**Lenovo Global Technology**

**ThinkSystem ST650 V2**
(3.60 GHz, Intel Xeon Gold 6334)

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

**SPECrater®2017_int_base =** 145  
**SPECrater®2017_int_peak =** Not Run

| Copies | 0 | 15.0 | 30.0 | 45.0 | 60.0 | 75.0 | 90.0 | 105 | 120 | 135 | 150 | 165 | 180 | 195 | 210 | 225 | 240 | 255 | 270 | 285 | 300 |
| 500.perlbench_r | 32 | 125 | 95.5 |
| 502.gcc_r | 32 | 98.3 |
| 505.mcf_r | 32 | 252 |
| 520.omnetpp_r | 32 | 187 |
| 523.xalancbmk_r | 32 | 78.0 |
| 525.x264_r | 32 | 292 |
| 531.deepsjeng_r | 32 | 108 |
| 541.leela_r | 32 | 105 |
| 548.exchange2_r | 32 | 292 |
| 557.xz_r | 32 | 78.0 |

**Hardware**

**CPU Name:** Intel Xeon Gold 6334  
**Max MHz:** 3700  
**Nominal:** 3600  
**Enabled:** 16 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:** 18 MB I+D on chip per chip  
**Other:** None  
**Memory:** 1 TB (32 x 32 GB 2Rx8 PC4-3200AA-R)  
**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 U8E111A 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 ST650 V2 (3.60 GHz, Intel Xeon Gold 6334)

Results Table

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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/cpu2017-1.1.8-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"
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
runcpu command invoked through numactl i.e.:

(Continued on next page)
General Notes (Continued)

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
DCU Streamer Prefetcher set to Disabled
SNC set to Enabled
UPI Link Disable set to Disabled 1 Link

Sysinfo program /home/cpu2017-1.1.8-ic2021.1-revB/bin/sysinfo
Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16acafc64d
running on localhost.localdomain Sat Jun 26 02:49:58 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 6334 CPU @ 3.60GHz
      2 "physical id"s (chips)
      32 "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 : 8
      siblings : 16
      physical 0: cores 0 1 2 3 4 5 6 7
      physical 1: cores 0 1 2 3 4 5 6 7

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):              32
    On-line CPU(s) list: 0-31
    Thread(s) per core:  2
    Core(s) per socket:  8
    Socket(s):           2
    NUMA node(s):        4
    Vendor ID:           GenuineIntel
**SPEC CPU®2017 Integer Rate Result**

Lenovo Global Technology

**ThinkSystem ST650 V2**

(3.60 GHz, Intel Xeon Gold 6334)

<table>
<thead>
<tr>
<th>SPECrate®2017_int_base</th>
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<td>SPECrate®2017_int_peak</td>
<td>Not Run</td>
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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

---

**Platform Notes (Continued)**

```plaintext
CPU family:          6  
Model:               106  
Model name:          Intel(R) Xeon(R) Gold 6334 CPU @ 3.60GHz  
Stepping:            6  
CPU MHz:             3600.000  
BogoMIPS:            7200.00  
Virtualization:      VT-x  
L1d cache:           48K  
L1i cache:           32K  
L2 cache:            1280K  
L3 cache:            18432K  
NUMA node0 CPU(s):   0-3,16-19  
NUMA node1 CPU(s):   4-7,20-23  
NUMA node2 CPU(s):   8-11,24-27  
NUMA node3 CPU(s):   12-15,28-31  
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 pdelgb rdtsscp lm constant_tsc art arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc cpuid aperfmpref pni pclmulqdq dtes64 ds_cpl vmx smx est tm2 ssse3 sdbg fma cx16 xtpr pdcm pcid dca sse4_1 lse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave avx fl64c rdrand lahf_lm abm 3dnowprefetch cpuid_fault epb cat_13 invpcid_single intel_pipp ssbd mba ibrs ibpb stibp ibrs:enhanced tpr_shadow vmpnth flexpriority ept vpid ept_ad fsgsbase tsc_adjust bm1 hle avx2 smep bmi2 erms invpcid cqm rdt_a avx512f avx512dq rdseed adx smap avx512ifma clflushopt clwb intel_pt avx512cd sha ni avx512bw avx512vl xsaveopt xsavec xsavec xsavec xsavec xsaves x Ces cqm_llc cqm_occp llc cqm_mmb_total cqm_mbb_local split_lock Detect wnoinvd dtherm ida arat pin pts avx512vmbmi umip pku ospke avx512_vbm12 gfnl vaes vpclmulqdq avx512_vnni avx512_bitalg tme avx512_vpocntdq 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 16 17 18 19  
node 0 size: 255792 MB  
node 0 free: 257370 MB  
node 1 cpus: 4 5 6 7 20 21 22 23  
node 1 size: 256240 MB  
node 1 free: 257500 MB  
node 2 cpus: 8 9 10 11 24 25 26 27  
node 2 size: 256313 MB  
node 2 free: 257771 MB  
node 3 cpus: 12 13 14 15 28 29 30 31  
node 3 size: 256267 MB  
node 3 free: 257798 MB

(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 = 145
SPECrate®2017_int_peak = Not Run

CPU2017 License: 9017
Test Sponsor: Lenovo Global Technology
Test Date: Jun-2021
Tested by: Lenovo Global Technology
Hardware Availability: Jul-2021
Software Availability: Dec-2020

Platform Notes (Continued)

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: 1056494988 kB
HugePages_Total: 0
Hugepagesize: 2048 kB

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

From /etc/*release* /etc/*version*
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
CVE-2017-5753 (Spectre variant 1): Mitigation: usercopy/swaps barriers and __user pointer sanitation
CVE-2017-5715 (Spectre variant 2): Mitigation: Enhanced IBRS, IBPB: conditional, RSB filling

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

**Lenovo Global Technology**

ThinkSystem ST650 V2
(3.60 GHz, Intel Xeon Gold 6334)

SPECrate®2017_int_base = 145

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---

**CPU2017 License:** 9017

**Test Sponsor:** Lenovo Global Technology

**Tested by:** Lenovo Global Technology

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**Platform Notes (Continued)**

CVE-2020-0543 (Special Register Buffer Data Sampling): Not affected

CVE-2019-11135 (TSX Asynchronous Abort): Not affected

---

run-level 3 Jun 26 02:49

SPEC is set to: /home/cpu2017-1.1.8-ic2021.1-revB

Filesystem Type Size Used Avail Use% Mounted on
/dev/sda4 xfs 818G 79G 739G 10% /home

From /sys/devices/virtual/dmi/id

**Vendor:** Lenovo

**Product:** ThinkSystem ST650V2

**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

**BIOS:**

BIOS Vendor: Lenovo

BIOS Version: U8E111A-1.02

BIOS Date: 05/07/2021

BIOS Revision: 1.2

Firmware Revision: 1.40

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

```
C++     | 520.omnetpp_r(base) 523.xalancbmk_r(base) 531.deepsjeng_r(base)
        | 541.leela_r(base)
```

(Continued on next page)
Lenovo Global Technology
ThinkSystem ST650 V2
(3.60 GHz, Intel Xeon Gold 6334)

Compiler Version Notes (Continued)

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

(Continued on next page)
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Base Optimization Flags (Continued)

C benchmarks (continued):
-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-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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For questions about this result, please contact the tester. For other inquiries, please contact info@spec.org.

Tested with SPEC CPU®2017 v1.1.8 on 2021-06-25 14:49:57-0400.
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