Lenovo Global Technology
ThinkSystem ST650 V2
(2.40 GHz, Intel Xeon Platinum 8360Y)

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

Test Date: Apr-2021
Hardware Availability: May-2021
Software Availability: Jul-2021

### SPECspeed\textsuperscript{®}2017\_int\_base = 12.0

### SPECspeed\textsuperscript{®}2017\_int\_peak = Not Run

<table>
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<tr>
<th>Thread</th>
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<th>SPECspeed\textsuperscript{®}2017_int_peak</th>
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<tr>
<td>657.xz_s</td>
<td>24.7</td>
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</tbody>
</table>

### Hardware

- **CPU Name**: Intel Xeon Platinum 8360Y
- **Max MHz**: 3500
- **Nominal**: 2400
- **Enabled**: 72 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**: 54 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 release 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;
- **Compiler**: C/C++: Version 2021.1 of Intel C/C++ Compiler
  - Classic Build 20201112 for Linux
- **Parallel**: Yes
- **Firmware**: Lenovo BIOS Version U8E109P 1.01 released Apr-2021
- **File System**: xfs
- **System State**: Run level 3 (multi-user)
- **Base Pointers**: 64-bit
- **Peak Pointers**: Not Applicable
- **Other**: jemalloc memory allocator V5.0.1
- **Power Management**: BIOS set to prefer performance at the cost of additional power usage
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Results Table

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<tr>
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<th>Seconds</th>
<th>Ratio</th>
<th>Base</th>
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SPECs²017_int_base = 12.0
SPECs²017_int_peak = Not Run

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

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:
KMP_AFFINITY = "granularity=fine,scatter"
LD_LIBRARY_PATH = "/home/cpu2017-1.1.5-ic2021.1-revB/lib/intel64:/home/cpu2017-1.1.5-ic202
1.1-revB/je5.0.1-64"
MALLOC_CONF = "retain:true"
OMP_STACKSIZE = "192M"

General Notes

Binaries compiled on a system with 1x Intel Core i9-7980XE CPU + 64GB RAM
memory using Redhat Enterprise Linux 8.0
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
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.

(Continued on next page)
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SPECSpeed®2017_int_base = 12.0
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General Notes (Continued)
jemalloc, a general purpose malloc implementation
built with the RedHat Enterprise 7.5, and the system compiler gcc 4.8.5

Platform Notes
BIOS configuration:
Choose Operating Mode set to Maximum Performance and then set it to Custom Mode
C-States set to Legacy
 Sysinfo program /home/cpu2017-1.1.5-ic2021.1-revB/bin/sysinfo
 Rev: r6538 of 2020-09-24 e8664e66d2d7080afeaa89d4b38e2f1c
 running on localhost.localdomain Tue Apr 20 22:08:32 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) Platinum 8360Y CPU @ 2.40GHz
  2 "physical id"s (chips)
  144 "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 : 36
siblings : 72
 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 28 29 30 31 32 33 34 35
 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 28 29 30 31 32 33 34 35
From lscpu:
 Architecture: x86_64
 CPU op-mode(s): 32-bit, 64-bit
 Byte Order: Little Endian
 CPU(s): 144
 On-line CPU(s) list: 0-143
 Thread(s) per core: 2
 Core(s) per socket: 36
 Socket(s): 2
 NUMA node(s): 2
 Vendor ID: GenuineIntel
 CPU family: 6
 Model: 106
 Model name: Intel(R) Xeon(R) Platinum 8360Y CPU @ 2.40GHz
 Stepping: 6

(Continued on next page)
### Lenovo Global Technology

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<table>
<thead>
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<td>Jul-2021</td>
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#### SPEC CPU 2017 Integer Speed Result

**SPECspeed®2017_int_base = 12.0**  
**SPECspeed®2017_int_peak = Not Run**

**Platform Notes (Continued)**

```plaintext
CPU MHz: 1615.291  
BogoMIPS: 4800.00  
Virtualization: VT-x  
L1d cache: 48K  
L1i cache: 32K  
L2 cache: 1280K  
L3 cache: 55296K  
NUMA node0 CPU(s): 0-35,72-107  
NUMA node1 CPU(s): 36-71,108-143  
Flags: fpu vme de pse sep mtrr 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
aperfmonperf pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg fma cx16
xtrpr pdcm pcid dca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave
avx f16c rdrand lahf_lm abm 3dnowprefetch cpuid_fault epb cat_l3 invpcid_single
intel_ppln ssbd mba ibrs ibpb stibp ibrs_enhanced tpr_shadow vmci flexpriority ept
vpid ept_ad fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 ibrm invpcid cqm
avx512f avx512dq rdseed adx smap avx512ifma clflushopt clwb intel_pt avx512cd sha ni
avx512bw avx512vl xsaveopt xsavec xSAVE xGETBV1 x Saves cmq_llc cmq_occup_llc cmq_mbb_total
cmq_mbb_local split_lock Detect wboinvd dtherm ida arat pln pts avx512vbmi umip pku
ospke avx512_vbmi2 gfnl vaes vpcmulpdq avx512_vnni avx512_bitalg tme
avx512_vpopcntdq la57 rdpid md_clear pconfig flush_lld arch_capabilities

/proc/cpuinfo cache data  
cache size : 55296 KB
```

