# SPEC® CPU2017 Floating Point Speed Result

## Lenovo Global Technology

ThinkSystem SR860 (2.60 GHz, Intel Xeon Gold 6126)

<table>
<thead>
<tr>
<th>SPECspeed2017_fp_base</th>
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### Software

- **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

### Hardware

- **CPU Name:** Intel Xeon Gold 6126
- **Max MHz.:** 3700
- **Nominal:** 2600
- **Enabled:** 48 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 2Rx8 PC4-2666V-R)
- **Storage:** 1 x 800 GB SAS SSD
- **Other:** None

### Benchmarks

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### Test Details

- **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

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**Note:** This report is generated by the SPEC CPU2017 benchmark suite for floating point performance evaluation. The results reflect the performance of the specified hardware configuration under the given conditions.
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)
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
MONITORM/WAIT 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 96c45e4568ad54c135fd618b0c91c0f
running on SR860 Mon Jan 8 15:42:05 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 6126 CPU @ 2.60GHz
  4  "physical id"s (chips)
  48 "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 : 12
    siblings : 12
    physical 0: cores 0 1 3 4 5 6 8 9 10 11 12 13
    physical 1: cores 0 1 2 4 5 6 8 9 10 11 13 14
    physical 2: cores 0 1 2 4 5 6 8 9 10 11 13 14
    physical 3: cores 0 1 2 4 5 6 8 9 10 11 13 14

From lscpu:

Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 48

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SPECspeed2017_fp_base = 129
SPECspeed2017_fp_peak = 132

Platform Notes (Continued)

On-line CPU(s) list:   0-47
Thread(s) per core:    1
Core(s) per socket:    12
Socket(s):             4
NUMA node(s):          4
Vendor ID:             GenuineIntel
CPU family:            6
Model:                 85
Model name:            Intel(R) Xeon(R) Gold 6126 CPU @ 2.60GHz
Stepping:              4
CPU MHz:               2600.000
BogoMIPS:              5200.00
Virtualization:        VT-x
L1d cache:             32K
L1i cache:             32K
L2 cache:              1024K
L3 cache:              19712K
NUMA node0 CPU(s):     0-11
NUMA node1 CPU(s):     12-23
NUMA node2 CPU(s):     24-35
NUMA node3 CPU(s):     36-47
Flags:                 fpu vme de pse 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
                       aperfmperf eagerfpup nni 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 abm 3dnowprefetch epb cat_l3 cdp_l3 intel_pt
                       tpr_shadow vnmi flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2
                       erms invpcid rtm rdt_a avx512if avx512dq rdseed adx smap clflushopt clwb
                       avx512cd avx512bw avx512v1 xsaveopt xsavec xgetbv1 cqm_llc cqm_occup_llc
                       cqm_mbm_total cqm_mbm_local dtherm ida arat pin pts

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
node 0 size: 196286 MB
node 0 free: 191759 MB
node 1 cpus: 12 13 14 15 16 17 18 19 20 21 22 23
node 1 size: 196608 MB
node 1 free: 192142 MB
node 2 cpus: 24 25 26 27 28 29 30 31 32 33 34 35
node 2 size: 196608 MB
node 2 free: 192182 MB
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Platform Notes (Continued)

node 3 cpus: 36 37 38 39 40 41 42 43 44 45 46 47
node 3 size: 196608 MB
node 3 free: 192161 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*
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
x86_64 GNU/Linux

run-level 3 Jan 8 15:39

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

Filesystem  Type  Size  Used  Avail  Use%  Mounted on
/dev/sda4   xfs  686G  103G  584G  15% /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 -[TEE117I-1.10]- 10/19/2017
Memory:
48x Samsung M393A2K43BB1-CTD 16 GB 2 rank 2666

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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.cactuBSSN_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.cactuBSSN_s(peak)
------------------------------------------------------------------------------
icpc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
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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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Compiler Version Notes (Continued)

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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.
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CC  621.wrf_s(base) 627.cam4_s(base, peak) 628.pop2_s(base)
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ifort (IFORT) 18.0.0 20170811
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icc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------
==============================================================================
CC  621.wrf_s(peak) 628.pop2_s(peak)
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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

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Base Portability Flags (Continued)

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

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

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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.ibm_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 -2DSPEC_OPENMP`
- `644.nab_s: Same as 638.imagick_s`

Fortran benchmarks:
- `prof-gen(pass 1) prof-use(pass 2) DSPEC_SUPPRESS_OPENMP`

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Peak Optimization Flags (Continued)

Fortran benchmarks (continued):
-DSPEC_OPENMP -O2 -xCORE-AVX512 -gopt-prefetch -ipo -O3
-ffinite-math-only -no-prec-div -gopt-mem-layout-trans=3 -gopenmp
-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
-ipo -O3 -ffinite-math-only -no-prec-div -gopt-mem-layout-trans=3
-DSPEC_SUPPRESS_OPENMP -gopenmp
-DSPEC_OPENMP -nostandard-realloc-lhs -align array32byte

627.cam4_s: -xCORE-AVX512 -ipo -O3 -no-prec-div -gopt-prefetch
-ffinite-math-only -gopt-mem-layout-trans=3 -gopenmp
-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 -gopt-prefetch
-ipo -O3 -ffinite-math-only -no-prec-div -gopt-mem-layout-trans=3
-DSPEC_SUPPRESS_OPENMP -gopenmp -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

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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
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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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