### Lenovo Global Technology

**ThinkEdge SE450**  
(2.00 GHz, Intel Xeon Gold 6330)

<table>
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<tr>
<th>SPECrate®2017_int_base =</th>
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<tbody>
<tr>
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**CPU2017 License:** 9017  
**Test Sponsor:** Lenovo Global Technology  
**Tested by:** Lenovo Global Technology

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<td>557.xz_r</td>
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### Hardware

**CPU Name:** Intel Xeon Gold 6330  
**Max MHz:** 3100  
**Nominal:** 2000  
**Enabled:** 28 cores, 1 chip, 2 threads/core  
**Orderable:** 1 chip  
**Cache L1:** 32 KB I + 48 KB D on chip per core  
**L2:** 1.25 MB I+D on chip per core  
**L3:** 42 MB I+D on chip per chip  
**Other:** None  
**Memory:** 256 GB (8 x 32 GB 2Rx4 PC4-3200AA-R, running at 2933)  
**Storage:** 1 x 960 GB SATA SSD  
**Other:** None

### Software

**OS:** Red Hat Enterprise Linux 8.5  
(Ooipa)  
**Kernel:** 4.18.0-348.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 CME104I 1.01 released Mar-2022  
**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

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**SPECrate®2017_int_base = 182**

**SPECrate®2017_int_peak = Not Run**

### Results Table

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<td>103</td>
<td></td>
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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:

```bash
LD_LIBRARY_PATH = 
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:

```bash
sync; echo 3> /proc/sys/vm/drop_caches
```

(Continued on next page)
Lenovo Global Technology
ThinkEdge SE450
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**SPEC CPU®2017 Integer Rate Result**

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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
SNC set to Enabled

Sysinfo program /home/cpu2017-1.1.8-ic2021.1-revB/bin/sysinfo
Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16aca6f4d
running on localhost.localdomain Fri May 20 19:09:57 2022

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 6330 CPU @ 2.00GHz
- 1 "physical id"s (chips)
- 56 "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 : 28
  - siblings : 56
  - 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

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): 56
- On-line CPU(s) list: 0-55
- Thread(s) per core: 2
- Core(s) per socket: 28
- Socket(s): 1
- NUMA node(s): 2
- Vendor ID: GenuineIntel
- BIOS Vendor ID: Intel(R) Corporation

(Continued on next page)
Lenovo Global Technology
ThinkEdge SE450
(2.00 GHz, Intel Xeon Gold 6330)

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

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**Platform Notes (Continued)**

- CPU family: 6
- Model: 106
- Model name: Intel(R) Xeon(R) Gold 6330 CPU @ 2.00GHz
- BIOS Model name: Intel(R) Xeon(R) Gold 6330 CPU @ 2.00GHz
- Stepping: 6
- CPU MHz: 2000.000
- BogoMIPS: 4000.00
- Virtualization: VT-x
- L1d cache: 48K
- L1i cache: 32K
- L2 cache: 1280K
- L3 cache: 43008K
- NUMA node0 CPU(s): 0-13,28-41
- NUMA node1 CPU(s): 14-27,42-55
- Flags: fpu vme de pse tsc msr pae mce cx8 apic sep mtrr pge mca cmov pat pse36 clflush dts acpi mmx fxsr sse sse2 ss ht tm pbe syscall nx pdelgb rdtscp 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 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 mcm bd aam cmov stpmul msr pae mcepx mpx cmov cx16 xtpr pdcm dmb iss dcache Static_Proprio
- /proc/cpuinfo cache data
  - cache size: 43008 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 28 29 30 31 32 33 34 35 36 37 38 39 40 41
- node 0 size: 128608 MB
- node 0 free: 128200 MB
- node 1 cpus: 14 15 16 17 18 19 20 21 22 23 24 25 26 27 42 43 44 45 46 47 48 49 50 51 52 53 54 55
- node 1 size: 128978 MB
- node 1 free: 128375 MB
- node distances:
  - node 0 1
    - 0: 10 11
    - 1: 11 10

From /proc/membr

(Continued on next page)
Platform Notes (Continued)

MemTotal: 263768692 kB
HugePages_Total: 0
Hugepagesize: 2048 kB

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

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

os-release:
NAME="Red Hat Enterprise Linux"
VERSION="8.5 (Ootpa)"
ID="rhel"
ID_LIKE="fedora"
VERSION_ID="8.5"
PLATFORM_ID="platform:el8"
PRETTY_NAME="Red Hat Enterprise Linux 8.5 (Ootpa)"
ANSI_COLOR="0;31"
redhat-release: Red Hat Enterprise Linux release 8.5 (Ootpa)
system-release: Red Hat Enterprise Linux release 8.5 (Ootpa)
system-release-cpe: cpe:/o:redhat:enterprise_linux:8::baseos

uname -a:
Linux localhost.localdomain 4.18.0-348.el8.x86_64 #1 SMP Mon Oct 4 12:17:22 EDT 2021
gx86_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 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 20 19:08
SPEC is set to: /home/cpu2017-1.1.8-ic2021.1-revB

Filesystem Type Size Used Avail Use% Mounted on
/dev/sda4 xfs 819G 26G 793G 4% /home

(Continued on next page)
Lenovo Global Technology
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SPECrater®2017_int_base = 182
SPECrater®2017_int_peak = Not Run

Platform Notes (Continued)

From /sys/devices/virtual/dmi/id
Vendor: Lenovo
Product: ThinkEdge SE450
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:
8x Samsung M393A4K40DB3-CWE 32 GB 2 rank 3200, configured at 2933

BIOS:
BIOS Vendor: Lenovo
BIOS Version: CME104I-1.01
BIOS Date: 03/17/2022
BIOS Revision: 1.1
Firmware Revision: 1.10

(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)
------------------------------------------------------------------------------
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)

(Continued on next page)
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### Compiler Version Notes (Continued)

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  
-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
```

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#### Base Optimization Flags (Continued)

C++ benchmarks (continued):
- `-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:

You can also download the XML flags sources by saving the following links: