# Lenovo Global Technology

**ThinkSystem SR650**  
(2.30 GHz, Intel Xeon Gold 6140M)

**SPECspeed2017_fp_base** = 109  
**SPECspeed2017_fp_peak** = 110

---

## Hardware

<table>
<thead>
<tr>
<th>Threads</th>
<th>SPECspeed2017_fp_base</th>
<th>SPECspeed2017_fp_peak</th>
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<tr>
<td>603.bwaves_s 36</td>
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<tr>
<td>607.cactuBSSN_s 36</td>
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<tr>
<td>619.lbm_s 36</td>
<td>43.0</td>
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<tr>
<td>621.wrf_s 36</td>
<td>87.4</td>
<td>91.1</td>
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<td>78.2</td>
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<td>628.pop2_s 36</td>
<td>61.9</td>
<td>62.0</td>
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<td>638.imagick_s 36</td>
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<tr>
<td>644.nab_s 36</td>
<td>79.5</td>
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<tr>
<td>649.fotonik3d_s 36</td>
<td>79.3</td>
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</tr>
<tr>
<td>654.roms_s 36</td>
<td>111</td>
<td>115</td>
</tr>
</tbody>
</table>

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## Software

| Software | OS: SUSE Linux Enterprise Server 12 SP2 (x86_64)  
Kernel 4.4.114-92.64-default  
Compiler: C/C++: Version 18.0.0.128 of Intel C/C++  
Compiler for Linux: Fortran: Version 18.0.0.128 of Intel Fortran  
Compiler for Linux  
Parallel: Yes  
Firmware: Lenovo BIOS Version IVE113W 1.12 released Feb-2018  
File System: btrfs  
System State: Run level 3 (multi-user)  
Base Pointers: 64-bit  
Peak Pointers: 64-bit  
Other: None |

---

CPU Name: Intel Xeon Gold 6140M  
Max MHz.: 3700  
Nominal: 2300  
Enabled: 36 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: 24.75 MB I+D on chip per core  
Other: None  
Memory: 384 GB (24 x 16 GB 2Rx8 PC4-2666V-R)  
Storage: 1 x 800 GB SAS SSD  
Other: None
SPEC CPU2017 Floating Point Speed Result

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ThinkSystem SR650
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SPECspeed2017_fp_base = 109
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Results Table

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<td>138</td>
<td>114</td>
<td></td>
<td></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"

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"
OMP_STACKSIZE = "192M"

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
Filesystem page cache synced and cleared with:
  sync; echo 3> /proc/sys/vm/drop_caches
Yes: 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.

Platform Notes

BIOS configuration:
Choose Operating Mode set to Custom Mode
CPU Pstate Control set to None

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SPECspeed2017_fp_peak = 110

CPU2017 License: 9017
Test Sponsor: Lenovo Global Technology
Test Date: May-2018
Tested by: Lenovo Global Technology
Hardware Availability: Aug-2017
Software Availability: Feb-2018

Platform Notes (Continued)

C1 Enhance Mode set to Disable
C-states set to Legacy
Hyper-Threading set to Disable
MONITOR/MWAIT set to Enable
Adjacent Cache Prefetch set to Disable
Stale AtoS set to Enable
DCA set to Enable
Patrol Scrub set to Enable
 Sysinfo program /home/cpu2017.1.0.2.ic18.0/bin/sysinfo
Rev: r5797 of 2017-06-14 96c45e4568ad54c135fd618bcc091c0f
running on linux-x86_64 Thu May 31 15:19:21 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

From /proc/cpuinfo
    model name : Intel(R) Xeon(R) Gold 6140M CPU @ 2.30GHz
                  2 "physical id"s (chips)
                  36 "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 : 18
                   siblings : 18
                   physical 0: cores 0 1 2 3 4 8 9 10 11 16 17 18 19 20 24 25 26 27
                   physical 1: cores 0 1 2 3 4 8 9 10 11 16 17 18 19 20 24 25 26 27

From lscpu:
    Architecture: x86_64
    CPU op-mode(s): 32-bit, 64-bit
    Byte Order: Little Endian
    CPU(s): 36
    On-line CPU(s) list: 0-35
    Thread(s) per core: 1
    Core(s) per socket: 18
    Socket(s): 2
    NUMA node(s): 2
    Vendor ID: GenuineIntel
    CPU family: 6
    Model: 85
    Model name: Intel(R) Xeon(R) Gold 6140M CPU @ 2.30GHz
    Stepping: 4
    CPU MHz: 2294.599
    BogoMIPS: 4589.19
    Virtualization: VT-x
    L1d cache: 32K
    L1i cache: 32K

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<td>Feb-2018</td>
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</tbody>
</table>

**Platform Notes (Continued)**

- L2 cache: 1024K
- L3 cache: 25344K
- NUMA node0 CPU(s): 0-17
- NUMA node1 CPU(s): 18-35
- Flags: fpu vme de pse tsc msr pae 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 ntopology nonstop_tsc aperfmperf eagerfpu pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg fma cx16 xtpr pdcm pclid dca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave avx f16c rdrand lahf_lm abm 3dnowprefetch ida arat epb invpcid_single pln pts dtc mtrr intel_pt rsb_ctsw spec_ctrl retpoline kaiser tpr_shadow vnmi fxlux priority etp vpid fsgsbase tsc_adjust bni hle avx2 smep bmi2 erms invpcid rtm cqm mpx avx512f avx512dq rdseed adx smap clflushopt clwb avx512cd avx512bw avx512vl xsaveopt xsavec xgetbv1 cqm_1lc cqm_occup_1lc

