## Lenovo Global Technology

**ThinkSystem SR570**  
(1.70 GHz, Intel Xeon Bronze 3106)

<table>
<thead>
<tr>
<th>SPECrate2017_fp_base</th>
<th>59.9</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECrate2017_fp_peak</td>
<td>60.6</td>
</tr>
</tbody>
</table>

### Hardware

**CPU Name:** Intel Xeon Bronze 3106  
**Max MHz.:** 1700  
**Nominal:** 1700  
**Enabled:** 16 cores, 2 chips  
**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:** 11 MB I+D on chip per core  
**Other:** None  
**Memory:** 192 GB (12 x 16 GB 2Rx8 PC4-2666V-R, running at 2133)  
**Storage:** 1 x 800 GB SAS SSD  
**Other:** None

### Software

**OS:** SUSE Linux Enterprise Server 12 SP3 (x86_64)  
**Kernel:** 4.4.73-5-default  
**Compiler:** C/C++: Version 18.0.0.128 of Intel C/C++  
**Fortran:** Version 18.0.0.128 of Intel Fortran  
**Compiler for Linux:**  
**Firmware:** Lenovo BIOS Version TEE119J 1.20 released Sep-2017  
**File System:** btrfs  
**System State:** Run level 3 (multi-user)  
**Base Pointers:** 64-bit  
**Peak Pointers:** 64-bit  
**Other:** None
Lenovo Global Technology
ThinkSystem SR570
(1.70 GHz, Intel Xeon Bronze 3106)

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

Results Table

<table>
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<th>Benchmark</th>
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<td>47.2</td>
</tr>
</tbody>
</table>

SPECrate2017_fp_base = 59.9
SPECrate2017_fp_peak = 60.9

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/cpu2017.1.0.2.ic18.0/lib/ia32:/home/cpu2017.1.0.2.ic18.0/lib/intel64"
LD_LIBRARY_PATH = "$LD_LIBRARY_PATH:/home/cpu2017.1.0.2.ic18.0/je5.0.1-32:/home/cpu2017.1.0.2.ic18.0/je5.0.1-64"
Binaries compiled on a system with 1x Intel Core i7-4790 CPU + 32GB RAM
memory using Redhat Enterprise Linux 7.4
Transparent Huge Pages enabled by default
Prior to runcpu invocation
Filesistem 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>
No: The test sponsor attests, as of date of publication, that CVE-2017-5754 (Meltdown) is mitigated in the system as tested and documented.
### General Notes (Continued)

No: 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.

No: 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.

This benchmark result is intended to provide perspective on past performance using the historical hardware and/or software described on this result page.

The system as described on this result page was formerly generally available. At the time of this publication, it may not be shipping, and/or may not be supported, and/or may fail to meet other tests of General Availability described in the SPEC OSG Policy document, [http://www.spec.org/osg/policy.html](http://www.spec.org/osg/policy.html)

This measured result may not be representative of the result that would be measured were this benchmark run with hardware and software available as of the publication date.

### Platform Notes

BIOS configuration:
Choose Operating Mode set to Maximum Performance
DCU Streamer Prefetcher set to Enable
MONITORMWAIT set to Enable
XPT Prefetcher set to Enable
Stale AtoS set to Enable
LLC Deadline Alloc set to Disable
Sysinfo program /home/cpu2017.1.0.2.ic18.0/bin/sysinfo
Rev: r5797 of 2017-06-14 96c45e4568ad54c135fd618bcc091c0f
running on linux-3fwh Thu Jan 4 22:57:06 2018

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](https://www.spec.org/cpu2017/Docs/config.html#sysinfo)

From /proc/cpuinfo

```
model name : Intel(R) Xeon(R) Bronze 3106 CPU @ 1.70GHz
  2 "physical id"s (chips)
  16 "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 : 8
siblings : 8
  physical 0: cores 0 1 2 3 4 5 6 7
  physical 1: cores 0 1 2 3 4 5 6 7
```

(Continued on next page)
Lenovo Global Technology
ThinkSystem SR570
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SPECrate2017_fp_base = 59.9
SPECrate2017_fp_peak = 60.6

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

Test Date: Jan-2018
Hardware Availability: Nov-2017
Software Availability: Sep-2017

Platform Notes (Continued)

