SPEC CPU®2017 Floating Point Rate Result

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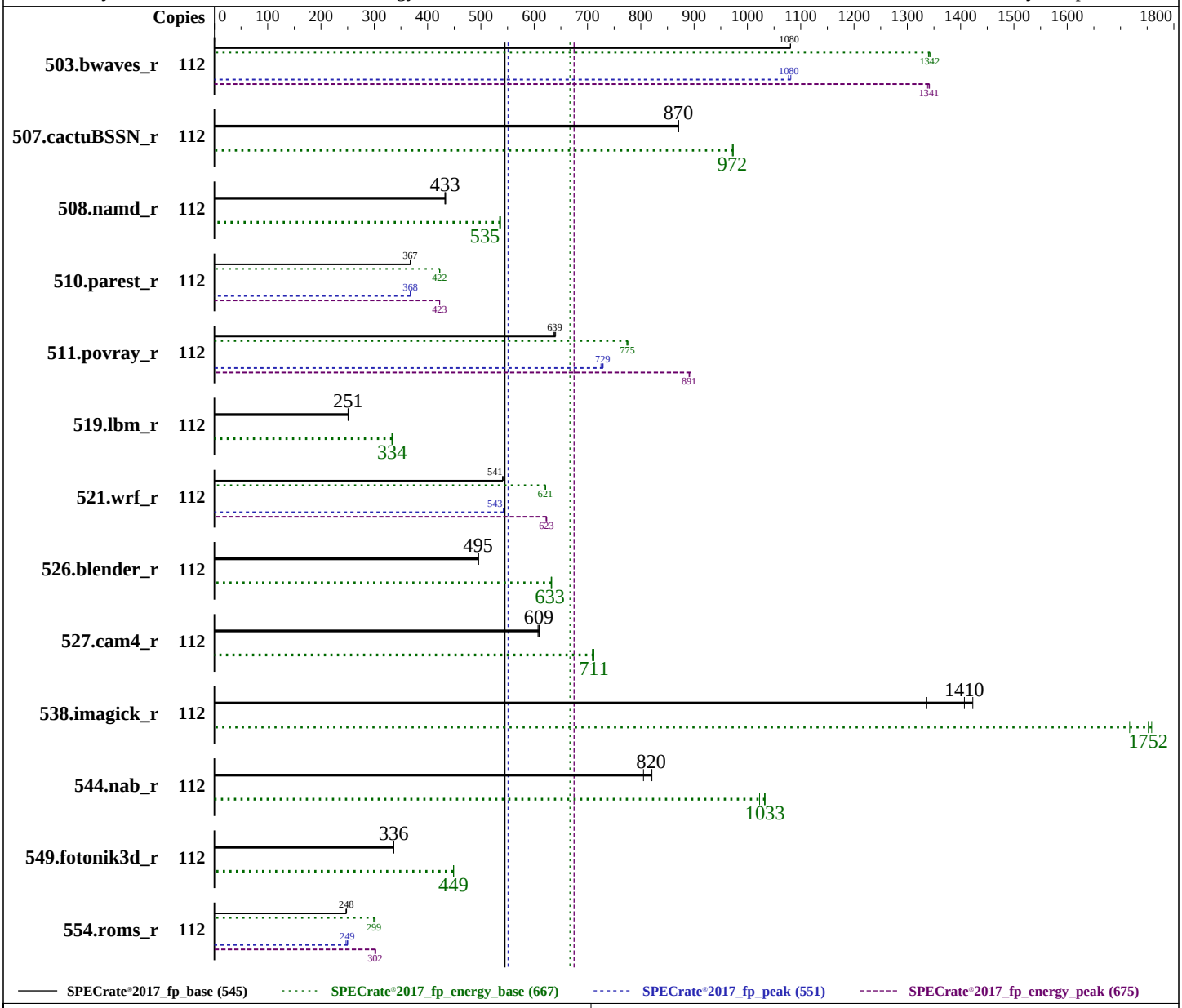
Lenovo Global Technology

