**Lenovo Global Technology**

**ThinkSystem SR650 V2**

(2.20 GHz, Intel Xeon Gold 5320)

**SPECrates**

<table>
<thead>
<tr>
<th>SpeCrates®2017_int_base</th>
<th>359</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECrates®2017_int_peak</td>
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</tbody>
</table>

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

**Copies**

<table>
<thead>
<tr>
<th>Benchmark</th>
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<tbody>
<tr>
<td>500.perlbench_r</td>
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</tr>
<tr>
<td>557.xz_r</td>
<td>104</td>
</tr>
</tbody>
</table>

**Hardware**

- **CPU Name:** Intel Xeon Gold 5320  
- **Max MHz:** 3400  
- **Nominal:** 2200  
- **Enabled:** 52 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:** 39 MB I+D on chip per chip  
- **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:** No  
- **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:** None  
- **Power Management:** BIOS and OS set to prefer performance at the cost of additional power usage
**SPEC CPU®2017 Integer Rate Result**

**Lenovo Global Technology**

ThinkSystem SR650 V2  
(2.20 GHz, Intel Xeon Gold 5320)

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

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**Results Table**

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<tr>
<th>Benchmark</th>
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</tbody>
</table>

**SPECrate®2017_int_base =** 359  
**SPECrate®2017_int_peak =** Not Run

Results appear in the order in which they were run. Bold underlined text indicates a median measurement.

---

**Submit Notes**

The numactl mechanism was used to bind copies to processors. The config file option 'submit' was used to generate numactl commands to bind each copy to a specific processor. For details, please see the config file.

---

**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:

```
LD_LIBRARY_PATH = 
"/home/cpu2017-1.1.8-ic2021.1-revB/lib/intel64:/home/cpu2017-1.1.8-ic202
1.1-revB/lib/ia32:/home/cpu2017-1.1.8-ic2021.1-revB/je5.0.1-32"
MALLOCONF = "retain:true"
```

---

**General Notes**

Binaries compiled on a system with 1x Intel Core i9-7980XE CPU + 64GB RAM  
memory using Red Hat Enterprise Linux 8.1

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
```

(Continued on next page)
Lenovo Global Technology
ThinkSystem SR650 V2
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**CPU2017 License:** 9017
**Test Sponsor:** Lenovo Global Technology
**Tested by:** Lenovo Global Technology

**General Notes (Continued)**

runcpu command invoked through numactl i.e.: numactl --interleave=all runcpu <etc>

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.

**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
DCU Streamer Prefetcher set to Disabled
SNC set to Enabled

Sysinfo program /home/cpu2017-1.1.8-ic2021.1-revB/bin/sysinfo
Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16aca6c64d
running on localhost.localdomain Wed Jul 21 22:11:29 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

```plaintext
model name : Intel(R) Xeon(R) Gold 5320 CPU @ 2.20GHz
core, siblings (Caution: counting these is hw and system dependent. The following excerpts from /proc/cpuinfo might not be reliable. Use with caution.)
cpu cores : 26
siblings : 52
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 24 25
physical 1: 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 24 25
```

From lscpu from util-linux 2.32.1:

