## Lenovo Global Technology

ThinkSystem SR650 V2
(2.10 GHz, Intel Xeon Gold 5318S)

### CPU2017 License
9017

### Test Sponsor
Lenovo Global Technology

### Tested by
Lenovo Global Technology

### Test Date
Jul-2021

### Hardware

| Copies | 0 | 30 | 60 | 90 | 120 | 150 | 180 | 210 | 240 | 270 | 300 | 330 | 360 | 390 | 420 | 450 | 480 | 510 | 540 | 570 | 600 | 630 | 660 | 690 | 720 | 750 | 780 | 810 | 840 | 870 | 900 | 930 | 960 | 990 | 1020 |
|--------|---|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 500.perlbench_r | 96 | 2 | 213 | 263 |
| 502.gcc_r | 96 |
| 505.mcf_r | 96 |
| 520.omnetpp_r | 96 | 216 |
| 523.xalancbmk_r | 96 |
| 525.x264_r | 96 |
| 531.deepsjeng_r | 96 | 234 |
| 541.leela_r | 96 | 279 |
| 548.exchange2_r | 96 |
| 557.xz_r | 96 | 179 |

### Software

#### OS:
Red Hat Enterprise Linux 8.3
(0o1pa)

#### 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;

#### 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

#### Power Management:
BIOS and OS set to prefer performance at the cost of additional power usage

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**SPECrates**

<table>
<thead>
<tr>
<th>SPECrates</th>
<th>Result</th>
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<tbody>
<tr>
<td>SPECrates\textsuperscript{2017_int_base}</td>
<td>316</td>
</tr>
<tr>
<td>SPECrates\textsuperscript{2017_int_peak}</td>
<td>Not Run</td>
</tr>
</tbody>
</table>

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**Specifications**

### Hardware

- **CPU Name:** Intel Xeon Gold 5318S
- **Max MHz:** 3400
- **Nominal:** 2100
- **Enabled:** 48 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:** 36 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
- **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
### Lenovo Global Technology
ThinkSystem SR650 V2
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</table>

SPECrate\textsuperscript{2017\_int\_base} = 316

SPECrate\textsuperscript{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)
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SPEC CPU®2017 Integer Rate Result
Copyright 2017-2021 Standard Performance Evaluation Corporation

SPECrate®2017_int_base = 316
SPECrate®2017_int_peak = Not Run

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 982a61ec0915b55891ef0e16acaac64d
running on localhost.localdomain Thu Jul 1 06:59:22 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 5318S CPU @ 2.10GHz
  2 "physical id"s (chips)
  96 "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 : 48
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
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

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): 96
On-line CPU(s) list: 0-95
Thread(s) per core: 2
Core(s) per socket: 24
Socket(s): 2

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SPEC CPU®2017 Integer Rate Result

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SPECRate®2017_int_base = 316
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CPU2017 License: 9017
Test Sponsor: Lenovo Global Technology
Test Date: Jul-2021
Hardware Availability: Jul-2021
Tested by: Lenovo Global Technology
Software Availability: Dec-2020

Platform Notes (Continued)

NUMA node(s): 4
Vendor ID: GenuineIntel
CPU family: 6
Model: 106
Model name: Intel(R) Xeon(R) Gold 5318S CPU @ 2.10GHz
Stepping: 6
CPU MHz: 2119.417
BogoMIPS: 4200.00
Virtualization: VT-x
L1d cache: 48K
L1i cache: 32K
L2 cache: 1280K
L3 cache: 36864K
NUMA node0 CPU(s): 0-11,48-59
NUMA node1 CPU(s): 12-23,60-71
NUMA node2 CPU(s): 24-35,72-83
NUMA node3 CPU(s): 36-47,84-95
Flags: fpu vme de pse tsc msr pae mca cmov pat pse36 clflush dts clflushopt cldt constat tm pbe

From numacli --hardware
WARNING: a numacli '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 48 49 50 51 52 53 54 55 56 57 58 59
node 0 size: 251953 MB
node 0 free: 257115 MB
node 1 cpus: 12 13 14 15 16 17 18 19 20 21 22 23 60 61 62 63 64 65 66 67 68 69 70 71
node 1 size: 252484 MB
node 1 free: 257672 MB
node 2 cpus: 24 25 26 27 28 29 30 31 32 33 34 35 72 73 74 75 76 77 78 79 80 81 82 83
node 2 size: 252454 MB
node 2 free: 257739 MB
node 3 cpus: 36 37 38 39 40 41 42 43 44 45 46 47 84 85 86 87 88 89 90 91 92 93 94 95

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

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

Platform Notes (Continued)

node 3 size: 253056 MB
node 3 free: 257680 MB
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:       1056481292 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
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

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Platform Notes (Continued)

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 1 06:57

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)

Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,
Version 2021.1 Build 20201113
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### SPEC CPU®2017 Integer Rate Result

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### Compiler Version Notes (Continued)

C++  
520.omnetpp_r(base) 523.xalancbmk_r(base) 531.deepsjeng_r(base) 541.leela_r(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  
548.exchange2_r(base)

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.

### Base Compiler Invocation

C benchmarks:  
icx

C++ benchmarks:  
icpx

Fortran benchmarks:  
ifort

### Base Portability Flags

500.perlbench_r: -DSPEC_LP64 -DSPEC_LINUX_X64  
502.gcc_r: -DSPEC_LP64  
505.mcf_r: -DSPEC_LP64  
520.omnetpp_r: -DSPEC_LP64  
523.xalancbmk_r: -DSPEC_LP64 -DSPEC_LINUX  
525.x264_r: -DSPEC_LP64  
531.deepsjeng_r: -DSPEC_LP64  
541.leela_r: -DSPEC_LP64  
548.exchange2_r: -DSPEC_LP64  
557.xz_r: -DSPEC_LP64
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**Base Optimization Flags**

**C benchmarks:**

**C++ benchmarks:**

**Fortran benchmarks:**

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

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