Lenovo Global Technology
ThinkSystem SD650
(2.70 GHz, Intel Xeon Platinum 8280M)

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CPU2017 License: 9017
Test Sponsor: Lenovo Global Technology
Tested by: Lenovo Global Technology
Test Date: Oct-2019
Hardware Availability: Apr-2019
Software Availability: May-2019

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<th>Threads</th>
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<tr>
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<tr>
<td>607.cactuBSSN_s 56</td>
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<td>644.nab_s 56</td>
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<tr>
<td>649.fotonik3d_s 56</td>
<td>87.5</td>
</tr>
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<td>654.roms_s 56</td>
<td>152</td>
</tr>
</tbody>
</table>

Hardware
CPU Name: Intel Xeon Platinum 8280M
Max MHz: 4000
Nominal: 2700
Enabled: 56 cores, 2 chips
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: 384 GB (12 x 32 GB 2Rx4 PC4-2933Y-R)
Storage: 1 x 480 GB SATA SSD
Other: None

Software
OS: Red Hat Enterprise Linux Server release 7.6 (Maipo)
Kernel 3.10.0-957.el7.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 Fortran
Compiler for Linux
Parallel: Yes
Firmware: Lenovo BIOS Version OTE142F 2.30 released Aug-2019 tested as OTE141F 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: --
Lenovo Global Technology

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Results Table

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</tr>
</tbody>
</table>

SPECspeed®2017_fp_base = 153
SPECspeed®2017_fp_peak = Not Run

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

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:
KMP_AFFINITY = "granularity=fine,compact"
LD_LIBRARY_PATH = "/home/cpu2017-1.0.5-ic19.0u4/lib/intel64"
OMP_STACKSIZE = "192M"

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

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.
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.
SPEC CPU®2017 Floating Point Speed Result

Lenovo Global Technology
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Test Sponsor: Lenovo Global Technology
Test Date: Oct-2019
Tested by: Lenovo Global Technology
Hardware Availability: Apr-2019
Software Availability: May-2019

Platform Notes

BIOS configuration:
Choose Operating Mode set to Maximum Performance and then set it to Custom Mode
C1 Enhanced Mode set to Enable
MONITOR/MWAIT set to Enable
Hyper-Threading set to Disable
Adjacent Cache Prefetch set to Disable
Sysinfo program /home/cpu2017-1.0.5-ic19.0u4/bin/sysinfo
Rev: r5974 of 2018-05-19 9bcde8f2999c33d61f64985e45859ea9
running on localhost.localdomain Fri Oct 11 10:17:37 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 8280M CPU @ 2.70GHz
  2 "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 : 28
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): 56
On-line CPU(s) list: 0-55
Thread(s) per core: 1
Core(s) per socket: 28
Socket(s): 2
NUMA node(s): 2
Vendor ID: GenuineIntel
CPU family: 6
Model: 85
Model name: Intel(R) Xeon(R) Platinum 8280M CPU @ 2.70GHz
Stepping: 6
CPU MHz: 2700.000
BogoMIPS: 5400.00
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K

(Continued on next page)
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Platform Notes (Continued)

| L2 cache:     | 1024K |
| L3 cache:     | 39424K |
| NUMA node0 CPU(s): | 0-27 |
| NUMA node1 CPU(s): | 28-55 |
| Flags:        | fpu vme de pse mtrr 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 aperfmperf eagerpfp nmi pclmulqdq dtes64 monitor 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 3nowprefetch cpb cat_13 cdp _l3 intel_pmm intel_pt ssbd mba ibrs ibpb stibp ibrs_enhanced tpr_shadow vmi flexpriority ept vpid fsgsbase tsc_adjust bml1 hle avx2 smep bmi2 erms invpcid rtm cqm mpx rdart_a avx512f avx512dq rdseed adx smap clflushopt clwb avx512bw avx512vl xsaveopt xsavec xgetbv1 cmp[args][llc cqm_ocup_llc cqm_mbb_total cqm_mbb_local dtherm ida arat pln pts pku ospe ke avx512_vnni spec_ctrl intel_stibp flush_lld arch_capabilities |

/proc/cpuinfo cache data

cache size : 39424 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 14 15 16 17 18 19 20 21 22 23 24 25 26 27
node 0 size: 196280 MB
node 0 free: 191375 MB
node 1 cpus: 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55
node 1 size: 196608 MB
node 1 free: 191879 MB
node distances:
node 0 1
0: 10 21
1: 21 10

From /proc/meminfo
MemTotal: 395878416 kB
HugePages_Total: 0
Hugepagesize: 2048 kB

From /etc/*release* /etc/*version*
os-release:
NAME="Red Hat Enterprise Linux Server"
VERSION="7.6 (Maipo)"
ID=rhel
ID_LIKE=fedora
VARIANT=Server
VARIANT_ID=server

(Continued on next page)
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Software Availability: May-2019

Platform Notes (Continued)

VERSION_ID="7.6"
PRETTY_NAME="Red Hat Enterprise Linux Server 7.6 (Maipo)"
redhat-release: Red Hat Enterprise Linux Server release 7.6 (Maipo)
system-release: Red Hat Enterprise Linux Server release 7.6 (Maipo)

uname -a:
Linux localhost.localdomain 3.10.0-957.el7.x86_64 #1 SMP Thu Oct 4 20:48:51 UTC 2018
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: Load fences, __user pointer sanitization
CVE-2017-5715 (Spectre variant 2): Mitigation: Enhanced IBRS

run-level 3 Oct 11 10:15

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

Filesystem Type Size Used Avail Use% Mounted on
/dev/mapper/rhel-root xfs 445G 53G 393G 12% /

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 -[OTE141F-2.30]- 07/02/2019
Memory:
4x NO DIMM NO DIMM
12x Samsung M393A4K40CB2-CVF 32 GB 2 rank 2933

Compiler Version Notes

==============================================================================
C          | 619.lbm_s(base) 638.imagick_s(base) 644.nab_s(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++, C, Fortran | 607.cactuBSSN_s(base)

(Continued on next page)
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SPECSpeed®2017_fp_base = 153
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CPU2017 License: 9017
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Compiler Version Notes (Continued)

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.
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.
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.

==============================================================================
Fortran         | 603.bwaves_s(base) 649.fotonik3d_s(base) 654.roms_s(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.
-----------------------------------------------------------------------------
Fortran, C      | 621.wrf_s(base) 627.cam4_s(base) 628.pop2_s(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

Fortran benchmarks:
  ifort -m64

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

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

- 603.bwaves_s: -DSPEC_LP64  
- 607.cactuBSSN_s: -DSPEC_LP64  
- 619.lbm_s: -DSPEC_LP64  
- 621.wrf_s: -DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian  
- 627.cam4_s: -DSPEC_LP64 -DSPEC_CASE_FLAG  
- 628.pop2_s: -DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian -assume byterecl  
- 638.imagick_s: -DSPEC_LP64  
- 644.nab_s: -DSPEC_LP64  
- 649.fotonik3d_s: -DSPEC_LP64  
- 654.roms_s: -DSPEC_LP64

**Base Optimization Flags**

**C benchmarks:**
- -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch  
- -ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP

**Fortran benchmarks:**
- -DSPEC_OPENMP -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch  
- -ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp  
- -nostandard-realloc-lhs  

**Benchmarks using both Fortran and C:**
- -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch  
- -ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP  
- -nostandard-realloc-lhs

**Benchmarks using Fortran, C, and C++:**
- -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch  
- -ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP  
- -nostandard-realloc-lhs

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

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
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For questions about this result, please contact the tester. For other inquiries, please contact info@spec.org.

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