## SPEC® CPU2017 Floating Point Speed Result

**Huawei**

Huawei 2288H V5 (Intel Xeon Platinum 8256)

<table>
<thead>
<tr>
<th>SPECspeed2017_fp_base</th>
<th>57.6</th>
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<tbody>
<tr>
<td>SPECspeed2017_fp_peak</td>
<td>58.4</td>
</tr>
</tbody>
</table>

### CPU2017 License: 3175

**Test Sponsor:** Huawei  
**Test Date:** Feb-2019

**Hardware**

- **CPU Name:** Intel Xeon Platinum 8256  
- **Max MHz.:** 3900
- **Nominal:** 3800  
- **Enabled:** 8 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:** 16.5 MB I+D on chip per chip  
- **Other:** None
- **Memory:** 384 GB (24 x 16 GB 2Rx8 PC4-2933Y-R, running at 2666)
- **Storage:** 1 x 1200 GB SAS, 10000 RPM
- **Other:** None

### Software

- **OS:** SUSE Linux Enterprise Server 12 SP4 (x86_64)  
- **Compiler:** C/C++: Version 19.0.1.144 of Intel C/C++ Compiler Build 20181018 for Linux; Fortran: Version 19.0.1.144 of Intel Fortran Compiler Build 20181018 for Linux  
- **Parallel:** Yes
- **Firmware:** Version 6.36 Released Feb-2019
- **File System:** btrfs  
- **System State:** Run level 5 (multi-user)
- **Base Pointers:** 64-bit
- **Peak Pointers:** 64-bit
- **Other:** None

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<table>
<thead>
<tr>
<th>Threads</th>
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<tr>
<td>8</td>
<td>55.1</td>
<td>58.4</td>
</tr>
<tr>
<td>603.bwaves_s</td>
<td>46.8</td>
<td>61.5</td>
</tr>
<tr>
<td>607.cactuBSSN_s</td>
<td>46.8</td>
<td>67.1</td>
</tr>
<tr>
<td>619.lbm_s</td>
<td>29.5</td>
<td>29.6</td>
</tr>
<tr>
<td>621.wrf_s</td>
<td>46.3</td>
<td>48.1</td>
</tr>
<tr>
<td>627.cam4_s</td>
<td>36.3</td>
<td>36.3</td>
</tr>
<tr>
<td>628.pop2_s</td>
<td>36.3</td>
<td>56.6</td>
</tr>
<tr>
<td>638.imagick_s</td>
<td>56.6</td>
<td>54.5</td>
</tr>
<tr>
<td>644.nab_s</td>
<td>63.1</td>
<td>63.1</td>
</tr>
<tr>
<td>649.fotonik3d_s</td>
<td>54.4</td>
<td>54.4</td>
</tr>
<tr>
<td>654.roms_s</td>
<td>8</td>
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**Software**

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<th>Benchmark</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
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<td>263</td>
<td>224</td>
<td>263</td>
<td>224</td>
<td>263</td>
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<tr>
<td>607.cactuBSSN_s</td>
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<td>303</td>
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<tr>
<td>621.wrf_s</td>
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<td>299</td>
<td>29.6</td>
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<tr>
<td>628.pop2_s</td>
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<td>256</td>
<td>46.4</td>
<td>256</td>
<td>46.3</td>
</tr>
<tr>
<td>638.imagick_s</td>
<td>8</td>
<td>397</td>
<td>36.3</td>
<td>398</td>
<td>36.2</td>
<td>397</td>
<td>36.3</td>
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<tr>
<td>644.nab_s</td>
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<td>63.1</td>
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<td>56.4</td>
<td>161</td>
<td>56.6</td>
<td>161</td>
<td>56.8</td>
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<tr>
<td>654.roms_s</td>
<td>8</td>
<td>287</td>
<td>54.8</td>
<td>290</td>
<td>54.3</td>
<td>290</td>
<td>54.4</td>
</tr>
</tbody>
</table>

