## SPEC® CPU2017 Floating Point Rate Result

**Huawei**

**Huawei CH225 V5 (Intel Xeon Silver 4110)**

<table>
<thead>
<tr>
<th>SPECrate2017_fp_peak</th>
<th>SPECrate2017_fp_base</th>
</tr>
</thead>
<tbody>
<tr>
<td>94.0</td>
<td>91.4</td>
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</table>

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

### Hardware

- **CPU Name:** Intel Xeon Silver 4110  
- **Max MHz.:** 3000  
- **Nominal:** 2100  
- **Enabled:** 16 cores, 2 chips, 2 threads/core  
- **Orderable:** 1.2 chips  
- **Cache L1:** 32 KB I + 32 KB D on chip per core  
- **Cache L2:** 1 MB I+D on chip per core  
- **Cache L3:** 11 MB I+D on chip per chip  
- **Memory:** 768 GB (24 x 32 GB 2Rx4 PC4-2666V-R, running at 2400)  
- **Storage:** 1 x 1200 GB SAS, 10000 RPM  
- **Other:** None

### Software

- **OS:** Red Hat Enterprise Linux Server release 7.4 (Maipo)  
  - 3.10.0-693.11.6.el7.x86_64  
- **Compiler:** 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  
- **Parallel:** No  
- **Firmware:** Version 0.80 Released Jun-2018  
- **File System:** xfs  
- **System State:** Run level 3 (multi-user)  
- **Base Pointers:** 64-bit  
- **Peak Pointers:** 64-bit  
- **Other:** None

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**Copies**

<table>
<thead>
<tr>
<th>Spec Name</th>
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<th>SPECrate2017_fp_base</th>
<th>SPECrate2017_fp_peak</th>
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<tr>
<td>503.bwaves_r</td>
<td>32</td>
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<td>507.cactuBSSN_r</td>
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Standard Performance Evaluation Corporation (info@spec.org)  
https://www.spec.org/
SPEC CPU2017 Floating Point Rate Result

Huawei
Huawei CH225 V5 (Intel Xeon Silver 4110)

SPECrate2017_fp_base = 91.4
SPECrate2017_fp_peak = 94.0

Results Table

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</tbody>
</table>

SPECrate2017_fp_base = 91.4
SPECrate2017_fp_peak = 94.0

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 i7-6700K 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
runcpu command invoked through numactl i.e.:
numactl --interleave=all runcpu <etc>

Yes: The test sponsor attests, as of date of publication, that CVE-2017-5754 (Meltdown) is mitigated in the system as tested and documented.

(Continued on next page)
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CPU2017 License: 3175
Test Sponsor: Huawei
Tested by: Huawei

**General Notes (Continued)**

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 Performance
XPT Prefetch Set to Enabled
Sysinfo program /spec2017/bin/sysinfo
Rev: r5797 of 2017-06-14 96c45e4568ad54c135fd618bcc091c0f
running on localhost.localdomain Tue Sep 4 05:08:59 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) Silver 4110 CPU @ 2.10GHz
- 2 "physical id"s (chips)
- 32 "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: 16
- 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): 32
- On-line CPU(s) list: 0-31
- Thread(s) per core: 2
- 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 4110 CPU @ 2.10GHz
- Stepping: 4
- CPU MHz: 2100.000
- BogoMIPS: 4200.00

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Test Date: Sep-2018

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Software Availability: Mar-2018

Platform Notes (Continued)

Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 11264K
NUMA node0 CPU(s): 0-7,16-23
NUMA node1 CPU(s): 8-15,24-31
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 arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc
aperfmperf eagerfpu nni pmlnulqdq dtes64 ds_cpl vmx smx est tm2 ssse3 fma cx16 xtrp
pcid pdcm dca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave avx
f16c rdrand lahf_lm abm 3dnowprefetch epb cat_l3 cdp_l3 invpcid_single intel_pt
spec_ctrl ibpb_support 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
smap clflushopt clwb avx512cd avx512bw avx512vl xsaveopt xsaves xgetbv1 cqm_llc
cqm_occup_llc cqm_mbm_total cqm_mbm_local dtherm ida arat pln pts

