Lenovo Global Technology
ThinkSystem SN550
(2.10 GHz, Intel Xeon Gold 6252)

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

SPECrater2017_int_base = 268
SPECrater2017_int_peak = Not Run

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

Hardware
CPU Name: Intel Xeon Gold 6252
Max MHz.: 3700
Nominal: 2100
Enabled: 48 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: 35.75 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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### 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>
</tr>
</thead>
<tbody>
<tr>
<td>500.perlbench_r</td>
<td>96</td>
<td>740</td>
<td>207</td>
<td>731</td>
<td>209</td>
<td>731</td>
<td>209</td>
</tr>
<tr>
<td>502.gcc_r</td>
<td>96</td>
<td>605</td>
<td>225</td>
<td>606</td>
<td>224</td>
<td>604</td>
<td>225</td>
</tr>
<tr>
<td>505.mcf_r</td>
<td>96</td>
<td>440</td>
<td>353</td>
<td>439</td>
<td>353</td>
<td>439</td>
<td>353</td>
</tr>
<tr>
<td>520.omnetpp_r</td>
<td>96</td>
<td>703</td>
<td>179</td>
<td>701</td>
<td>180</td>
<td>701</td>
<td>180</td>
</tr>
<tr>
<td>523.xalanbmk_r</td>
<td>96</td>
<td>340</td>
<td>299</td>
<td>341</td>
<td>298</td>
<td>338</td>
<td>300</td>
</tr>
<tr>
<td>525.x264_r</td>
<td>96</td>
<td>325</td>
<td>517</td>
<td>325</td>
<td>517</td>
<td>324</td>
<td>518</td>
</tr>
<tr>
<td>531.deepsjeng_r</td>
<td>96</td>
<td>487</td>
<td>226</td>
<td>485</td>
<td>227</td>
<td>486</td>
<td>226</td>
</tr>
<tr>
<td>541.leela_r</td>
<td>96</td>
<td>749</td>
<td>212</td>
<td>750</td>
<td>212</td>
<td>751</td>
<td>212</td>
</tr>
<tr>
<td>548.exchange2_r</td>
<td>96</td>
<td>527</td>
<td>478</td>
<td>527</td>
<td>478</td>
<td>527</td>
<td>478</td>
</tr>
<tr>
<td>557.xz_r</td>
<td>96</td>
<td>578</td>
<td>179</td>
<td>578</td>
<td>179</td>
<td>577</td>
<td>180</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)
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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-ic19.0ut/bin/sysinfo
Rev: r5974 of 2018-05-19 9bcde8f2999c33d61f64985e45859ea9
running on linux-4brr Wed May 22 16:52:46 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) Gold 6252 CPU @ 2.10GHz
  2 "physical id"s (chips)
  96 "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 : 24
  siblings : 48
    physical 0: cores 0 1 2 3 4 5 6 8 10 11 12 13 16 17 18 19 20 21 24 25 26 27 28 29
    physical 1: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 16 17 18 19 20 21 25 26 27 28 29

From lscpu:
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 96
On-line CPU(s) list: 0-95
Thread(s) per core: 2
Core(s) per socket: 24
Socket(s): 2
NUMA node(s): 4
Vendor ID: GenuineIntel
CPU family: 6
Model: 85
Model name: Intel(R) Xeon(R) Gold 6252 CPU @ 2.10GHz

(Continued on next page)
**SPEC CPU2017 Integer Rate Result**

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**SPECrate2017_int_base = 268**

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**Platform Notes (Continued)**

- Stepping: 6
- CPU MHz: 2100.000
- CPU max MHz: 3700.0000
- CPU min MHz: 1000.0000
- BogoMIPS: 4200.00
- Virtualization: VT-x
- L1d cache: 32K
- L1i cache: 32K
- L2 cache: 1024K
- L3 cache: 36608K
- NUMA node0 CPU(s): 0-3, 7, 8, 12-14, 18-20, 48-51, 55, 56, 60-62, 66-68
- NUMA node1 CPU(s): 4-6, 9-11, 15-17, 21-23, 52-54, 57-59, 63-65, 69-71
- NUMA node2 CPU(s): 24-27, 31-33, 37-39, 43, 44, 72-75, 79-81, 85-87, 91, 92
- NUMA node3 CPU(s): 28-30, 34-36, 40-42, 45-47, 76-78, 82-84, 88-90, 93-95
- 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 pdpt64 k骨 tn mendian_80387 nop apic nd iommu vme pbe intel_pt x2apic full_page_faults pge smm nonstop_tsc pse36 vmx smx est tm2 ssse3 sse3 sse3ديك pku ospke avx512cd avx512bw avx512vl xsaves cqm_l1c qcm_occup_llc qcm_mbb_total qcm_mbb_local dtherm ida arat pln pts kpu ospke avx512_vnni flush_l1d arch_capabilities

/proc/cpuinfo cache data
  cache size: 36608 KB

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

- available: 4 nodes (0-3)
- node 0 cpus: 0 1 2 3 7 8 12 13 14 18 19 20 48 49 50 51 55 56 60 61 62 66 67 68
- node 0 size: 193132 MB
- node 0 free: 187000 MB
- node 1 cpus: 4 5 6 9 10 11 15 16 17 21 22 23 52 53 54 57 58 59 63 64 65 69 70 71
- node 1 size: 193462 MB
- node 1 free: 193120 MB
- node 2 cpus: 24 25 26 27 31 32 33 37 38 39 43 44 72 73 74 75 79 80 81 85 86 87 91 92
- node 2 size: 193521 MB
- node 2 free: 193226 MB
- node 3 cpus: 28 29 30 34 35 36 40 41 42 45 46 47 76 77 78 82 83 84 88 90 93 94 95
- node 3 size: 193518 MB
- node 3 free: 192942 MB
- node distances:
  - node 0 1 2 3
  - 0: 10 11 21 21

(Continued on next page)
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Platform Notes (Continued)

1: 11 10 21 21
2: 21 21 10 11
3: 21 21 11 10

From /proc/meminfo
  MemTotal: 792232340 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 22 16:51

SPEC is set to: /home/cpu2017-1.0.5-ic19.0u1
  Filesystem Type Size Used Avail Use% Mounted on
  /dev/sda3 xfs 891G 47G 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 SMBIOS" standard.
  BIOS Lenovo -[IVE135M-2.10]– 01/16/2019
  Memory:
    24x Samsung M393A4K40CB2-CVF 32 GB 2 rank 2933

(End of data from sysinfo program)
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**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
```

---

**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
```

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Base Portability Flags (Continued)

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:
-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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