ThinkSystem SR860 V2
(2.60 GHz, Intel Xeon Platinum 8376HL)

SPECrate®2017_fp_base =	545
SPECrate®2017_fp_energy_base =	667
SPECrate®2017_fp_peak =	551
SPECrate®2017_fp_energy_peak =	675

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

Test Date: Oct-2020
Hardware Availability: Nov-2020
Software Availability: Apr-2020



Hardware

CPU Name: Intel Xeon Platinum 8376HL
Max MHz: 4300
Nominal: 2600
Enabled: 112 cores, 4 chips
Orderable: 2,4 chips

(Continued on next page)

Software

OS: Red Hat Enterprise Linux release 8.2 (Ootpa)
Kernel 4.18.0-193.el8.x86_64

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Hardware (Continued)

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 (24 x 16 GB 2Rx8 PC4-3200AA-R)
Storage:	1 x 960 GB SATA SSD
Other:	None

Software (Continued)

Compiler:	C/C++: Version 19.1.1.217 of Intel C/C++ Compiler for Linux; Fortran: Version 19.1.1.217 of Intel Fortran Compiler for Linux
Parallel:	No
Firmware:	Lenovo BIOS Version M5E107D 1.00 released Sep-2020
File System:	xfs
System State:	Run level 3 (multi-user)
Base Pointers:	64-bit
Peak Pointers:	64-bit
Other:	jemalloc memory allocator V5.0.1
Power Management:	BIOS set to prefer performance at the cost of additional power usage

Power

Max. Power (W):	1024.9
Idle Power (W):	158.92
Min. Temperature (C):	21.31
Elevation (m):	43
Line Standard:	220 V / 50 Hz / 1 phase / 3 wires
Provisioning:	Line-powered

Power Settings

Management FW:	Version 1.00 of TGBT07M
Memory Mode:	Normal

Power-Relevant Hardware

Power Supply:	1 x 1800 W (non-redundant)
Details:	ThinkSystem 1800W Platinum Power Supply 4P57A26294
Backplane:	8 x 2.5-inch HDD back plane
Other Storage:	None
Storage Model #s:	4XB7A17089
NICs Installed:	1 x ThinkSystem Ethernet 4-port Adaptor @ 1 Gb
NICs Enabled (FW/OS):	4 / 1
NICs Connected/Speed:	1 @ 1 Gb
Other HW Model #s:	1 x ThinkSystem SR860 V2 Performance Fan Upgrade Kit

Power Analyzer

Power Analyzer:	WIN:9888
Hardware Vendor:	YOKOGAWA, Inc.
Model:	YokogawaWT310E
Serial Number:	C3UD17023E
Input Connection:	Default
Metrology Institute:	CNAS
Calibration By:	China CEPREI Laboratory
Calibration Label:	J202009040176A-0001
Calibration Date:	25-Sep-2020
PTDaemon™ Version:	1.9.1 (a2d19f26; 2019-07-17)
Setup Description:	Connected to PSU1

(Continued on next page)

Temperature Meter

Temperature Meter:	WIN:9889
Hardware Vendor:	Digi International, Inc.
Model:	DigiWATCHPORT_H
Serial Number:	COM1
Input Connection:	USB
PTDaemon Version:	1.9.1 (a2d19f26; 2019-07-17)
Setup Description:	50 mm in front of SUT main intake

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SPECrate®2017_fp_peak = 551
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CPU2017 License: 9017
Test Sponsor: Lenovo Global Technology
Tested by: Lenovo Global Technology

Test Date: Oct-2020
Hardware Availability: Nov-2020
Software Availability: Apr-2020

Power Analyzer (Continued)

