**Lenovo Global Technology**

**ThinkSystem SR650**
(2.90 GHz, Intel Xeon Platinum 8268)

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

**Software**

**OS:** Red Hat Enterprise Linux Server release 7.6 (Maipo)  
**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 IVE135R 2.10 released Feb-2019  
**File System:** xfs  
**System State:** Run level 3 (multi-user)  
**Base Pointers:** 64-bit  
**Peak Pointers:** Not Applicable  
**Other:** None

---

| Benchmark   | Copies | 0 | 30 | 60 | 90 | 120 | 150 | 180 | 210 | 240 | 270 | 300 | 330 | 360 | 390 | 420 | 450 | 480 | 510 | 540 | 570 | 600 | 630 | 660 | 690 | 720 | 750 |
|-------------|--------|---|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|---|
| bwaves      | 96     |   |    |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |   |
| cactuBSSN   | 96     | 235 |    |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |   |
| namd        | 96     | 224 |    |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |   |
| parest      | 96     | 135 |    |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |   |
| povray      | 96     | 348 |    |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |   |
| lbm         | 96     | 127 |    |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |   |
| wrf         | 96     | 236 |    |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |   |
| blender     | 96     | 329 |    |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |   |
| cam4        | 96     | 339 |    |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |   |
| imagick     | 96     | 722 |    |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |   |
| nab         | 96     | 531 |    |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |   |
| fotonik3d   | 96     | 173 |    |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |   |
| roms        | 96     | 103 |    |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |   |

**Hardware**

**CPU Name:** Intel Xeon Platinum 8268  
**Max MHZ.:** 3900  
**Nominal:** 2900  
**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  
**Memory:** 384 GB (24 x 16 GB 2Rx8 PC4-2933Y-R)  
**Storage:** 1 x 800 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 19.0.1.144 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 IVE135R 2.10 released Feb-2019  
**File System:** xfs  
**System State:** Run level 3 (multi-user)  
**Base Pointers:** 64-bit  
**Peak Pointers:** Not Applicable  
**Other:** None
Lenovo Global Technology
ThinkSystem SR650
(2.90 GHz, Intel Xeon Platinum 8268)

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

SPECrate2017_fp_base = 264
SPECrate2017_fp_peak = Not Run

Results Table

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<td>103</td>
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<td></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)
SPEC CPU2017 Floating Point Rate Result

Lenovo Global Technology

ThinkSystem SR650
(2.90 GHz, Intel Xeon Platinum 8268)

SPECrate2017_fp_base = 264
SPECrate2017_fp_peak = Not Run

General Notes (Continued)

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.

Platform Notes

BIOS configuration:
Choose Operating Mode set to Maximum Performance
Choose Operating Mode set to Custom Mode
C-states set to Legacy
SNC set to Enable
DCU Streamer Prefetcher set to Disable
Trusted Execution Technology set to Enable
Stale AtoS set to Enable
LLC dead line alloc set to Disable
Patrol Scrub set to Disable
Sysinfo program /home/cpu2017-1.0.5-ic19.0u1/bin/sysinfo
Rev: r5974 of 2018-05-19 9bced8f2999c33d61f64985e45859ea9
running on localhost.localdomain Sat May 11 23:37:12 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 8268 CPU @ 2.90GHz
  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 9 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

(Continued on next page)
### Lenovo Global Technology

**ThinkSystem SR650**  
(2.90 GHz, Intel Xeon Platinum 8268)

<table>
<thead>
<tr>
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<tbody>
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<td>Lenovo Global Technology</td>
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<tr>
<td>Tested by:</td>
<td>Lenovo Global Technology</td>
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<tr>
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<td>Hardware Availability:</td>
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<td>Software Availability:</td>
<td>Nov-2018</td>
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</tbody>
</table>

**SPEC CPU2017 Floating Point Rate Result**

**SPECrate2017_fp_base = 264**

**SPECrate2017_fp_peak = Not Run**

---

### Platform Notes (Continued)

- **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) Platinum 8268 CPU @ 2.90GHz  
- **Stepping:** 6  
- **CPU MHz:** 2900.000  
- **BogoMIPS:** 5800.00

