Lenovo Global Technology
ThinkSystem SR650 V2
(2.40 GHz, Intel Xeon Gold 6312U)

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

Test Date: Jun-2021
Hardware Availability: Jul-2021
Software Availability: Dec-2020

Threads

<table>
<thead>
<tr>
<th>Package</th>
<th>Threads</th>
<th>SPECspeed\textsuperscript{2017_fp_base}</th>
</tr>
</thead>
<tbody>
<tr>
<td>603.bwaves_s</td>
<td>24</td>
<td>603.bwaves_s 24</td>
</tr>
<tr>
<td>607.cactuBSSN_s</td>
<td>24</td>
<td>607.cactuBSSN_s 24</td>
</tr>
<tr>
<td>619.lbm_s</td>
<td>24</td>
<td>619.lbm_s 24</td>
</tr>
<tr>
<td>621.wrf_s</td>
<td>24</td>
<td>621.wrf_s 24</td>
</tr>
<tr>
<td>627.cam4_s</td>
<td>24</td>
<td>627.cam4_s 24</td>
</tr>
<tr>
<td>628.pop2_s</td>
<td>24</td>
<td>628.pop2_s 24</td>
</tr>
<tr>
<td>638.imagick_s</td>
<td>24</td>
<td>638.imagick_s 24</td>
</tr>
<tr>
<td>644.nab_s</td>
<td>24</td>
<td>644.nab_s 24</td>
</tr>
<tr>
<td>649.fotonik3d_s</td>
<td>24</td>
<td>649.fotonik3d_s 24</td>
</tr>
<tr>
<td>654.roms_s</td>
<td>24</td>
<td>654.roms_s 24</td>
</tr>
</tbody>
</table>

Hardware

CPU Name: Intel Xeon Gold 6312U
Max MHz: 3600
Nominal: 2400
Enabled: 24 cores, 1 chip
Orderable: 1 chip
Cache L1: 32 KB I + 48 KB D on chip per core
L2: 1.25 MB I+D on chip per core
L3: 36 MB I+D on chip per chip
Other: None
Memory: 512 GB (16 x 32 GB 2Rx8 PC4-3200AA-R)
Storage: 1 x 960 GB SATA SSD
Other: None

Software

OS: SUSE Linux Enterprise Server 15 SP2 (x86_64)
Kernel 5.3.18-22-default
Compiler: 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 AFE111A 1.02 released May-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
Power Management: BIOS and OS set to prefer performance at the cost of additional power usage
Lenovo Global Technology
ThinkSystem SR650 V2
(2.40 GHz, Intel Xeon Gold 6312U)

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

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></td>
<td>Threads</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>603.bwaves_s</td>
<td>24</td>
<td>157</td>
<td>375</td>
<td>159</td>
<td>372</td>
<td>158</td>
<td>372</td>
</tr>
<tr>
<td>607.cactuBSSN_s</td>
<td>24</td>
<td>102</td>
<td>164</td>
<td>102</td>
<td>163</td>
<td>102</td>
<td>164</td>
</tr>
<tr>
<td>619.lbm_s</td>
<td>24</td>
<td>66.2</td>
<td>79.1</td>
<td>66.6</td>
<td>78.6</td>
<td>66.5</td>
<td>78.8</td>
</tr>
<tr>
<td>621.wrf_s</td>
<td>24</td>
<td>101</td>
<td>131</td>
<td>100</td>
<td>132</td>
<td>101</td>
<td>131</td>
</tr>
<tr>
<td>627.cam4_s</td>
<td>24</td>
<td>110</td>
<td>80.9</td>
<td>110</td>
<td>80.6</td>
<td>110</td>
<td>80.9</td>
</tr>
<tr>
<td>628.pop2_s</td>
<td>24</td>
<td>132</td>
<td>90.2</td>
<td>132</td>
<td>89.9</td>
<td>132</td>
<td>90.3</td>
</tr>
<tr>
<td>638.imagick_s</td>
<td>24</td>
<td>122</td>
<td>118</td>
<td>122</td>
<td>118</td>
<td>123</td>
<td>118</td>
</tr>
<tr>
<td>644.nab_s</td>
<td>24</td>
<td>90.0</td>
<td>194</td>
<td>90.0</td>
<td>194</td>
<td>90.0</td>
<td>194</td>
</tr>
<tr>
<td>649.fotonik3d_s</td>
<td>24</td>
<td>131</td>
<td>69.5</td>
<td>131</td>
<td>69.7</td>
<td>131</td>
<td>69.5</td>
</tr>
<tr>
<td>654.roms_s</td>
<td>24</td>
<td>152</td>
<td>104</td>
<td>152</td>
<td>103</td>
<td>151</td>
<td>105</td>
</tr>
</tbody>
</table>

SPECspeed®2017_fp_base = 123
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"
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)
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/cpu2017-1.1.8-ic2021.1-revA-update1/bin/sysinfo
Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16acaf64d
running on localhost Sat Jun 26 01:59:30 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) Gold 6312U CPU @ 2.40GHz
    1 "physical id"s (chips)
    24 "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 : 24
siblings : 24
   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