Current Ranges Used: 5A
Voltage Range Used: 300V

Base Results Table

Benchmark	Copies	Seconds	Ratio	Energy (kJ)	Energy Ratio	Average Power	Maximum Power	Seconds	Ratio	Energy (kJ)	Energy Ratio	Average Power	Maximum Power	Seconds	Ratio	Energy (kJ)	Energy Ratio	Average Power	Maximum Power
503.bwaves_r	112	**1042**	**1080**	**912**	**1340**	**876**	**883**	1039	1080	912	1340	878	884	1042	1080	914	1340	877	884
507.cactuBSSN_r	112	163	870	160	973	983	1000	**163**	**870**	**160**	**972**	**984**	**998**	163	871	160	973	984	998
508.namd_r	112	**246**	**433**	**217**	**535**	**882**	**905**	245	434	216	537	882	904	246	433	216	536	879	904
510.parest_r	112	796	368	753	423	946	1020	798	367	755	422	946	1020	**797**	**367**	**755**	**422**	**946**	**1020**
511.povray_r	112	**410**	**639**	**366**	**775**	**894**	**934**	409	640	366	776	895	932	411	637	367	774	893	936
519.lbm_r	112	470	251	402	333	855	862	471	251	402	333	855	862	**470**	**251**	**402**	**334**	**855**	**861**
521.wrf_r	112	463	541	441	621	951	991	**463**	**541**	**441**	**621**	**952**	**990**	464	541	441	621	951	993
526.blender_r	112	345	495	292	632	848	898	**345**	**495**	**292**	**633**	**847**	**900**	344	496	292	633	848	920
527.cam4_r	112	322	609	300	712	932	1010	323	607	301	709	932	1000	**322**	**609**	**300**	**711**	**932**	**1010**
538.imagick_r	112	208	1340	176	1720	843	1010	196	1420	172	1760	876	1010	**198**	**1410**	**172**	**1750**	**870**	**1020**
544.nab_r	112	234	805	200	1020	853	911	**230**	**820**	**198**	**1030**	**860**	**912**	230	821	198	1030	862	911
549.fotonik3d_r	112	1298	336	1080	449	835	847	**1297**	**336**	**1080**	**449**	**835**	**843**	1297	336	1080	449	835	843
554.roms_r	112	**718**	**248**	**655**	**299**	**913**	**948**	718	248	651	302	907	947	721	247	656	299	910	946

SPECrate®2017_fp_base = 545

SPECrate®2017_fp_energy_base = 667

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

Peak Results Table

Benchmark	Copies	Seconds	Ratio	Energy (kJ)	Energy Ratio	Average Power	Maximum Power	Seconds	Ratio	Energy (kJ)	Energy Ratio	Average Power	Maximum Power	Seconds	Ratio	Energy (kJ)	Energy Ratio	Average Power	Maximum Power
503.bwaves_r	112	1039	1080	913	1340	879	895	**1042**	**1080**	**913**	**1340**	**876**	**892**	1043	1080	915	1340	878	893
507.cactuBSSN_r	112	163	870	160	973	983	1000	**163**	**870**	**160**	**972**	**984**	**998**	163	871	160	973	984	998
508.namd_r	112	**246**	**433**	**217**	**535**	**882**	**905**	245	434	216	537	882	904	246	433	216	536	879	904
510.parest_r	112	**797**	**368**	**754**	**423**	**947**	**1020**	797	368	754	423	946	1020	797	368	754	423	947	1020
511.povray_r	112	361	725	319	891	883	916	**359**	**729**	**319**	**891**	**888**	**917**	359	729	318	894	886	918
519.lbm_r	112	470	251	402	333	855	862	471	251	402	333	855	862	**470**	**251**	**402**	**334**	**855**	**861**
521.wrf_r	112	462	543	439	624	951	984	463	542	440	622	952	989	**462**	**543**	**440**	**623**	**951**	**988**
526.blender_r	112	345	495	292	632	848	898	**345**	**495**	**292**	**633**	**847**	**900**	344	496	292	633	848	920
527.cam4_r	112	322	609	300	712	932	1010	323	607	301	709	932	1000	**322**	**609**	**300**	**711**	**932**	**1010**
538.imagick_r	112	208	1340	176	1720	843	1010	196	1420	172	1760	876	1010	**198**	**1410**	**172**	**1750**	**870**	**1020**
544.nab_r	112	234	805	200	1020	853	911	**230**	**820**	**198**	**1030**	**860**	**912**	230	821	198	1030	862	911
549.fotonik3d_r	112	1298	336	1080	449	835	847	**1297**	**336**	**1080**	**449**	**835**	**843**	1297	336	1080	449	835	843
554.roms_r	112	711	250	649	303	912	949	**714**	**249**	**651**	**302**	**912**	**950**	721	247	652	301	904	948

