# Lenovo Global Technology

ThinkSystem ST650 V2
(2.20 GHz, Intel Xeon Platinum 8352Y)

<table>
<thead>
<tr>
<th>Threaded SPECspeed 2017 Integer Speed Result</th>
<th>Lenovo Global Technology</th>
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<tbody>
<tr>
<td>Test Sponsor: Lenovo Global Technology</td>
<td>Test Date: May-2021</td>
<td>Hardware Availability: Jul-2021</td>
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<tr>
<td>Tested by: Lenovo Global Technology</td>
<td>Software Availability: Feb-2021</td>
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<table>
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<tr>
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<table>
<thead>
<tr>
<th>Threads</th>
<th>SPECspeed2017_int_base (11.6)</th>
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<tr>
<td>128</td>
<td>7.02</td>
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<tr>
<td>128</td>
<td>10.4</td>
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<td>128</td>
<td>16.7</td>
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<td>128</td>
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<td>128</td>
<td>18.8</td>
</tr>
<tr>
<td>128</td>
<td>13.2</td>
</tr>
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</table>

**Hardware**

- **CPU Name:** Intel Xeon Platinum 8352Y
- **Max MHz:** 3400
- **Nominal:** 2200
- **Enabled:** 64 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:** 48 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

**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;
  C/C++: Version 2021.1 of Intel C/C++ Compiler Classic Build 20201112 for Linux
- **Parallel:** Yes
- **Firmware:** Lenovo BIOS Version U8E109PT1 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 and OS set to prefer performance at the cost of additional power usage

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Page 1  Standard Performance Evaluation Corporation (info@spec.org)  https://www.spec.org/
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### SPEC CPU®2017 Integer Speed Result

**Lenovo Global Technology**

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**SPECSpeed®2017_int_base =** 11.6  
**SPECSpeed®2017_int_peak =** Not Run

---

**Results Table**

<table>
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<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Base Seconds</th>
<th>Ratio</th>
<th>Base Seconds</th>
<th>Ratio</th>
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<th>Ratio</th>
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<th>Ratio</th>
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<tr>
<td>641.leela_s</td>
<td>128</td>
<td>362</td>
<td>4.72</td>
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<td>4.72</td>
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<td>648.exchange2_s</td>
<td>128</td>
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<td>18.8</td>
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<td>657.xz_s</td>
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<td>24.3</td>
<td>254</td>
<td>24.3</td>
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<td></td>
</tr>
</tbody>
</table>

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Operating System Notes

Stack size set to unlimited using "ulimit -s unlimited"

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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-ic2021.1-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:

```bash
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)
Lenovo Global Technology

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(2.20 GHz, Intel Xeon Platinum 8352Y)

SPECspeed®2017_int_base = 11.6
SPECspeed®2017_int_peak = Not Run

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 May 11 18:30:25 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) Platinum 8352Y CPU @ 2.20GHz
  2 "physical id"s (chips)
  128 "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 : 32
siblings : 64
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
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

From lscpu:

Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 128
On-line CPU(s) list: 0-127
Thread(s) per core: 2
Core(s) per socket: 32
Socket(s): 2
NUMA node(s): 2
Vendor ID: GenuineIntel
CPU family: 6
Model: 106
Model name: Intel(R) Xeon(R) Platinum 8352Y CPU @ 2.20GHz
Stepping: 6

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

<table>
<thead>
<tr>
<th>CPU MHz:</th>
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<tr>
<td>BogoMIPS:</td>
<td>4400.00</td>
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<tr>
<td>Virtualization:</td>
<td>VT-x</td>
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<tr>
<td>L1d cache:</td>
<td>48K</td>
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<tr>
<td>L1i cache:</td>
<td>32K</td>
</tr>
<tr>
<td>L2 cache:</td>
<td>1280K</td>
</tr>
<tr>
<td>L3 cache:</td>
<td>49152K</td>
</tr>
<tr>
<td>NUMA node0 CPU(s):</td>
<td>0-31,64-95</td>
</tr>
<tr>
<td>NUMA node1 CPU(s):</td>
<td>32-63,96-127</td>
</tr>
</tbody>
</table>

**Flags:**

```
flags = fpu vme de pse sep mtrr pge 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
        aperfmperf pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg fma cx16
        xtpr pdcm 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_pni ssbd mba ibrs ibpb stibp ibrs_enhanced tpr_shadow vnmi flexpriority ept
        vpd ept_ad fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 3dnow invpcid cqm
        rdt_a
        avx512f avx512dq rdseed adx smap avx512ifma clflushopt clwb intel_pt avx512cd sha ni
        avx512bw avx512vl xsaveopt xsaves xsavec xsaveopt xclwb xsavec xsaveopt
        cqm柁local split_lock_detecl wboinovd dtccltherm ida arat pltn pts avx512vmbi umipi
        ospe avx512_vbmi2 gfnl vaes vpcmcmldq avx512_vnni avx512_bitalg tme
        avx512_vpopcntdq la57 rdrid md_clear pconfing flush_lid arch_capabilities
```

From `/proc/cpuinfo` cache data:

- cache size: 49152 KB

From `numactl --hardware`:

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

### Memory Information

```
MemTotal: 1056474900 kB
```

---

Note: Additional information and performance metrics are provided in the original document, which include detailed specifications and test results for the Lenovo Global Technology ThinkSystem ST650 V2 system with a specified CPU configuration and associated performance data. The document also highlights the importance of understanding the platform notes for accurate interpretation of the test results.
Lenovo Global Technology
ThinkSystem ST650 V2
(2.20 GHz, Intel Xeon Platinum 8352Y)

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

SPECspeed®2017_int_base = 11.6
SPECspeed®2017_int_peak = Not Run

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

Platform Notes (Continued)

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
  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
CVE-2020-0543 (Special Register Buffer Data Sampling): Not affected
CVE-2019-11135 (TSX Asynchronous Abort): Not affected

run-level 3 May 11 18:27
SPEC is set to: /home/cpu2017-1.1.5-ic2021.1-revB
  Filesystem Type Size Used Avail Use% Mounted on
  /dev/sda4 xfs 818G 89G 729G 11% /home

From /sys/devices/virtual/dmi/id

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

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**Platform Notes (Continued)**

- **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:**  
  - **Vendor:** Lenovo  
  - **Version:** U8E109PT1-1.01  
  - **Date:** 04/28/2021  
  - **Revision:** 1.1  
  - **Firmware Revision:** 1.20

(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)
---|-----------------------------------------------
C++| 620.omnetpp_s(base) 623.xalancbmk_s(base) 631.deepsjeng_s(base) 641.leela_s(base)
---|-----------------------------------------------
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,  
    Version 2021.1 Build 20201113
---|-----------------------------------------------
Fortran  | 648.exchange2_s(base)
---|-----------------------------------------------
Intel(R) Fortran Intel(R) 64 Compiler Classic for applications running on  
    Intel(R) 64, Version 2021.1 Build 20201112_000000
```

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SPECSpeed®2017_int_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

Compiler Version Notes (Continued)
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Base Compiler Invocation

C benchmarks:
icx

C++ benchmarks:
icpx

Fortran benchmarks:
ifort

Base Portability Flags

600.perlbench_s: -DSPEC_LP64 -DSPEC_LINUX_X64
602gcc_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
-1/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
-1/opt/intel/oneapi/compiler/2021.1.1/linux/compiler/lib/intel64_lin/
-1qkmalloc

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## Lenovo Global Technology

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**SPECspeed®2017_int_base = 11.6**  
**SPECspeed®2017_int_peak = Not Run**

### Base Optimization Flags (Continued)

**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:

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