Huawei

Huawei XH321 V5 (Intel Xeon Gold 5120)

<table>
<thead>
<tr>
<th>SPECrate2017_fp_base = 142</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECrate2017_fp_peak = 145</td>
</tr>
</tbody>
</table>

CPU2017 License: 3175
Test Sponsor: Huawei
Tested by: Huawei

Hardware

CPU Name: Intel Xeon Gold 5120
Max MHZ.: 3200
Nominal: 2200
Enabled: 28 cores, 2 chips, 2 threads/core
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: 19.25 MB I+D on chip per chip
Other: None
Memory: 384 GB (12 x 32 GB 2Rx4 PC4-2666V-R, running at 2400)
Storage: 1 x 1200 GB SAS, 10000 RPM
Other: None

Software

OS: Red Hat Enterprise Linux Server release 7.3 (Maipo)
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: No
Firmware: Version 0.59 Released Feb-2018
File System: xfs
System State: Run level 3 (multi-user)
Base Pointers: 64-bit
Peak Pointers: 64-bit
Other: None
SPEC CPU2017 Floating Point Rate Result

Huawei XH321 V5 (Intel Xeon Gold 5120)  

**SPECrate2017_fp_base** = 142  
**SPECrate2017_fp_peak** = 145

<table>
<thead>
<tr>
<th>Benchmark</th>
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<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
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<th>Ratio</th>
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<tbody>
<tr>
<td>503.bwaves_r</td>
<td>56</td>
<td>1355</td>
<td>414</td>
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<td>414</td>
<td>1356</td>
<td>414</td>
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<td></td>
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<tr>
<td>507.cactuBSSN_r</td>
<td>56</td>
<td>547</td>
<td>130</td>
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<td>548</td>
<td>129</td>
<td>56</td>
<td>547</td>
<td>130</td>
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<tr>
<td>508.namd_r</td>
<td>56</td>
<td>507</td>
<td>105</td>
<td>508</td>
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<td>508</td>
<td>105</td>
<td>56</td>
<td>504</td>
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<tr>
<td>510.parest_r</td>
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<td>1571</td>
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<td>1572</td>
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<tr>
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<td>56</td>
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<td>521.wrf_r</td>
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<td>526.blender_r</td>
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<td>527.cam4_r</td>
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<tr>
<td>544.nab_r</td>
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<td>549.fotonik3d_r</td>
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<tr>
<td>554.roms_r</td>
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<td>1206</td>
<td>73.8</td>
<td>56</td>
<td>1175</td>
<td>75.8</td>
<td></td>
</tr>
</tbody>
</table>

Results appear in the order in which they were run. Bold underlined text indicates a median measurement.

**Submit Notes**

The numactl mechanism was used to bind copies to processors. The config file option 'submit' was used to generate numactl commands to bind each copy to a specific processor.
For details, please see the config file.

**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 = "/spec/lib/ia32:/spec/lib/intel64:/spec/je5.0.1-32:/spec/je5.0.1-64"

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
runcpu command invoked through numactl i.e.:
numactl --interleave=all runcpu <etc>
Yes: The test sponsor attests, as of date of publication, that CVE-2017-5754 (Meltdown) is mitigated in the system as tested and documented.

(Continued on next page)
General Notes (Continued)

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:
Power Policy Set to Performance
SNC Set to Enabled
IMC Interleaving Set to 1-way Interleave
XPT Prefetch Set to Enabled
ADDDC Sparing Set to Disabled
Sysinfo program /spec/bin/sysinfo
Rev: r5797 of 2017-06-14 96c45e4568ad54c135fd618bcc091c0f
running on localhost.localdomain Tue May 29 02:55:59 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 5120 CPU @ 2.20GHz
  2 "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 : 28
  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