SPECrate®2017_fp_peak = 551

SPECrate®2017_fp_energy_peak = 675

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

Compiler Notes

The inconsistent Compiler version information under Compiler Version section is due to a discrepancy in Intel Compiler.
The correct version of C/C++ compiler is: Version 19.1.1.217 Build 20200306 Compiler for Linux
The correct version of Fortran compiler is: Version 19.1.1.217 Build 20200306 Compiler for Linux

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"
```

Environment Variables Notes

```
Environment variables set by runcpu before the start of the run:
LD_LIBRARY_PATH =
     "/home/cpu2017-1.1.0-ic19.1.1/lib/intel64:/home/cpu2017-1.1.0-ic19.1.1/j
     e5.0.1-64"
MALLOC_CONF = "retain:true"
```

General Notes

```
 Binaries compiled on a system with 1x Intel Core i9-7980XE CPU + 64GB RAM
 memory using Redhat Enterprise Linux 8.0
 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)
is mitigated in the system as tested and documented.
 jemalloc, a general purpose malloc implementation
 built with the RedHat Enterprise 7.5, and the system compiler gcc 4.8.5
 sources available from jemalloc.net or https://github.com/jemalloc/jemalloc/releases
```

Platform Notes

```
 BIOS settings:
 Choose Operating Mode set to Maximum Performance and then set it to Custom Mode
 Turbo Mode set to Disabled
```

(Continued on next page)

Platform Notes (Continued)

```
CPU P-state Control set to Cooperative with Legacy
C-States set to Legacy
Memory Power Management set to Automatic
UPI Link Disable set to Disabled 1 Link
Platform Controlled Type set to Minimal Power
Hyper-Threading set to Disabled
SNC set to Enabled
C1 Enhanced Mode set to Enabled
LLC dead line alloc set to Disable

Sysinfo program /home/cpu2017-1.1.0-ic19.1.1/bin/sysinfo
Rev: r6365 of 2019-08-21 295195f888a3d7edb1e6e46a485a0011
running on localhost.localdomain Sat Oct 24 03:16:49 2020

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 8376HL CPU @ 2.60GHz
      4  "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  : 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
      physical 2: 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 3: 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:  1
     Core(s) per socket:  28
     Socket(s):           4
     NUMA node(s):        8
```

(Continued on next page)

Platform Notes (Continued)

