# Lenovo Global Technology

**ThinkSystem SR650 V2**  
(2.30 GHz, Intel Xeon Gold 5320T)

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### 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

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>SPECspeed^2017_int_base</th>
<th>SPECspeed^2017_int_peak</th>
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<tr>
<td>600.perlbench_s</td>
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<tr>
<td>602.gcc_s</td>
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<td>10.5</td>
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<tr>
<td>605.mcf_s</td>
<td>80</td>
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<tr>
<td>620.omnetpp_s</td>
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<td>13.6</td>
<td>20.2</td>
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<tr>
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</tr>
<tr>
<td>641.leela_s</td>
<td>80</td>
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<tr>
<td>648.exchange2_s</td>
<td>80</td>
<td>4.76</td>
<td></td>
</tr>
<tr>
<td>657.xz_s</td>
<td>80</td>
<td>10.7</td>
<td></td>
</tr>
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### Hardware

- **CPU Name:** Intel Xeon Gold 5320T
- **Max MHz:** 3500
- **Nominal:** 2300
- **Enabled:** 40 cores, 2 chips, 2 threads/core
- **Orderable:** 1.2 chips
- **Cache L1:** 32 KB I + 48 KB D on chip per core
- **Cache L2:** 1.25 MB I+D on chip per core
- **Cache L3:** 30 MB I+D on chip per chip
- **Other:** None
- **Memory:** 1 TB (32 x 32 GB 2Rx8 PC4-3200AA-R, running at 2933)
- **Storage:** 1 x 960 GB SATA SSD
- **Other:** None

### Software

- **OS:** Red Hat Enterprise Linux 8.3 (Ootpa)
- **Kernel:** 4.18.0-240.el8.x86_64
- **Compiler:** C/C++, Version 2021.1 of Intel oneAPI DPC++/C++ Compiler Build 20201113 for Linux; Fortran: Version 2021.1 of Intel Fortran 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
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Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
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<th>Ratio</th>
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<td>657.xz_s</td>
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<td>266</td>
<td>23.2</td>
<td>267</td>
<td>23.2</td>
<td>267</td>
<td>23.2</td>
</tr>
</tbody>
</table>

SPECspeed®2017_int_base = 11.6
SPECspeed®2017_int_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,scatter"
LD_LIBRARY_PATH =
   "/home/cpu2017-1.1.8-ic2021.1-revB/lib/intel64:/home/cpu2017-1.1.8-ic202
   1.1-revB/je5.0.1-64"
MALLOCP_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

Sysinfo program /home/cpu2017-1.1.8-ic2021.1-revB/bin/sysinfo
Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16acaf64d
running on localhost.localdomain Fri Jun 25 22:32:44 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 5320T CPU @ 2.30GHz
  2 "physical id"s (chips)
  80 "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 : 20
  siblings : 40
  physical 0: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19
  physical 1: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19

From lscpu from util-linux 2.32.1:
Architecture:      x86_64
CPU op-mode(s):    32-bit, 64-bit
Byte Order:        Little Endian
CPU(s):            80
On-line CPU(s) list: 0-79
Thread(s) per core: 2
Core(s) per socket: 20
Socket(s):         2
NUMA node(s):      2
Vendor ID:         GenuineIntel
CPU family:        6
Model:             106
Model name:        Intel(R) Xeon(R) Gold 5320T CPU @ 2.30GHz
Stepping:          6
CPU MHz:           2956.363
BogoMIPS:          4600.00

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Platform Notes (Continued)

Virtualization: VT-x
L1d cache: 48K
L1i cache: 32K
L2 cache: 1280K
L3 cache: 30720K
NUMA node0 CPU(s): 0-19,40-59
NUMA node1 CPU(s): 20-39,60-79
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
aperfmperf pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg fma cx16
xtrr pdcm pccid 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
intel_puin ssbd mbah ibpb stibp ibrs_enhanced tptr_shadow vnmi flexpriority ept
vpid ept_ad fs.gsbase tsc_adjust bm1 hle avx2 smep bmi2 erts invpcid cmq rdt_a
avx512f avx512dq rdseed adx smap avx512ifma clflushopt clwb intel_pt avx512cd sha_ni
avx512bw avx512vl xsaveopt xsaves xgetbv1 xsavec cmq_llc cmq_occmlc cmq_mbb_total
cmq_mbb_local split_lock_detect wbnoinvd dtzero ida arat pln pts avx512vmbi umip pku
ospke avx512_vbmi2 gfnl vaes vcp1mulqdq avx512_vnni avx512_bitslg tme
avx512_vpopcntdq la57 rdpid md_clear pconfig flush_lid arch_capabilities

From /proc/cpuinfo cache data
  cache size : 30720 KB

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 16 17 18 19 40 41 42 43 44 45
  46 47
  node 0 size: 486363 MB
  node 0 free: 514713 MB
  node 1 cpus: 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 60 61
  62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79
  node 1 size: 487356 MB
  node 1 free: 515585 MB
  node distances:
    node 0 1
    0: 10 20
    1: 20 10

