## **SPEC CPU®2017 Integer Rate Result**

**Lenovo Global Technology**  
**ThinkSystem SR650 V2**  
**(2.00 GHz, Intel Xeon Gold 6330)**

<table>
<thead>
<tr>
<th>Test Date:</th>
<th>Jun-2021</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>
<tr>
<td>Hardware Availability:</td>
<td>Jul-2021</td>
</tr>
<tr>
<td>Software Availability:</td>
<td>Feb-2021</td>
</tr>
</tbody>
</table>

### Software

- **OS:** Red Hat Enterprise Linux 8.3  
  (Ootpa)  
- **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;  
  C/C++: Version 2021.1 of Intel C/C++ Compiler Classic Build 20201112 for Linux  
- **Firmware:** Lenovo BIOS Version AFE109PT1 1.00 released Apr-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

### Hardware

- **CPU Name:** Intel Xeon Gold 6330  
- **Max MHz:** 3100  
- **Nominal:** 2000  
- **Enabled:** 56 cores, 2 chips, 2 threads/core  
- **Orderable:** 1.2 chips  
- **Cache L1:** 32 KB I + 48 KB D on chip per core  
- **L2:** 1.25 MB I+D on chip per core  
- **L3:** 42 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

### Benchmark Results

<table>
<thead>
<tr>
<th>SPECbench</th>
<th>Copy</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>500.perlbench_r</td>
<td>112</td>
<td>248</td>
</tr>
<tr>
<td>502.gcc_r</td>
<td>112</td>
<td>296</td>
</tr>
<tr>
<td>505.mcf_r</td>
<td>112</td>
<td>615</td>
</tr>
<tr>
<td>520.omnetpp_r</td>
<td>112</td>
<td>243</td>
</tr>
<tr>
<td>523.xalancbmk_r</td>
<td>112</td>
<td>459</td>
</tr>
<tr>
<td>525.x264_r</td>
<td>112</td>
<td>748</td>
</tr>
<tr>
<td>531.deepsjeng_r</td>
<td>112</td>
<td>273</td>
</tr>
<tr>
<td>541.leea_r</td>
<td>112</td>
<td>267</td>
</tr>
<tr>
<td>548.exchange2_r</td>
<td>112</td>
<td>736</td>
</tr>
<tr>
<td>557.xz_r</td>
<td>112</td>
<td>208</td>
</tr>
</tbody>
</table>

---

**SPECrate®2017_int_base =** 365  
**SPECrate®2017_int_peak =** Not Run
Lenovo Global Technology
ThinkSystem SR650 V2
(2.00 GHz, Intel Xeon Gold 6330)

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

Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Copies</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>500.perlbench_r</td>
<td>112</td>
<td>720</td>
<td>248</td>
<td>718</td>
<td>248</td>
<td>718</td>
<td>248</td>
</tr>
<tr>
<td>502.gcc_r</td>
<td>112</td>
<td>536</td>
<td>296</td>
<td>536</td>
<td>296</td>
<td>535</td>
<td>296</td>
</tr>
<tr>
<td>505.mcf_r</td>
<td>112</td>
<td>294</td>
<td>615</td>
<td>294</td>
<td>616</td>
<td>294</td>
<td>615</td>
</tr>
<tr>
<td>520.omnetpp_r</td>
<td>112</td>
<td>603</td>
<td>244</td>
<td>605</td>
<td>243</td>
<td>604</td>
<td>243</td>
</tr>
<tr>
<td>523.xalancbmk_r</td>
<td>112</td>
<td>258</td>
<td>458</td>
<td>258</td>
<td>459</td>
<td>258</td>
<td>459</td>
</tr>
<tr>
<td>525.x264_r</td>
<td>112</td>
<td>262</td>
<td>747</td>
<td>262</td>
<td>748</td>
<td>262</td>
<td>749</td>
</tr>
<tr>
<td>531.deepsjeng_r</td>
<td>112</td>
<td>471</td>
<td>273</td>
<td>471</td>
<td>273</td>
<td>471</td>
<td>273</td>
</tr>
<tr>
<td>541.leela_r</td>
<td>112</td>
<td>695</td>
<td>267</td>
<td>694</td>
<td>267</td>
<td>695</td>
<td>267</td>
</tr>
<tr>
<td>548.exchange2_r</td>
<td>112</td>
<td>399</td>
<td>736</td>
<td>399</td>
<td>736</td>
<td>400</td>
<td>733</td>
</tr>
<tr>
<td>557.xz_r</td>
<td>112</td>
<td>582</td>
<td>208</td>
<td>583</td>
<td>208</td>
<td>582</td>
<td>208</td>
</tr>
</tbody>
</table>

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/cpu2017-1.1.5-ic2021.1-revB/lib/intel64:/home/cpu2017-1.1.5-ic2021.1-revB/lib/ia32:/home/cpu2017-1.1.5-ic2021.1-revB/je5.0.1-32"
MALLOC_CONF = "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)
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/cpu2017-1.1.5-ic2021.1-revB/bin/sysinfo
Rev: r6538 of 2020-09-24 e8664e66d2d7080afeaa89d4b38e2f1c
running on localhost.localdomain Thu Jun 3 23:08:25 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 6330 CPU @ 2.00GHz
    2 "physical id"s (chips)
    112 "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 : 28
    siblings : 56
    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 26 27
    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 26 27