```
      Vendor ID:           GenuineIntel
      CPU family:          6
      Model:               85
      Model name:          Intel(R) Xeon(R) Platinum 8376HL CPU @ 2.60GHz
      Stepping:            11
      CPU MHz:             1000.025
      BogoMIPS:            5200.00
      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
      NUMA node1 CPU(s):   4-6,10-13,18-20,24-27
      NUMA node2 CPU(s):   28-31,35-37,42-45,49-51
      NUMA node3 CPU(s):   32-34,38-41,46-48,52-55
      NUMA node4 CPU(s):   56-59,63-65,70-73,77-79
      NUMA node5 CPU(s):   60-62,66-69,74-76,80-83
      NUMA node6 CPU(s):   84-87,91-93,98-101,105-107
      NUMA node7 CPU(s):   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 pebs bts rep_good nopl xtopology nonstop_tsc cpuid
      aperfmperf pni 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 3dnowprefetch cpuid_fault epb cat_l3 cdp_l3
      invpcid_single intel_ppin ssbd mba ibrs ibpb stibp ibrs_enhanced tpr_shadow vnmi
      flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid rtm
      cqm mpx rdt_a avx512f avx512dq rdseed adx smap clflushopt clwb intel_pt avx512cd
      avx512bw avx512vl xsaveopt xsavec xgetbv1 xsaves cqm_llc cqm_occup_llc cqm_mbm_total
      cqm_mbm_local avx512_bf16 dtherm arat pln pts hwp_epp pku ospke avx512_vnni md_clear
      flush_l1d 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: 8 nodes (0-7)
    node 0 cpus: 0 1 2 3 7 8 9 14 15 16 17 21 22 23
    node 0 size: 47970 MB
    node 0 free: 47758 MB
    node 1 cpus: 4 5 6 10 11 12 13 18 19 20 24 25 26 27
    node 1 size: 48380 MB
    node 1 free: 48259 MB
```

(Continued on next page)

Platform Notes (Continued)

```
   node 2 cpus: 28 29 30 31 35 36 37 42 43 44 45 49 50 51
   node 2 size: 48353 MB
   node 2 free: 48256 MB
   node 3 cpus: 32 33 34 38 39 40 41 46 47 48 52 53 54 55
   node 3 size: 48380 MB
   node 3 free: 48283 MB
   node 4 cpus: 56 57 58 59 63 64 65 70 71 72 73 77 78 79
   node 4 size: 48380 MB
   node 4 free: 48070 MB
   node 5 cpus: 60 61 62 66 67 68 69 74 75 76 80 81 82 83
   node 5 size: 48380 MB
   node 5 free: 48217 MB
   node 6 cpus: 84 85 86 87 91 92 93 98 99 100 101 105 106 107
   node 6 size: 48380 MB
   node 6 free: 48251 MB
   node 7 cpus: 88 89 90 94 95 96 97 102 103 104 108 109 110 111
   node 7 size: 48380 MB
   node 7 free: 48282 MB
   node distances:
   node   0   1   2   3   4   5   6   7
     0:  10  11  20  20  20  20  30  30
     1:  11  10  20  20  20  20  30  30
     2:  20  20  10  11  30  30  20  20
     3:  20  20  11  10  30  30  20  20
     4:  20  20  30  30  10  11  20  20
     5:  20  20  30  30  11  10  20  20
     6:  30  30  20  20  20  20  10  11
     7:  30  30  20  20  20  20  11  10

 From /proc/meminfo
    MemTotal:       395885732 kB
    HugePages_Total:       0
    Hugepagesize:       2048 kB

 /usr/bin/lsb_release -d
    Red Hat Enterprise Linux release 8.2 (Ootpa)

 From /etc/*release* /etc/*version*
    os-release:
       NAME="Red Hat Enterprise Linux"
       VERSION="8.2 (Ootpa)"
       ID="rhel"
       ID_LIKE="fedora"
       VERSION_ID="8.2"
       PLATFORM_ID="platform:el8"
```

(Continued on next page)

Platform Notes (Continued)

```
      PRETTY_NAME="Red Hat Enterprise Linux 8.2 (Ootpa)"
      ANSI_COLOR="0;31"
   redhat-release: Red Hat Enterprise Linux release 8.2 (Ootpa)
   system-release: Red Hat Enterprise Linux release 8.2 (Ootpa)
   system-release-cpe: cpe:/o:redhat:enterprise_linux:8.2:ga

uname -a:
   Linux localhost.localdomain 4.18.0-193.el8.x86_64 #1 SMP Fri Mar 27 14:35:58 UTC 2020
   x86_64 x86_64 x86_64 GNU/Linux

