# SPEC® CPU2017 Floating Point Speed Result

## Huawei

**Huawei 2288 V5 (Intel Xeon Silver 4208)**

| SPECspeed2017_fp_base = 67.3 | SPECspeed2017_fp_peak = 67.6 |

**CPU2017 License:** 3175  
**Test Date:** Mar-2019  
**Test Sponsor:** Huawei  
**Hardware Availability:** Apr-2019  
**Tested by:** Huawei  
**Software Availability:** Dec-2018

### Hardware

| Threads | 0 | 15.0 | 30.0 | 45.0 | 60.0 | 75.0 | 90.0 | 105 | 120 | 135 | 150 | 165 | 180 | 195 | 210 | 225 | 240 | 255 | 270 | 285 | 300 | 315 | 330 | 345 | 360 |
|---------|---|------|------|------|------|------|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 603.bwaves_s | 16 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 314 |
| 607.cactuBSSN_s | 16 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 314 |
| 619.lbm_s | 16 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 314 |
| 621.wrf_s | 16 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 314 |
| 627.cam4_s | 16 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 314 |
| 628.pop2_s | 16 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 314 |
| 638.imagick_s | 16 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 314 |
| 644.nab_s | 16 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 314 |
| 649.fotonik3d_s | 16 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 314 |
| 654.roms_s | 16 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 314 |

- SPECspeed2017_fp_base (67.3)
- SPECspeed2017_fp_peak (67.6)

**CPU Name:** Intel Xeon Silver 4208  
**Max MHz.:** 3200  
**Nominal:** 2100  
**Enabled:** 16 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:** 11 MB I+D on chip per chip  
**Memory:** 192 GB (12 x 16 GB 2Rx8 PC4-2933Y-R, running at 2400)  
**Storage:** 1 x 1200 GB SAS, 10000 RPM  
**Other:** None

### Software

**OS:** SUSE Linux Enterprise Server 12 SP4 (x86_64)  
**C/C++:** 4.12.14-94.41-default  
**Compiler:** Version 19.0.1.144 of Intel C/C++  
**Fortran:** Version 19.0.1.144 of Intel Fortran  
**Compiler Build:** 20181018  
**Firmware:** Version 6.52 Released Mar-2019  
**File System:** xfs  
**System State:** Run level 3 (multi-user)  
**Base Pointers:** 64-bit  
**Peak Pointers:** 64-bit  
**Other:** None
### Huawei

Huawei 2288 V5 (Intel Xeon Silver 4208)

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
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<tbody>
<tr>
<td>603.bwaves_s</td>
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<td>188</td>
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<td>188</td>
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<td>187</td>
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<tr>
<td>607.cactuBSSN_s</td>
<td>16</td>
<td>227</td>
<td>73.4</td>
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<td>227</td>
<td>73.4</td>
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<tr>
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<td>16</td>
<td>91.3</td>
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<td>57.4</td>
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<td>216</td>
<td>61.3</td>
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<td>60.5</td>
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<tr>
<td>627.cam4_s</td>
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<td>34.5</td>
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<td>46.4</td>
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<td>638.imagick_s</td>
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<td>649.fotonik3d_s</td>
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<td>149</td>
<td>61.2</td>
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<td>235</td>
<td>67.1</td>
<td>235</td>
<td>67.0</td>
<td>235</td>
<td>67.1</td>
</tr>
</tbody>
</table>

**SPECspeed2017_fp_base = 67.3**

**SPECspeed2017_fp_peak = 67.6**

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:

```c
KMP_AFFINITY = "granularity=fine,compact"
LD_LIBRARY_PATH = "/spec2017/lib/ia32/:/spec2017/lib/intel64"
OMP_STACKSIZE = "192M"
```

Binaries compiled on a system with 1x Intel Core i9-7900X 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:

```bash
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 Load Balance
- Hyper-Threading Set to Disable

(Continued on next page)
Huawei

Huawei 2288 V5 (Intel Xeon Silver 4208)

**SPECspeed2017_fp_base = 67.3**

**SPECspeed2017_fp_peak = 67.6**

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**Platform Notes (Continued)**

XPT Prefetch Set to Enabled
Sysinfo program /spec2017/bin/sysinfo
Rev: r5797 of 2017-06-14 96c45e4568ad54c135fd618bccc091c0f
running on linux-0o4j Mon Mar 25 14:00:46 2019

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) Silver 4208 CPU @ 2.10GHz
  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:

```
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 4208 CPU @ 2.10GHz
Stepping: 6
CPU MHz: 2100.000
CPU max MHz: 3200.0000
CPU min MHz: 800.0000
BogoMIPS: 4200.00
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 11264K
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
```

(Continued on next page)
Huawei

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**Platform Notes (Continued)**

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 cpuid aperfmperf pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg fma cx16 xtr intentionally missing Intel-specific instructions

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

