Lenovo Global Technology
ThinkSystem SD530
(2.10 GHz, Intel Xeon Gold 6230T)

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

<table>
<thead>
<tr>
<th>SPECspeed®2017_fp_base = 126</th>
</tr>
</thead>
</table>

| SPECspeed®2017_fp_peak = Not Run |

**Threads**

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
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</thead>
<tbody>
<tr>
<td>603.bwaves_s</td>
<td>40</td>
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<tr>
<td>607.cactuBSSN_s</td>
<td>40</td>
</tr>
<tr>
<td>619.lbm_s</td>
<td>40</td>
</tr>
<tr>
<td>621.wrf_s</td>
<td>40</td>
</tr>
<tr>
<td>627.cam4_s</td>
<td>40</td>
</tr>
<tr>
<td>628.pop2_s</td>
<td>40</td>
</tr>
<tr>
<td>638.imagick_s</td>
<td>40</td>
</tr>
<tr>
<td>644.nab_s</td>
<td>40</td>
</tr>
<tr>
<td>649.fotonik3d_s</td>
<td>40</td>
</tr>
<tr>
<td>654.roms_s</td>
<td>40</td>
</tr>
</tbody>
</table>

**Hardware**

- **CPU Name:** Intel Xeon Gold 6230T
- **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:** 192 GB (12 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 19.0.4.227 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 TEE142E 2.30 released Aug-2019 tested as TEE141E 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:** --
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Results Table

<table>
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<tr>
<th>Benchmark</th>
<th>Threads</th>
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<th>Ratio</th>
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<tr>
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<td>83.2</td>
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<td>130</td>
<td>121</td>
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</table>

SPECspeed®2017_fp_base = 126
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,1,0"
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 syncd 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.
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Test Date: Oct-2019
Hardware Availability: Jul-2019
Software Availability: May-2019

Platform Notes

BIOS configuration:
Choose Operating Mode set to Maximum Performance and then set it to Custom Mode
C-States set to Legacy
Cl Enhanced Mode set to Enable
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 Sat Oct 12 00:01:54 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 6230T 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): 2
Vendor ID: GenuineIntel
CPU family: 6
Model: 85
Model name: Intel(R) Xeon(R) Gold 6230T CPU @ 2.10GHz
Stepping: 7
CPU MHz: 2100.000
BogoMIPS: 4200.00
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 28160K
NUMA node0 CPU(s): 0-19,40-59

(Continued on next page)
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SPECs®2017_fp_base = 126
SPECs®2017_fp_peak = Not Run

CPU2017 License: 9017
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Hardware Availability: Jul-2019
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NUMA node1 CPU(s): 20-39, 60-79
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
aperfmpref eagercpu pi pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg
fma cx16 xtpre pdcm pcid dca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes
xsaves avx f16c rdrand lahf_lm abm 3nowprefetch eb pH cat_13 cd p_l3 intel_pinn
intel_pt ssbd mba ibrs ibpb stibp ibrs_enhanced tpr_shadow vmmi flexpriority ept
vpid fsgsbase tsc_adjust bm1 hle avx2 smpem bm2 erms invpcid rtm cqm mxm rdt_a
avx512f avx512dq rseed adx smap clflushopt clwb avx512cd avx512bw avx512vl xsavesopt
gxsave xtypebl vcm_llc vcm_occup_llc vcm_mbm_total vcm_mbm_local dtherm isa arat pln
ts pku ospke avx512_vnni spec_ctrl intel_stibp flush_l1d arch_capabilities

/platforminfo cache data
  cache size: 28160 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 40 41 42 43 44 45 46 47
  48 49 50 51 52 53 54 55 56 57 58 59
  node 0 size: 97976 MB
  node 0 free: 95291 MB
  node 1 cpus: 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 60 61 62 63 64
  65 66 67 68 69 70 71 72 73 74 75 76 77 78 79
  node 1 size: 98304 MB
  node 1 free: 95422 MB
  node distances:
  node 0 1
  0: 10 21
  1: 21 10

From /proc/meminfo
MemTotal: 197697816 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)"

(Continued on next page)
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SPECSpeed®2017_fp_base = 126
SPECSpeed®2017_fp_peak = Not Run

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<tr>
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<td>Software Availability:</td>
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</tbody>
</table>

**Platform Notes (Continued)**

- 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 12 00:01

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

- Filesystem Type Size Used Avail Use% Mounted on
  /dev/sdb3 xfs 693G 47G 647G 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 -[TEE141E-2.30]- 07/02/2019

- Memory:
  - 4x NO DIMM NO DIMM
  - 12x SK Hynix HMA82GR7CJR8N-WM 16 GB 2 rank 2933

(End of data from sysinfo program)

**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)
-----------------------------------------------
```

```
Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64,
Version 19.0.4.227 Build 20190416
```

(Continued on next page)
## Lenovo Global Technology

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### SPECspeed®2017_fp_base = 126  
SPECspeed®2017_fp_peak = Not Run

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### Compiler Version Notes (Continued)

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

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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.

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<table>
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<tr>
<th>Fortran</th>
<th>603.bwaves_s(base) 649.fotonik3d_s(base) 654.roms_s(base)</th>
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| Intel (R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)  
64, Version 19.0.4.227 Build 20190416 |
|----------------------------------------|

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<th>Fortran, C</th>
<th>621.wrf_s(base) 627.cam4_s(base) 628.pop2_s(base)</th>
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| Intel (R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)  
64, Version 19.0.4.227 Build 20190416 |
|----------------------------------------|

---

| Intel (R) C Intel(R) 64 Compiler for applications running on Intel(R)  
64, Version 19.0.4.227 Build 20190416 |
|----------------------------------------|

---

### Base Compiler Invocation

C benchmarks:

```bash
icc -m64 -std=c11
```

Fortran benchmarks:

```bash
ifort -m64
```

Benchmarks using both Fortran and C:

```bash
ifort -m64 icc -m64 -std=c11
```

Benchmarks using Fortran, C, and C++:

```bash
icpc -m64 icc -m64 -std=c11 ifort -m64
```
# SPEC CPU®2017 Floating Point Speed Result

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**SPECspeed®2017_fp_base =** 126  
**SPECspeed®2017_fp_peak =** Not Run

## Base Portability Flags

- 603.bwaves_s: --DSPEC_LP64  
- 607.cactuBSSN_s: --DSPEC_LP64  
- 619.ibm_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.

Tested with SPEC CPU®2017 v1.0.5 on 2019-10-11 12:01:53-0400.


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