## Lenovo Global Technology

**ThinkSystem SR860**  
(2.70 GHz, Intel Xeon Gold 6150)

<table>
<thead>
<tr>
<th>SPECspeed2017_fp_base</th>
<th>150</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECspeed2017_fp_peak</td>
<td>151</td>
</tr>
</tbody>
</table>

### Hardware

- **CPU Name:** Intel Xeon Gold 6150  
- **Max MHz.:** 3700  
- **Nominal:** 2700  
- **Enabled:** 72 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:** 24.75 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

### 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
Lenovo Global Technology

ThinkSystem SR860
(2.70 GHz, Intel Xeon Gold 6150)

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

SPECspeed2017_fp_base = 150
SPECspeed2017_fp_peak = 151

Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
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<tr>
<td>603.bwaves_s</td>
<td>72</td>
<td>73.4</td>
<td>804</td>
<td>72.7</td>
<td>812</td>
<td>73.3</td>
<td>804</td>
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<tr>
<td>607.cactuBSSN_s</td>
<td>72</td>
<td>84.2</td>
<td>198</td>
<td>84.4</td>
<td>198</td>
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<td>67.3</td>
<td>77.8</td>
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<td>621.wrf_s</td>
<td>72</td>
<td>196</td>
<td>67.6</td>
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<td>67.7</td>
<td>196</td>
<td>67.4</td>
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<tr>
<td>627.cam4_s</td>
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<td>65.2</td>
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<td>66.0</td>
<td>134</td>
<td>66.1</td>
<td>134</td>
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<tr>
<td>628.pop2_s</td>
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<td>223</td>
<td>53.3</td>
<td>224</td>
<td>53.1</td>
<td>224</td>
<td>53.1</td>
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<tr>
<td>638.imagick_s</td>
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<td>193</td>
<td>72.3</td>
<td>199</td>
<td>75.0</td>
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<tr>
<td>644.nab_s</td>
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<td>47.5</td>
<td>368</td>
<td>47.5</td>
<td>368</td>
</tr>
<tr>
<td>649.fotonik3d_s</td>
<td>72</td>
<td>85.6</td>
<td>107</td>
<td>80.3</td>
<td>113</td>
<td>84.7</td>
<td>108</td>
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<tr>
<td>654.roms_s</td>
<td>72</td>
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<td>123</td>
<td>132</td>
<td>119</td>
<td>127</td>
<td>124</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:
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)
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ThinkSystem SR860
(2.70 GHz, Intel Xeon Gold 6150)

SPECspeed2017_fp_base = 150
SPECspeed2017_fp_peak = 151

CPU2017 License: 9017
Test Sponsor: Lenovo Global Technology
Test Date: Jan-2018
Tested by: Lenovo Global Technology

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 Thu Jan  4 16:41:41 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 6150 CPU @ 2.70GHz
  4 "physical id"s (chips)
  72 "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
physical 2: cores 0 1 2 3 4 8 9 10 11 16 17 18 19 20 24 25 26 27
physical 3: 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): 72

(Continued on next page)
Lenovo Global Technology
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SPECspeed2017_fp_base = 150
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Platform Notes (Continued)

On-line CPU(s) list: 0-71
Thread(s) per core: 1
Core(s) per socket: 18
Socket(s): 4
NUMA node(s): 4
Vendor ID: GenuineIntel
CPU family: 6
Model: 85
Model name: Intel(R) Xeon(R) Gold 6150 CPU @ 2.70GHz
Stepping: 4
CPU MHz: 2700.000
BogoMIPS: 5400.00
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 25344K
NUMA node0 CPU(s): 0-17
NUMA node1 CPU(s): 18-35
NUMA node2 CPU(s): 36-53
NUMA node3 CPU(s): 54-71

Flags: fpu vme de pse mce sincr ds nx pmx cx8 apic sep mtrr pge mca cmov
tab pse36 clflush dts acpi mmx fxsr sse sse2 ss ht tm pbe syscall nx pdpe1gb rdtsscp
lm constant-tsc arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc
aperfmrperf eagerfpu pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 fma
cx16 xtpr pdcm pcdt dca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes
xsavex f16c rtfr drrand rafh_lm abm 3dnowprefetch epb cat_13 cdp_13 intel_pt
tpr_shadow vnni flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2
ermi invpcid rtm cmq mpx rdt_a avx512f avx512dq rdseed adx smap clflushopt clwb
avx512cd avx512bw avx512vl xsaveopt xsavec xgetbv1 cmq_llc cmq_occmlc cmq_mbtotal

/proc/cpuinfo cache data
Cache size: 25344 KB

From numactl --hardware WARNING: a numactl 'node' might or might not correspond to a
different physical chip.

available: 4 nodes (0-3)
nod 0 cpus: 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17
node 0 size: 196286 MB
node 0 free: 191737 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: 196608 MB
node 1 free: 192115 MB
node 2 cpus: 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53
node 2 size: 196608 MB
node 2 free: 192145 MB

(Continued on next page)
Lenovo Global Technology
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Test Sponsor: Lenovo Global Technology
Tested by: Lenovo Global Technology

Platform Notes (Continued)

node 3 cpus: 54 55 56 57 58 60 61 62 63 64 65 66 67 68 69 70 71
node 3 size: 196608 MB
node 3 free: 192198 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: 792255896 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 4 16:38

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

Filesystem Type Size Used Avail Use% Mounted on
/dev/sda4 xfs 686G 143G 544G 21% /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
Lenovo Global Technology
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CPU2017 License: 9017
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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.
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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SPECspeed2017_fp_base = 150
SPECspeed2017_fp_peak = 151

CPU2017 License: 9017
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Tested by: Lenovo Global Technology

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

Compiler Version Notes (Continued)

==============================================================================
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

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## Lenovo Global Technology

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### 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 Portability Flags (Continued)

<table>
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<th>Benchmark</th>
<th>Flags</th>
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<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:**
  -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)
SPEC CPU2017 Floating Point Speed Result

Lenovo Global Technology
ThinkSystem SR860
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SPECspeed2017_fp_base = 150
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Tested by: Lenovo Global Technology
Hardware Availability: Nov-2017
Software Availability: Sep-2017

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 -03 -ffinite-math-only -no-prec-div -qopt-mem-layout-trans=3 -DSPEC_SUPPRESS_OPENMP -qopenmp -DSPEC_OPENMP

638.imagick_s: -xCORE-AVX512 -ipo -03 -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)
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SPECspeed2017_fp_base = 150
SPECspeed2017_fp_peak = 151

Peak Optimization Flags (Continued)

Fortran benchmarks (continued):
-DSPEC_OPENMP -02 -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
-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

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) -02 -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

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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### SPEC CPU2017 Floating Point Speed Result

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**Software Availability:** Sep-2017

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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)