Kernel self-reported vulnerability status:

itlb_multihit:                          Not affected
CVE-2018-3620 (L1 Terminal Fault):      Not affected
Microarchitectural Data Sampling:       Not affected
CVE-2017-5754 (Meltdown):               Not affected
CVE-2018-3639 (Speculative Store Bypass): Mitigation: Speculative Store Bypass disabled
                                          via prctl and seccomp
CVE-2017-5753 (Spectre variant 1):      Mitigation: usercopy/swapgs barriers and __user
                                          pointer sanitization
CVE-2017-5715 (Spectre variant 2):      Mitigation: Enhanced IBRS, IBPB: conditional,
                                          RSB filling
tsx_async_abort:                        Not affected

run-level 3 Oct 24 03:10

SPEC is set to: /home/cpu2017-1.1.0-ic19.1.1
   Filesystem     Type  Size  Used Avail Use% Mounted on
   /dev/sda3      xfs   892G   43G  850G   5% /

From /sys/devices/virtual/dmi/id
    BIOS:    Lenovo M5E107D-1.00 09/16/2020
    Vendor:  Lenovo
    Product: ThinkSystem SR860 V2
    Product Family: ThinkSystem
    Serial:  none

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.
  Memory:
    24x NO DIMM NO DIMM
    24x SK Hynix HMA82GR7CJR8N-XN 16 GB 2 rank 3200
```

(Continued on next page)

Platform Notes (Continued)

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

Compiler Version Notes

```
==============================================================================
C               | 519.lbm_r(base, peak) 538.imagick_r(base, peak)
                | 544.nab_r(base, peak)
------------------------------------------------------------------------------
Intel(R) C Compiler for applications running on Intel(R) 64, Version 2021.1
  NextGen Build 20200304
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------

==============================================================================
C++             | 508.namd_r(base, peak) 510.parest_r(base, peak)
------------------------------------------------------------------------------
Intel(R) C++ Compiler for applications running on Intel(R) 64, Version 2021.1
  NextGen Build 20200304
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------

==============================================================================
C++, C          | 511.povray_r(base) 526.blender_r(base, peak)
------------------------------------------------------------------------------
Intel(R) C++ Compiler for applications running on Intel(R) 64, Version 2021.1
  NextGen Build 20200304
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
Intel(R) C Compiler for applications running on Intel(R) 64, Version 2021.1
  NextGen Build 20200304
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------

==============================================================================
C++, C          | 511.povray_r(peak)
------------------------------------------------------------------------------
Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64,
  Version 19.1.1.217 Build 20200306
Copyright (C) 1985-2020 Intel Corporation.  All rights reserved.
Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
  Version 19.1.1.217 Build 20200306
Copyright (C) 1985-2020 Intel Corporation.  All rights reserved.
------------------------------------------------------------------------------

==============================================================================
```

(Continued on next page)

Compiler Version Notes (Continued)

```
C++, C          | 511.povray_r(base) 526.blender_r(base, peak)
------------------------------------------------------------------------------
Intel(R) C++ Compiler for applications running on Intel(R) 64, Version 2021.1
  NextGen Build 20200304
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
Intel(R) C Compiler for applications running on Intel(R) 64, Version 2021.1
  NextGen Build 20200304
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------

==============================================================================
C++, C          | 511.povray_r(peak)
------------------------------------------------------------------------------
Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64,
  Version 19.1.1.217 Build 20200306
Copyright (C) 1985-2020 Intel Corporation.  All rights reserved.
Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
  Version 19.1.1.217 Build 20200306
Copyright (C) 1985-2020 Intel Corporation.  All rights reserved.
------------------------------------------------------------------------------

