## SPEC® CPU2017 Floating Point Speed Result

**Huawei**

Huawei XH628 V5 (Intel Xeon Silver 4108)

<table>
<thead>
<tr>
<th>SPECspeed2017_fp_base = 58.9</th>
<th>SPECspeed2017_fp_peak = 59.4</th>
</tr>
</thead>
</table>

### Hardware

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU Name</td>
<td>Intel Xeon Silver 4108</td>
</tr>
<tr>
<td>Max MHz.</td>
<td>3000</td>
</tr>
<tr>
<td>Nominal</td>
<td>1800</td>
</tr>
<tr>
<td>Enabled</td>
<td>16 cores, 2 chips</td>
</tr>
<tr>
<td>Orderable</td>
<td>1.2 chips</td>
</tr>
<tr>
<td>Cache L1</td>
<td>32 KB I + 32 KB D on chip per core</td>
</tr>
<tr>
<td>L2:</td>
<td>1 MB I+D on chip per core</td>
</tr>
<tr>
<td>L3:</td>
<td>11 MB I+D on chip per chip</td>
</tr>
<tr>
<td>Other:</td>
<td>None</td>
</tr>
<tr>
<td>Memory</td>
<td>384 GB (12 x 32 GB 2Rx4 PC4-2666V-R, running at 2400)</td>
</tr>
<tr>
<td>Storage</td>
<td>1 x 1800 GB SAS, 10000 RPM</td>
</tr>
<tr>
<td>Other:</td>
<td>None</td>
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### Software

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
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<tbody>
<tr>
<td>OS:</td>
<td>Red Hat Enterprise Linux Server release 7.4 (Maipo)</td>
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<tr>
<td>Compiler:</td>
<td>C/C++: Version 18.0.2.199 of Intel C/C++ Compiler for Linux: Fortran: Version 18.0.2.199 of Intel Fortran Compiler for Linux</td>
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<tr>
<td>Parallel:</td>
<td>Yes</td>
</tr>
<tr>
<td>Firmware:</td>
<td>Version 0.86 Released Aug-2018</td>
</tr>
<tr>
<td>File System:</td>
<td>xfs</td>
</tr>
<tr>
<td>System State:</td>
<td>Run level 3 (multi-user)</td>
</tr>
<tr>
<td>Base Pointers:</td>
<td>64-bit</td>
</tr>
<tr>
<td>Peak Pointers:</td>
<td>64-bit</td>
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<tr>
<td>Other:</td>
<td>jemalloc memory allocator V5.0.1</td>
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### Test Information

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<thead>
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<tr>
<td>CPU2017 License:</td>
<td>3175</td>
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<tr>
<td>Test Sponsor:</td>
<td>Huawei</td>
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<tr>
<td>Tested by:</td>
<td>Huawei</td>
</tr>
<tr>
<td>Test Date:</td>
<td>Aug-2018</td>
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<tr>
<td>Hardware Availability:</td>
<td>Aug-2018</td>
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<td>Software Availability:</td>
<td>Mar-2018</td>
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### Benchmarks Results

<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>bwaves_s</td>
<td>16</td>
<td>603</td>
<td>59.4</td>
</tr>
<tr>
<td>cactuBSSN_s</td>
<td>16</td>
<td>607</td>
<td></td>
</tr>
<tr>
<td>lbm_s</td>
<td>16</td>
<td>619</td>
<td></td>
</tr>
<tr>
<td>wrf_s</td>
<td>16</td>
<td>621</td>
<td></td>
</tr>
<tr>
<td>cam4_s</td>
<td>16</td>
<td>627</td>
<td></td>
</tr>
<tr>
<td>pop2_s</td>
<td>16</td>
<td>628</td>
<td></td>
</tr>
<tr>
<td>imagick_s</td>
<td>16</td>
<td>638</td>
<td></td>
</tr>
<tr>
<td>nab_s</td>
<td>16</td>
<td>644</td>
<td></td>
</tr>
<tr>
<td>fotonik3d_s</td>
<td>16</td>
<td>649</td>
<td></td>
</tr>
<tr>
<td>roms_s</td>
<td>16</td>
<td>654</td>
<td></td>
</tr>
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Huawei XH628 V5 (Intel Xeon Silver 4108)
Huawei
Huawei XH628 V5 (Intel Xeon Silver 4108)