**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 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 aperfmperf eagerfpu 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 epb cat_l3 cdp_l3 intel_pt ssbd mba ibrs ibpb stibp ibrs_enhanced tpr_shadow vmi flexpriority ept vpid fsgsbase tsc_adjust bm1 hle avx2 smep bmi2 erts invpcid rtm cqm mpx rd_t_a avx512f avx512dq rdseed adx smap clflushopt clwb avx512cd avx512bw avx512vl xsaveopt xsaves xgetbv1 cqm_llc cqm_occup_llc cqm_mbb_total cqm_mbb_local dtherm ida arat pln pts pku ospke avx512_vnni spec_ctrl intel_stibp flush_l1d arch_capabilities

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

<table>
<thead>
<tr>
<th>available</th>
<th>4 nodes (0-3)</th>
</tr>
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<tbody>
<tr>
<td>node 0 cpus:</td>
<td>0 1 2 3 7 8 12 13 14 18 19 20 48 49 50 51 55 56 60 61 62 66 67 68</td>
</tr>
<tr>
<td>node 0 size:</td>
<td>97976 MB</td>
</tr>
<tr>
<td>node 0 free:</td>
<td>95501 MB</td>
</tr>
<tr>
<td>node 1 cpus:</td>
<td>4 5 6 9 10 11 15 16 17 21 22 23 52 53 54 57 58 59 63 64 65 69 70 71</td>
</tr>
<tr>
<td>node 1 size:</td>
<td>98304 MB</td>
</tr>
<tr>
<td>node 1 free:</td>
<td>95512 MB</td>
</tr>
<tr>
<td>node 2 cpus:</td>
<td>24 25 26 27 31 32 33 37 38 39 43 44 47 72 73 74 75 79 80 81 85 86 87 91 92</td>
</tr>
<tr>
<td>node 2 size:</td>
<td>98304 MB</td>
</tr>
</tbody>
</table>

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<tbody>
<tr>
<td>SPECrate2017_fp_peak</td>
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</table>

**CPU2017 License:** 9017
**Test Sponsor:** Lenovo Global Technology
**Test Date:** May-2019
**Tested by:** Lenovo Global Technology

**Hardware Availability:** Apr-2019
**Software Availability:** Nov-2018

**Platform Notes (Continued)**

```
node 2 free: 95941 MB
node 3 cpus: 28 29 30 34 35 36 40 41 42 45 46 47 76 77 78 82 83 84 88 89 90 93 94 95
node 3 size: 98304 MB
node 3 free: 95821 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:       395878244 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"
  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 May 11 23:33

SPEC is set to: /home/cpu2017-1.0.5-ic19.0u1
```
Filesystem   Type   Size  Used Avail Use% Mounted on
/dev/sda2    xfs    689G  14G  676G    2%  /home
```

Additional information from dmidecode follows. WARNING: Use caution when you interpret
SPEC CPU2017 Floating Point Rate Result

Lenovo Global Technology
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SPECrater2017_fp_base = 264
SPECrater2017_fp_peak = Not Run

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

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

Platform Notes (Continued)

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 -[IVE135R-2.10]- 02/27/2019
Memory:
24x Samsung M393A2K43CB2-CVF 16 GB 2 rank 2933

(End of data from sysinfo program)

Compiler Version Notes

==============================================================================
CC  519.lbm_r(base) 538.imagick_r(base) 544.nab_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 508.namd_r(base) 510.parest_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.
------------------------------------------------------------------------------

CC  511.povray_r(base) 526.blender_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.
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  507.cactuBSSN_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.
Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
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**CPU2017 License:** 9017  
**Test Date:** May-2019  
**Hardware Availability:** Apr-2019

**Test Sponsor:** Lenovo Global Technology  
**Tested by:** Lenovo Global Technology

**Software Availability:** Nov-2018

### Compiler Version Notes (Continued)

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`
**SPEC CPU2017 Floating Point Rate Result**

**Lenovo Global Technology**

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**SPECrate2017_fp_base = 264**

**SPECrate2017_fp_peak = Not Run**

### 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:**
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=4

**C++ benchmarks:**
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=4

**Fortran benchmarks:**
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=4 -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=4 -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=4

**Benchmarks using Fortran, C, and C++:**
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=4 -auto -nostandard-realloc-lhs
-align array32byte
## Lenovo Global Technology

**ThinkSystem SR650**  
(2.90 GHz, Intel Xeon Platinum 8268)

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The flags files that were used to format this result can be browsed at:

- [Lenovo-Platform-SPECcpu2017-Flags-V1.2-CLX-A.html](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:

- [Lenovo-Platform-SPECcpu2017-Flags-V1.2-CLX-A.xml](http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-CLX-A.xml)

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