**Lenovo Global Technology**  
ThinkSystem SR570  
(2.30 GHz, Intel Xeon Gold 6230N)

<table>
<thead>
<tr>
<th>SPECsxeed®2017_fp_base</th>
<th>122</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECsxeed®2017_fp_peak</td>
<td>Not Run</td>
</tr>
</tbody>
</table>

**CPU2017 License:** 9017  
**Test Date:** Sep-2019  
**Test Sponsor:** Lenovo Global Technology  
**Hardware Availability:** Jul-2019  
**Tested by:** Lenovo Global Technology  
**Software Availability:** May-2019

---

### Hardware

<table>
<thead>
<tr>
<th>Description</th>
<th>Spec</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU Name:</td>
<td>Intel Xeon Gold 6230N</td>
</tr>
<tr>
<td>Max MHZ:</td>
<td>3900</td>
</tr>
<tr>
<td>Nominal:</td>
<td>2300</td>
</tr>
<tr>
<td>Enabled:</td>
<td>40 cores, 2 chips</td>
</tr>
<tr>
<td>Orderable:</td>
<td>1.2 chips</td>
</tr>
<tr>
<td>Cache L1:</td>
<td>32 KB I + 32 KB D on chip per core</td>
</tr>
<tr>
<td>L2:</td>
<td>1 MB I+D on chip per core</td>
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<tr>
<td>L3:</td>
<td>27.5 MB I+D on chip per chip</td>
</tr>
<tr>
<td>Other:</td>
<td>None</td>
</tr>
<tr>
<td>Memory:</td>
<td>192 GB (12 x 16 GB 2Rx8 PC4-2933Y-R)</td>
</tr>
<tr>
<td>Storage:</td>
<td>1 x 960 GB SATA SSD</td>
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<tr>
<td>Other:</td>
<td>None</td>
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</table>

### Software

<table>
<thead>
<tr>
<th>Description</th>
<th>Spec</th>
</tr>
</thead>
<tbody>
<tr>
<td>OS:</td>
<td>SUSE Linux Enterprise Server 12 SP4 (x86_64)</td>
</tr>
<tr>
<td>Kernel:</td>
<td>4.12.14-94.41-default</td>
</tr>
<tr>
<td>Compiler:</td>
<td>C/C++: Version 19.0.4.227 of Intel</td>
</tr>
<tr>
<td>Fortran:</td>
<td>Intel Fortran</td>
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<tr>
<td>Parallel:</td>
<td>Yes</td>
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<tr>
<td>Firmware:</td>
<td>Lenovo BIOS Version TEE142E 2.30 released Aug-2019 tested as TEE141E 2.30 Jul-2019</td>
</tr>
<tr>
<td>File System:</td>
<td>xfs</td>
</tr>
<tr>
<td>System State:</td>
<td>Run level 3 (multi-user)</td>
</tr>
<tr>
<td>Base Pointers:</td>
<td>64-bit</td>
</tr>
<tr>
<td>Peak Pointers:</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>Other:</td>
<td>None</td>
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<tr>
<td>Power Management:</td>
<td>--</td>
</tr>
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</table>

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**SPEC CPU®2017 Floating Point Speed Result**

---

**Threads**

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
</tr>
</thead>
<tbody>
<tr>
<td>603.bwaves_s</td>
<td>40</td>
</tr>
<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>

---

**SPECsxeed®2017_fp_base (122)**

---

**Notes:**

- Hardware: CPU Name: Intel Xeon Gold 6230N  
- Memory: 192 GB (12 x 16 GB 2Rx8 PC4-2933Y-R)  
- Storage: 1 x 960 GB SATA SSD  
- Other: None  
- Software: OS: SUSE Linux Enterprise Server 12 SP4 (x86_64)  
- Compiler: C/C++: Version 19.0.4.227 of Intel  
- Parallel: Yes  
- File System: xfs  
- System State: Run level 3 (multi-user)  
- Base Pointers: 64-bit  
- Peak Pointers: Not Applicable  
- Power Management: --
**SPEC CPU®2017 Floating Point Speed Result**

