**Lenovo Global Technology**

ThinkSystem SR650 V2  
(2.20 GHz, Intel Xeon Gold 6330N)

---

**SPECrater 2017_fp_base = 334**

**SPECrater 2017_fp_peak = Not Run**

---

<table>
<thead>
<tr>
<th>Hardware</th>
<th>Software</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CPU Name:</strong> Intel Xeon Gold 6330N</td>
<td><strong>OS:</strong> SUSE Linux Enterprise Server 15 SP2 (x86_64)</td>
</tr>
<tr>
<td><strong>Max MHz:</strong> 3400</td>
<td><strong>Kernel:</strong> 5.3.18-22-default</td>
</tr>
<tr>
<td><strong>Nominal:</strong> 2200</td>
<td><strong>Compiler:</strong> 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</td>
</tr>
<tr>
<td><strong>Enabled:</strong> 56 cores, 2 chips</td>
<td><strong>Parallel:</strong> No</td>
</tr>
<tr>
<td><strong>Orderable:</strong> 1,2 chips</td>
<td><strong>Firmware:</strong> Lenovo BIOS Version AFE109PT1 1.00 released Apr-2021</td>
</tr>
<tr>
<td><strong>Cache L1:</strong> 32 KB I + 48 KB D on chip per core</td>
<td><strong>File System:</strong> xfs</td>
</tr>
<tr>
<td><strong>L2:</strong> 1.25 MB I+D on chip per core</td>
<td><strong>System State:</strong> Run level 3 (multi-user)</td>
</tr>
<tr>
<td><strong>L3:</strong> 42 MB I+D on chip per chip</td>
<td><strong>Base Pointers:</strong> 64-bit</td>
</tr>
<tr>
<td><strong>Other:</strong> None</td>
<td><strong>Peak Pointers:</strong> Not Applicable</td>
</tr>
<tr>
<td><strong>Memory:</strong> 1 TB (32 x 32 GB 2Rx8 PC4-3200AA-R, running at 2666)</td>
<td><strong>Other:</strong> jemalloc memory allocator V5.0.1</td>
</tr>
<tr>
<td><strong>Storage:</strong> 1 x 960 GB SATA SSD</td>
<td><strong>Power Management:</strong> BIOS and OS set to prefer performance at the cost of additional power usage</td>
</tr>
</tbody>
</table>

---

**Test Data:**  
**Test Sponsor:** Lenovo Global Technology  
**Test Date:** May-2021  
**Hardware Availability:** Jul-2021  
**Software Availability:** Feb-2021

---

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---

**Hardware**  
**Software**
Lenovo Global Technology
ThinkSystem SR650 V2
(2.20 GHz, Intel Xeon Gold 6330N)

SPECrater®2017_fp_base = 334
SPECrater®2017_fp_peak = Not Run

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

Results Table

<table>
<thead>
<tr>
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<td>541</td>
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</tbody>
</table>

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-revA-update1/lib/intel64:/home/cpu2017-1.1.5-ic2021.1-revA-update1/je5.0.1-64"
MALLOC_CONF = "retain:true"

General Notes
Binaries compiled on a system with 1x Intel Core i9-7940X CPU + 64GB RAM
memory using openSUSE Leap 15.2
Transparent Huge Pages enabled by default

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

**Lenovo Global Technology**

ThinkSystem SR650 V2  
(2.20 GHz, Intel Xeon Gold 6330N)

<table>
<thead>
<tr>
<th><strong>SPECrade®2017_fp_base</strong></th>
<th>334</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SPECrade®2017_fp_peak</strong></td>
<td>Not Run</td>
</tr>
</tbody>
</table>