From lscpu:
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 56
On-line CPU(s) list: 0-55
Thread(s) per core: 2
Core(s) per socket: 14
Socket(s): 2
NUMA node(s): 4
Vendor ID: GenuineIntel
CPU family: 6
Model: 85
Model name: Intel(R) Xeon(R) Gold 5120 CPU @ 2.20GHz

(Continued on next page)
Huawei
Huawei XH321 V5 (Intel Xeon Gold 5120)

SPEC CPU2017 Floating Point Rate Result

Copyright 2017-2018 Standard Performance Evaluation Corporation

SPECrate2017_fp_base = 142
SPECrate2017_fp_peak = 145

Platform Notes (Continued)

Stepping: 4
CPU MHz: 2200.000
BogoMIPS: 4404.84
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 19712K
NUMA node0 CPU(s): 0-3,7-9,28-31,35-37
NUMA node1 CPU(s): 4-6,10-13,32-34,38-41
NUMA node2 CPU(s): 14-17,21-23,42-45,49-51
NUMA node3 CPU(s): 18-20,24-27,46-48,52-55

/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 7 8 9 28 29 30 31 35 36 37
node 0 size: 96437 MB
node 0 free: 93898 MB
node 1 cpus: 4 5 6 10 11 12 13 32 33 34 38 39 40 41
node 1 size: 98304 MB
node 1 free: 95974 MB
node 2 cpus: 14 15 16 17 21 22 23 42 43 44 45 49 50 51
node 2 size: 98304 MB
node 2 free: 96014 MB
node 3 cpus: 18 19 20 24 25 26 27 46 47 48 52 53 54 55
node 3 size: 98304 MB
node 3 free: 95535 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: 394174484 kB
HugePages_Total: 0
Hugepagesize: 2048 kB

From /etc/*release* /etc/*version*
os-release:
NAME="Red Hat Enterprise Linux Server"
VERSION="7.3 (Maipo)"

(Continued on next page)
Huawei
Huawei XH321 V5 (Intel Xeon Gold 5120)

**SPEC CPU2017 Floating Point Rate Result**

**SPECraten2017_fp_base = 142**

**SPECraten2017_fp_peak = 145**

**CPU2017 License:** 3175

**Test Sponsor:** Huawei

**Test Date:** May-2018

**Tested by:** Huawei

**Hardware Availability:** Jul-2017

**Software Availability:** Jan-2018

**Platform Notes (Continued)**

ID="rhel"
ID_LIKE="fedora"
VERSION_ID="7.3"
PRETTY_NAME="Red Hat Enterprise Linux Server 7.3 (Maipo)"
ANSI_COLOR="0;31"
CPE_NAME="cpe:/o:redhat:enterprise_linux:7.3:GA:server"
redhat-release: Red Hat Enterprise Linux Server release 7.3 (Maipo)
system-release: Red Hat Enterprise Linux Server release 7.3 (Maipo)

uname -a:
Linux localhost.localdomain 3.10.0-693.11.6.el7.x86_64 #1 SMP Thu Dec 28 14:23:39 EST 2017 x86_64 x86_64 x86_64 GNU/Linux

run-level 3 May 29 02:54

**SPEC is set to:** /spec

<table>
<thead>
<tr>
<th>Filesystem</th>
<th>Type</th>
<th>Size</th>
<th>Used</th>
<th>Avail</th>
<th>Use%</th>
<th>Mounted on</th>
</tr>
</thead>
<tbody>
<tr>
<td>/dev/sda8</td>
<td>xfs</td>
<td>325G</td>
<td>40G</td>
<td>286G</td>
<td>13%</td>
<td>/</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 INSYDE Corp. 0.59 02/24/2018

**Memory:**
4x NO DIMM NO DIMM
12x Samsung M393A4K40BB2-CTD 32 GB 2 rank 2666, configured at 2400

(End of data from sysinfo program)

**Compiler Version Notes**

```
CC  519.lbm_r(base) 538.imagick_r(base, peak) 544.nab_r(base)
```

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

```
CC  519.lbm_r(peak) 544.nab_r(peak)
```