**Lenovo Global Technology**

ThinkSystem SR570 (2.30 GHz, Intel Xeon Gold 6230N)

<table>
<thead>
<tr>
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<tr>
<td>Test Sponsor:</td>
<td>Lenovo Global Technology</td>
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<tr>
<td>Tested by:</td>
<td>Lenovo Global Technology</td>
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</table>

### Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
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<th>Ratio</th>
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<tr>
<td>603.bwaves_s</td>
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<td>142</td>
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<td>619.lbm_s</td>
<td>40</td>
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<td>95.0</td>
<td>55.3</td>
<td>94.8</td>
<td>55.1</td>
<td>95.1</td>
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<tr>
<td>621.wrf_s</td>
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<td>114</td>
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<tr>
<td>627.cam4_s</td>
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<td>87.4</td>
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<tr>
<td>628.pop2_s</td>
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<td>52.4</td>
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<td>638.imagick_s</td>
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<td>117</td>
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<td>644.nab_s</td>
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<tr>
<td>649.fotonik3d_s</td>
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<td>78.2</td>
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<td>654.roms_s</td>
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<td>136</td>
<td>116</td>
<td>136</td>
<td>116</td>
<td>136</td>
<td>116</td>
</tr>
</tbody>
</table>

**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.
Lenovo Global Technology
ThinkSystem SR570
(2.30 GHz, Intel Xeon Gold 6230N)

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

SPECspeed®2017_fp_base = 122
SPECspeed®2017_fp_peak = Not Run

Test Date: Sep-2019
Hardware Availability: Jul-2019
Software Availability: May-2019

Platform Notes

BIOS configuration:
Choose Operating Mode set to Maximum Performance
Choose Operating Mode set to Custom Mode
CPU P-state Control set to Automatic
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 9bcede8f2999c33d61f64985e45859ea9
running on linux-et90 Thu Sep 26 10:24:54 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 6230N CPU @ 2.30GHz
- 2 "physical id"s (chips)
- 40 "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: 20
  - 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): 40
- On-line CPU(s) list: 0-39
- Thread(s) per core: 1
- Core(s) per socket: 20
- Socket(s): 2
- NUMA node(s): 4
- Vendor ID: GenuineIntel
- CPU family: 6
- Model: 85
- Model name: Intel(R) Xeon(R) Gold 6230N CPU @ 2.30GHz
- Stepping: 6
- CPU MHz: 2300.000
- BogoMIPS: 4600.00
- Virtualization: VT-x
- L1d cache: 32K
- L1i cache: 32K
- L2 cache: 1024K

(Continued on next page)
Lenovo Global Technology

ThinkSystem SR570
(2.30 GHz, Intel Xeon Gold 6230N)

SPECspeed®2017_fp_base = 122
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CPU2017 License: 9017
Test Sponsor: Lenovo Global Technology
Tested by: Lenovo Global Technology

<table>
<thead>
<tr>
<th>Platform Notes (Continued)</th>
</tr>
</thead>
<tbody>
<tr>
<td>L3 cache:</td>
</tr>
<tr>
<td>NUMA node0 CPU(s):</td>
</tr>
<tr>
<td>NUMA node1 CPU(s):</td>
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<tr>
<td>NUMA node2 CPU(s):</td>
</tr>
<tr>
<td>NUMA node3 CPU(s):</td>
</tr>
<tr>
<td>Flags:</td>
</tr>
<tr>
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<tr>
<td></td>
</tr>
</tbody>
</table>

/proc/cpuinfo cache data
  cache size : 28160 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 5 6 10 11 12 15 16
  node 0 size: 47686 MB
  node 0 free: 47455 MB
  node 1 cpus: 3 4 7 8 9 13 14 17 18 19
  node 1 size: 48342 MB
  node 1 free: 48149 MB
  node 2 cpus: 20 21 22 25 26 30 31 32 35 36
  node 2 size: 48371 MB
  node 2 free: 48033 MB
  node 3 cpus: 23 24 27 28 29 33 34 37 38 39
  node 3 size: 48369 MB
  node 3 free: 48027 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: 197396848 kB
  HugePages_Total: 0
  Hugepagesize: 2048 kB