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Base Seconds</th>
<th>Base Ratio</th>
<th>Base Seconds</th>
<th>Base Ratio</th>
<th>Base Seconds</th>
<th>Base Ratio</th>
<th>Peak Seconds</th>
<th>Peak Ratio</th>
<th>Peak Seconds</th>
<th>Peak Ratio</th>
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<tr>
<td>603.bwaves_s</td>
<td>16</td>
<td>185</td>
<td>319</td>
<td>185</td>
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<td>185</td>
<td>320</td>
<td>16</td>
<td>185</td>
<td>320</td>
<td>185</td>
</tr>
<tr>
<td>607.cactuBSSN_s</td>
<td>16</td>
<td>221</td>
<td>75.3</td>
<td>216</td>
<td>77.2</td>
<td>219</td>
<td>76.2</td>
<td>16</td>
<td>221</td>
<td>77.2</td>
<td>219</td>
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<tr>
<td>619.llvm_s</td>
<td>16</td>
<td>156</td>
<td>33.6</td>
<td>156</td>
<td>33.6</td>
<td>156</td>
<td>33.6</td>
<td>16</td>
<td>156</td>
<td>33.6</td>
<td>156</td>
</tr>
<tr>
<td>621.wrf_s</td>
<td>16</td>
<td>301</td>
<td>44.0</td>
<td>302</td>
<td>43.8</td>
<td>300</td>
<td>44.1</td>
<td>16</td>
<td>292</td>
<td>45.2</td>
<td>294</td>
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<tr>
<td>628.pop2_s</td>
<td>16</td>
<td>279</td>
<td>42.6</td>
<td>280</td>
<td>42.4</td>
<td>280</td>
<td>42.4</td>
<td>16</td>
<td>265</td>
<td>44.8</td>
<td>294</td>
</tr>
<tr>
<td>638.imagick_s</td>
<td>16</td>
<td>397</td>
<td>36.4</td>
<td>395</td>
<td>36.5</td>
<td>394</td>
<td>36.6</td>
<td>16</td>
<td>391</td>
<td>36.9</td>
<td>397</td>
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<tr>
<td>644.nab_s</td>
<td>16</td>
<td>240</td>
<td>72.9</td>
<td>240</td>
<td>72.8</td>
<td>240</td>
<td>72.8</td>
<td>16</td>
<td>240</td>
<td>72.8</td>
<td>240</td>
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<tr>
<td>649.fotonik3d_s</td>
<td>16</td>
<td>146</td>
<td>62.5</td>
<td>144</td>
<td>63.3</td>
<td>144</td>
<td>63.3</td>
<td>16</td>
<td>146</td>
<td>62.5</td>
<td>144</td>
</tr>
<tr>
<td>654.roms_s</td>
<td>16</td>
<td>252</td>
<td>62.5</td>
<td>252</td>
<td>62.5</td>
<td>250</td>
<td>62.9</td>
<td>16</td>
<td>251</td>
<td>62.7</td>
<td>251</td>
</tr>
</tbody>
</table>

SPECspeed2017_fp_base = 58.9
SPECspeed2017_fp_peak = 59.4

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:
KMP_AFFINITY = "granularity=fine,compact"
OMP_STACKSIZE = "192M"

Binaries compiled on a system with 1x Intel Core i7-6700K CPU + 32GB RAM
memory using Redhat Enterprise Linux 7.5
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
Yes: The test sponsor attests, as of date of publication, that CVE-2017-5754 (Meltdown) is mitigated in the system as tested and documented.
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.
jemalloc, a general purpose malloc implementation built with the RedHat Enterprise 7.5, and the system compiler gcc 4.8.5
## Platform Notes

BIOS configuration:
- Power Policy Set to Load Balance
- Hyper-Threading Set to Disable
- XPT Prefetch Set to Enabled

Sysinfo program /spec2017/bin/sysinfo

Rev: r5797 of 2017-06-14 96c45e4568ad54c135fd618bcc091c0f
running on localhost.localdomain Tue Aug 21 00:58:18 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](https://www.spec.org/cpu2017/Docs/config.html#sysinfo)

From /proc/cpuinfo

```plaintext
model name : Intel(R) Xeon(R) Silver 4108 CPU @ 1.80GHz
  2  "physical id"s (chips)
  16 "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 : 8
siblings : 8
physical 0: cores 0 1 2 3 4 5 6 7
physical 1: cores 0 1 2 3 4 5 6 7
```