```plaintext
 available: 2 nodes (0-1)
 node 0 cpus: 0 1 2 3 4 5 6 7
 node 0 size: 95138 MB
 node 0 free: 94576 MB
 node 1 cpus: 8 9 10 11 12 13 14 15
 node 1 size: 96529 MB
 node 1 free: 95377 MB
 node distances:
 node 0:  10  21
 node 1:  21  10
```

From /proc/meminfo

```plaintext
MemTotal:       196268056 kB
HugePages_Total:       0
Hugepagesize:       2048 kB
```

From /etc/*release* /etc/*version*

SuSE-release:

```plaintext
 SUSE Linux Enterprise Server 12 (x86_64)
 VERSION = 12
 PATCHLEVEL = 4
```

os-release:

```plaintext
 NAME="SLES"
 VERSION="12-SP4"
 VERSION_ID="12.4"
 PRETTY_NAME="SUSE Linux Enterprise Server 12 SP4"
 ID="sles"
 ANSI_COLOR="0;32"
```

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Huawei
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SPECspeed2017_fp_base = 67.3
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Test Sponsor: Huawei
Tested by: Huawei

Platform Notes (Continued)

uname -a:
    x86_64 x86_64 x86_64 GNU/Linux

run-level 3 Mar 25 08:11

SPEC is set to: /spec2017

Filesystem     Type Size  Used Avail Use% Mounted on
/dev/sda2      xfs  919G  11G  909G   2% /

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. 6.52 03/16/2019
Memory:
    4x NO DIMM NO DIMM
    12x Samsung M393A2K43CB2-CVF 16 GB 2 rank 2933, configured at 2400

Compiler Version Notes

Compiler (Continued)
Huawei
Huawei 2288 V5 (Intel Xeon Silver 4208)

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==============================================================================
FC 603.bwaves_s(base) 649.fotonik3d_s(base) 654.roms_s(base, peak)
Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)
64, Version 19.0.1.144 Build 20181018
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
==============================================================================
FC 603.bwaves_s(peak) 649.fotonik3d_s(peak)
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64, Version 19.0.1.144 Build 20181018
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==============================================================================
CC 621.wrf_s(base) 627.cam4_s(base, peak) 628.pop2_s(base)
Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)
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Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
CC 621.wrf_s(peak) 628.pop2_s(peak)
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Base Compiler Invocation

C benchmarks:
icc -m64 -std=c11

Fortran benchmarks:
ifort -m64

(Continued on next page)
### Base Compiler Invocation (Continued)

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

Benchmarks using Fortran, C, and C++:
```plaintext
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 -convert big_endian
- 628.pop2_s: -DSPEC_LP64 -DSPEC_CASE_FLAG
- 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:**
```plaintext
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP
```

**Fortran benchmarks:**
```plaintext
-DSPEC_OPENMP -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp
-nostandard-realloc-lhs
```

**Benchmarks using both Fortran and C:**
```plaintext
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP
-nostandard-realloc-lhs
```

**Benchmarks using Fortran, C, and C++:**
```plaintext
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP
-nostandard-realloc-lhs
```
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Peak Compiler Invocation

C benchmarks:
icc -m64 -std=c11

Fortran benchmarks:
ifort -m64

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

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

Peak Portability Flags

Same as Base Portability Flags

Peak Optimization Flags

C benchmarks:
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP

Fortran benchmarks:

603.bwaves_s: -prof-gen(pass 1) -prof-use(pass 2) -DSPEC_SUPPRESS_OPENMP -DSPEC_OPENMP -O2 -xCORE-AVX512 -qopt-prefetch -ipo -O3 -ffinite-math-only -no-prec-div -qopt-mem-layout-trans=4 -qopenmp -nostandard-realloc-lhs
649.fotonik3d_s: basepeak = yes
654.roms_s: -DSPEC_OPENMP -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -nostandard-realloc-lhs

Benchmarks using both Fortran and C:
621.wrf_s: basepeak = yes
627.cam4_s: basepeak = yes

(Continued on next page)
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### Peak Optimization Flags (Continued)

628.pop2_s: -prof-gen(pass 1) -prof-use(pass 2) -O2 -xCORE-AVX512
-qopt-prefetch -ipo -O3 -ffinite-math-only -no-prec-div
-qopt-mem-layout-trans=4 -DSPEC_SUPPRESS_OPENMP -qopenmp
-DSPEC_OPENMP -nostandard-realloc-lhs

**Benchmarks using Fortran, C, and C++:**
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP
-nostandard-realloc-lhs

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/Huawei-Platform-Settings-SKL-V1.9-revC.xml

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Tested with SPEC CPU2017 v1.0.2 on 2019-03-25 02:00:45-0400.