Lenovo Global Technology
ThinkSystem SN550
(2.20 GHz, Intel Xeon Platinum 8276M)

SPECrate2017_int_base = 297
SPECrate2017_int_peak = Not Run

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

Test Date: May-2019
Hardware Availability: Apr-2019
Software Availability: Nov-2018

Hardware
CPU Name: Intel Xeon Platinum 8276M
Max MHz.: 4000
Nominal: 2200
Enabled: 56 cores, 2 chips, 2 threads/core
Orderable: 1,2 chips
Cache L1: 32 KB I + 32 KB D on chip per core
L2: 1 MB I+D on chip per core
L3: 38.5 MB I+D on chip per chip
Other: None
Memory: 768 GB (24 x 32 GB 2Rx4 PC4-2933Y-R)
Storage: 1 x 960 GB SATA SSD
Other: None

Software
OS: SUSE Linux Enterprise Server 15 (x86_64)
Compiler: C/C++: Version 19.0.1.144 of Intel C/C++
Compiler Build 20181018 for Linux:
Fortran: Version 19.0.1.144 of Intel Fortran
Compiler Build 20181018 for Linux
Parallel: No
Firmware: Lenovo BIOS Version IVE135M 2.10 released Jan-2019
File System: xfs
System State: Run level 3 (multi-user)
Base Pointers: 64-bit
Peak Pointers: Not Applicable
Other: None
## Lenovo Global Technology

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<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
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<tr>
<td>500.perlbench_r</td>
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<td>505.mcf_r</td>
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<td>520.omnetpp_r</td>
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<td>191</td>
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<td>541</td>
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<tr>
<td>557.xz_r</td>
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<td>204</td>
<td>594</td>
<td>204</td>
<td>592</td>
<td>204</td>
</tr>
</tbody>
</table>

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

### 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"

### General Notes

Environment variables set by runcpu before the start of the run:
LD_LIBRARY_PATH = "/home/cpu2017-1.0.5-ic19.0u1/lib/intel64"

Binaries compiled on a system with 1x Intel Core i9-7900X CPU + 32GB RAM  
memory using Redhat Enterprise Linux 7.5  
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  
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)

(Continued on next page)
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Test Date: May-2019
Hardware Availability: Apr-2019
Software Availability: Nov-2018

General Notes (Continued)

is mitigated in the system as tested and documented.
Yes: The test sponsor attests, as of date of publication, that CVE-2018-3640 (Spectre variant 3a) is mitigated in the system as tested and documented.
Yes: The test sponsor attests, as of date of publication, that CVE-2018-3639 (Spectre variant 4) is mitigated in the system as tested and documented.

Platform Notes

BIOS configuration:
Choose Operating Mode set to Maximum Performance
Trusted Execution Technology set to Enable
SNC set to Enable
Stale AtoS set to Enable
Sysinfo program /home/cpu2017-1.0.5-ic19.0u1/bin/sysinfo
Rev: r5974 of 2018-05-19 9bcde8f2999c33d61f64985e45859ea9
running on linux-4brr Tue May 7 11:37:32 2019

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 8276M CPU @ 2.20GHz
2 "physical id"s (chips)
112 "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 8 9 10 11 12 13 14 16 17 18 19 20 21 22 24 25 26 27 28 29 30
physical 1: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14 16 17 18 19 20 21 22 24 25 26 27 28 29 30

From lscpu:

Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 112
On-line CPU(s) list: 0-111
Thread(s) per core: 2
Core(s) per socket: 28
Socket(s): 2
NUMA node(s): 4
Vendor ID: GenuineIntel
CPU family: 6
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Platform Notes (Continued)

Model: B5
Model name: Intel(R) Xeon(R) Platinum 8276M CPU @ 2.20GHz
Stepping: 6
CPU MHz: 2200.000
CPU max MHz: 4000.0000
CPU min MHz: 1000.0000
BogoMIPS: 4400.00
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 39424K
NUMA node0 CPU(s): 0-3,7-9,14-17,21-23,56-59,63-65,70-73,77-79
NUMA node1 CPU(s): 4-6,10-13,18-20,24-27,60-62,66-69,74-76,80-83
NUMA node2 CPU(s): 28-31,35-37,42-45,49-51,84-87,91-93,98-101,105-107
NUMA node3 CPU(s): 32-34,38-41,46-48,52-55,88-90,94-97,102-104,108-111
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 pdpe1gb rdtscp
lm constant_tsc art arch_perfmon pbebs pts rep_good nopl xtopology nonstop_tsc cpuid
aperfperf perf pni pclmulqdq dtstes64 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 fl64c
rdrand lahf_lm admb 3dnowprefetch cpuid_fault epb cat_13 cdp_13 invpcid_single ssbd
msb ibrs ibpb stibp tpr_shadow vmm flexpriority ept vpid fsgsbase tsc_adjust bmid
hle avx2 smep bmi2 erms invpcid rtm cmp mpx rdt_a avx512f avx512dq rseed adx smap
ciflushopt cilwb intel_pt avx512cd avx512bw avx512vl xsavesopt xsaveopt xsaves
vmb cmq_summary_total vmb_summary_local dtherm ida pln pts ksu ospke
avx512_vnumi flush_lld arch_capabilities