From lscpu from util-linux 2.33.1:
  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): 24
  On-line CPU(s) list: 0-23
  Thread(s) per core: 1
  Core(s) per socket: 24
  Socket(s): 1
  NUMA node(s): 1
  Vendor ID: GenuineIntel
  CPU family: 6
  Model: 106
  Model name: Intel(R) Xeon(R) Gold 6312U CPU @ 2.40GHz

(Continued on next page)
Lenovo Global Technology

ThinkSystem SR650 V2
(2.40 GHz, Intel Xeon Gold 6312U)

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

**Platform Notes (Continued)**

Stepping: 6
CPU MHz: 3600.000
BogoMIPS: 4800.00
Virtualization: VT-x
L1d cache: 48K
L1i cache: 32K
L2 cache: 1280K
L3 cache: 36864K
NUMA node0 CPU(s): 0-23
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 xtrr 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 invpcid_single ssbd mbx ibrs ibpb stibp ibrs_enabled tpr_shadow vnmi flexpriority ept vpid ept_ad fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 0rms invpcid rtm cqm rdt_a avx512f avx512dq rdseed adx smap avx512ifma clflushopt clwb intel_pt avx512cd sha ni avx512bw avx512vl xsaveopt xsavec xgetbv1 xsavecs cqm_llc cqm_occup_llc cqm_mbb_total cqm_mbb_local wboinvd dtherm ida arat pfn pts avx512vni umip pku ospke avx512_vbmi2 gfnl vaes vpclmulqdq avx512_vnni avx512_bitalg tme avx512_vpopcntdq la57 rdpid md_clear pconfig flush_l1d arch_capabilities

/proc/cpuinfo cache data
  cache size : 36864 KB

From numactl --hardware
  WARNING: a numactl 'node' might or might not correspond to a physical chip.
  available: 1 nodes (0)
    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
  node 0 size: 515452 MB
  node 0 free: 514780 MB
  node distances:
    node 0
      0: 10

From /proc/meminfo
  MemTotal: 527823408 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"

(Continued on next page)
# SPEC CPU®2017 Floating Point Speed Result

## Lenovo Global Technology

**ThinkSystem SR650 V2**  
(2.40 GHz, Intel Xeon Gold 6312U)

<table>
<thead>
<tr>
<th>SPECspeed®2017_fp_base</th>
<th>123</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECspeed®2017_fp_peak</td>
<td>Not Run</td>
</tr>
</tbody>
</table>

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

**Test Date:** Jun-2021  
**Hardware Availability:** Jul-2021  
**Software Availability:** Dec-2020

---

### Platform Notes (Continued)

```
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 sanitization
- **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 Jun 26 01:57**

**SPEC is set to:** /home/cpu2017-1.1.8-ic2021.1-revA-updatel

<table>
<thead>
<tr>
<th>Filesystem</th>
<th>Type</th>
<th>Size</th>
<th>Used</th>
<th>Avail</th>
<th>Use% Mounted on</th>
</tr>
</thead>
<tbody>
<tr>
<td>/dev/sda3</td>
<td>xfs</td>
<td>891G</td>
<td>53G</td>
<td>838G</td>
<td>6% /</td>
</tr>
</tbody>
</table>

**From /sys/devices/virtual/dmi/id**

- **Vendor:** Lenovo
- **Product:** ThinkSystem SR650 V2 MB
- **Product Family:** ThinkSystem
- **Serial:** 1234567890

**Additional information from dmidecode 3.2 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 SMI BIOS" standard.**

- **Memory:** 16x NO DIMM NO DIMM

---

(Continued on next page)
Lenovo Global Technology
ThinkSystem SR650 V2
(2.40 GHz, Intel Xeon Gold 6312U)

SPECspeed®2017_fp_base = 123
SPECspeed®2017_fp_peak = Not Run

Platform Notes (Continued)

16x Samsung M393A4G43AB3-CWE 32 GB 2 rank 3200

BIOS:
- BIOS Vendor: Lenovo
- BIOS Version: AFE111A-1.02
- BIOS Date: 05/07/2021
- BIOS Revision: 1.2
- Firmware Revision: 1.10

(End of data from sysinfo program)

Compiler Version Notes

==============================================================================
| 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.
---
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.
---
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.
---
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.
---
For the compiler classic version, the platform notes and compiler version notes are followed by more compiler versions.
Lenovo Global Technology
ThinkSystem SR650 V2
(2.40 GHz, Intel Xeon Gold 6312U)

SPECspeed®2017_fp_base = 123
SPECspeed®2017_fp_peak = Not Run

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

CPU: Lenovo Global Technology
Test Date: Jun-2021
Hardware Availability: Jul-2021
Software Availability: Dec-2020

Compiler Version Notes (Continued)

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.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 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:
-m64 -std=c11 -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP

(Continued on next page)
### Base Optimization Flags (Continued)

C benchmarks (continued):
- `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:

---

SPEC CPU and SPECspeed are registered trademarks 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 CPU®2017 v1.1.8 on 2021-06-25 13:59:29-0400.
Originally published on 2021-07-20.