### 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"
- 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:
```
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)
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Test Sponsor: Huawei
Tested by: Huawei

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<tr>
<td>Software Availability</td>
<td>Dec-2018</td>
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**Platform Notes (Continued)**

XPT Prefetch Set to Enabled
Sysinfo program /spec/bin/sysinfo
Rev: r5797 of 2017-06-14 96c45e4568ad54c135fd618bccc091c0f
running on linux-qzen Thu Feb 28 03:05:39 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) Platinum 8256 CPU @ 3.80GHz
  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 5 8 9 12
  physical 1: cores 0 5 8 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):          2
Vendor ID:             GenuineIntel
CPU family:            6
Model:                 85
Model name:            Intel(R) Xeon(R) Platinum 8256 CPU @ 3.80GHz
Stepping:              6
CPU MHz:               3800.000
CPU max MHz:           3900.0000
CPU min MHz:           1200.0000
BogoMIPS:              7600.00
Virtualization:        VT-x
L1d cache:             32K
L1i cache:             32K
L2 cache:              1024K
L3 cache:              16896K
NUMA node0 CPU(s):     0-3
NUMA node1 CPU(s):     4-7
Flags:                 fpu vm de pse tsc msr pae mce cx8 apic sep mtrr pge mca cmov
```

(Continued on next page)
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**Tested by:** Huawei

**Software Availability:** Dec-2018

---

**Platform Notes (Continued)**

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 nopl xtopology nonstop_tsc cpuid
aperfmpref pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg fma cx16
xtrp pdcm pcid dca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave
avx f16c rdrand lahf_lm abm 3dnowprefetch cpuid_fault epb cat_l3 cdp_l3
invpcid_single ssbd mba ibrs ibpb tpr_shadow vmmi flexpriority ept vpid
fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid rtm cqm mpx rdt_a avx512f
avx512dq rdseed adx clflushopt clwb intel_pt avx512cd avx512bw avx512vl
xsaves xsaveopt xsaves xsavec xgetbv1 xsaves cqm_llc cqm_occmap llc cqm_mbb_total cqm_mbb_local
dtherm ida arat pln pts pku ospke avx512_vnni flush_l1d arch_capabilities

```
/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: 2 nodes (0-1)
    node 0 cpus: 0 1 2 3
    node 0 size: 191906 MB
    node 0 free: 178965 MB
    node 1 cpus: 4 5 6 7
    node 1 size: 193282 MB
    node 1 free: 191568 MB
    node distances:
      node   0   1
      0:  10  21
      1:  21  10

From /proc/meminfo
    MemTotal:       394433620 kB
    HugePages_Total:       0
    Hugepagesize:       2048 kB

/usr/bin/lsb_release -d
    SUSE Linux Enterprise Server 12 SP4

From /etc/*release*/etc/*version*
    SuSE-release:
        SUSE Linux Enterprise Server 12 (x86_64)
        VERSION = 12
        PATCHLEVEL = 4
        # 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-SP4"
        VERSION_ID="12.4"
```

(Continued on next page)
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Platform Notes (Continued)

PRETTY_NAME="SUSE Linux Enterprise Server 12 SP4"
ID="sles"
ANSI_COLOR="0;32"
CPE_NAME="cpe:/o:suse:sles:12:sp4"

uname -a:
x86_64 x86_64 x86_64 GNU/Linux

run-level 5 Feb 27 22:03

SPEC is set to: /spec

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. 6.36 02/15/2019

Memory:
24x Samsung M393A2K43CB2-CVF 16 GB 2 rank 2933, configured at 2666

Compiler Version Notes

==============================================================================
CC  619.lbm_s(base, peak) 638.imagick_s(base, peak) 644.nab_s(base, peak)
Intel(R) C 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  607.cactuBSSN_s(base, peak)
Intel(R) C++ 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.

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**Hardware Availability:** Apr-2019

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**Tested by:** Huawei

**Software Availability:** Dec-2018

### Compiler Version Notes (Continued)

Copyright (C) 1985-2018 Intel Corporation. All rights reserved.

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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)

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.

---

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) 64, Version 19.0.1.144 Build 20181018
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.

Intel(R) C 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.

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

Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64, Version 19.0.1.144 Build 20181018
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### Base Compiler Invocation

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

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Base Compiler Invocation (Continued)

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

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

Fortran benchmarks:
-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:
-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++:
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
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Base Optimization Flags (Continued)

Benchmarks using Fortran, C, and C++ (continued):
-nostandard-realloc-lhs

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 -nstandard-realloc-lhs
649.fotonik3d_s: Same as 603.bwaves_s
654.roms_s: -DSPEC_OPENMP -xCORE-AVX512 -ipo -O3 -no-prec-div
-qpopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4
-qopenmp -nstandard-realloc-lhs

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---

Peak Optimization Flags (Continued)

Benchmarks using both Fortran and C:

621.wrf_s: -prof-gen(pass l) -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

627.cam4_s: -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4 -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/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 2019-02-27 14:05:38-0500.