==============================================================================
C++, C, Fortran | 507.cactuBSSN_r(base, peak)
------------------------------------------------------------------------------
Intel(R) C++ Compiler for applications running on Intel(R) 64, Version 2021.1
  NextGen Build 20200304
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
Intel(R) C Compiler for applications running on Intel(R) 64, Version 2021.1
  NextGen Build 20200304
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)
  64, Version 19.1.1.217 Build 20200306
Copyright (C) 1985-2020 Intel Corporation.  All rights reserved.
------------------------------------------------------------------------------

==============================================================================
Fortran         | 503.bwaves_r(base, peak) 549.fotonik3d_r(base, peak)
                | 554.roms_r(base, peak)
------------------------------------------------------------------------------
Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)
  64, Version 19.1.1.217 Build 20200306
Copyright (C) 1985-2020 Intel Corporation.  All rights reserved.
------------------------------------------------------------------------------

==============================================================================
```

(Continued on next page)

Compiler Version Notes (Continued)

```
Fortran, C      | 521.wrf_r(base) 527.cam4_r(base, peak)
------------------------------------------------------------------------------
Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)
  64, Version 19.1.1.217 Build 20200306
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Intel(R) C Compiler for applications running on Intel(R) 64, Version 2021.1
  NextGen Build 20200304
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Fortran, C      | 521.wrf_r(peak)
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==============================================================================
Fortran, C      | 521.wrf_r(base) 527.cam4_r(base, peak)
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==============================================================================
Fortran, C      | 521.wrf_r(peak)
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```

Base Compiler Invocation

C benchmarks:
icc

C++ benchmarks:
icpc

Fortran benchmarks:
ifort

Benchmarks using both Fortran and C:
ifort icc

Benchmarks using both C and C++:
icpc icc

Benchmarks using Fortran, C, and C++:
icpc icc ifort

Base Portability Flags

503.bwaves_r: -DSPEC_LP64
507.cactuBSSN_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
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:
-m64 -qnextgen -std=c11
-Wl,-plugin-opt=-x86-branches-within-32B-boundaries -Wl,-z,muldefs

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Base Optimization Flags (Continued)

C benchmarks (continued):
-fuse-ld=gold -xCORE-AVX512 -Ofast -ffast-math -flto -mfpmath=sse
-funroll-loops -qopt-mem-layout-trans=4
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

C++ benchmarks:
-m64 -qnextgen -Wl,-plugin-opt=-x86-branches-within-32B-boundaries
-Wl,-z,muldefs -fuse-ld=gold -xCORE-AVX512 -Ofast -ffast-math -flto
-mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

Fortran benchmarks:
-m64 -Wl,-plugin-opt=-x86-branches-within-32B-boundaries -Wl,-z,muldefs
-fuse-ld=gold -xCORE-AVX512 -O3 -ipo -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-multiple-gather-scatter-by-shuffles
-qopt-mem-layout-trans=4 -nostandard-realloc-lhs -align array32byte
-auto -mbranches-within-32B-boundaries
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

Benchmarks using both Fortran and C:
-m64 -qnextgen -std=c11
-Wl,-plugin-opt=-x86-branches-within-32B-boundaries -Wl,-z,muldefs
-fuse-ld=gold -xCORE-AVX512 -Ofast -ffast-math -flto -mfpmath=sse
-funroll-loops -qopt-mem-layout-trans=4 -O3 -ipo -no-prec-div
-qopt-prefetch -ffinite-math-only
-qopt-multiple-gather-scatter-by-shuffles -nostandard-realloc-lhs
-align array32byte -auto -mbranches-within-32B-boundaries
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

Benchmarks using both C and C++:
-m64 -qnextgen -std=c11
-Wl,-plugin-opt=-x86-branches-within-32B-boundaries -Wl,-z,muldefs
-fuse-ld=gold -xCORE-AVX512 -Ofast -ffast-math -flto -mfpmath=sse
-funroll-loops -qopt-mem-layout-trans=4
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

