Lenovo Global Technology
ThinkSystem SR860
(2.20 GHz, Intel Xeon Gold 5120T)

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

Threads

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>SPECspeed2017_fp_base</th>
<th>SPECspeed2017_fp_peak</th>
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<tbody>
<tr>
<td>603.bwaves_s</td>
<td>56</td>
<td>120</td>
<td>121</td>
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<tr>
<td>607.cactuBSSN_s</td>
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<td>164</td>
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<td>621.wrf_s</td>
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<td>627.cam4_s</td>
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<tr>
<td>638.imagick_s</td>
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<tr>
<td>644.nab_s</td>
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<tr>
<td>649.fotonik3d_s</td>
<td>56</td>
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<tr>
<td>654.roms_s</td>
<td>56</td>
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<td>129</td>
</tr>
</tbody>
</table>

CPU Name: Intel Xeon Gold 5120T
Max MHz.: 3200
Nominal: 2200
Enabled: 56 cores, 4 chips
Orderable: 2,4 chips
Cache L1: 32 KB I + 32 KB D on chip per core
L2: 1 MB I+D on chip per core
L3: 19.25 MB I+D on chip per chip
Other: None
Memory: 768 GB (48 x 16 GB 2R×8 PC4-2666V-R, running at 2400)
Storage: 1 x 800 GB SAS SSD
Other: None

OS: Red Hat Enterprise Linux Server release 7.4 (Maipo)
Kernel 3.10.0-693.el7.x86_64
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 TEE117I 1.10 released Oct-2017
File System: xfs
System State: Run level 3 (multi-user)
Base Pointers: 64-bit
Peak Pointers: 64-bit
Other: None
**Lenovo Global Technology**  
**ThinkSystem SR860**  
(2.20 GHz, Intel Xeon Gold 5120T)  

**SPECspeed2017_fp_base = 120**  
**SPECspeed2017_fp_peak = 121**

### Results Table

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<th>Seconds</th>
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<th>Seconds</th>
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<td>133</td>
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</tbody>
</table>