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

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CPU2017 License: 3175
Test Sponsor: Huawei
Hardware Availability: Jul-2017
Tested by: Huawei
Software Availability: Jan-2018

Test Date: May-2018

Compiler Version Notes (Continued)

==============================================================================
CXXC 508.namd_r(base) 510.parest_r(base)
------------------------------------------------------------------------------
icpc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------

==============================================================================
CXXC 508.namd_r(peak) 510.parest_r(peak)
------------------------------------------------------------------------------
icpc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------

==============================================================================
CC  511.povray_r(base) 526.blender_r(base)
------------------------------------------------------------------------------
icpc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
iccc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------

==============================================================================
CC  511.povray_r(peak) 526.blender_r(peak)
------------------------------------------------------------------------------
icpc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
iccc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------

==============================================================================
FC  507.cactuBSSN_r(base)
------------------------------------------------------------------------------
icpc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
iccc (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  507.cactuBSSN_r(peak)
------------------------------------------------------------------------------
(Continued on next page)
**SPEC CPU2017 Floating Point Rate Result**

**Huawei**

**Huawei XH321 V5 (Intel Xeon Gold 5120)**

<table>
<thead>
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<th>SPECrate2017_fp_base</th>
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<tr>
<td>142</td>
<td>145</td>
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</table>

**CPU2017 License:** 3175  
**Test Sponsor:** Huawei  
**Tested by:** Huawei  
**Test Date:** May-2018  
**Hardware Availability:** Jul-2017  
**Software Availability:** Jan-2018

---

### Compiler Version Notes (Continued)

```plaintext
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.

------------------------------------------------------------------------------
```

```plaintext
FC  503.bwaves_r(base, peak) 549.fotonik3d_r(base, peak) 554.roms_r(base)  
------------------------------------------------------------------------------
```

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

------------------------------------------------------------------------------
```

