# Lenovo Global Technology

**ThinkSystem ST650 V2**

(2.30 GHz, Intel Xeon Platinum 8352M)

<table>
<thead>
<tr>
<th>Thread</th>
<th>SPECspeed(^{2017})_fp_base</th>
<th>SPECspeed(^{2017})_fp_peak</th>
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<tr>
<td>603.bwaves_s 64</td>
<td>256</td>
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</tr>
<tr>
<td>607.cactuBSSN_s 64</td>
<td>144</td>
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</tr>
<tr>
<td>619.lbm_s 64</td>
<td>166</td>
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<tr>
<td>621.wrf_s 64</td>
<td>152</td>
<td></td>
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<tr>
<td>627.cam4_s 64</td>
<td>82.7</td>
<td></td>
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<tr>
<td>628.pop2_s 64</td>
<td>257</td>
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<tr>
<td>638.imagick_s 64</td>
<td>380</td>
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<tr>
<td>644.nab_s 64</td>
<td>116</td>
<td></td>
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<tr>
<td>649.fotonik3d_s 64</td>
<td>262</td>
<td></td>
</tr>
<tr>
<td>654.roms_s 64</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## Hardware

**CPU Name:** Intel Xeon Platinum 8352M  
**Max MHz:** 3500  
**Nominal:** 2300  
**Enabled:** 64 cores, 2 chips  
**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:** 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  
**Other:** None

## Software

**OS:** Red Hat Enterprise Linux 8.3 (Ootpa)  
**Kernel:** 4.18.0-240.el8.x86_64  
**Compiler:** Fortran: Version 2021.1 of Intel Fortran Compiler  
**Parallel:** Yes  
**System State:** Run level 3 (multi-user)  
**Power Management:** BIOS and OS set to prefer performance at the cost of additional power usage
Lenovo Global Technology
ThinkSystem ST650 V2
(2.30 GHz, Intel Xeon Platinum 8352M)

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

Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
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<td>628.pop2_s</td>
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<td>60.7</td>
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<td>61.0</td>
<td>237</td>
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<td>116</td>
<td>78.4</td>
<td>116</td>
<td>81.4</td>
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<tr>
<td>654.roms_s</td>
<td>64</td>
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<td>262</td>
<td>61.0</td>
<td>258</td>
<td>59.9</td>
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</table>

SPECspeed®2017_fp_base = 211
SPECspeed®2017_fp_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,compact"
LD_LIBRARY_PATH = "'/home/cpu2017-1.1.8-ic2021.1-revB/lib/intel64:/home/cpu2017-1.1.8-ic2021.1-revB/jre5.0.1-64"
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)
## General Notes (Continued)


## 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
Hyper-Threading set to Disabled

Sysinfo program /home/cpu2017-1.1.8-ic2021.1-revB/bin/sysinfo
Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16a5af64d
running on localhost.localdomain Mon Jun 21 21:56:28 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 8352M CPU @ 2.30GHz
  2 "physical id"s (chips)
  64 "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 : 32
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 from util-linux 2.32.1:

```
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 64
On-line CPU(s) list: 0-63
Thread(s) per core: 1
Core(s) per socket: 32
Socket(s): 2
NUMA node(s): 2
Vendor ID: GenuineIntel
CPU family: 6
Model: 106
```
**Lenovo Global Technology**

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<table>
<thead>
<tr>
<th>SPECspeed®2017_fp_base =</th>
<th>211</th>
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</thead>
<tbody>
<tr>
<td>SPECspeed®2017_fp_peak =</td>
<td>Not Run</td>
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</tbody>
</table>

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<th>9017</th>
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<tr>
<th>Test Date:</th>
<th>Jun-2021</th>
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<tbody>
<tr>
<td>Hardware Availability:</td>
<td>Jul-2021</td>
</tr>
<tr>
<td>Software Availability:</td>
<td>Dec-2020</td>
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**Platform Notes (Continued)**