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

available: 4 nodes (0-3)
nodel node0 cpus: 0 1 2 3 7 8 9 14 15 16 17 21 22 23 56 57 58 59 63 64 65 70 71 72 73 77 78 79
node0 size: 193132 MB
node0 free: 186950 MB
node1 cpus: 4 5 6 10 11 12 13 18 19 20 24 25 26 27 60 61 62 65 67 68 69 74 75 76 80 81 82 83
node1 size: 193520 MB
node1 free: 193221 MB
node2 cpus: 28 29 30 31 35 36 37 42 43 44 45 49 50 51 84 85 86 87 91 92 93 98 99 100
node2 size: 193491 MB
node2 free: 192968 MB
node3 cpus: 32 33 34 38 39 40 41 46 47 48 52 53 54 55 88 89 90 94 95 96 97 102 103 104

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### Platform Notes (Continued)

```
108 109 110 111
node 3 size: 193517 MB  
node 3 free: 193118 MB
node distances:
node  0  1  2  3
  0:  10 11 21 21
  1:  11 10 21 21
  2:  21 21 10 11
  3:  21 21 11 10
```

From `/proc/meminfo`

```plaintext`
MemTotal:       792229324 kB  
HugePages_Total:       0  
Hugepagesize:       2048 kB
```

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

```
os-release:
  NAME="SLES"
  VERSION="15"
  VERSION_ID="15"
  PRETTY_NAME="SUSE Linux Enterprise Server 15"
  ID="sles"
  ID_LIKE="suse"
  ANSI_COLOR="0;32"
  CPE_NAME="cpe:/o:suse:sles:15"
```

```
uname -a:
  x86_64 x86_64 x86_64 GNU/Linux
```

Kernel self-reported vulnerability status:

- **CVE-2017-5754** (Meltdown): Not affected
- **CVE-2017-5753** (Spectre variant 1): Mitigation: __user pointer sanitization
- **CVE-2017-5715** (Spectre variant 2): Mitigation: Indirect Branch Restricted Speculation, IBPB, IBRS_FW

**run-level 3** May 7 11:35

SPEC is set to: `/home/cpu2017-1.0.5-ic19.0u1`

```
Filesystem     Type  Size  Used Avail Use% Mounted on
/dev/sda3      xfs   891G  46G  845G  6%  /
```

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 SM BIOS" standard.

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Platform Notes (Continued)

BIOS Lenovo -[IVE135M-2.10]- 01/16/2019
Memory:
24x Samsung M393A4K40CB2-CVF 32 GB 2 rank 2933

(End of data from sysinfo program)

Compiler Version Notes

| CC 500.perlbench_r(base) 502.gcc_r(base) 505.mcf_r(base) 525.x264_r(base) 557.xz_r(base) |
| Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64, Version 19.0.1.144 Build 20181018 |
| Copyright (C) 1985-2018 Intel Corporation. All rights reserved. |

| CXXC 520.omnetpp_r(base) 523.xalancbmk_r(base) 531.deepsjeng_r(base) 541.leela_r(base) |
| Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64, Version 19.0.1.144 Build 20181018 |
| Copyright (C) 1985-2018 Intel Corporation. All rights reserved. |

| FC 548.exchange2_r(base) |
| Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R) 64, Version 19.0.1.144 Build 20181018 |
| Copyright (C) 1985-2018 Intel Corporation. All rights reserved. |

Base Compiler Invocation

C benchmarks:
icc -m64 -std=c11

C++ benchmarks:
icpc -m64

Fortran benchmarks:
ifort -m64
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### Base Portability Flags

- perlbench_r: -DSPEC_LP64 -DSPEC_LINUX_X64
- gcc_r: -DSPEC_LP64
- mcf_r: -DSPEC_LP64
- omnetpp_r: -DSPEC_LP64
- xalancbmk_r: -DSPEC_LP64 -DSPEC_LINUX
- x264_r: -DSPEC_LP64
- deepsjeng_r: -DSPEC_LP64
- leela_r: -DSPEC_LP64
- exchange2_r: -DSPEC_LP64
- xz_r: -DSPEC_LP64

### Base Optimization Flags

**C benchmarks:**
- -Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div
- -qopt-mem-layout-trans=4
- -L/usr/local/IntelCompiler19/compilers_and_libraries_2019.1.144/linux/compiler/lib/intel64 -lqkmalloc

**C++ benchmarks:**
- -Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div
- -qopt-mem-layout-trans=4
- -L/usr/local/IntelCompiler19/compilers_and_libraries_2019.1.144/linux/compiler/lib/intel64 -lqkmalloc

**Fortran benchmarks:**
- -Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div
- -qopt-mem-layout-trans=4 -nostandard-realloc-lhs -align array32byte
- -L/usr/local/IntelCompiler19/compilers_and_libraries_2019.1.144/linux/compiler/lib/intel64 -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-CLX-A.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-CLX-A.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 CPU2017 v1.0.5 on 2019-05-06 23:37:31-0400.
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