Lenovo Global Technology
ThinkSystem ST550
(2.10 GHz, Intel Xeon Gold 6230)

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

SPECrater2017_fp_base = 206
SPECrater2017_fp_peak = Not Run

Test Date: Mar-2019
Hardware Availability: Apr-2019
Software Availability: Sep-2018

Hardware
CPU Name: Intel Xeon Gold 6230
Max MHz.: 3900
Nominal: 2100
Enabled: 40 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: 27.5 MB I+D on chip per chip
Other: None
Memory: 384 GB (12 x 32 GB 2Rx4 PC4-2933Y-R)
Storage: 1 x 480 GB SATA SSD
Other: None

Software
OS: SUSE Linux Enterprise Server 15 (x86_64)
Compiler: C/C++: Version 19.0.0.117 of Intel C/C++
C/C++ Compiler for Linux;
Fortran: Version 19.0.0.117 of Intel Fortran
Compiler for Linux;
Parallel: No
Firmware: Lenovo BIOS Version O0E135M 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

Copies
503.bwaves_r 80
507.cactuBSSN_r 80
508.namd_r 80
510.parest_r 80
511.povray_r 80
519.lbm_r 80
521.wrf_r 80
526.blender_r 80
527.cam4_r 80
538.imagick_r 80
544.nab_r 80
549.fotonik3d_r 80
554.roms_r 80

SPECrate2017_fp_base (206)
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Results Table

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</table>

SPECrate2017_fp_base = 206
SPECrate2017_fp_peak = Not Run

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/lib/ia32:/home/cpu2017-1.0.5-ic19/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.:
Yes: 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.

(Continued on next page)
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General Notes (Continued)
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.
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
LLC dead line alloc set to Disable
SNC set to Enable
Sysinfo program /home/cpu2017-1.0.5-ic19/bin/sysinfo
Rev: r5974 of 2018-05-19 9bcde8f2999c33d61f64985e45859ea9
running on linux-pork Fri Mar 15 06:11:43 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 6230 CPU @ 2.10GHz
  2 "physical id"s (chips)
  80 "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 : 20
  siblings : 40
  physical 0: cores 0 1 2 3 4 8 9 10 11 12 16 17 18 19 20 24 25 26 27 28
  physical 1: cores 0 1 2 3 4 8 9 10 11 12 16 17 18 19 20 24 25 26 27 28

From lscpu:
  Architecture:          x86_64
  CPU op-mode(s):        32-bit, 64-bit
  Byte Order:            Little Endian
  CPU(s):                80
  On-line CPU(s) list:   0-79
  Thread(s) per core:    2
  Core(s) per socket:    20
  Socket(s):             2
  NUMA node(s):          4
  Vendor ID:             GenuineIntel
  CPU family:            6
  Model:                 85

(Continued on next page)
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Hardware Availability: Apr-2019
Software Availability: Sep-2018

Platform Notes (Continued)

Model name: Intel(R) Xeon(R) Gold 6230 CPU @ 2.10GHz
Stepping: 6
CPU MHz: 2100.000
CPU max MHz: 3900.000
CPU min MHz: 800.0000
BogoMIPS: 4200.00
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 28160K
NUMA node0 CPU(s): 0-2, 5, 6, 10-12, 15, 16, 40-42, 45, 46, 50, 52-55, 56
NUMA node1 CPU(s): 3, 4, 7, 9, 13, 14, 17-19, 43, 44, 47-49, 53, 54, 57-59
NUMA node2 CPU(s): 20-22, 25, 26, 30-32, 35, 36, 60-62, 65, 66, 70-72, 75, 76
NUMA node3 CPU(s): 23, 24, 27-29, 33, 34, 37-39, 63, 64, 67-69, 73, 74, 77-79

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

cache size : 28160 KB

/proc/cpuinfo cache data
From numactl --hardware

(Continued on next page)
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**Software Availability:** Sep-2018

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### Platform Notes (Continued)

```
0:  10  11  21  21
1:  11  10  21  21
2:  21  21  10  11
3:  21  21  11  10
```

From `/proc/meminfo`
- MemTotal: 395873628 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 Mar 15 06:05**

**SPEC is set to:** /home/cpu2017-1.0.5-ic19
- Filesystem Type Size Used Avail Use% Mounted on
  - /dev/sdc3 xfs 445G 32G 414G 7% /

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 -[00E135M-2.10]- 01/16/2019
- Memory:
  - 12x Samsung M393A4K40CB2-CVF 32 GB 2 rank 2933

(End of data from sysinfo program)
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Compiler Version Notes (Continued)

-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------
CC  521.wrf_r(base)  527.cam4_r(base)
-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------
Intel (R) Fortran Intel (R) 64 Compiler for applications running on Intel (R) 64, Version 19.0.0.117 Build 20180804
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
Intel (R) C Intel (R) 64 Compiler for applications running on Intel (R) 64, Version 19.0.0.117 Build 20180804
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

Benchmarks using both Fortran and C:
ifort -m64 icc -m64 -std=c11

Benchmarks using both C and C++:
icpc -m64 icc -m64 -std=c11

Benchmarks using Fortran, C, and C++:
icpc -m64 icc -m64 -std=c11 ifort -m64

Base Portability Flags

503.bwaves_r: -DSPEC_LP64
507.cactusBSSN_r: -DSPEC_LP64
508.namd_r: -DSPEC_LP64
510.parest_r: -DSPEC_LP64
511.povray_r: -DSPEC_LP64
519.lbm_r: -DSPEC_LP64
521.wrf_r: -DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian
526.blender_r: -DSPEC_LP64 -DSPEC_LINUX -funsigned-char

(Continued on next page)
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Base Portability Flags (Continued)

527.cam4_r: -DSPEC_LP64 -DSPEC_CASE_FLAG
538.imagick_r: -DSPEC_LP64
544.nab_r: -DSPEC_LP64
549.fotonik3d_r: -DSPEC_LP64
554.roms_r: -DSPEC_LP64

Base Optimization Flags

C benchmarks:
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=3

C++ benchmarks:
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=3

Fortran benchmarks:
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=3 -auto -nostandard-realloc-lhs
-align array32byte

Benchmarks using both Fortran and C:
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=3 -auto -nostandard-realloc-lhs
-align array32byte

Benchmarks using both C and C++:
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=3

Benchmarks using Fortran, C, and C++:
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=3 -auto -nostandard-realloc-lhs
-align array32byte

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:
**Lenovo Global Technology**

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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 2019-03-14 18:11:42-0400.  
Originally published on 2019-04-02.