# SPEC® CPU2017 Floating Point Speed Result

## Huawei

### Huawei XH321 V5 (Intel Xeon Gold 6138)

<table>
<thead>
<tr>
<th>SPECspeed2017_fp_base</th>
<th>SPECspeed2017_fp_peak</th>
</tr>
</thead>
<tbody>
<tr>
<td>106</td>
<td>108</td>
</tr>
</tbody>
</table>

### Hardware

- **CPU Name:** Intel Xeon Gold 6138
- **Max MHz.:** 3700
- **Nominal:** 2000
- **Enabled:** 40 cores, 2 chips
- **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:** 27.5 MB I+D on chip per chip
- **Other:** None
- **Memory:** 384 GB (12 x 32 GB 2Rx4 PC4-2666V-R)
- **Storage:** 1 x 1200 GB SAS, 10000 RPM
- **Other:** None

### Software

- **OS:** Red Hat Enterprise Linux Server release 7.3 (Maipo)
  3.10.0-693.11.6.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:** 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

### Test Details

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

### Threads

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>SPECspeed2017_fp_base</th>
<th>SPECspeed2017_fp_peak</th>
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</thead>
<tbody>
<tr>
<td>603.bwaves_s</td>
<td>40</td>
<td>0</td>
<td>444</td>
</tr>
<tr>
<td>607.cactuBSSN_s</td>
<td>40</td>
<td>41.4</td>
<td>454</td>
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<tr>
<td>619.lbm_s</td>
<td>40</td>
<td>76.2</td>
<td>139</td>
</tr>
<tr>
<td>621.wrf_s</td>
<td>40</td>
<td>83.3</td>
<td>142</td>
</tr>
<tr>
<td>627.cam4_s</td>
<td>40</td>
<td>60.9</td>
<td>107</td>
</tr>
<tr>
<td>628.pop2_s</td>
<td>40</td>
<td>83.4</td>
<td>186</td>
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<tr>
<td>638.imagick_s</td>
<td>40</td>
<td>66.2</td>
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<tr>
<td>644.nab_s</td>
<td>40</td>
<td>81.0</td>
<td></td>
</tr>
<tr>
<td>649.fotonik3d_s</td>
<td>40</td>
<td>111</td>
<td></td>
</tr>
<tr>
<td>654.roms_s</td>
<td>40</td>
<td>116</td>
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</tr>
</tbody>
</table>
## Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
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<tr>
<td>603.bwaves_s</td>
<td>40</td>
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**SPECspeed2017_fp_base** = 106

**SPECspeed2017_fp_peak** = 108

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"
- LD_LIBRARY_PATH = "/spec/lib/ia32:/spec/lib/intel64:/spec/je5.0.1-32:/spec/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
```

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.

## Platform Notes

BIOS configuration:

- Power Policy Set to Custom
- Hyper-Threading Set to Disable

(Continued on next page)
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SPECspeed2017_fp_base = 106
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Platform Notes (Continued)

ADDDC Sparing Set to Disabled
Sysinfo program /spec/bin/sysinfo
Rev: r5797 of 2017-06-14 96c45e4568ad54c135fd618bcc091c0f
running on localhost.localdomain Tue May  8 15:37:30 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 6138 CPU @ 2.00GHz
  2  "physical id"s (chips)
  40 "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 : 20
  siblings : 20
  physical 0: cores 0 1 2 3 4 8 9 10 11 12 16 17 18 19 20 24 25 26 27 28
  physical 1: cores 0 1 2 3 4 8 9 10 11 12 16 17 18 19 20 24 25 26 27 28

From lscpu:
Architecture:          x86_64
CPU op-mode(s):        32-bit, 64-bit
Byte Order:            Little Endian
CPU(s):                40
On-line CPU(s) list:   0-39
Thread(s) per core:    1
Core(s) per socket:    20
Socket(s):             2
NUMA node(s):          2
Vendor ID:             GenuineIntel
CPU family:            6
Model:                 85
Model name:            Intel(R) Xeon(R) Gold 6138 CPU @ 2.00GHz
Stepping:              4
CPU MHz:               2001.000
BogoMIPS:              4005.55
Virtualization:        VT-x
L1d cache:             32K
L1i cache:             32K
L2 cache:              1024K
L3 cache:              28160K
NUMA node0 CPU(s):     0-19
NUMA node1 CPU(s):     20-39

/proc/cpuinfo cache data
  cache size : 28160 KB

(Continued on next page)
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Platform Notes (Continued)

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 8 9 10 11 12 13 14 15 16 17 18 19
   node 0 size: 194741 MB
   node 0 free: 186432 MB
   node 1 cpus: 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39
   node 1 size: 196608 MB
   node 1 free: 188499 MB
   node distances:
   node 0: 10 21
   node 1: 21 10

From /proc/meminfo
   MemTotal:       394174996 kB
   HugePages_Total:       0
   Hugepagesize:       2048 kB

From /etc/*release* /etc/*version*
   os-release:
      NAME="Red Hat Enterprise Linux Server"
      VERSION="7.3 (Maipo)"
      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 8 10:25

SPEC is set to: /spec
   Filesystem     Type  Size  Used  Avail  Use% Mounted on
   /dev/sda8      xfs   325G  83G   243G  26% /

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
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Platform Notes (Continued)

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

(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. |
|------------------------------------------------------------------------------

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---

Compiler Version Notes (Continued)

==============================================================================
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)
------------------------------------------------------------------------------
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
SPEC CPU2017 Floating Point Speed Result

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Base Portability Flags

603.bwaves_s: -DSPEC_LP64
607.cactuBSSN_s: -DSPEC_LP64
619.llm_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-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=3 -qopenmp -DSPEC_OPENMP

Fortran benchmarks:
-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:
-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

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

(Continued on next page)
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Base Other Flags (Continued)

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

Peak Optimization Flags

C benchmarks:

619.lbm_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

638.imagick_s: basepeak = yes

644.nab_s: -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=3 -qopenmp
-DSPEC_OPENMP
## Peak Optimization Flags (Continued)

### 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 -align array32byte`

649.fotonik3d_s: `basepeak = yes`

654.roms_s: Same as 603.bwaves_s

### 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 -align array32byte`

627.cam4_s: `basepeak = yes`

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 -O3 -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`

### 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

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/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 2018-05-08 15:37:29-0400.