```plaintext
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 104
On-line CPU(s) list: 0-103
Thread(s) per core: 2
```

(Continued on next page)
**Platform Notes (Continued)**

Core(s) per socket: 26  
Socket(s): 2  
NUMA node(s): 4  
Vendor ID: GenuineIntel  
CPU family: 6  
Model: 106  
Model name: Intel(R) Xeon(R) Gold 5320 CPU @ 2.20GHz  
Stepping: 6  
CPU MHz: 2989.184  
BogoMIPS: 4400.00  
Virtualization: VT-x  
L1d cache: 48K  
L1i cache: 32K  
L2 cache: 1280K  
L3 cache: 39936K  
NUMA node0 CPU(s): 0-12,52-64  
NUMA node1 CPU(s): 13-25,65-77  
NUMA node2 CPU(s): 26-38,78-90  
NUMA node3 CPU(s): 39-51,91-103  
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 xtpr pdcm pcid dca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave avx f16c rdrand lahf_lm abml1 abml2 3nowprefetch cpuid_fault ept cat_l3 invpcid_single intel_pppin ssbd mba ibrs ibpb stibp ibrs_enhanced trp_shadow vmmi flexpriority ept vpid ept_ad fsbgbase tsc_adjust bm1 hle avx2 smep bmi2 erms invpcid cqm rdt_a avx512f avx512qd rdseed adx smap avx512ifma clflushopt clwb intel_pt avx512cd sha ni avx512bw avx512vl xsaveopt xsaves xsavec xgetbv1 xsavevs cqm_llc cqm_occup_llc cqm_mbm_total cqm_mbb_local split_lock_detect wbnoindvd dtscalloc atp arat pln pts avx512v bmi2 gfnl vaes vpclmulqdq avx512_vnni avx512_bitalg tme avx512_vpopcntdq la57 rdpid md_clear pconfig flush_l1d arch_capabilities

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 12 52 53 54 55 56 57 58 59 60 61 62 63 64  
node 0 size: 251902 MB  
node 0 free: 257311 MB  
node 1 cpus: 13 14 15 16 17 18 19 20 21 22 23 24 25 65 66 67 68 69 70 71 72 73 74 75 76 77  
node 1 size: 252291 MB  
node 1 free: 257552 MB  
node 2 cpus: 26 27 28 29 30 31 32 33 34 35 36 37 38 78 79 80 81 82 83 84 85 86 87 88 89

(Continued on next page)
Lenovo Global Technology
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SPEC CPU®2017 Integer Rate Result
Copyright 2017-2021 Standard Performance Evaluation Corporation

SPECrate®2017_int_base = 359
SPECrate®2017_int_peak = Not Run

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

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

Platform Notes (Continued)

90
node 2 size: 252123 MB
node 2 free: 257600 MB
node 3 cpus: 39 40 41 42 43 44 45 46 47 48 49 50 51 91 92 93 94 95 96 97 98
node 3 size: 251999 MB
node 3 free: 257707 MB
node distances:
node distances:
node 0 1 2 3
0: 10 11 20 20
1: 11 10 20 20
2: 20 20 10 11
3: 20 20 11 10

From /proc/meminfo
MemTotal: 1056479576 kB
HugePages_Total: 0
Hugepagesize: 2048 kB
/sbin/tuned-adm active
Current active profile: balanced
/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

(Continued on next page)
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SPECrate®2017_int_base  =  359
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Platform Notes (Continued)

Microarchitectural Data Sampling: Not affected
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: usercopy/swapgs barriers and __user pointer sanitization
CVE-2017-5715 (Spectre variant 2):
Mitigation: Enhanced IBRS, IBPB: conditional, RSB filling
CVE-2020-0543 (Special Register Buffer Data Sampling): Not affected
CVE-2019-11135 (TSX Asynchronous Abort): Not affected

run-level 3 Jul 21 22:10
SPEC is set to: /home/cpu2017-1.1.8-ic2021.1-revB
Filesystem Type Size Used Avail Use% Mounted on
/dev/sda4 xfs 818G 160G 658G 20% /home

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 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       | 500.perlbench_r(base) 502.gcc_r(base) 505.mcf_r(base) 525.x264_r(base) 557.xz_r(base)
(Continued on next page)
## Lenovo Global Technology

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### Compiler Version Notes (Continued)

Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,  
Version 2021.1 Build 20201113  
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<table>
<thead>
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<th>Base Portability Flags</th>
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<tr>
<td>500.perlbench_r: -DSPEC_LP64 -DSPEC_LINUX_X64</td>
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**Base Portability Flags (Continued)**

541.leela_r: -DSPEC_LP64
548.exchange2_r: -DSPEC_LP64
557.xz_r: -DSPEC_LP64

**Base Optimization Flags**

**C benchmarks:**
-\( -w \) -std=c11 -m64 -Wl,-z,muldefs -xCORE-AVX512 -O3 -ffast-math
-\( -flto \) -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-\( -mbranches-within-32B-boundaries \)
-\( -L/opt/intel/oneapi/compiler/2021.1.1/linux/compiler/lib/intel64_lin \)
-\( -lqkmalloc \)

**C++ benchmarks:**
-\( -w \) -m64 -Wl,-z,muldefs -xCORE-AVX512 -O3 -ffast-math -flto
-\( -mfpmath=sse \) -funroll-loops -qopt-mem-layout-trans=4
-\( -mbranches-within-32B-boundaries \)
-\( -L/opt/intel/oneapi/compiler/2021.1.1/linux/compiler/lib/intel64_lin \)
-\( -lqkmalloc \)

**Fortran benchmarks:**
-\( -w \) -m64 -Wl,-z,muldefs -xCORE-AVX512 -O3 -ipo -no-prec-div
-\( -qopt-mem-layout-trans=4 \) -nostandard-realloc-lhs -align array32byte
-\( -auto \) -mbranches-within-32B-boundaries
-\( -L/opt/intel/oneapi/compiler/2021.1.1/linux/compiler/lib/intel64_lin \)
-\( -lqkmalloc \)

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-ICElake-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-ICElake-F.xml
http://www.spec.org/cpu2017/flags/Intel-ic2021-official-linux64_revA.xml

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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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