# SPEC® CPU2017 Floating Point Rate Result

## Huawei

Huawei 2288H V5 (Intel Xeon Silver 4116)

<table>
<thead>
<tr>
<th>SPECrate2017_fp_base</th>
<th>118</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECrate2017_fp_peak</td>
<td>121</td>
</tr>
</tbody>
</table>

**CPU2017 License:** 3175  
**Test Date:** Dec-2017  
**Test Sponsor:** Huawei  
**Hardware Availability:** Jul-2017  
**Software Availability:** Sep-2017

<table>
<thead>
<tr>
<th>Hardware</th>
<th>Software</th>
</tr>
</thead>
</table>
| **CPU Name:** Intel Xeon Silver 4116  
**Max MHz.:** 3000  
**Nominal:** 2100  
**Enabled:** 24 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:** 16.5 MB I+D on chip per chip  
**Other:** None  
**Memory:** 384 GB (24 x 16 GB 2Rx8 PC4-2666V-R, running at 2400)  
**Storage:** 1 x 1200 GB SAS, 10000 RPM  
**Other:** None  | **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 0.31 Released Sep-2017  
**File System:** xfs  
**System State:** Run level 3 (multi-user)  
**Base Pointers:** 64-bit  
**Peak Pointers:** 64-bit  
**Other:** None |
Huawei
Huawei 2288H V5 (Intel Xeon Silver 4116)

Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
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<td>589</td>
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<td>1114</td>
<td>68.5</td>
<td>1112</td>
<td>68.6</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:

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>

No: The test sponsor attests, as of date of publication, that CVE-2017-5754 (Meltdown)
Huawei
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SPECrate2017_fp_base = 118
SPECrate2017_fp_peak = 121

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

General Notes (Continued)

is mitigated in the system as tested and documented.
No: 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.
No: 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.

This benchmark result is intended to provide perspective on past performance using the historical hardware and/or software described on this result page.

The system as described on this result page was formerly generally available. At the time of this publication, it may not be shipping, and/or may not be supported, and/or may fail to meet other tests of General Availability described in the SPEC OSG Policy document, http://www.spec.org/osg/policy.html

This measured result may not be representative of the result that would be measured were this benchmark run with hardware and software available as of the publication date.

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
Sysinfo program /spec2017/bin/sysinfo
Rev: r5797 of 2017-06-14 96c45e4568ad54c135fd618bcc091c0f
running on localhost.localdomain Sat Dec 30 21:31:21 2017

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 4116 CPU @ 2.10GHz
  2 "physical id"s (chips)
  48 "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 : 12
siblings : 24
physical 0: cores 0 1 2 3 4 5 8 9 10 11 12 13
physical 1: cores 0 1 2 3 4 5 8 9 10 11 12 13

(Continued on next page)
Huawei
Huawei 2288H V5 (Intel Xeon Silver 4116) SPECrate2017_fp_base = 118
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Test Date: Dec-2017
Tested by: Huawei
Hardware Availability: Jul-2017
Software Availability: Sep-2017

Platform Notes (Continued)

From lscpu:
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 48
On-line CPU(s) list: 0-47
Thread(s) per core: 2
Core(s) per socket: 12
Socket(s): 2
NUMA node(s): 4
Vendor ID: GenuineIntel
CPU family: 6
Model: 85
Model name: Intel(R) Xeon(R) Silver 4116 CPU @ 2.10GHz
Stepping: 4
CPU MHz: 2100.000
BogoMIPS: 4204.75
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 16896K
NUMA node0 CPU(s): 0-2, 6-8, 24-26, 30-32
NUMA node1 CPU(s): 3-5, 9-11, 27-29, 33-35
NUMA node2 CPU(s): 12-14, 18-20, 36-38, 42-44
NUMA node3 CPU(s): 15-17, 21-23, 39-41, 45-47

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 6 7 8 24 25 26 30 31 32
node 0 size: 96405 MB
node 0 free: 93109 MB
node 1 cpus: 3 4 5 9 10 11 27 28 29 33 34 35
node 1 size: 98304 MB
node 1 free: 95298 MB
node 2 cpus: 12 13 14 18 19 20 36 37 38 42 43 44
node 2 size: 98304 MB
node 2 free: 94860 MB
node 3 cpus: 15 16 17 21 22 23 39 40 41 45 46 47
node 3 size: 98304 MB
node 3 free: 95283 MB
node distances:
node 0 1 2 3

(Continued on next page)
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Platform Notes (Continued)

0:  10  11  21  21
1:  11  10  21  21
2:  21  21  10  11
3:  21  21  11  10

From /proc/meminfo
MemTotal:       394144696 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 3.10.0-514.el7.x86_64 #1 SMP Wed Oct 19 11:24:13 EDT 2016
x86_64 x86_64 x86_64 GNU/Linux

run-level 3 Dec 27 21:00

SPEC is set to: /spec2017
  Filesystem     Type  Size  Used Avail Use% Mounted on
/dev/sda2       xfs    781G  229G  553G  30% /

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. 0.31 09/29/2017
  Memory:
  24x Samsung M393A2K43BB1-CTD 16 GB 2 rank 2666, configured at 2400

(End of data from sysinfo program)
SPEC CPU2017 Floating Point Rate Result

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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)
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icc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
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CXXC 508.namd_r(base) 510.parest_r(base)
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icpc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
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CXXC 508.namd_r(peak) 510.parest_r(peak)
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CC  511.povray_r(base) 526.blender_r(base)
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icpc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
iccc (ICC) 18.0.0 20170811
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(Continued on next page)
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SPEC CPU2017 Floating Point Rate Result

SPECrate2017_fp_base = 118
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Compiler Version Notes (Continued)

FC 507.cactuBSSN_r(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 507.cactuBSSN_r(peak)

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Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
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ifort (IFORT) 18.0.0 20170811
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FC 503.bwaves_r(base, peak) 549.fotonik3d_r(base, peak) 554.roms_r(base)

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

----

FC 554.roms_r(peak)

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Copyright (C) 1985-2017 Intel Corporation. All rights reserved.

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FC 521.wrf_r(base) 527.cam4_r(base)

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Copyright (C) 1985-2017 Intel Corporation. All rights reserved.

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CC 521.wrf_r(peak) 527.cam4_r(peak)

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

C benchmarks:
icc

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.cactuBSSN_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
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### 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`

**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`  
  `-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`  
  `-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`
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Peak Compiler Invocation

C benchmarks:
iccc

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

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

510.parest_r: basepeak = yes

Fortran benchmarks:
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:
    -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 -O3
    -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 2288H V5 (Intel Xeon Silver 4116)

### SPEC CPU2017 Floating Point Rate Result

**SPECrate2017_fp_base** = 118  
**SPECrate2017_fp_peak** = 121

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### Peak Other Flags (Continued)

Benchmarks using both C and C++:
- `-m64 -std=c++11`

Benchmarks using Fortran, C, and C++:
- `-m64 -std=c++11`

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.

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