Lenovo Global Technology
ThinkSystem SR550
(3.60 GHz, Intel Xeon Platinum 8156)

SPECSpeed2017_fp_base = 52.7
SPECSpeed2017_fp_peak = 54.1

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

<table>
<thead>
<tr>
<th>Software</th>
<th>Hardware</th>
</tr>
</thead>
<tbody>
<tr>
<td>OS: SUSE Linux Enterprise Server 12 SP2 (x86_64)</td>
<td>CPU Name: Intel Xeon Platinum 8156</td>
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<tr>
<td>Kernel 4.4.21-69-default</td>
<td>Max MHz.: 3700</td>
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<tr>
<td>Compiler: C/C++: Version 18.0.0.128 of Intel C/C++</td>
<td>Nominal: 3600</td>
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<tr>
<td>Compiler for Linux: Fortran: Version 18.0.0.128 of Intel Fortran</td>
<td>Enabled: 8 cores, 2 chips</td>
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<tr>
<td>Firmware: Lenovo BIOS Version TEE119J 1.20 released Sep-2017</td>
<td>Orderable: 1.2 chips</td>
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<tr>
<td>File System: btrfs</td>
<td>Cache L1: 32 KB I+ 32 KB D on chip per core</td>
</tr>
<tr>
<td>System State: Run level 3 (multi-user)</td>
<td>L2: 1 MB I+D on chip per core</td>
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<tr>
<td>Base Pointers: 64-bit</td>
<td>L3: 16.5 MB I+D on chip per chip</td>
</tr>
<tr>
<td>Peak Pointers: 64-bit</td>
<td>Other: None</td>
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<td>Other: None</td>
<td>Memory: 384 GB (12 x 32 GB 2Rx4 PC4-2666V-R)</td>
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<td>Storage: 1 x 800 GB SAS SSD</td>
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Threads

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<th>SPECspeed2017_fp_base (52.7)</th>
<th>SPECspeed2017_fp_peak (54.1)</th>
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<tr>
<td>603.bwaves_s 8</td>
<td>607.cactuBSSN_s 8</td>
</tr>
<tr>
<td>619.lbm_s 8</td>
<td>621.wrf_s 8</td>
</tr>
<tr>
<td>627.cam4_s 8</td>
<td>628.pop2_s 8</td>
</tr>
<tr>
<td>638.imagick_s 8</td>
<td>644.nab_s 8</td>
</tr>
<tr>
<td>649.fotonik3d_s 8</td>
<td>654.roms_s 8</td>
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603.bwaves_s 8

54.3

607.cactuBSSN_s 8

56.3

619.lbm_s 8

30.6

31.5

46.9

52.9

621.wrf_s 8

30.0

30.1

43.5

46.2

627.cam4_s 8

33.7

33.8

59.5

59.5

628.pop2_s 8

33.7

55.0

638.imagick_s 8

33.7

33.8

59.5

59.5

644.nab_s 8

52.6

54.8

649.fotonik3d_s 8

52.6

654.roms_s 8

54.8
Lenovo Global Technology
ThinkSystem SR550
(3.60 GHz, Intel Xeon Platinum 8156)

CPU2017 License: 9017
Test Sponsor: Lenovo Global Technology
Test Date: Dec-2017
Tested by: Lenovo Global Technology
Hardware Availability: Aug-2017
Software Availability: Sep-2017

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<tr>
<th>Benchmark</th>
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<th>Seconds</th>
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<th>Seconds</th>
<th>Ratio</th>
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<td>30.2</td>
<td>293</td>
<td>30.2</td>
</tr>
<tr>
<td>628.pop2_s</td>
<td>8</td>
<td>288</td>
<td>41.2</td>
<td>273</td>
<td>43.5</td>
<td>273</td>
<td>43.5</td>
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<tr>
<td>638.imagick_s</td>
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<td>33.6</td>
<td>429</td>
<td>33.7</td>
<td>429</td>
<td>33.7</td>
</tr>
<tr>
<td>644.nab_s</td>
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<td>59.6</td>
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<td>654.roms_s</td>
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<td>52.6</td>
<td>294</td>
<td>53.6</td>
<td>300</td>
<td>52.4</td>
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</tbody>
</table>