From /proc/meminfo
  MemTotal: 1056485432 KB
  HugesPages_Total: 0
  Hugepagesize: 2048 KB

/sbin/tuned-adm active
  Current active profile: balanced

(Continued on next page)
Platform Notes (Continued)

/usr/bin/lsb_release -d
   Red Hat Enterprise Linux release 8.3 (Ootpa)

From /etc/*release* /etc/*version*
   os-release:
   NAME="Red Hat Enterprise Linux"
   VERSION="8.3 (Ootpa)"
   ID="rhel"
   ID_LIKE="fedora"
   VERSION_ID="8.3"
   PLATFORM_ID="platform:el8"
   PRETTY_NAME="Red Hat Enterprise Linux 8.3 (Ootpa)"
   ANSI_COLOR="0;31"
redhat-release: Red Hat Enterprise Linux release 8.3 (Ootpa)
system-release: Red Hat Enterprise Linux release 8.3 (Ootpa)
system-release-cpe: cpe:/o:redhat:enterprise_linux:8.3:ga
uname -a:
   Linux localhost.localdomain 4.18.0-240.el8.x86_64 #1 SMP Wed Sep 23 05:13:10 EDT 2020
   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/swaps
   barriers and __user pointer
   sanitization
CVE-2017-5753 (Spectre variant 1): Mitigation: Enhanced IBRS, IBPB:
   conditional, RSB filling
CVE-2017-5715 (Spectre variant 2):
CVE-2020-0543 (Special Register Buffer Data Sampling): Not affected
CVE-2019-11135 (TSX Asynchronous Abort): Not affected

run-level 3 Jun 25 22:31

SPEC is set to: /home/cpu2017-1.1.8-ic2021.1-revB
   Filesysten Type Size Used Avail Use% Mounted on
   /dev/sda4 xfs 818G 160G 658G 20% /home

   From /sys/devices/virtual/dmi/id
   Vendor: Lenovo

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SPECspeed®2017_int_base = 11.6
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Platform Notes (Continued)

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 SMBIOS" standard.

Memory:
32x Samsung M393A4G43AB3-CWE 32 GB 2 rank 3200, configured at 2933

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

C
--------------------------
600.perlbench_s(base) 602.gcc_s(base) 605.mcf_s(base)
625.x264_s(base) 657.xz_s(base)
--------------------------

Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2021.1 Build 20201113
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

C++
--------------------------
620.omnetpp_s(base) 623.xalancbmk_s(base) 631.deepsjeng_s(base)
641.leela_s(base)
--------------------------

Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2021.1 Build 20201113
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

Fortran
--------------------------
648.exchange2_s(base)
--------------------------

Intel(R) Fortran Intel(R) 64 Compiler Classic for applications running on Intel(R) 64, Version 2021.1 Build 20201112_000000
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Compiler Version Notes (Continued)

Base CompilerInvocation

C benchmarks:
icx

C++ benchmarks:
icpx

Fortran benchmarks:
ifort

Base Portability Flags

600.perlbench_s: -DSPEC_LP64 -DSPEC_LINUX_X64
602.gcc_s: -DSPEC_LP64
605.mcf_s: -DSPEC_LP64
620.omnetpp_s: -DSPEC_LP64
623.xalancbmk_s: -DSPEC_LP64 -DSPEC_LINUX
625.x264_s: -DSPEC_LP64
631.deepsjeng_s: -DSPEC_LP64
641.leela_s: -DSPEC_LP64
648.exchange2_s: -DSPEC_LP64
657.xz_s: -DSPEC_LP64

Base Optimization Flags

C benchmarks:
-DSPEC_OPENMP -std=c11 -m64 -fiopenmp -Wl,-z,muldefs -xCORE-AVX2
-O3 -ffast-math -flto -mfpmath=sse -funroll-loops
-qopt-mem-layout-trans=4 -mbranches-within-32B-boundaries
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

C++ benchmarks:
-DSPEC_OPENMP -m64 -Wl,-z,muldefs -xCORE-AVX2 -O3 -ffast-math -flto
-mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-mbranches-within-32B-boundaries
-L/opt/intel/oneapi/compiler/2021.1.1/linux/compiler/lib/intel64_lin/
-lqkmalloc

(Continued on next page)
**SPEC CPU®2017 Integer Speed Result**

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**Base Optimization Flags (Continued)**

Fortran benchmarks:
- `m64`  
- `-xCORE-AVX2`  
- `-O3`  
- `-ipo`  
- `-no-prec-div`  
- `-qopt-mem-layout-trans=4`  
- `-nostandard-realloc-lhs`  
- `-align array32byte`  
- `-auto`  
- `-mbranches-within-32B-boundaries`

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:


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

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