From lscpu:
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 16
On-line CPU(s) list: 0-15
Thread(s) per core: 1
Core(s) per socket: 8
Socket(s): 2
NUMA node(s): 2
Vendor ID: GenuineIntel
CPU family: 6
Model: 85
Model name: Intel(R) Xeon(R) Bronze 3106 CPU @ 1.70GHz
Stepping: 4
CPU MHz: 1696.014
BogoMIPS: 3392.02
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 11264K
NUMA node0 CPU(s): 0-7
NUMA node1 CPU(s): 8-15
Flags: fpu vme de pse mce cmov pat pse36 clflush dts msr mce cx8 apic sep mtrr pae mca cmov
pat pse36 clflush dts acpi mmx fxsr sse sse2 ss ht tm pbe syscall nx pdpe1gb rdtscp
lm constant_tsc arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc
aperfmonf eagerfpu pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg
fma cx16 tpxr pdcm pclid dca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes
xsave avx f16c rdrand lahf_lm abm 3dnowprefetch arat epb pni pts dtherm intel_pt
tpr_shadow vmmi flexpriority ept vpid fsgsbase tsc_adjust tm2 hle avx2 smep bmi2
erms invpcid rtm cmpuvo avx512f avx512dq rdseed adx smap clflushopt clwb avx512cd
avx512bw avx512vl xsaveopt xsavec xgetbv1 xsaveopt cqm_llc cqm_occup_llc pku ospke

/proc/cpuinfo cache data
  cache size: 11264 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
  node 0 size: 96060 MB
  node 0 free: 95645 MB
  node 1 cpus: 8 9 10 11 12 13 14 15
  node 1 size: 96749 MB
  node 1 free: 96367 MB

(Continued on next page)
Platform Notes (Continued)

node distances:
node  0  1
  0:  10  21
  1:  21  10

From /proc/meminfo
MemTotal: 197437652 kB
HugePages_Total: 0
Hugepagesize: 2048 kB

From /etc/*release* /etc/*version*
SuSE-release:
   SUSE Linux Enterprise Server 12 (x86_64)
   VERSION = 12
   PATCHLEVEL = 3
   # 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-SP3"
      VERSION_ID="12.3"
      PRETTY_NAME="SUSE Linux Enterprise Server 12 SP3"
      ID="sles"
      ANSI_COLOR="0;32"
      CPE_NAME="cpe:/o:suse:sles:12:sp3"

uname -a:
   Linux linux-3fwh 4.4.73-5-default #1 SMP Tue Jul 4 15:33:39 UTC 2017 (b7ce4e4) x86_64
   x86_64 x86_64 GNU/Linux

run-level 3 Jan 4 22:38

SPEC is set to: /home/cpu2017.1.0.2.ic18.0
   Filesystem Type Size Used Avail Use% Mounted on
   /dev/sda2  btrfs  744G  36G  708G  5% /home

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 -[TEE119J-1.20]- 09/06/2017
   Memory:
      4x NO DIMM NO DIMM
      12x Samsung M393A2K43BB1-CTD 16 GB 2 rank 2666, configured at 2133

(End of data from sysinfo program)
Lenovo Global Technology
ThinkSystem SR570
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SPECrate2017_fp_base = 59.9
SPECrate2017_fp_peak = 60.6

Compiler Version Notes

==============================================================================
CC   519.lbm_r(base) 538.imagick_r(base, peak) 544.nab_r(base)
------------------------------------------------------------------------------
icc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------
==============================================================================
CC   519.lbm_r(peak) 544.nab_r(peak)
------------------------------------------------------------------------------
icc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------
==============================================================================
CXXC 508.namd_r(base) 510.parest_r(base)
------------------------------------------------------------------------------
icpc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------
==============================================================================
CXXC 508.namd_r(peak) 510.parest_r(peak)
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icpc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------
==============================================================================
CC   511.povray_r(base) 526.blender_r(base)
------------------------------------------------------------------------------
icpc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
icc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------
==============================================================================
CC   511.povray_r(peak) 526.blender_r(peak)
------------------------------------------------------------------------------
icpc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
icc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------
(Continued on next page)
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SPECrater2017_fp_peak = 60.6

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

Test Date: Jan-2018
Hardware Availability: Nov-2017
Software Availability: Sep-2017

Compiler Version Notes (Continued)

FC 507.cactuBSSN_r(base)

---------------------------------------------------------------
icpc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
ic (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
ifort (IFORT) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
---------------------------------------------------------------

FC 507.cactuBSSN_r(peak)

---------------------------------------------------------------
icpc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
ic (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
ifort (IFORT) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
---------------------------------------------------------------

FC 503.bwaves_r(base, peak) 549.fotonik3d_r(base, peak) 554.roms_r(base)

---------------------------------------------------------------
ifort (IFORT) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
---------------------------------------------------------------

FC 554.roms_r(peak)

---------------------------------------------------------------
ifort (IFORT) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
---------------------------------------------------------------

CC 521.wrf_r(base) 527.cam4_r(base)

---------------------------------------------------------------
ifort (IFORT) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
icc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
---------------------------------------------------------------

CC 521.wrf_r(peak) 527.cam4_r(peak)

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Tested by: Lenovo Global Technology

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Software Availability: Sep-2017

 Compiler Version Notes (Continued)

ifort (IFORT) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
icc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.