<table>
<thead>
<tr>
<th>Model name:</th>
<th>Intel(R) Xeon(R) Platinum 8352M CPU @ 2.30GHz</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stepping:</td>
<td>6</td>
</tr>
<tr>
<td>CPU MHz:</td>
<td>912.124</td>
</tr>
<tr>
<td>BogoMIPS:</td>
<td>4600.00</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>
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<tr>
<td>L2 cache:</td>
<td>1280K</td>
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<tr>
<td>L3 cache:</td>
<td>49152K</td>
</tr>
<tr>
<td>NUMA node0 CPU(s):</td>
<td>0-31</td>
</tr>
<tr>
<td>NUMA node1 CPU(s):</td>
<td>32-63</td>
</tr>
<tr>
<td>Flags:</td>
<td>fpu vme de pse tsc msr pae mce cx8 apic sep mtrr pge mca cmov</td>
</tr>
<tr>
<td></td>
<td>pat pse36 clflush dts acpi mmx fxsr sse sse2 ss ht tm pbe syscall nx pdpe1gb rdtscp</td>
</tr>
<tr>
<td></td>
<td>lm constant_tsc art arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc cpuid</td>
</tr>
<tr>
<td></td>
<td>aperfmperf pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg fma cx16</td>
</tr>
<tr>
<td></td>
<td>xtrt pdcm pcid dca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave</td>
</tr>
<tr>
<td></td>
<td>avx f16c rdrand lahf_lm abm 3dnowprefetch cpuid_fault epb cat_l3 invpcid_single</td>
</tr>
<tr>
<td></td>
<td>intel_pgp xmm ssbd mba ibrs ibpb stibp ibrs_enhanced tpr_shadow vnmi flexpriority ept</td>
</tr>
<tr>
<td></td>
<td>vpid ept_ad fsgrbase tsc_adjunct bmi1 hle avx2 smep bmi2 erms invpcid cqm rdt_a</td>
</tr>
<tr>
<td></td>
<td>avx512f avx512dq rdseed adx smap avx512ifma clflushopt clwb intel_pt avx512cd sha ni</td>
</tr>
<tr>
<td></td>
<td>avx512bw avx512vl xsaveopt xsaves xgetbv xsavec arch_capabilities</td>
</tr>
</tbody>
</table>

/proc/cpuinfo cache data

```
cache size : 49152 KB
```

From numactl --hardware

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

```
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
node 0 size: 485045 MB
node 0 free: 515038 MB
node 1 cpus: 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
node 1 size: 486039 MB
node 1 free: 515291 MB
node distances:
node 0: 10 20
node 1: 20 10
```

From /proc/meminfo

```
MemTotal: 1056488736 kB
```

HugePages_Total: 0

(Continued on next page)
Platform Notes (Continued)

Hugepage size: 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 Multi-hit):
  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 Jun 21 21:51

SPEC is set to: /home/cpu2017-1.1.8-ic2021.1-revB
  Filesystem Type Size Used Avail Use% Mounted on
  /dev/sda4 xfs 818G 108G 710G 14% /home

From /sys/devices/virtual/dmi/id
Lenovo Global Technology
ThinkSystem ST650 V2
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CPU2017 License: 9017
Test Sponsor: Lenovo Global Technology
Tested by: Lenovo Global Technology

SPECspeed®2017_fp_base = 211
SPECspeed®2017_fp_peak = Not Run

Test Date: Jun-2021
Hardware Availability: Jul-2021
Software Availability: Dec-2020

Platform Notes (Continued)

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               | 619.lbm_s(base) 638.imagick_s(base) 644.nab_s(base)
------------------------------------------------------------------------------
Intel(R) C 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.
------------------------------------------------------------------------------

==============================================================================
C++, C, Fortran | 607.cactuBSSN_s(base)
------------------------------------------------------------------------------
Intel(R) C++ 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) C 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) 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.
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## Base Compiler Invocation

C benchmarks:
- icc

Fortran benchmarks:
- ifort

Benchmarks using both Fortran and C:
- ifort icc

Benchmarks using Fortran, C, and C++:
- icpc icc ifort

## Base Portability Flags

603.bwaves_s: -DSPEC_LP64
607.cactuBSSN_s: -DSPEC_LP64
619.ibm_s: -DSPEC_LP64
621.wrf_s: -DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian
627.cam4_s: -DSPEC_LP64 -DSPEC_CASE_FLAG
628.pop2_s: -DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian -assume byterecl
638.imagick_s: -DSPEC_LP64
644.nab_s: -DSPEC_LP64

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

**Lenovo Global Technology**  
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**Base Portability Flags (Continued)**

649.fotonik3d.s: -DSPEC_LP64  
654.roms.s: -DSPEC_LP64

**Base Optimization Flags**

C benchmarks:
- -m64 -std=c11 -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch  
- -ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP  
- -mbranches-within-32B-boundaries

Fortran benchmarks:
- -m64 -Wl,-z,muldefs -DSPEC_OPENMP -xCORE-AVX2 -ipo -O3 -no-prec-div  
- -qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp  
- -nostandard-realloc-lhs -mbranches-within-32B-boundaries  
- -L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

Benchmarks using both Fortran and C:
- -m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX2 -ipo -O3 -no-prec-div  
- -qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp  
- -DSPEC_OPENMP -mbranches-within-32B-boundaries -nostandard-realloc-lhs  
- -L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

Benchmarks using Fortran, C, and C++:
- -m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX2 -ipo -O3 -no-prec-div  
- -qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp  
- -DSPEC_OPENMP -mbranches-within-32B-boundaries -nostandard-realloc-lhs  
- -L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

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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