**SPECspeed2017_fp_base = 120**  
**SPECspeed2017_fp_peak = 121**

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
  ```

- No: The test sponsor attests, as of date of publication, that CVE-2017-5754 (Meltdown) is mitigated in the system as tested and documented.
- 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

(Continued on next page)
SPEC CPU2017 Floating Point Speed Result

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General Notes (Continued)

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

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
Hyper-Threading set to Disable
Adjacent Cache Prefetch set to Disable
MONITORMWAIT set to Enable
Per Core P-state set to Disable
XPT Prefetcher set to Enable
StaleAtoS 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 SR860 Fri Jan 12 16:31:40 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 5120T CPU @ 2.20GHz
  4 "physical id"s (chips)
  56 "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 : 14
siblings : 14
physical 0: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14
physical 1: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14
physical 2: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14
physical 3: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14

From lscpu:
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 56

(Continued on next page)
SPEC CPU2017 Floating Point Speed Result

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| SPECspeed2017_fp_base | 120 |
| SPECspeed2017_fp_peak | 121 |

CPU2017 License: 9017
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| Test Date: | Jan-2018 |
| Hardware Availability: | Nov-2017 |
| Software Availability: | Sep-2017 |

Platform Notes (Continued)

- On-line CPU(s) list: 0-55
- Thread(s) per core: 1
- Core(s) per socket: 14
- Socket(s): 4
- NUMA node(s): 4
- Vendor ID: GenuineIntel
- CPU family: 6
- Model: 85
- Model name: Intel(R) Xeon(R) Gold 5120T CPU @ 2.20GHz
- Stepping: 4
- CPU MHz: 2200.000
- BogoMIPS: 4400.00
- Virtualization: VT-x
- L1d cache: 32K
- L1i cache: 32K
- L2 cache: 1024K
- L3 cache: 19712K
- NUMA node0 CPU(s): 0-13
- NUMA node1 CPU(s): 14-27
- NUMA node2 CPU(s): 28-41
- NUMA node3 CPU(s): 42-55
- Flags: fpu vme de pse mtrr 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 aperfmperf eagerfpu pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 fma cx16 xtpr pdcm pcid dca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave avx f16c rdrand lahf_lm abrmep mmioPrefetch wp lbx tsc_known_cies cpuid tm2fs挽救
- /proc/cpuinfo cache data
  - cache size: 19712 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
    - node 0 size: 196286 MB
    - node 0 free: 191738 MB
    - node 1 cpus: 14 15 16 17 18 19 20 21 22 23 24 25 26 27
    - node 1 size: 196608 MB
    - node 1 free: 192108 MB
    - node 2 cpus: 28 29 30 31 32 33 34 35 36 37 38 39 40 41
    - node 2 size: 196608 MB
    - node 2 free: 192236 MB

(Continued on next page)
## Lenovo Global Technology

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<table>
<thead>
<tr>
<th>SPECspeed2017_fp_base</th>
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<tbody>
<tr>
<td>120</td>
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</table>

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### Platform Notes (Continued)

| node 3 cpus: 42 43 44 45 46 47 48 49 50 51 52 53 54 55 |
| node 3 size: 196608 MB |
| node 3 free: 192097 MB |
| node distances: node 0 1 2 3 |
| 0: 10 21 21 31 |
| 1: 21 10 31 21 |
| 2: 21 31 10 21 |
| 3: 31 21 21 10 |

From `/proc/meminfo`  
MemTotal: 792256420 kB  
HugePages_Total: 0  
Hugepagesize: 2048 kB

From `/etc/*release*/etc/*version*`  
os-release:  
NAME="Red Hat Enterprise Linux Server"  
VERSION="7.4 (Maipo)"  
ID="rhel"  
ID_LIKE="fedora"  
VARIANT="Server"  
VARIANT_ID="server"  
VERSION_ID="7.4"  
PRETTY_NAME="Red Hat Enterprise Linux Server 7.4 (Maipo)"  
redhat-release: Red Hat Enterprise Linux Server release 7.4 (Maipo)  
system-release: Red Hat Enterprise Linux Server release 7.4 (Maipo)  
system-release-cpe: cpe:/o:redhat:enterprise_linux:7.4:ga:server

uname -a:  
Linux SR860 3.10.0-693.el7.x86_64 #1 SMP Thu Jul 6 19:56:57 EDT 2017 x86_64 x86_64 GNU/Linux

run-level 3 Jan 12 16:29

SPEC is set to: /home/cpu2017.1.0.2.ic18.0

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<tr>
<th>Filesystem Type</th>
<th>Size</th>
<th>Used</th>
<th>Avail</th>
<th>Use%</th>
<th>Mounted on</th>
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<tbody>
<tr>
<td>/dev/sda4</td>
<td>xfs</td>
<td>686G</td>
<td>103G</td>
<td>584G</td>
<td>15% /home</td>
</tr>
</tbody>
</table>

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 -[TEE117I-1.10]- 10/19/2017  
Memory:  
48x Samsung M393A2K43BB1-CTD 16 GB 2 rank 2666, configured at 2400

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

(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.

============================================================================
  CC   619.lbm_s(peak)
============================================================================
  icc (ICC) 18.0.0 20170811
  Copyright (C) 1985-2017 Intel Corporation. All rights reserved.

============================================================================
  FC   607.cactusBSSN_s(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.
  ifort (IFORT) 18.0.0 20170811
  Copyright (C) 1985-2017 Intel Corporation. All rights reserved.

============================================================================
  FC   607.cactusBSSN_s(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.
  ifort (IFORT) 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.
```

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# Lenovo Global Technology

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## Compiler Version Notes (Continued)

```plaintext
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.
------------------------------------------------------------------------------

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

- **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`

(Continued on next page)
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Base Portability Flags (Continued)

607.cactuBSSN_s: -DSPEC_LP64
619.libm_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

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

(Continued on next page)
## Lenovo Global Technology

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### SPEC CPU2017 Floating Point Speed Result

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### Base Other Flags (Continued)

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`

### 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`

(Continued on next page)
SPEC CPU2017 Floating Point Speed Result

Lenovo Global Technology
ThinkSystem SR860
(2.20 GHz, Intel Xeon Gold 5120T)

SPECspeed2017_FP_peak = 121
SPECspeed2017_FP_base = 120

CPU2017 License: 9017
Test Sponsor: Lenovo Global Technology
Test Date: Jan-2018
Tested by: Lenovo Global Technology
Hardware Availability: Nov-2017
Software Availability: Sep-2017

Peak Optimization Flags (Continued)

Fortran benchmarks (continued):
-DSPEC_OPENMP -02 -xCORE-AVX512 -qopt-prefetch -ipo -03
-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) -02 -xCORE-AVX512
-qopt-prefetch -ipo -03 -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 -03 -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) -02 -xCORE-AVX512 -qopt-prefetch
-ipo -03 -ffinite-math-only -no-prec-div -qopt-mem-layout-trans=3
-DSPEC_SUPPRESS_OPENMP -qopenmp -DSPEC_OPENMP -nostandard-realloc-lhs
-align array32byte

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
Lenovo Global Technology
ThinkSystem SR860
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CPU2017 License: 9017
Test Sponsor: Lenovo Global Technology
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SPECspeed2017_fp_base = 120
SPECspeed2017_fp_peak = 121

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

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/Lenovo-Platform-SPECcpu2017-Flags-V1.2-SKL-A.xml