SPECspeed2017_fp_base = 52.7
SPECspeed2017_fp_peak = 54.1

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

Platform Notes

BIOS configuration:
Choose Operating Mode set to Maximum Performance
Hyper-Threading set to Disable
MONITORWARN set to Enable
Adjacent Cache Prefetch set to Disable
LLC dead line alloc set to Disable
Sysinfo program /home/cpu2017.1.0.2.ic18.0/bin/sysinfo
Rev: r5797 of 2017-06-14 96c45e4568ad54c135fd618bcb091c0f
running on linux-g50d Mon Dec 18 22:39:54 2017

(Continued on next page)
SPEC CPU2017 Floating Point Speed Result
Copyright 2017-2018 Standard Performance Evaluation Corporation

Lenovo Global Technology
ThinkSystem SR550
(3.60 GHz, Intel Xeon Platinum 8156)

SPECspeed2017_fp_peak = 54.1
SPECspeed2017_fp_base = 52.7

CPU2017 License: 9017
Test Sponsor: Lenovo Global Technology
Test Date: Dec-2017
Tested by: Lenovo Global Technology
Hardware Availability: Aug-2017
Software Availability: Sep-2017

Platform Notes (Continued)

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) Platinum 8156 CPU @ 3.60GHz
  2 "physical id"s (chips)
  8 "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 : 4
  siblings : 4
  physical 0: cores 0 3 10 13
  physical 1: cores 1 5 9 13

From lscpu:
  Architecture:          x86_64
  CPU op-mode(s):        32-bit, 64-bit
  Byte Order:            Little Endian
  CPU(s):                8
  On-line CPU(s) list:   0-7
  Thread(s) per core:    1
  Core(s) per socket:    4
  Socket(s):             2
  NUMA node(s):          4
  Vendor ID:             GenuineIntel
  CPU family:            6
  Model:                 85
  Model name:            Intel(R) Xeon(R) Platinum 8156 CPU @ 3.60GHz
  Stepping:              4
  CPU MHz:               3591.544
  BogoMIPS:              7183.08
  Virtualization:        VT-x
  L1d cache:             32K
  L1i cache:             32K
  L2 cache:              1024K
  L3 cache:              16896K
  NUMA node0 CPU(s):     0,2
  NUMA node1 CPU(s):     1,3
  NUMA node2 CPU(s):     4,6
  NUMA node3 CPU(s):     5,7
  Flags:                 fpu vme de pse tsc msr pae mce cx8 apic sep mtrr pge 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 eagerfpu nni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg
                        fma cx16 xtpr pdcm pcid dca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes

(Continued on next page)
Lenovo Global Technology
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**Test Sponsor:** Lenovo Global Technology  
** Tested by:** Lenovo Global Technology  
**Test Date:** Dec-2017  
**Hardware Availability:** Aug-2017  
**Software Availability:** Sep-2017

Platform Notes (Continued)

```
xsave avx f16c rdrand lahf_lm abm 3dnowprefetch ida arat epb pln pts dtherm intel_pt
trp_shadow vmx f1xep vsx vsxd1 fma ces xrmrc xsaveopt xsaveopt xsavec xgetbv1
```

```
	cmo avx512bw avx512v1 xsaveopt xsavec xgetbv1 cqm_llc cqm_occup_llc
```

```
/proc/cpuinfo cache data  
cache size : 16896 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 2
node 0 size: 96357 MB
node 0 free: 95420 MB
node 1 cpus: 1 3
node 1 size: 96753 MB
node 1 free: 95874 MB
node 2 cpus: 4 6
node 2 size: 96753 MB
node 2 free: 96044 MB
node 3 cpus: 5 7
node 3 size: 96750 MB
node 3 free: 96182 MB
node distances:
node   0   1   2   3
 0:  10  11  21  21
 1:  11  10  21  21
 2:  21  21  10  11
 3:  21  21  11  10
```

```
From /proc/meminfo
MemTotal:       395893228 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"
    VERSION_ID="12.2"
    PRETTY_NAME="SUSE Linux Enterprise Server 12 SP2"
```