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

## General Notes (Continued)

- Prior to runcpu invocation
- Filesystem page cache synced and cleared with:
  - `sync; echo 3 > /proc/sys/vm/drop_caches`
- 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
  - Hyper-Threading set to Disabled
  - DCU Streamer Prefetcher set to Disabled
  - DCU IP Prefetcher set to Disabled
  - SNC set to Enabled
  - Patrol Scrub set to Disabled
- Sysinfo program /home/cpu2017-1.1.5-ic2021.1-revA-update1/bin/sysinfo  
  Rev: r6538 of 2020-09-24 e8664e66d2d7080afeaa89d4b38e2f1c  
  running on localhost Wed May 26 02:11:40 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 6330N CPU @ 2.20GHz
  2 "physical id"s (chips)
  56 "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 : 28
  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
  ```

(Continued on next page)
Platform Notes (Continued)

From lscpu:
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):              56  
On-line CPU(s) list: 0-55  
Thread(s) per core:  1  
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 6330N CPU @ 2.20GHz  
Stepping:            6  
CPU MHz:             2600.000  
BogoMIPS:            4400.00  
Virtualization:      VT-x  
L1d cache:           48K  
L1i cache:           32K  
L2 cache:            1280K  
L3 cache:            43008K  
NUMA node0 CPU(s):   0-13  
NUMA node1 CPU(s):   14-27  
NUMA node2 CPU(s):   28-41  
NUMA node3 CPU(s):   42-55  
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 arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc cpuid aperf perfctr pni pclmulqdq dtes64 ds_cpl vmx smx est tm2 ssse3 sdbg fma cx16 xtpr pdcm crc32 pdcm rdseed rdrand lahf_lm abm 3dnowprefetch cpuid_fault epb cat_l3 invpcid_single ssbd mba ibrs ibpb stibp ibrs_enabled tpr_shadow vnmi flexpriority ept vpid ept_ad fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid rdt_a avx512ifma clflushopt clwb intel_pt avx512cd sha ni avx512bw avx512vl xsavesopt xsaves xgetbv1 xsaves cqm_llc cqm_occup_llc cqm_mbb_total cqm_mbb_local wbenlvd dtherm ida arat pfn pts avx512vmbi umip pku ospke avx512_vmbi2 gfnl vaes vpclmulqdq avx512_vnni avx512_bitalg tme avx512_vpopcntdq 1a57 rdpid md_clear pconfiug flush_l1d arch_capabilities

/proc/cpuinfo cache data
  cache size : 43008 KB

From numactl --hardware  WARNING: a numactl 'node' might or might not correspond to a physical chip.
  available: 4 nodes (0-3)
Lenovo Global Technology
ThinkSystem SR650 V2
(2.20 GHz, Intel Xeon Gold 6330N)

SPECrate®2017_fp_base = 334
SPECrate®2017_fp_peak = Not Run

Platform Notes (Continued)

node 0 cpus: 0 1 2 3 4 5 6 7 8 9 10 11 12 13
node 0 size: 257635 MB
node 0 free: 257119 MB
node 1 cpus: 14 15 16 17 18 19 20 21 22 23 24 25 26 27
node 1 size: 258010 MB
node 1 free: 257778 MB
node 2 cpus: 28 29 30 31 32 33 34 35 36 37 38 39 40 41
node 2 size: 258044 MB
node 2 free: 257816 MB
node 3 cpus: 42 43 44 45 46 47 48 49 50 51 52 53 54 55
node 3 size: 258041 MB
node 3 free: 257796 MB

node distances:
node 0 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: 1056493004 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"
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

(Continued on next page)
Platform Notes (Continued)

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 swapped 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 May 26 02:09

SPEC is set to: /home/cpu2017-1.1.5-ic2021.1-revA-update1
Filesystem   Type  Size  Used Avail Use% Mounted on
/dev/sdb3     xfs   891G   23G  868G   3% /

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 2666

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 | 519.lbm_r(base) 538.imagick_r(base) 544.nab_r(base) |
==============================================================================

Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,
Compiler Version Notes (Continued)

Version 2021.1 Build 20201113
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

==============================================================================
C++                      | 508.namd_r(base) 510.parest_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.

==============================================================================
C++, C                  | 511.povray_r(base) 526.blender_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.

==============================================================================
