:
- Choose Operating Mode set to Maximum Performance
- Choose Operating Mode set to Custom Mode
- C-states set to Legacy
- Hyper-Threading set to Disable
- Adjacent Cache Prefetch set to Disable
- Stale AtoS set to Enable

Sysinfo program /home/cpu2017-1.0.5-ic19.0ull/bin/sysinfo
Rev: r5974 of 2018-05-19 9bcde8f2999c33d61f64985e45859ea9
running on localhost.localdomain Fri Apr 12 15:42:50 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 5218 CPU @ 2.30GHz
  2 "physical id"s (chips)
  32 "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 : 16
siblings : 16
physical 0: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
physical 1: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
```

From lscpu:
```
Architecture:          x86_64
CPU op-mode(s):        32-bit, 64-bit
Byte Order:            Little Endian
CPU(s):                32
On-line CPU(s) list:   0-31
Thread(s) per core:    1
Core(s) per socket:    16
Socket(s):             2
NUMA node(s):          2
Vendor ID:             GenuineIntel
CPU family:            6
Model:                 85
Model name:            Intel(R) Xeon(R) Gold 5218 CPU @ 2.30GHz
Stepping:              6
CPU MHz:               2300.000
BogoMIPS:              4600.00
Virtualization:        VT-x
L1d cache:             32K
L1i cache:             32K
L2 cache:              1024K
```
Lenovo Global Technology
ThinkSystem SR650
(2.30 GHz, Intel Xeon Gold 5218)

SPEC® CPU2017 Floating Point Speed Result
Copyright 2017-2019 Standard Performance Evaluation Corporation

SPECspeed2017_fp_base = 119
SPECspeed2017_fp_peak = Not Run

CPU2017 License: 9017
Test Sponsor: Lenovo Global Technology
Tested by: Lenovo Global Technology
Test Date: Apr-2019
Hardware Availability: Apr-2019
Software Availability: Nov-2018

Platform Notes (Continued)

L3 cache: 22528K
NUMA node0 CPU(s): 0-15
NUMA node1 CPU(s): 16-31
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 arch_perfmon pebs bts rep_good nopl apic sm mtrr pge mca 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 apic sm mtrr pge mca cmov

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
node 0 size: 196281 MB
node 0 free: 191497 MB
node 1 cpus: 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
node 1 size: 196608 MB
node 1 free: 191894 MB
node distances:
node 0: 10 21
node 1: 21 10

From /proc/meminfo
MemTotal: 395879788 kB
HugePages_Total: 0
Hugepagesize: 2048 kB

From /etc/*release* /etc/*version*
os-release:
NAME="Red Hat Enterprise Linux Server"
VERSION="7.6 (Maipo)"
ID=rhel
ID_LIKE="fedora"
VARIANT="Server"
VARIANT_ID="server"
VERSION_ID="7.6"
PRETTY_NAME="Red Hat Enterprise Linux Server 7.6 (Maipo)"

(Continued on next page)
Lenovo Global Technology
ThinkSystem SR650
(2.30 GHz, Intel Xeon Gold 5218)

SPECspeed2017_fp_base = 119
SPECspeed2017_fp_peak = Not Run

Platform Notes (Continued)
redhat-release: Red Hat Enterprise Linux Server release 7.6 (Maipo)
system-release: Red Hat Enterprise Linux Server release 7.6 (Maipo)

uname -a:
Linux localhost.localdomain 3.10.0-957.el7.x86_64 #1 SMP Thu Oct 4 20:48:51 UTC 2018
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: Load fences, __user pointer sanitization
CVE-2017-5715 (Spectre variant 2): Mitigation: Enhanced IBRS

run-level 3 Apr 12 15:41

SPEC is set to: /home/cpu2017-1.0.5-ic19.0u1

Filesystem     Type  Size  Used Avail Use% Mounted on
/dev/sdb2      xfs   689G   18G  672G   3% /home

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 -[IVE135R-2.10]- 02/27/2019
Memory:
24x Samsung M393A2K43CB2-CVF 16 GB 2 rank 2933, configured at 2666

Compiler Version Notes

==============================================================================
CC  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 19.0.1.144 Build 20181018
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------

FC  607.cactuBSSN_s(base)
------------------------------------------------------------------------------
Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64,
Version 19.0.1.144 Build 20181018
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.

(Continued on next page)
Lenovo Global Technology
ThinkSystem SR650
(2.30 GHz, Intel Xeon Gold 5218)

| SPECspeed2017_fp_base | 119 |
| SPECspeed2017_fp_peak | Not Run |

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

Compiler Version Notes (Continued)

Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
Version 19.0.1.144 Build 20181018
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.

Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)
64, Version 19.0.1.144 Build 20181018
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.

Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)
64, Version 19.0.1.144 Build 20181018
Copyright (C) 1985-2018 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
Lenovo Global Technology
ThinkSystem SR650
(2.30 GHz, Intel Xeon Gold 5218)

SPEC2017 fp_base = 119
SPEC2017 fp_peak = Not Run

Base Portability Flags

603.bwaves_s: -DSPEC_LP64
607.cactuBSSN_s: -DSPEC_LP64
619.hm_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:
-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

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-A.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-A.xml
**Lenovo Global Technology**  
ThinkSystem SR650  
(2.30 GHz, Intel Xeon Gold 5218)

<table>
<thead>
<tr>
<th>SPECs speed2017_fp_base</th>
<th>119</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECs speed2017_fp_peak</td>
<td>Not Run</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CPU2017 License:</th>
<th>9017</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Sponsor:</td>
<td>Lenovo Global Technology</td>
</tr>
<tr>
<td>Tested by:</td>
<td>Lenovo Global Technology</td>
</tr>
</tbody>
</table>

| Test Date: | Apr-2019 |
| Hardware Availability: | Apr-2019 |
| Software Availability: | Nov-2018 |

SPEC is a registered trademark of the Standard Performance Evaluation Corporation. All other brand and product names appearing in this result are trademarks or registered trademarks of their respective holders.

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

Tested with SPEC CPU2017 v1.0.5 on 2019-04-12 03:42:49-0400.  