```plaintext
FC  554.roms_r(peak)  
------------------------------------------------------------------------------
```

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

------------------------------------------------------------------------------
```

```plaintext
CC  521.wrf_r(base) 527.cam4_r(base)  
------------------------------------------------------------------------------
```

```plaintext
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.

------------------------------------------------------------------------------
```

```plaintext
CC  521.wrf_r(peak) 527.cam4_r(peak)  
------------------------------------------------------------------------------
```

```plaintext
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

---

(Continued on next page)
Huawei XH321 V5 (Intel Xeon Gold 5120)

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CPU2017 License: 3175
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Tested by: Huawei
Test Date: May-2018
Hardware Availability: Jul-2017
Software Availability: Jan-2018

Base Compiler Invocation (Continued)

C++ benchmarks:
icpc

Fortran benchmarks:
ifort

Benchmarks using both Fortran and C:
ifort icc

Benchmarks using both C and C++:
icpc icc

Benchmarks using Fortran, C, and C++:
icpc icc ifort

Base Portability Flags

503.bwaves_r: -DSPEC_LP64
507.cactusBSSN_r: -DSPEC_LP64
508.namd_r: -DSPEC_LP64
510.parest_r: -DSPEC_LP64
511.povray_r: -DSPEC_LP64
519.lbm_r: -DSPEC_LP64
521.wrf_r: -DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian
526.blender_r: -DSPEC_LP64 -DSPEC_LINUX -funsigned-char
527.cam4_r: -DSPEC_LP64 -DSPEC_CASE_FLAG
538.imagick_r: -DSPEC_LP64
544.nab_r: -DSPEC_LP64
549.fotonik3d_r: -DSPEC_LP64
554.roms_r: -DSPEC_LP64

Base Optimization Flags

C benchmarks:
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=3

C++ benchmarks:
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=3

(Continued on next page)
Huawei

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CPU2017 License: 3175
Test Sponsor: Huawei
Tested by: Huawei

Test Date: May-2018
Hardware Availability: Jul-2017
Software Availability: Jan-2018

Base Optimization Flags (Continued)

Fortran benchmarks:
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=3 -nostandard-realloc-lhs -align array32byte

Benchmarks using both Fortran and C:
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=3 -nostandard-realloc-lhs -align array32byte

Benchmarks using both C and C++:
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=3

Benchmarks using Fortran, C, and C++:
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=3 -nostandard-realloc-lhs -align array32byte

Base Other Flags

C benchmarks:
-m64 -std=c11

C++ benchmarks:
-m64

Fortran benchmarks:
-m64

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

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

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

Peak Compiler Invocation

C benchmarks:
icc

(Continued on next page)
Huawei
Huawei XH321 V5 (Intel Xeon Gold 5120)

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CPU2017 License: 3175
Test Sponsor: Huawei
Test Date: May-2018
Hardware Availability: Jul-2017
Tested by: Huawei
Software Availability: Jan-2018

Peak Compiler Invocation (Continued)

C++ benchmarks:
icpc
Fortran benchmarks:
ifort
Benchmarks using both Fortran and C:
ifort icc
Benchmarks using both C and C++:
icpc icc
Benchmarks using Fortran, C, and C++:
icpc icc ifort

Peak Portability Flags
Same as Base Portability Flags

Peak Optimization Flags

C benchmarks:
519.lbm_r: -prof-gen(pass 1) -prof-use(pass 2) -ipo -xCORE-AVX2 -O3
-no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=3
538.imagick_r: -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=3
544.nab_r: Same as 519.lbm_r

C++ benchmarks:
508.namd_r: -prof-gen(pass 1) -prof-use(pass 2) -ipo -xCORE-AVX2 -O3
-no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=3
510.parest_r: basepeak = yes

Fortran benchmarks:
SPEC CPU2017 Floating Point Rate Result

Huawei

Huawei XH321 V5 (Intel Xeon Gold 5120)

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</table>

CPU2017 License: 3175
Test Sponsor: Huawei
Tested by: Huawei

Test Date: May-2018
Hardware Availability: Jul-2017
Software Availability: Jan-2018

Peak Optimization Flags (Continued)

503.bwaves_r: -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=3 -nostandard-realloc-lhs -align array32byte

549.fotonik3d_r: Same as 503.bwaves_r

554.roms_r: -prof-gen(pass 1) -prof-use(pass 2) -ipo -xCORE-AVX2 -O3 -no-prec-div -qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=3 -nostandard-realloc-lhs -align array32byte

Benchmarks using both Fortran and C:

521.wrf_r: basepeak = yes

527.cam4_r: -prof-gen(pass 1) -prof-use(pass 2) -ipo -xCORE-AVX2 -O3 -no-prec-div -qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=3 -nostandard-realloc-lhs -align array32byte

Benchmarks using both C and C++:

-prof-gen(pass 1) -prof-use(pass 2) -ipo -xCORE-AVX2 -03 -no-prec-div -qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=3

Benchmarks using Fortran, C, and C++:

507.cactuBSSN_r: basepeak = yes

Peak Other Flags

C benchmarks:
-m64 -std=c11

C++ benchmarks:
-m64

Fortran benchmarks:
-m64

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

(Continued on next page)
## Huawei

**Huawei XH321 V5 (Intel Xeon Gold 5120)**

<table>
<thead>
<tr>
<th>SPECrate2017_fp_base = 142</th>
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<td>SPECrate2017_fp_peak = 145</td>
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### CPU2017 License: 3175

<table>
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<th>Test Date: May-2018</th>
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<td>Hardware Availability: Jul-2017</td>
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<tr>
<td>Software Availability: Jan-2018</td>
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### Test Sponsor: Huawei

### Tested by: Huawei

### Peak Other Flags (Continued)

Benchmarks using both C 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.

Tested with SPEC CPU2017 v1.0.2 on 2018-05-29 02:55:58-0400.