From lscpu:

```plaintext
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 16
On-line CPU(s) list: 0-15
Thread(s) per core: 1
Core(s) per socket: 8
Socket(s): 2
NUMA node(s): 2
Vendor ID: GenuineIntel
CPU family: 6
Model: 85
Model name: Intel(R) Xeon(R) Silver 4108 CPU @ 1.80GHz
Stepping: 4
CPU MHz: 1801.000
CPU max MHz: 1801.0000
CPU min MHz: 800.0000
BogoMIPS: 3600.00
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 11264K
```

(Continued on next page)
Huawei

Huawei XH628 V5 (Intel Xeon Silver 4108)

SPECspeed2017_fp_base = 58.9
SPECspeed2017_fp_peak = 59.4

CPU2017 License: 3175
Test Date: Aug-2018
Test Sponsor: Huawei
Hardware Availability: Aug-2018
Tested by: Huawei
Software Availability: Mar-2018

Platform Notes (Continued)

NUMA node0 CPU(s): 0-7
NUMA node1 CPU(s): 8-15
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 art arch_perfmon pebs bts rep_good ntopology nonstop_tsc
aperfmpref perfmapfpu 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 abm 3dnowprefetch epb cat_13 cd p13 invpcid_single
 intel_pt spec_ctrl ibpb_support tpr_shadow vmi flexpriority ept vpid fsgsbase
tsc_adjust bmi1 hle avx2 smep bmi2 ersed pmxs invpcid rtm cqm mpx rdt_a avx512f avx512dq
rds earthquake edx smap clflushopt clwb avx512cd avx512bw avx512vl xsaveopt xsaves xgetbv
xcq_lmc cqm_occup_llc cqm_mbm_total cqm_mbm_local dtherm ida arat pln

/cache data

From numactl --hardware WARNING: a numactl 'node' might or might not correspond to a
physical chip.
available: 2 nodes (0-1)
node 0 cpus: 0 1 2 3 4 5 6 7
node 0 size: 194741 MB
node 0 free: 189645 MB
node 1 cpus: 8 9 10 11 12 13 14 15
node 1 size: 196608 MB
node 1 free: 191487 MB
node distances:
node 0 1
0: 10 21
1: 21 10

From /proc/meminfo
MemTotal: 394174956 kB
HugePages_Total: 0
Hugepagesize: 4096 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)
## SPEC CPU2017 Floating Point Speed Result

**Huawei**  
Huawei XH628 V5 (Intel Xeon Silver 4108)  

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECspeed2017_fp_base</td>
<td>58.9</td>
</tr>
<tr>
<td>SPECspeed2017_fp_peak</td>
<td>59.4</td>
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</table>

**CPU2017 License:** 3175  
**Test Sponsor:** Huawei  
**Tested by:** Huawei  
**Test Date:** Aug-2018  
**Hardware Availability:** Aug-2018  
**Software Availability:** Mar-2018

### Platform Notes (Continued)


- `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 Aug 20 18:35`

- `SPEC is set to: /spec2017`

- `Filesystem Type Size Used Avail Use% Mounted on
  /dev/nvme0n1p4 xfs 1.5T 8.3G 1.5T 1% /

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. 0.86 08/06/2018
- 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

```
<table>
<thead>
<tr>
<th>Compiler</th>
<th>Version</th>
<th>Copyright</th>
</tr>
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<tr>
<td>CC</td>
<td>619.lbm_s(base)</td>
<td>638.imagick_s(base, peak) 644.nab_s(base, peak)</td>
</tr>
<tr>
<td></td>
<td>icc (ICC) 18.0.2</td>
<td>20180210</td>
</tr>
<tr>
<td></td>
<td>Copyright (C) 1985-2018 Intel Corporation. All rights reserved.</td>
<td></td>
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</tr>
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<th>Compiler</th>
<th>Version</th>
<th>Copyright</th>
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<tr>
<td>FC</td>
<td>607.cactuBSSN_s(base, peak)</td>
<td></td>
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<td>20180210</td>
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<tr>
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**Test Sponsor:** Huawei  
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**Tested by:** Huawei  
**Software Availability:** Mar-2018

### Compiler Version Notes (Continued)

