Lenovo Global Technology
ThinkSystem SR850P
(2.20 GHz, Intel Xeon Platinum 8276)

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

Test Date: Sep-2020
Hardware Availability: Jun-2020
Software Availability: Sep-2019

Threads

<table>
<thead>
<tr>
<th>Threads</th>
<th>SPECspeed®2017_fp_base</th>
<th>SPECspeed®2017_fp_peak</th>
</tr>
</thead>
<tbody>
<tr>
<td>603.bwaves_s</td>
<td>112</td>
<td>233</td>
</tr>
<tr>
<td>607.cactuBSSN_s</td>
<td>112</td>
<td>233</td>
</tr>
<tr>
<td>619.lbm_s</td>
<td>112</td>
<td>179</td>
</tr>
<tr>
<td>621.wrf_s</td>
<td>112</td>
<td>141</td>
</tr>
<tr>
<td>627.cam4_s</td>
<td>112</td>
<td>169</td>
</tr>
<tr>
<td>628.pop2_s</td>
<td>112</td>
<td>67.6</td>
</tr>
<tr>
<td>638.imagick_s</td>
<td>112</td>
<td>248</td>
</tr>
<tr>
<td>644.nab_s</td>
<td>112</td>
<td>449</td>
</tr>
<tr>
<td>649.fotonik3d_s</td>
<td>112</td>
<td>123</td>
</tr>
<tr>
<td>654.roms_s</td>
<td>112</td>
<td>423</td>
</tr>
</tbody>
</table>

Hardware

CPU Name: Intel Xeon Platinum 8276
Max MHz: 4000
Nominal: 2200
Enabled: 112 cores, 4 chips
Orderable: 4 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: 1536 GB (48 x 32 GB 2Rx4 PC4-2933Y-R)
Storage: 1 x 960 GB SATA SSD
Other: None

Software

OS: SUSE Linux Enterprise Server 15 SP1 (x86_64)
Kernel 4.12.14-195-default
Compiler: C/C++: Version 19.0.5.281 of Intel
C/C++ Compiler for Linux;
Fortran: Version 19.0.5.281 of
Intel Fortran
Compiler for Linux
Parallel: Yes
Firmware: Lenovo BIOS Version TEE156L 2.61 released May-2020
File System: xfs
System State: Run level 3 (multi-user)
Base Pointers: 64-bit
Peak Pointers: Not Applicable
Other: None
Power Management: BIOS set to prefer performance at the cost of additional power usage
Lenovo Global Technology
ThinkSystem SR850P
(2.20 GHz, Intel Xeon Platinum 8276)

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

Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>603.bwaves_s</td>
<td>112</td>
<td>71.5</td>
<td>826</td>
<td>73.0</td>
<td>808</td>
<td>72.4</td>
<td>814</td>
</tr>
<tr>
<td>607.cactuBSSN_s</td>
<td>112</td>
<td>71.8</td>
<td>232</td>
<td>71.2</td>
<td>234</td>
<td>71.6</td>
<td>233</td>
</tr>
<tr>
<td>619.lbm_s</td>
<td>112</td>
<td>29.2</td>
<td>179</td>
<td>29.4</td>
<td>178</td>
<td>29.2</td>
<td>179</td>
</tr>
<tr>
<td>621.wrf_s</td>
<td>112</td>
<td>93.5</td>
<td>141</td>
<td>93.8</td>
<td>141</td>
<td>94.0</td>
<td>141</td>
</tr>
<tr>
<td>627.cam4_s</td>
<td>112</td>
<td>52.4</td>
<td>169</td>
<td>52.1</td>
<td>170</td>
<td>52.5</td>
<td>169</td>
</tr>
<tr>
<td>628.pop2_s</td>
<td>112</td>
<td>175</td>
<td>67.7</td>
<td>176</td>
<td>67.3</td>
<td>176</td>
<td>67.6</td>
</tr>
<tr>
<td>638.imagick_s</td>
<td>112</td>
<td>58.2</td>
<td>248</td>
<td>58.2</td>
<td>248</td>
<td>58.1</td>
<td>248</td>
</tr>
<tr>
<td>644.nab_s</td>
<td>112</td>
<td>38.9</td>
<td>449</td>
<td>38.9</td>
<td>449</td>
<td>38.9</td>
<td>449</td>
</tr>
<tr>
<td>649.fotonik3d_s</td>
<td>112</td>
<td>74.3</td>
<td>123</td>
<td>74.3</td>
<td>123</td>
<td>74.4</td>
<td>123</td>
</tr>
<tr>
<td>654.roms_s</td>
<td>112</td>
<td>37.2</td>
<td>424</td>
<td>37.4</td>
<td>421</td>
<td>37.2</td>
<td>423</td>
</tr>
</tbody>
</table>

