Lenovo Global Technology

ThinkSystem SD530
(2.70 GHz, Intel Xeon Platinum 8280L)

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

SPECrater®2017_int_base = 334
SPECrater®2017_int_peak = Not Run

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Hardware

<table>
<thead>
<tr>
<th>CPU Name:</th>
<th>Intel Xeon Platinum 8280L</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max MHz:</td>
<td>4000</td>
</tr>
<tr>
<td>Nominal:</td>
<td>2700</td>
</tr>
<tr>
<td>Enabled:</td>
<td>56 cores, 2 chips, 2 threads/core</td>
</tr>
<tr>
<td>Orderable:</td>
<td>1,2 chips</td>
</tr>
<tr>
<td>Cache L1:</td>
<td>32 KB I + 32 KB D on chip per core</td>
</tr>
<tr>
<td>L2:</td>
<td>1 MB I+D on chip per core</td>
</tr>
<tr>
<td>L3:</td>
<td>38.5 MB I+D on chip per chip</td>
</tr>
<tr>
<td>Other:</td>
<td>None</td>
</tr>
<tr>
<td>Memory:</td>
<td>192 GB (12 x 16 GB 2Rx8 PC4-2933Y-R)</td>
</tr>
<tr>
<td>Storage:</td>
<td>1 x 800 GB SATA SSD</td>
</tr>
<tr>
<td>Other:</td>
<td>None</td>
</tr>
</tbody>
</table>

Software

| OS:         | SUSE Linux Enterprise Server 15 (x86_64) |
| Compiler:  | C/C++: Version 19.0.4.227 of Intel        |
|            | C/C++ Compiler for Linux;                |
|            | Fortran: Version 19.0.4.227 of Intel     |
|            | Intel Fortran Compiler for Linux         |
| Parallel:  | No                                       |
| Firmware:  | Lenovo BIOS Version TEE142E 2.30 released Aug-2019 tested as TEE141E 2.30 Jul-2019 |
| File System:| xfs                                    |
| System State:| Run level 3 (multi-user)                |
| Base Pointers:| 64-bit                                |
| Peak Pointers:| Not Applicable                        |
| Other:    | None                      |
| Power Management:-- |

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Copies

<table>
<thead>
<tr>
<th>Function</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>500.perlbench_r</td>
<td>266</td>
</tr>
<tr>
<td>502.gcc_r</td>
<td>248</td>
</tr>
<tr>
<td>505.mcf_r</td>
<td>417</td>
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<tr>
<td>520.omnetpp_r</td>
<td>195</td>
</tr>
<tr>
<td>523.xalancbmk_r</td>
<td>338</td>
</tr>
<tr>
<td>525.x264_r</td>
<td>724</td>
</tr>
<tr>
<td>531.deepsjeng_r</td>
<td>293</td>
</tr>
<tr>
<td>541.leela_r</td>
<td>290</td>
</tr>
<tr>
<td>548.exchange2_r</td>
<td>720</td>
</tr>
<tr>
<td>557.xz_r</td>
<td>224</td>
</tr>
</tbody>
</table>

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Test Date: Sep-2019
Hardware Availability: Apr-2019
Software Availability: May-2019

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SPEC CPU®2017 Integer Rate Result
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Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Base</th>
<th>Peak</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Copies</td>
<td>Seconds</td>
</tr>
<tr>
<td>500.perlbench_r</td>
<td>112</td>
<td>670</td>
</tr>
<tr>
<td>502.gcc_r</td>
<td>112</td>
<td>640</td>
</tr>
<tr>
<td>505.mcf_r</td>
<td>112</td>
<td>433</td>
</tr>
<tr>
<td>520.omnetpp_r</td>
<td>112</td>
<td>752</td>
</tr>
<tr>
<td>523.xalanbmk_r</td>
<td>112</td>
<td>350</td>
</tr>
<tr>
<td>525.x264_r</td>
<td>112</td>
<td>271</td>
</tr>
<tr>
<td>531.deepsjeng_r</td>
<td>112</td>
<td>438</td>
</tr>
<tr>
<td>541.leela_r</td>
<td>112</td>
<td>662</td>
</tr>
<tr>
<td>548.exchange2_r</td>
<td>112</td>
<td>409</td>
</tr>
<tr>
<td>557.xz_r</td>
<td>112</td>
<td>541</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-ic19.0u4/lib/intel64"