```plaintext
ifort (IFORT) 18.0.2 20180210
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
```

```plaintext
FC 603.bwaves_s(base) 649.fotonik3d_s(base) 654.roms_s(base, peak)
```

```plaintext
ifort (IFORT) 18.0.2 20180210
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
```

```plaintext
FC 603.bwaves_s(peak) 649.fotonik3d_s(peak)
```

```plaintext
ifort (IFORT) 18.0.2 20180210
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
```

```plaintext
CC 621.wrf_s(base) 627.cam4_s(base, peak) 628.pop2_s(base)
```

```plaintext
ifort (IFORT) 18.0.2 20180210
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
```

```plaintext
icc (ICC) 18.0.2 20180210
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
```

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

```plaintext
ifort (IFORT) 18.0.2 20180210
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
```

```plaintext
icc (ICC) 18.0.2 20180210
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
```

### Base Compiler Invocation

**C benchmarks:**

```plaintext
icc -m64 -std=c11
```

**Fortran benchmarks:**

```plaintext
ifort -m64
```

**Benchmarks using both Fortran and C:**

```plaintext
ifort -m64 icc -m64 -std=c11
```

(Continued on next page)
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### Huawei

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</table>

### Base Compiler Invocation (Continued)

Benchmarks using Fortran, C, and C++:
```
icpc -m64 icc -m64 -std=c11 ifort -m64
```

### 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:**
```
-W1,-z,muldefs -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=3 -qopenmp -DSPEC_OPENMP
-L/usr/local/je5.0.1-64/lib -ljemalloc
```

**Fortran benchmarks:**
```
-W1,-z,muldefs -DSPEC_OPENMP -xCORE-AVX2 -ipo -O3 -no-prec-div
-qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=3 -qopenmp
-nostandard-realloc-lhs -L/usr/local/je5.0.1-64/lib -ljemalloc
```

**Benchmarks using both Fortran and C:**
```
-W1,-z,muldefs -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=3 -qopenmp -DSPEC_OPENMP
-nostandard-realloc-lhs -L/usr/local/je5.0.1-64/lib -ljemalloc
```

**Benchmarks using Fortran, C, and C++:**
```
-W1,-z,muldefs -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=3 -qopenmp -DSPEC_OPENMP
-nostandard-realloc-lhs -L/usr/local/je5.0.1-64/lib -ljemalloc
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**Hardware Availability:** Aug-2018  
**Software Availability:** Mar-2018

### Peak Compiler Invocation

C benchmarks:
```bash
icc -m64 -std=c11
```

Fortran benchmarks:
```bash
ifort -m64
```

Benchmarks using both Fortran and C:
```bash
ifort -m64 icc -m64 -std=c11
```

Benchmarks using Fortran, C, and C++:
```bash
icpc -m64 icc -m64 -std=c11 ifort -m64
```

### Peak Portability Flags

Same as Base Portability Flags

### Peak Optimization Flags

C benchmarks:

- `619.lbm_s`: `basepeak = yes`
- `638.imagick_s`: `-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=3 -qopenmp -DSPEC_OPENMP

Fortran benchmarks:

- `603.bwaves_s`: `-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`
- `649.fotonik3d_s`: `basepeak = yes`
- `654.roms_s`: `-DSPEC.OpenMP -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=3 -qopenmp -nostandard-realloc-lhs`

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

Huawei

Huawei XH628 V5 (Intel Xeon Silver 4108)

SPECspeed2017_fp_base = 58.9
SPECspeed2017_fp_peak = 59.4

CPU2017 License: 3175
Test Sponsor: Huawei
Test Date: Aug-2018
Tested by: Huawei
Hardware Availability: Aug-2018
Software Availability: Mar-2018

Peak Optimization Flags (Continued)

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 -DSPEC_SUPPRESS_OPENMP -qopenmp
-DSPEC_OPENMP -nostandard-realloc-lhs

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

628.pop2_s: Same as 621.wrf_s

Benchmarks using Fortran, C, and C++:

607.cactuBSSN_s: basepeak = yes

The flags files that were used to format this result can be browsed at

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2017/flags/Intel-ic18.0-official-linux64.2017-12-21.xml
http://www.spec.org/cpu2017/flags/Huawei-Platform-Settings-SKL-V1.9-revC.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 2018-08-20 20:58:17-0400.
Originally published on 2018-10-30.