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"

Environment Variables Notes
Environment variables set by runcpu before the start of the run:
KMP_AFFINITY = "granularity=fine,compact"
LD_LIBRARY_PATH = "/home/cpu2017-1.1.0-ic19.0u5-2/lib/intel64"
OMP_STACKSIZE = "192M"

General Notes
Binaries compiled on a system with 1x Intel Core i9-9900K 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
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.

SPECspeed®2017_fp_base = 224
SPECspeed®2017_fp_peak = Not Run
**Platform Notes**

**BIOS configuration:**
Choose Operating Mode set to Maximum Performance and then set it to Custom Mode
MONITOR/MWAIT set to Enable
Hyper-Threading set to Disable

Sysinfo program /home/cpu2017-1.1.0-ic19.0u5-2/bin/sysinfo
Rev: r6365 of 2019-08-21 295195f888a3d7edeb1e6e46a485a0011
running on linux-qjkl Sun Sep 6 20:17:29 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 8276 CPU @ 2.20GHz
  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
Address sizes: 46 bits physical, 48 bits virtual
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): 4
Vendor ID: GenuineIntel
CPU family: 6
Model: 85
Model name: Intel(R) Xeon(R) Platinum 8276 CPU @ 2.20GHz
Stepping: 6
CPU MHz: 2200.000
```
Lenovo Global Technology

ThinkSystem SR850P
(2.20 GHz, Intel Xeon Platinum 8276)

SPECspeed®2017 fp_base = 224
SPECspeed®2017 fp_peak = Not Run

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

Test Date: Sep-2020
Hardware Availability: Jun-2020
Software Availability: Sep-2019

Platform Notes (Continued)

CPU max MHz: 4000.0000
CPU min MHz: 1000.0000
BogoMIPS: 4400.00
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 39424K
NUMA node0 CPU(s): 0-27
NUMA node1 CPU(s): 28-55
NUMA node2 CPU(s): 56-83
NUMA node3 CPU(s): 84-111

/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: 4 nodes (0-3)
  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: 386682 MB
  node 0 free: 385719 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
  node 1 size: 387066 MB
  node 1 free: 386816 MB
  node 2 cpus: 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80
  node 2 size: 387037 MB
  node 2 free: 386788 MB
  node 3 cpus: 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100 101 102 103 104 105
  node 3 size: 387065 MB
  node 3 free: 386825 MB
  node distances:

(Continued on next page)
Lenovo Global Technology
ThinkSystem SR850P
(2.20 GHz, Intel Xeon Platinum 8276)

SPECSpeed®2017_fp_base = 224
SPECSpeed®2017_fp_peak = Not Run

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

Test Date: Sep-2020
Hardware Availability: Jun-2020
Software Availability: Sep-2019

Platform Notes (Continued)

<table>
<thead>
<tr>
<th>node</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>0:</td>
<td>10</td>
<td>21</td>
<td>21</td>
<td>21</td>
</tr>
<tr>
<td>1:</td>
<td>21</td>
<td>10</td>
<td>21</td>
<td>21</td>
</tr>
<tr>
<td>2:</td>
<td>21</td>
<td>21</td>
<td>10</td>
<td>21</td>
</tr>
<tr>
<td>3:</td>
<td>21</td>
<td>21</td>
<td>21</td>
<td>10</td>
</tr>
</tbody>
</table>

From /proc/meminfo
MemTotal: 1584999736 kB
HugePages_Total: 0
Hugepagesize: 2048 kB

From /etc/*release* /etc/*version*
os-release:
NAME="SLES"
VERSION="15-SP1"
VERSION_ID="15.1"
PRETTY_NAME="SUSE Linux Enterprise Server 15 SP1"
ID="sles"
ID_LIKE="suse"
ANSI_COLOR="0;32"
CPE_NAME="cpe:/o:suse:sles:15:sp1"

uname -a:
Linux linux-qjkl 4.12.14-195-default #1 SMP Tue May 7 10:55:11 UTC 2019 (8fba516)
x86_64 x86_64 x86_64 GNU/Linux

Kernel self-reported vulnerability status:
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: __user pointer sanitization
CVE-2017-5715 (Spectre variant 2): Mitigation: Enhanced IBRS, IBPB: conditional, RSB filling

run-level 3 Sep 6 20:16

SPEC is set to: /home/cpu2017-1.1.0-ic19.0u5-2
/proc/meminfo
MemTotal: 1584999736 kB
HugePages_Total: 0
Hugepagesize: 2048 kB