(Continued on next page)
Lenovo Global Technology
ThinkSystem SR550
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| SPECspeed2017_fp_base = 52.7 |
| SPECspeed2017_fp_peak = 54.1 |

CPU2017 License: 9017
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Test Date: Dec-2017
Hardware Availability: Aug-2017
Software Availability: Sep-2017

Platform Notes (Continued)

ID="sles"
ANSI_COLOR="0;32"
CPE_NAME="cpe:/o:suse:sles:12:sp2"

uname -a:
    Linux linux-g50d 4.4.21-69-default #1 SMP Tue Oct 25 10:58:20 UTC 2016 (9464f67)
    x86_64 x86_64 x86_64 GNU/Linux

run-level 3 Dec 18 18:52
SPEC is set to: /home/cpu2017.1.0.2.ic18.0

Filesustem     Type   Size  Used Avail Use% Mounted on
/dev/sda2      btrfs  744G  211G  533G  29% /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:
        12x Hynix HMA84GR7AFR4N-VK 32 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.

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
(Continued on next page)
Lenovo Global Technology
ThinkSystem SR550
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<tbody>
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<td>54.1</td>
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</table>

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Test Sponsor: Lenovo Global Technology
Tested by: Lenovo Global Technology

Compiler Version Notes (Continued)

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.

==============================================================================
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)

==============================================================================
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Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
icc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
Lenovo Global Technology
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**SPECspeed2017_fp_base = 52.7**

**SPECspeed2017_fp_peak = 54.1**

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</tr>
<tr>
<td>Tested by: Lenovo Global Technology</td>
<td>Software Availability: Sep-2017</td>
</tr>
</tbody>
</table>

### Base Compiler Invocation

C benchmarks:

```c
icc
```

Fortran benchmarks:

```fortran
ifort
```

Benchmarks using both Fortran and C:

```fortran
ifort icc
```

Benchmarks using Fortran, C, and C++:

```fortran 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:

```c
-CORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=3 -qopenmp -DSPEC_OPENMP
```

Fortran benchmarks:

```fortran
-DSPEC_OPENMP -xCORE-AVX2 -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:

```fortran
-CORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=3 -qopenmp -DSPEC_OPENMP
-nostandard-realloc-lhs -align array32byte
```

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Lenovo Global Technology
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SPECspeed2017_fp_base = 52.7
SPECspeed2017_fp_peak = 54.1

Base Optimization Flags (Continued)

Benchmarks using Fortran, C, and C++:
-xCORE-AVX2 -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

Peak Portability Flags

Same as Base Portability Flags
Lenovo Global Technology
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### Peak Optimization Flags

**C benchmarks:**

- `619.lbm_s`:
  - `-prof-gen(pass 1)`
  - `-prof-use(pass 2)`
  - `-O2`
  - `-xCORE-AVX2`
  - `-qopt-prefetch`
  - `-ipo`
  - `-ffinite-math-only`
  - `-no-prec-div`
  - `-qopt-mem-layout-trans=3`
  - `-DSPEC_SUPPRESS_OPENMP`
  - `-qopenmp`
  - `-DSPEC_OPENMP`

- `638.imagick_s`:
  - `-xCORE-AVX2`
  - `-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-AVX2`
- `-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-AVX2`
  - `-qopt-prefetch`
  - `-ipo`
  - `-O3`
  - `-ffinite-math-only`
  - `-no-prec-div`
  - `-qopt-mem-layout-trans=3`
  - `-qopenmp`
  - `-DSPEC_OPENMP`
  - `-nostandard-realloc-lhs`
  - `-align array32byte`

- `627.cam4_s`:
  - `-xCORE-AVX2`
  - `-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-AVX2`
- `-qopt-prefetch`
- `-ipo`
- `-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`

(Continued on next page)
## Lenovo Global Technology

**ThinkSystem SR550**  
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<tr>
<td>Tested by: Lenovo Global Technology</td>
<td>Software Availability: Sep-2017</td>
</tr>
</tbody>
</table>

### SPECspeed2017_fp_base = 52.7

### SPECspeed2017_fp_peak = 54.1

### Peak Other Flags (Continued)

- **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)

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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