From `numactl --hardware` WARNING: a numactl 'node' might or might not correspond to a physical chip.

```plaintext
available: 2 nodes (0-1)  
node 0 cpus: 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
28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56
57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86
87 88 89 90 91 92 93 94 95 96 97 98 99 100 101 102 103 104 105 106 107
node 0 size: 480039 MB  
node 0 free: 515044 MB
```

```
node 1 cpus: 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60
61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87
88 89 90 91 92 93 94 95 96 97 98 99 100 101 102 103 104 105 106 107
node 1 size: 481245 MB  
node 1 free: 514996 MB
```

```
node distances:
node 0 1
0: 10 20  
1: 20 10
```

From `/proc/meminfo`  
MemTotal: 1056469840 kB

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Platform Notes (Continued)

HugePages_Total:       0
Hugepagesize:       2048 kB

/sbin/tuned-adm active
Current active profile: balanced

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
ox86_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): Mitigation: Speculative Store Bypass disabled via prctl and seccomp
CVE-2018-3639 (Speculative Store Bypass): Mitigation: usercopy/swaps barriers and __user pointer sanitation
CVE-2017-5753 (Spectre variant 1): Mitigation: Enhanced IBRS, IBPB: conditional, RSB filling
CVE-2017-5715 (Spectre variant 2):
CVE-2020-0543 (Special Register Buffer Data Sampling):
CVE-2019-11135 (TSX Asynchronous Abort):

run-level 3 Apr 20 22:06

SPEC is set to: /home/cpu2017-1.1.5-ic2021.1-revB
Filesystem  Type  Size  Used Avail Use% Mounted on
/dev/sda4    xfs  818G  82G   736G  10%  /home

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Platform Notes (Continued)

From /sys/devices/virtual/dmi/id
Vendor: Lenovo
Product: ThinkSystem ST650V2
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

BIOS:
BIOS Vendor: Lenovo
BIOS Version: U8E109P-1.01
BIOS Date: 04/08/2021
BIOS Revision: 1.1
Firmware Revision: 0.90

(End of data from sysinfo program)

Compiler Version Notes
==============================================================================
| C       | 600.perlbench_s(base) 602.gcc_s(base) 605.mcf_s(base) |
|         | 625.x264_s(base) 657.xz_s(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++     | 620.omnetpp_s(base) 623.xalancbmk_s(base) 631.deepsjeng_s(base) |
|         | 641.lleela_s(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. |
==============================================================================
<table>
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<th>Fortran</th>
<th>648.exchange2_s(base)</th>
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<tr>
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Compiler Version Notes (Continued)

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

600.perlbench_s: -DSPEC_LP64 -DSPEC_LINUX_X64
602.gcc_s: -DSPEC_LP64
605.mcf_s: -DSPEC_LP64
620.omnetpp_s: -DSPEC_LP64
623.xalancbmk_s: -DSPEC_LP64 -DSPEC_LINUX
625.x264_s: -DSPEC_LP64
631.deepsjeng_s: -DSPEC_LP64
641.leela_s: -DSPEC_LP64
648.exchange2_s: -DSPEC_LP64
657.xz_s: -DSPEC_LP64

Base Optimization Flags

C benchmarks:
-DSPEC_OPENMP -std=c11 -m64 -fiopenmp -Wl,-z,muldefs -xCORE-AVX512
-O3 -ffast-math -flto -mfpmath=sse -funroll-loops
-qopt-mem-layout-trans=4 -mbranches-within-32B-boundaries
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

C++ benchmarks:
-DSPEC_OPENMP -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/

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

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#### SPECspeed®2017 Int Base & Peak Results:

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#### Base Optimization Flags (Continued)

**C++ benchmarks (continued):**

- lqkmalloc

**Fortran benchmarks:**

- m64  
  -xCORE-AVX512  
  -O3  
  -ipo  
  -no-prec-div  
  -qopt-mem-layout-trans=4  
  -nostandard-realloc-lhs  
  -align array32byte  
  -auto  
  -mbranches-within-32B-boundaries

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)

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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 2021-04-20 10:08:31-0400.*

*Report generated on 2021-05-12 14:04:26 by CPU2017 PDF formatter v6442.*

*Originally published on 2021-05-12.*