Lenovo Global Technology
ThinkSystem ST650 V2
(2.10 GHz, Intel Xeon Platinum 8352V)

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

SPECrate®2017_int_base = 434
SPECrate®2017_int_peak = Not Run

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

Hardware
CPU Name: Intel Xeon Platinum 8352V
Max MHz: 3500
Nominal: 2100
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, running at 2933)
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;
C/C++: Version 2021.1 of Intel C/C++ Compiler
Classic Build 20201112 for Linux
Parallel: No
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: None
Power Management: BIOS and OS set to prefer performance
at the cost of additional power usage
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Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Copies</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
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</thead>
<tbody>
<tr>
<td>500.perlbench_r</td>
<td>144</td>
<td>762</td>
<td>301</td>
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<td>896</td>
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<td>895</td>
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<td>618</td>
<td>251</td>
<td>620</td>
<td>251</td>
</tr>
</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-revB/lib/intel64:/home/cpu2017-1.1.5-ic2021.1-revB/lib/ia32:/home/cpu2017-1.1.5-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

(Continued on next page)
## Lenovo Global Technology

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**CPU2017 License:** 9017  
**Test Date:** May-2021  
**Test Sponsor:** Lenovo Global Technology  
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### General Notes (Continued)

- **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 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/cpu2017-1.1.5-ic2021.1-revB/bin/sysinfo**

Rev: r6538 of 2020-09-24 e8664e66d2d7080afeaa89d4b38e2f1c  
running on localhost.localdomain Tue May 11 23:42:02 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 8352V CPU @ 2.10GHz
- `physical id`: (chips)
- `sibling`: (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

(Continued on next page)
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Test Sponsor: Lenovo Global Technology
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SPECratenode CPU2017_int_base = 434
SPECratenode CPU2017_int_peak = Not Run

---

**Platform Notes (Continued)**

- Socket(s): 2
- NUMA node(s): 4
- Vendor ID: GenuineIntel
- CPU family: 6
- Model: 106
- Model name: Intel(R) Xeon(R) Platinum 8352V CPU @ 2.10GHz
- Stepping: 6
- CPU MHz: 2500.000
- BogoMIPS: 4200.00
- Virtualization: VT-x
- L1d cache: 48K
- L1i cache: 32K
- L2 cache: 1280K
- L3 cache: 55296K
- NUMA node0 CPU(s): 0-17,72-89
- NUMA node1 CPU(s): 18-35,90-107
- NUMA node2 CPU(s): 36-53,108-125
- NUMA node3 CPU(s): 54-71,126-143
- 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 pdpellgb rdtscp lm constant_tsc art arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc cpuid aperfmperf pni pclmulqdq dtes64 ds_cpl vmx smx est tm2 ssse3 sdbg fma cx16 xtpr pdcm pcid dcasse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave avx f16c rdrand lahf_lm abm 3nowprefetch cpuid_fault epb cat_l3 invpcid_single intel_ppin ssbd mba ibrs ibpb ibrs_enhanced tpr_shadow vnmi flexpriority ept vpid ept_ad fsgsbase tsc_adjust bmi1 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 xsave cxtgbv1 xsavec cqm_1lc cqm_occup_1lc cqm_mbm_total cqm_mbm_local split_lock_detect wbnoinvd dtherm ida arat pln pts avx512vbmi umip pku ospke avx512_vbmi2 gfn biased vpcimulqdq avx512_vnmi avx512_bitalg tme avx512_vpopcntdq la57 rdrpid md_clear pconfig flush_l1d arch_capabilities

/proc/cpuinfo cache data
cache size: 55296 KB

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

- available: 4 nodes (0-3)
- node 0 cpus: 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 22 23 24 25 26 27 28 29 30 31 32 33 34 35 39 90 91 92 93 94 95 96
- node 0 size: 250614 MB
- node 0 free: 257158 MB
- node 1 cpus: 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 39 90 91 92 93 94 95 96
- node 1 size: 251225 MB
- node 1 free: 257716 MB
- node 2 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

(Continued on next page)
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<td>Hardware Availability:</td>
<td>Jul-2021</td>
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<td>Lenovo Global Technology</td>
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### SPECrate®2017_int_base = 434

### SPECrate®2017_int_peak = Not Run

#### Platform Notes (Continued)

<table>
<thead>
<tr>
<th>node</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>0:</td>
<td>10</td>
<td>11</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>1:</td>
<td>11</td>
<td>10</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>2:</td>
<td>20</td>
<td>20</td>
<td>10</td>
<td>11</td>
</tr>
<tr>
<td>3:</td>
<td>20</td>
<td>20</td>
<td>11</td>
<td>10</td>
</tr>
</tbody>
</table>

From `/proc/meminfo`

```plaintext```
MemTotal:       1056468708 kB
HugePages_Total:       0
Hugepagesize:       2048 kB
/sbin/tuned-adm active
    Current active profile: throughput-performance
```

From `/etc/*release*` /`/etc/*version*`

```plaintext```
NAME="Red Hat Enterprise Linux"
VERSION="8.3 (Ootpa)"
OS="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
```

```plaintext```
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 |

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

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### Platform Notes (Continued)

- **CVE-2017-5753 (Spectre variant 1):**  
  Bypass disabled via prctl and seccomp  
  Mitigation: usercopy/swaps 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 11 23:39**

SPEC is set to: /home/cpu2017-1.1.5-ic2021.1-revB

<table>
<thead>
<tr>
<th>Filesystem</th>
<th>Type</th>
<th>Size</th>
<th>Used</th>
<th>Avail</th>
<th>Use%</th>
<th>Mounted on</th>
</tr>
</thead>
<tbody>
<tr>
<td>/dev/sda4</td>
<td>xfs</td>
<td>818G</td>
<td>50G</td>
<td>768G</td>
<td>7%</td>
<td>/home</td>
</tr>
</tbody>
</table>

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, configured at 2933

**BIOS:**

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

(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

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

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**SPECrate®2017_int_base = 434**

**SPECrate®2017_int_peak = Not Run**

**Compiler Version Notes (Continued)**

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

----------------------------------------------------------------------

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

```
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
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Base Optimization Flags

C benchmarks:
-w -std=c11 -m64 -Wl,-z,muldefs -xCORE-AVX512 -O3 -ffast-math
-fflto -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-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.

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