Benchmarks using Fortran, C, and C++:
-m64 -qnextgen -std=c11
-Wl,-plugin-opt=-x86-branches-within-32B-boundaries -Wl,-z,muldefs
-fuse-ld=gold -xCORE-AVX512 -Ofast -ffast-math -flto -mfpmath=sse
-funroll-loops -qopt-mem-layout-trans=4 -O3 -ipo -no-prec-div
-qopt-prefetch -ffinite-math-only
-qopt-multiple-gather-scatter-by-shuffles -nostandard-realloc-lhs
-align array32byte -auto -mbranches-within-32B-boundaries

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Base Optimization Flags (Continued)

Benchmarks using Fortran, C, and C++ (continued):
`-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc`

Peak Compiler Invocation

C benchmarks:
`icc`

C++ benchmarks:
`icpc`

Fortran benchmarks:
`ifort`

Benchmarks using both Fortran and C:
`ifort icc`

Benchmarks using both C and C++:
`icpc icc`

Benchmarks using Fortran, C, and C++:
`icpc icc ifort`

Peak Portability Flags

`Same as Base Portability Flags`

Peak Optimization Flags

C benchmarks:

519.lbm_r: `basepeak = yes`

538.imagick_r: `basepeak = yes`

544.nab_r: `basepeak = yes`

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Peak Optimization Flags (Continued)

C++ benchmarks:

508.namd_r: `basepeak = yes`

510.parest_r: `-m64 -qnextgen -Wl,-plugin-opt=-x86-branches-within-32B-boundaries -Wl,-z,muldefs -fuse-ld=gold -xCORE-AVX512 -Ofast -ffast-math -flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4 -L/usr/local/jemalloc64-5.0.1/lib -ljemalloc`

Fortran benchmarks:

503.bwaves_r: `-m64 -Wl,-plugin-opt=-x86-branches-within-32B-boundaries -Wl,-z,muldefs -fuse-ld=gold -xCORE-AVX512 -O3 -ipo -no-prec-div -qopt-prefetch -ffinite-math-only -qopt-multiple-gather-scatter-by-shuffles -qopt-mem-layout-trans=4 -nostandard-realloc-lhs -align array32byte -auto -mbranches-within-32B-boundaries -L/usr/local/jemalloc64-5.0.1/lib -ljemalloc`

549.fotonik3d_r: `basepeak = yes`

554.roms_r: `Same as 503.bwaves_r`

Benchmarks using both Fortran and C:

521.wrf_r: `-prof-gen`(pass 1) `-prof-use`(pass 2) `-xCORE-AVX512 -O3 -ipo -no-prec-div -qopt-prefetch -ffinite-math-only -qopt-multiple-gather-scatter-by-shuffles -qopt-mem-layout-trans=4 -mbranches-within-32B-boundaries -nostandard-realloc-lhs -align array32byte -auto -L/usr/local/jemalloc64-5.0.1/lib -ljemalloc`

527.cam4_r: `basepeak = yes`

Benchmarks using both C and C++:

511.povray_r: `-prof-gen`(pass 1) `-prof-use`(pass 2) `-xCORE-AVX512 -O3 -ipo -no-prec-div -qopt-prefetch -ffinite-math-only -qopt-multiple-gather-scatter-by-shuffles -qopt-mem-layout-trans=4 -mbranches-within-32B-boundaries -L/usr/local/jemalloc64-5.0.1/lib -ljemalloc`

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Peak Optimization Flags (Continued)

526.blender_r: `basepeak = yes`

Benchmarks using Fortran, C, and C++:

507.cactuBSSN_r: `basepeak = yes`

The flags files that were used to format this result can be browsed at
`http://www.spec.org/cpu2017/flags/Intel-ic19.1u1-official-linux64_revA.html`
`http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-Cooperlake-A.html`

You can also download the XML flags sources by saving the following links:
`http://www.spec.org/cpu2017/flags/Intel-ic19.1u1-official-linux64_revA.xml`
`http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-Cooperlake-A.xml`

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