From lscpu:
    Architecture: x86_64
    CPU op-mode(s): 32-bit, 64-bit
    Byte Order: Little Endian
    CPU(s): 112
    On-line CPU(s) list: 0-111
    Thread(s) per core: 2
Lenovo Global Technology
ThinkSystem SR650 V2
(2.00 GHz, Intel Xeon Gold 6330)

SPECrate®2017_int_base = 365
SPECrate®2017_int_peak = Not Run

CPU2017 License: 9017
Test Sponsor: Lenovo Global Technology
Test Date: Jun-2021
Hardware Availability: Jul-2021
Tested by: Lenovo Global Technology
Software Availability: Feb-2021

Platform Notes (Continued)

Core(s) per socket: 28
Socket(s): 2
NUMA node(s): 4
Vendor ID: GenuineIntel
CPU family: 6
Model: 106
Model name: Intel(R) Xeon(R) Gold 6330 CPU @ 2.00GHz
Stepping: 6
CPU MHz: 2011.157
BogoMIPS: 4000.00
Virtualization: VT-x
L1d cache: 48K
L1i cache: 32K
L2 cache: 1280K
L3 cache: 43008K
NUMA node0 CPU(s): 0-13,56-69
NUMA node1 CPU(s): 14-27,70-83
NUMA node2 CPU(s): 28-41,84-97
NUMA node3 CPU(s): 42-55,98-111
Flags: fpu vme de pse ts cmov cx8 apic sep mtrr pge mca cmov pat pse36 clflush dts acpica pm x save ss tm hlt syscall nx pdpe1gb rdtscp lm constant tsc 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 pclid dca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave avx f16c rdrand lahf_lm abm 3nowprefetch cpuid_fault epb cat_l3 invpmd_single intel_pinn ssbd mba ibrs ibpb stibp ibrs_enhanced tpr_shadow vmmi flexpriori ept vpid ad fsbgbase tsc_adjust bni hle avx2 smep bmi2 erms invpcid cmp rdt_a avx512f avx512dq rdseed adx smap avx512ifma clflushopt clwb intel_pt avx512cd sha ni avx512bw avx512vl xsaveopt xsaves xsavec xgetbv1 xsave xsaves cmp_l1 cmp_l1c cmp_mb m_total cmp_mb_local split_lock Detect wbnoinvd dtherm ida arat pni pts avx512vbmi umip pku ospe avx512_vbmi gfni vaes vpcmulqdq 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 13 56 57 58 59 60 61 62 63 64 65 66 67 68 69
node 0 size: 251458 MB
node 0 free: 257005 MB
node 1 cpus: 14 15 16 17 18 19 20 21 22 23 24 25 26 27 70 71 72 73 74 75 76 77 78 79 80 81 82 83
node 1 size: 252337 MB
node 1 free: 257519 MB
node 2 cpus: 28 29 30 31 32 33 34 35 36 37 38 39 40 41 84 85 86 87 88 89 90 91 92 93 94

(Continued on next page)
Lenovo Global Technology
ThinkSystem SR650 V2
(2.00 GHz, Intel Xeon Gold 6330)

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

SPECrate®2017_int_base = 365
SPECrate®2017_int_peak = Not Run

Test Date: Jun-2021
Hardware Availability: Jul-2021
Software Availability: Feb-2021

Platform Notes (Continued)

95 96 97
node 2 size: 252189 MB
node 2 free: 257189 MB
node 3 cpus: 42 43 44 45 46 47 48 49 50 51 52 53 54 55 98 99 100 101 102 103 104 105 106 107 108 109 110 111
node 3 size: 252841 MB
node 3 free: 257502 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: 1056477880 kB
HugePages_Total: 0
Hugepagesize: 2048 kB

/sbin/tuned-adm active
Current active profile: throughput-performance

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

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

CVE-2017-5753 (Spectre variant 1):
- Bypass disabled via prctl and seccomp
- Mitigation: usercopy/swappgs 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 Jun 3 18:28

SPEC is set to: /home/cpu2017-1.1.5-ic2021.1-revB

<table>
<thead>
<tr>
<th>Filesystem</th>
<th>Type</th>
<th>Size</th>
<th>Used</th>
<th>Avail</th>
<th>Use%</th>
<th>Mounted on</th>
</tr>
</thead>
<tbody>
<tr>
<td>/dev/sdb4</td>
<td>xfs</td>
<td>819G</td>
<td>234G</td>
<td>585G</td>
<td>29%</td>
<td>/home</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 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: AFE109PT1-1.00
- BIOS Date: 04/28/2021
- BIOS Revision: 1.0
- Firmware Revision: 1.0

(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
**SPEC CPU®2017 Integer Rate Result**

**Lenovo Global Technology**
ThinkSystem SR650 V2
(2.00 GHz, Intel Xeon Gold 6330)

<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>
<tr>
<td>Test Date:</td>
<td>Jun-2021</td>
</tr>
<tr>
<td>Hardware Availability:</td>
<td>Jul-2021</td>
</tr>
<tr>
<td>Software Availability:</td>
<td>Feb-2021</td>
</tr>
</tbody>
</table>

**SPECrate®2017_int_base =** 365

**SPECrate®2017_int_peak =** Not Run

---

**Compiler Version Notes (Continued)**

Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

-------------------------------------------------------------

C++

<table>
<thead>
<tr>
<th>520.omnetpp_r(base)</th>
<th>523.xalancbmk_r(base)</th>
<th>531.deepsjeng_r(base)</th>
<th>541.leela_r(base)</th>
</tr>
</thead>
</table>

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
## 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:

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-D.xml](http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-ICElake-D.xml)