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.llvm_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
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SPECrate2017_fp_base = 59.9
SPECrate2017_fp_peak = 60.6

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

Test Date: Jan-2018
Hardware Availability: Nov-2017
Software Availability: Sep-2017

Base Optimization Flags

C benchmarks:
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=3

C++ benchmarks:
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=3

Fortran benchmarks:
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=3 -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=3 -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=3

Benchmarks using Fortran, C, and C++:
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=3 -nostandard-realloc-lhs -align array32byte

Base Other Flags

C benchmarks:
-m64 -std=c11

C++ benchmarks:
-m64

Fortran benchmarks:
-m64

Benchmarks using both Fortran and C:
-m64 -std=c11

Benchmarks using both C and C++:
-m64 -std=c11

Benchmarks using Fortran, C, and C++:
-m64 -std=c11
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CPU2017 License: 9017
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Test Date: Jan-2018
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Software Availability: Sep-2017

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: -prof-gen(pass 1) -prof-use(pass 2) -ipo -xCORE-AVX2 -O3
-no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=3

538.imagick_r: -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=3

544.nab_r: Same as 519.lbm_r

C++ benchmarks:
-prof-gen(pass 1) -prof-use(pass 2) -ipo -xCORE-AVX2 -O3
-no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=3

Fortran benchmarks:

(Continued on next page)
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<table>
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<th>9017</th>
<th>Test Date:</th>
<th>Jan-2018</th>
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<td>Lenovo Global Technology</td>
<td>Hardware Availability:</td>
<td>Nov-2017</td>
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<tr>
<td>Tested by:</td>
<td>Lenovo Global Technology</td>
<td>Software Availability:</td>
<td>Sep-2017</td>
</tr>
</tbody>
</table>

### SPECrate2017_fp_base = 59.9

### SPECrate2017_fp_peak = 60.6

### Peak Optimization Flags (Continued)

- **503.bwaves_r:**
  - `-xCORE-AVX2`  
  - `-ipo`  
  - `-no-prec-div`  
  - `-qopt-prefetch`  
  - `-ffinite-math-only`  
  - `-qopt-mem-layout-trans=3`  
  - `-nostandard-realloc-lhs`  
  - `-align array32byte`

- **549.fotonik3d_r:**
  - Same as 503.bwaves_r

- **554.roms_r:**
  - `-prof-gen(pass 1)`  
  - `-prof-use(pass 2)`  
  - `-ipo`  
  - `-xCORE-AVX2`  
  - `-O3`  
  - `-no-prec-div`  
  - `-qopt-prefetch`  
  - `-ffinite-math-only`  
  - `-qopt-mem-layout-trans=3`  
  - `-nostandard-realloc-lhs`  
  - `-align array32byte`

**Benchmarks using both Fortran and C:**
- `-prof-gen(pass 1)`  
  - `-prof-use(pass 2)`  
  - `-ipo`  
  - `-xCORE-AVX2`  
  - `-O3`  
  - `-no-prec-div`  
  - `-qopt-prefetch`  
  - `-ffinite-math-only`  
  - `-qopt-mem-layout-trans=3`  
  - `-nostandard-realloc-lhs`  
  - `-align array32byte`

**Benchmarks using both C and C++:**
- `-prof-gen(pass 1)`  
  - `-prof-use(pass 2)`  
  - `-ipo`  
  - `-xCORE-AVX2`  
  - `-O3`  
  - `-no-prec-div`  
  - `-qopt-prefetch`  
  - `-ffinite-math-only`  
  - `-qopt-mem-layout-trans=3`

**Benchmarks using Fortran, C, and C++:**
- `-prof-gen(pass 1)`  
  - `-prof-use(pass 2)`  
  - `-ipo`  
  - `-xCORE-AVX2`  
  - `-O3`  
  - `-no-prec-div`  
  - `-qopt-prefetch`  
  - `-ffinite-math-only`  
  - `-qopt-mem-layout-trans=3`  
  - `-nostandard-realloc-lhs`  
  - `-align array32byte`

### Peak Other Flags

**C benchmarks:**
- `-m64`  
  - `-std=c11`

**C++ benchmarks:**
- `-m64`

**Fortran benchmarks:**
- `-m64`

**Benchmarks using both Fortran and C:**
- `-m64`  
  - `-std=c11`

**Benchmarks using both C and C++:**
- `-m64`  
  - `-std=c11`
# Lenovo Global Technology

**ThinkSystem SR570**  
(1.70 GHz, Intel Xeon Bronze 3106)

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**Peak Other Flags (Continued)**

Benchmarks using Fortran, C, and C++:
- `-m64`  
- `-std=c11`

The flags files that were used to format this result can be browsed at:
- [http://www.spec.org/cpu2017/flags/Intel-ic18.0-official-linux64.html](http://www.spec.org/cpu2017/flags/Intel-ic18.0-official-linux64.html)

You can also download the XML flags sources by saving the following links:
- [http://www.spec.org/cpu2017/flags/Intel-ic18.0-official-linux64.xml](http://www.spec.org/cpu2017/flags/Intel-ic18.0-official-linux64.xml)

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

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