From /sys/devices/virtual/dmi/id
BIOS: Lenovo -[TEE156L-2.61]- 05/20/2020
Vendor: Lenovo
Product: ThinkSystem SR850P -[7D2HCTO1WW]-

(Continued on next page)
## Platform Notes (Continued)

Product Family: ThinkSystem  
Serial: 1234567890

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:
48x Samsung M393A4K40CB2-CVF 32 GB 2 rank 2933

(End of data from sysinfo program)

## Compiler Version Notes

<table>
<thead>
<tr>
<th>C</th>
<th>619.lbm_s(base) 638.imagick_s(base) 644.nab_s(base)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intel(R) C</td>
<td>Intel(R) 64 Compiler for applications running on Intel(R) 64, Version 19.0.5.281 Build 20190815</td>
</tr>
<tr>
<td>Copyright (C) 1985–2019 Intel Corporation. All rights reserved.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>C++, C, Fortran</th>
<th>607.cactus_s(base)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intel(R) C++</td>
<td>Intel(R) 64 Compiler for applications running on Intel(R) 64, Version 19.0.5.281 Build 20190815</td>
</tr>
<tr>
<td>Copyright (C) 1985–2019 Intel Corporation. All rights reserved.</td>
<td></td>
</tr>
<tr>
<td>Intel(R) C</td>
<td>Intel(R) 64 Compiler for applications running on Intel(R) 64, Version 19.0.5.281 Build 20190815</td>
</tr>
<tr>
<td>Copyright (C) 1985–2019 Intel Corporation. All rights reserved.</td>
<td></td>
</tr>
<tr>
<td>Intel(R) Fortran</td>
<td>Intel(R) 64 Compiler for applications running on Intel(R) 64, Version 19.0.5.281 Build 20190815</td>
</tr>
<tr>
<td>Copyright (C) 1985–2019 Intel Corporation. All rights reserved.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Fortran</th>
<th>603.bwaves_s(base) 649.fotonik3d_s(base) 654.roms_s(base)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intel(R) Fortran</td>
<td>Intel(R) 64 Compiler for applications running on Intel(R) 64, Version 19.0.5.281 Build 20190815</td>
</tr>
<tr>
<td>Copyright (C) 1985–2019 Intel Corporation. All rights reserved.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Fortran, C</th>
<th>621.wrf_s(base) 627.cam4_s(base) 628.pop2_s(base)</th>
</tr>
</thead>
</table>

(Continued on next page)
Lenovo Global Technology
ThinkSystem SR850P
(2.20 GHz, Intel Xeon Platinum 8276)

CASTOR for applications running on Intel(R) 64, Version 19.0.5.281 Build 20190815
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R) 64, Version 19.0.5.281 Build 20190815
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

Base Compiler Invocation

C benchmarks:
icc

Fortran benchmarks:
ifort

Benchmarks using both Fortran and C:
ifort icc

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

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:
-m64 -std=c11 -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch

(Continued on next page)
Lenovo Global Technology
ThinkSystem SR850P
(2.20 GHz, Intel Xeon Platinum 8276)

SPECspeed®2017_fp_base = 224
SPECspeed®2017_fp_peak = Not Run

CPU2017 License: 9017
Test Sponsor: Lenovo Global Technology
Tested by: Lenovo Global Technology
Test Date: Sep-2020
Hardware Availability: Jun-2020
Software Availability: Sep-2019

Base Optimization Flags (Continued)

C benchmarks (continued):
-ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP

Fortran benchmarks:
-m64 -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:
-m64 -std=c11 -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++:
-m64 -std=c11 -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-I.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-I.xml

SPEC CPU and SPECspeed are registered trademarks of the Standard Performance Evaluation Corporation. All other brand and product names appearing in this result are trademarks or registered trademarks of their respective holders.

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

Tested with SPEC CPU®2017 v1.1.0 on 2020-09-06 08:17:29-0400.
Originally published on 2020-09-29.