C++, C, Fortran          | 507.cactuBSSN_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.
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.

==============================================================================
Fortran                  | 503.bwaves_r(base) 549.fotonik3d_r(base) 554.roms_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.

==============================================================================
Fortran, C               | 521.wrf_r(base) 527.cam4_r(base)
(Continued on next page)
Lenovo Global Technology
ThinkSystem SR650 V2
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CPU2017 License: 9017
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Tested by: Lenovo Global Technology

Test Date: May-2021
Hardware Availability: Jul-2021
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Compiler Version Notes (Continued)

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) 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.

Base Compiler Invocation

C benchmarks:
icx

C++ benchmarks:
icpx

Fortran benchmarks:
ifort

Benchmarks using both Fortran and C:
ifort icx

Benchmarks using both C and C++:
icpx icx

Benchmarks using Fortran, C, and C++:
icpx icx ifort

Base Portability Flags

503.bwaves_r: -DSPEC_LP64
507.cactuBSSN_r: -DSPEC_LP64
508.namd_r: -DSPEC_LP64
510.parest_r: -DSPEC_LP64
511.povray_r: -DSPEC_LP64
519.ibm_r: -DSPEC_LP64
521.wrf_r: -DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian
526.blender_r: -DSPEC_LP64 -DSPEC_LINUX -funsigned-char
527.cam4_r: -DSPEC_LP64 -DSPEC_CASE_FLAG
538.imagick_r: -DSPEC_LP64
544.nab_r: -DSPEC_LP64
549.fotonik3d_r: -DSPEC_LP64

(Continued on next page)
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CPU2017 License: 9017
Test Sponsor: Lenovo Global Technology
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Software Availability: Feb-2021
Hardware Availability: Jul-2021

Base Portability Flags (Continued)
554.roms_r: -DSPEC_LP64

Base Optimization Flags

C benchmarks:
-w -std=c11 -m64 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math
-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-mbranches-within-32B-boundaries -ljemalloc
-L/usr/local/jemalloc64-5.0.1/lib

C++ benchmarks:
-w -m64 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math -flto
-mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-mbranches-within-32B-boundaries -ljemalloc
-L/usr/local/jemalloc64-5.0.1/lib

Fortran benchmarks:
-w -m64 -Wl,-z,muldefs -xCORE-AVX512 -O3 -ipo -no-prec-div
-qopt-prefetch -ffinite-math-only
-qopt-multiple-gather-scatter-by-shuffles -qopt-mem-layout-trans=4
-nostandard-realloc-lhs -align array32byte -auto
-mbranches-within-32B-boundaries -ljemalloc
-L/usr/local/jemalloc64-5.0.1/lib

Benchmarks using both Fortran and C:
-w -m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math
-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4 -O3 -ipo
-no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-multiple-gather-scatter-by-shuffles
-mbranches-within-32B-boundaries -nostandard-realloc-lhs
-align array32byte -auto -ljemalloc -L/usr/local/jemalloc64-5.0.1/lib

Benchmarks using both C and C++:
-w -m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math
-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-mbranches-within-32B-boundaries -ljemalloc
-L/usr/local/jemalloc64-5.0.1/lib

Benchmarks using Fortran, C, and C++:
-w -m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math
-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4 -O3
-no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-multiple-gather-scatter-by-shuffles
-mbranches-within-32B-boundaries -nostandard-realloc-lhs

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

**SPECraté®2017_fp_base = 334**

**SPECraté®2017_fp_peak = Not Run**

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**Base Optimization Flags (Continued)**

Benchmarks using Fortran, C, and C++ (continued):
- align array32byte -auto -ljemalloc -L/usr/local/jemalloc64-5.0.1/lib

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-D.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-D.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.

Tested with SPEC CPU®2017 v1.1.5 on 2021-05-25 14:11:39-0400.
Report generated on 2021-06-22 17:05:53 by CPU2017 PDF formatter v6442.
Originally published on 2021-06-22.