Binaries compiled on a system with 1x Intel Core i9-799X 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.:
umactl --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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<table>
<thead>
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CPU2017 License: 9017
Test Sponsor: Lenovo Global Technology
Tested by: Lenovo Global Technology

Test Date: Sep-2019
Hardware Availability: Apr-2019
Software Availability: May-2019

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
Choose Operating Mode set to Custom Mode
DCU Streamer Prefetcher set to Disable
MONITOR/MWAIT set to Enable
SNC set to Enable
Sysinfo program /home/cpu2017-1.0.5-ic19.0u4/bin/sysinfo
Rev: r5974 of 2018-05-19 9bcd8f2999c33d61f64985e45859ea9
running on linux-xd43 Fri Sep 20 09:17:50 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 8280L CPU @ 2.70GHz
   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

(Continued on next page)
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Platform Notes (Continued)

CPU family: 6
Model: 85
Model name: Intel(R) Xeon(R) Platinum 8280L CPU @ 2.70GHz
Stepping: 6
CPU MHz: 2700.000
CPU max MHz: 4000.0000
CPU min MHz: 1000.0000
BogoMIPS: 5400.00
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 arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc cpuid
aarch64 lwp cpuid extension lcs	mmx+ fdiv rtit

From numactl --hardware

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

Available: 4 nodes (0-3)

//proc/cpuinfo cache data

Cache size : 39424 KB
# Lenovo Global Technology

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### SPEC CPU®2017 Integer Rate Result

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<tr>
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<td>Software Availability</td>
<td>May-2019</td>
</tr>
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### Platform Notes (Continued)

```
node 3 cpus: 32 33 34 38 40 41 46 47 48 52 53 54 55 88 89 90 94 95 96 97 102 103 104 108 109 110 111
node 3 size: 48336 MB
node 3 free: 48047 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`

```
MemTotal:       197686756 kB
HugePages_Total:       0
Hugepagesize:       2048 kB
```

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

```
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 Sep 20 09:17
```

**SPEC is set to**: /home/cpu2017-1.0.5-ic19.0u4

```
Filesystem     Type  Size  Used Avail Use% Mounted on
/dev/md126p3   xfs   743G  60G  683G  9%   /
```

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

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

frequent changes to hardware, firmware, and the "DMTF SMBIOS" standard.
   BIOS Lenovo -[TEE141E-2.30]- 07/02/2019
   Memory:
      4x NO DIMM NO DIMM
      12x SK Hynix HMA82GR7CJR8N-WM 16 GB 2 rank 2933

(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) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
   Version 19.0.4.227 Build 20190416
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------

==============================================================================
C++     | 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 19.0.4.227 Build 20190416
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------

==============================================================================
Fortran | 548.exchange2_r(base)
------------------------------------------------------------------------------
Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)
   64, Version 19.0.4.227 Build 20190416
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------

Base Compiler Invocation

C benchmarks:
   icc -m64 -std=c11

C++ benchmarks:
   icpc -m64

(Continued on next page)
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SPECrates®

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Base Compiler Invocation (Continued)

Fortran benchmarks:
ifort -m64

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:
-W1, -z, muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div
-qopt-mem-layout-trans=4
-L/usr/local/IntelCompiler19/compilers_and_libraries_2019.4.227/linux/compiler/lib/intel64
-1qkmalloc

C++ benchmarks:
-W1, -z, muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div
-qopt-mem-layout-trans=4
-L/usr/local/IntelCompiler19/compilers_and_libraries_2019.4.227/linux/compiler/lib/intel64
-1qkmalloc

Fortran benchmarks:
-W1, -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_2019.4.227/linux/compiler/lib/intel64
-1qkmalloc

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-F.html
<table>
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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-F.xml](http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-CLX-F.xml)

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Tested with SPEC CPU®2017 v1.0.5 on 2019-09-19 21:17:49-0400.  