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
- node 0 size: 193109 MB
- node 0 free: 191275 MB
- node 1 cpus: 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35
- node 1 size: 193504 MB
- node 1 free: 192004 MB
- node distances:
  - node 0 1
  - 0: 10 21
  - 1: 21 10

From `/proc/meminfo`

- MemTotal: 395892600 kB
- HugePages_Total: 0
- Hugepagesize: 2048 kB

From `/etc/*release* /etc/*version*`

- SuSE-release:
  - SUSE Linux Enterprise Server 12 (x86_64)
  - VERSION = 12
  - PATCHLEVEL = 2
  - # 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-SP2"

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**SPEC CPU2017 Floating Point Speed Result**  
Copyright 2017-2018 Standard Performance Evaluation Corporation  

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**Platform Notes (Continued)**

- `VERSION_ID="12.2"`  
- `PRETTY_NAME="SUSE Linux Enterprise Server 12 SP2"`  
- `ID="sles"`  
- `ANSI_COLOR="0;32"`  
- `CPE_NAME="cpe:/o:suse:sles:12:sp2"`

```
uname -a:
    Linux linux-ur5c 4.4.114-92.64-default #1 SMP Thu Feb 1 19:18:19 UTC 2018 (c6ce5db)
x86_64 x86_64 x86_64 GNU/Linux
```

- `run-level 3 May 30 12:34`
- `SPEC is set to: /home/cpu2017.1.0.2.ic18.0`
- `Filesystem Type Size Used Avail Use% Mounted on`
  - `/dev/sda3 btrfs 445G 35G 411G 8% /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 -[IVE113W-1.12]- 02/06/2018
    Memory:
        24x Samsung M393A2K43BB1-CTD 16 GB 2 rank 2666
```

(End of data from sysinfo program)

**Compiler Version Notes**

```
==============================================================================
  CC  619.lbm_s(base) 638.imagick_s(base, peak) 644.nab_s(base, peak)
==============================================================================
  icc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
==============================================================================
```

```
==============================================================================
  FC  607.cactuBSSN_s(base)
==============================================================================
  icpc (ICC) 18.0.0 20170811
```

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icpc (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.

Compiler Version Notes (Continued)

FC 607.cactuBSSN_s(peak)

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

-----------------------------------------------------
FC 603.bwaves_s(base) 649.fotonik3d_s(base) 654.roms_s(base)

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

-----------------------------------------------------
FC 603.bwaves_s(peak) 649.fotonik3d_s(peak) 654.roms_s(peak)

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

-----------------------------------------------------
CC 621.wrf_s(base) 627.cam4_s(base, peak) 628.pop2_s(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.

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CC 621.wrf_s(peak) 628.pop2_s(peak)

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Hardware Availability: Aug-2017
Software Availability: Feb-2018

Compiler Version Notes (Continued)

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:
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=3 -qopenmp -DSPEC_OPENMP

Fortran benchmarks:
-DSPEC_OPENMP -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=3 -qopenmp
-nostandard-realloc-lhs -align array32byte

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Base Optimization Flags (Continued)

Benchmarks using both Fortran and C:
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=3 -qopenmp -DSPEC_OPENMP
-nostandard-realloc-lhs -align array32byte

Benchmarks using Fortran, C, and C++:
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=3 -qopenmp -DSPEC_OPENMP
-nostandard-realloc-lhs -align array32byte

Base Other Flags

C benchmarks:
-m64 -std=c11

Fortran benchmarks:
-m64

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

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

Peak 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
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Peak Portability Flags
Same as Base Portability Flags

Peak Optimization Flags

C benchmarks:
619.lbm_s: -prof-gen(pass 1) -prof-use(pass 2) -O2 -xCORE-AVX512
-qopt-prefetch -ipo -O3 -ffinite-math-only -no-prec-div
-qopt-mem-layout-trans=3 -DSPEC_SUPPRESS_OPENMP -qopenmp
-DSPEC_OPENMP

638.imagick_s: -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=3 -qopenmp
-DSPEC_OPENMP

644.nab_s: Same as 638.imagick_s

Fortran benchmarks:
-prof-gen(pass 1) -prof-use(pass 2) -DSPEC_SUPPRESS_OPENMP
-DSPEC_OPENMP -O2 -xCORE-AVX512 -qopt-prefetch -ipo -O3
-ffinite-math-only -no-prec-div -qopt-mem-layout-trans=3 -qopenmp
-nostandard-realloc-lhs -align array32byte

Benchmarks using both Fortran and C:
621.wrf_s: -prof-gen(pass 1) -prof-use(pass 2) -O2 -xCORE-AVX512
-qopt-prefetch -ipo -O3 -ffinite-math-only -no-prec-div
-qopt-mem-layout-trans=3 -DSPEC_SUPPRESS_OPENMP -qopenmp
-DSPEC_OPENMP -nostandard-realloc-lhs -align array32byte

627.cam4_s: -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=3 -qopenmp
-DSPEC_OPENMP -nostandard-realloc-lhs -align array32byte

628.pop2_s: Same as 621.wrf_s

Benchmarks using Fortran, C, and C++:
-prof-gen(pass 1) -prof-use(pass 2) -O2 -xCORE-AVX512 -qopt-prefetch
-ipo -O3 -ffinite-math-only -no-prec-div -qopt-mem-layout-trans=3
-DSPEC_SUPPRESS_OPENMP -qopenmp -DSPEC_OPENMP -nostandard-realloc-lhs
-align array32byte
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### Peak Other Flags

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

Fortran benchmarks:
- `-m64`

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

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