/proc/cpuinfo cache data
  cache size : 11264 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 4 5 6 7 16 17 18 19 20 21 22 23
  node 0 size: 391349 MB
  node 0 free: 372188 MB
  node 1 cpus: 8 9 10 11 12 13 14 15 24 25 26 27 28 29 30 31
  node 1 size: 393216 MB
  node 1 free: 373028 MB
  node distances:
    node 0 1
    0: 10 21
    1: 21 10

From /proc/meminfo
  MemTotal: 790510872 kB
  HugePages_Total: 0
  Hugepagesize: 2048 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"

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Platform Notes (Continued)

    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)
    system-release-cpe: cpe:/o:redhat:enterprise_linux:7.4:ga:server

    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 Sep 3 18:04

    SPEC is set to: /spec2017
    Filesystem     Type  Size  Used Avail Use% Mounted on
    /dev/sda2      xfs   720G   64G  657G   9% /

    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. 0.80 06/27/2018
    Memory:
    24x Samsung M393A4K40BB2-CTD 32 GB 2 rank 2666, configured at 2400

    (End of data from sysinfo program)

Compiler Version Notes

==============================================================================
 CC  519.lbm_r(base) 538.imagick_r(base, peak) 544.nab_r(base, peak)
==============================================================================

ICC (ICC) 18.0.2 20180210
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
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CC  519.lbm_r(peak)
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CXXC 508.namd_r(base) 510.parest_r(base, peak)

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Compiler Version Notes (Continued)

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

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CXXC 508.namd_r(peak)
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icpc (ICC) 18.0.2 20180210
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Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
iccc (ICC) 18.0.2 20180210
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.

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CC 511.povray_r(peak)
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Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
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FC 507.cactuBSSN_r(base, peak)
icpc (ICC) 18.0.2 20180210
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
iccc (ICC) 18.0.2 20180210
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
ifort (IFORT) 18.0.2 20180210
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------------------------------------------------------------------------------

Base Compiler Invocation

C benchmarks:
icc -m64 -std=c11

C++ benchmarks:
icpc -m64

Fortran benchmarks:
ifort -m64

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

Benchmarks using both C and C++:
icpc -m64 icc -m64 -std=c11

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

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 -auto -nostandard-realloc-lhs

Benchmarks using both Fortran and C:
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=3 -auto -nostandard-realloc-lhs

Benchmarks using both C and C++:
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=3

Benchmarks using Fortran, C, and C++:
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=3 -auto -nostandard-realloc-lhs
Huawei CH225 V5 (Intel Xeon Silver 4110) SPECrate2017_fp_base = 91.4 SPECrate2017_fp_peak = 94.0

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

Peak Compiler Invocation

C benchmarks:
icc -m64 -std=c11

C++ benchmarks:
icpc -m64

Fortran benchmarks:
ifort -m64

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

Benchmarks using both C and C++:
icpc -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:
519.ibm_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 538.imagick_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)
Huawei

Huawei CH225 V5 (Intel Xeon Silver 4110)

SPECrate2017_fp_base = 91.4
SPECrate2017_fp_peak = 94.0

CPU2017 License: 3175
Test Sponsor: Huawei
Test Date: Sep-2018
Hardware Availability: Jul-2017
Tested by: Huawei
Software Availability: Mar-2018

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 -auto -nostandard-realloc-lhs
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 -auto -nostandard-realloc-lhs

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 -auto -nostandard-realloc-lhs

Benchmarks using both C and C++:
511.povray_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
526.blender_r -xCORE-AVX2 -ipo -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

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
### Huawei

**Huawei CH225 V5 (Intel Xeon Silver 4110)**

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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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