(Continued on next page)
Lenovo Global Technology
ThinkSystem SR570
(2.30 GHz, Intel Xeon Gold 6230N)

SPECspeed®2017_fp_base = 122
SPECspeed®2017_fp_peak = Not Run

Platform Notes (Continued)

From /etc/*release* /etc/*version*
  SuSE-release:
    SUSE Linux Enterprise Server 12 (x86_64)
    VERSION = 12
    PATCHLEVEL = 4
    # This file is deprecated and will be removed in a future service pack or release.
    # Please check /etc/os-release for details about this release.
  os-release:
    NAME="SLES"
    VERSION="12-SP4"
    VERSION_ID="12.4"
    PRETTY_NAME="SUSE Linux Enterprise Server 12 SP4"
    ID="sles"
    ANSI_COLOR="0;32"
    CPE_NAME="cpe:/o:suse:sles:12:sp4"

uname -a:
    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: __user pointer sanitization
CVE-2017-5715 (Spectre variant 2): Mitigation: Indirect Branch Restricted Speculation, IBPB, IBRS_FW

run-level 3 Sep 26 10:23

SPEC is set to: /home/cpu2017-1.0.5-ic19.0u4
  Filesystem Type Size Used Avail Use% Mounted on
  /dev/sda3 xfs 892G 50G 842G 6% /

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 -[TE141E-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)
Lenovo Global Technology
ThinkSystem SR570
(2.30 GHz, Intel Xeon Gold 6230N)

SPECspeed®2017_fp_base = 122
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CPU2017 License: 9017
Test Sponsor: Lenovo Global Technology
Tested by: Lenovo Global Technology

Test Date: Sep-2019
Hardware Availability: Jul-2019
Software Availability: May-2019

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
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.
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.
------------------------------------------------------------------------------

Base Compiler Invocation

C benchmarks:
  icc -m64 -std=c11

(Continued on next page)
Lenovo Global Technology
ThinkSystem SR570
(2.30 GHz, Intel Xeon Gold 6230N)

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<thead>
<tr>
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**Test Date:** Sep-2019  
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**Software Availability:** May-2019

### Base Compiler Invocation (Continued)

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
```

### Base Portability Flags

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Flags</th>
</tr>
</thead>
<tbody>
<tr>
<td>603.bwaves_s</td>
<td>-DSPEC_LP64</td>
</tr>
<tr>
<td>607.cactuBSSN_s</td>
<td>-DSPEC_LP64</td>
</tr>
<tr>
<td>619.lbm_s</td>
<td>-DSPEC_LP64</td>
</tr>
<tr>
<td>621.wrf_s</td>
<td>-DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian</td>
</tr>
<tr>
<td>627.cam4_s</td>
<td>-DSPEC_LP64 -DSPEC_CASE_FLAG</td>
</tr>
<tr>
<td>628.pop2_s</td>
<td>-DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian -assume byterecl</td>
</tr>
<tr>
<td>638.imagick_s</td>
<td>-DSPEC_LP64</td>
</tr>
<tr>
<td>644.nab_s</td>
<td>-DSPEC_LP64</td>
</tr>
<tr>
<td>649.fotonik3d_s</td>
<td>-DSPEC_LP64</td>
</tr>
<tr>
<td>654.roms_s</td>
<td>-DSPEC_LP64</td>
</tr>
</tbody>
</table>

### Base Optimization Flags

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

#### Fortran benchmarks:
```bash
-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:
```bash
-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++:
```bash
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP
```

(Continued on next page)
# Lenovo Global Technology

ThinkSystem SR570  
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**Test Date:** Sep-2019  
**Hardware Availability:** Jul-2019  
**Software Availability:** May-2019

## Base Optimization Flags (Continued)

Benchmarks using Fortran, C, and C++ (continued):  
- 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 2019-09-25 22:24:54-0400.  