Huawei

Huawei 2288H V5 (Intel Xeon Silver 4108)

<table>
<thead>
<tr>
<th>SPECrate2017_fp_base</th>
<th>SPECrate2017_fp_peak</th>
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<td>80.5</td>
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CPU2017 License: 3175
Test Sponsor: Huawei
Tested by: Huawei
Test Date: Jul-2018
Hardware Availability: Jul-2017
Software Availability: Jan-2018

Copies

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Hardware

CPU Name: Intel Xeon Silver 4108
Max MHz.: 3000
Nominal: 1800
Enabled: 16 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: 11 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

Software

OS: Red Hat Enterprise Linux Server release 7.4 (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 0.62 Released Mar-2018
File System: xfs
System State: Run level 3 (multi-user)
Base Pointers: 64-bit
Peak Pointers: 64-bit
Other: None
### SPEC CPU2017 Floating Point Rate Result

**Huawei**

Huawei 2288H V5 (Intel Xeon Silver 4108)

<table>
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#### Results Table

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</table>

**SPECrate2017_fp_base = 78.4**  
**SPECrate2017_fp_peak = 80.5**

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>
```

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)
**SPEC CPU2017 Floating Point Rate Result**

**Huawei**

Huawei 2288H V5 (Intel Xeon Silver 4108)

---

**SPECrate2017_fp_base = 78.4**  
**SPECrate2017_fp_peak = 80.5**

---

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

---

**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 Thu Jul 19 16:56:28 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 4108 CPU @ 1.80GHz  
  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 4108 CPU @ 1.80GHz  
  Stepping: 4  
  CPU MHz: 1800.000  
  BogoMIPS: 3600.00

(Continued on next page)
Huawei 2288H V5 (Intel Xeon Silver 4108)

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

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 art arch_perfmon pebs bts rep_good nst 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 vnlmi flexpriority ept vpid fsgsbase tsc_adjust
bmi1 hle avx2 smep bmi2 erms invpcid rdms cqm mpx rdt_a avx512f avx512dq rdseed adx
smap clflushopt clwb avx512cd avx512bw avx512vl xsaveopt xsavec xgetbv1 cqm_llc
cqin_occuq_llc cqm_mbml_total cqm_mbml_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: 195701 MB
    node 0 free: 189364 MB
    node 1 cpus: 8 9 10 11 12 13 14 15 24 25 26 27 28 29 30 31
    node 1 size: 196608 MB
    node 1 free: 190813 MB
    node distances:
        node 0 1
        0: 10 21
        1: 21 10

From /proc/meminfo
    MemTotal: 395141240 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

(Continued on next page)
Huawei

Huawei 2288H V5 (Intel Xeon Silver 4108)

SPECCpu2017_fp_base = 78.4
SPECCpu2017_fp_peak = 80.5

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

Test Date: Jul-2018
Hardware Availability: Jul-2017
Software Availability: Jan-2018

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 Jul 16 13:28

SPEC is set to: /spec2017

Filesystem Type Size Used Avail Use% Mounted on
/dev/sda4 xfs 700G 35G 666G 5% /

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. 0.62 03/26/2018
Memory:
24x Samsung M393A2K43BB1-CTD 16 GB 2 rank 2666, configured at 2400

(End of data from sysinfo program)

Compiler Version Notes

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<tr>
<th>CC  519.lbm_r(base) 538.imagick_r(base, peak) 544.nab_r(base)</th>
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<td>icc (ICC) 18.0.0 20170811</td>
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<tr>
<td>Copyright (C) 1985-2017 Intel Corporation. All rights reserved.</td>
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(Continued on next page)
**Huawei**

**Huawei 2288H V5 (Intel Xeon Silver 4108)**

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

### Compiler Version Notes (Continued)

```plaintext
icpc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.

==============================================================================
CXXC 508.namd_r(peak) 510.parest_r(peak)
==============================================================================
icpc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.

==============================================================================
CC  511.povray_r(base) 526.blender_r(base)
==============================================================================
icpc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
ic (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.

==============================================================================
CC   511.povray_r(peak) 526.blender_r(peak)
==============================================================================
icpc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
ic (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(base)
==============================================================================
icpc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
ic (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)
==============================================================================
icpc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
ic (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
```
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Huawei 2288H V5 (Intel Xeon Silver 4108)

SPECrate2017_fp_base = 78.4
SPECrate2017_fp_peak = 80.5

Compiler Version Notes (Continued)

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

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

------------------------------------------------------------------------------
CC  521.wrf_r(base) 527.cam4_r(base)
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ifort (IFORT) 18.0.0 20170811
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icc (ICC) 18.0.0 20170811
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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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

C++ benchmarks:
icpcc

Fortran benchmarks:
ifort

(Continued on next page)
Huawei 2288H V5 (Intel Xeon Silver 4108)  

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**SPEC CPU2017 Floating Point Rate Result**

**SPECrate2017_fp_base = 78.4**  
**SPECrate2017_fp_peak = 80.5**

---

**Base Compiler Invocation (Continued)**

Benchmarks using both Fortran and C:

```bash
ifort icc
```

Benchmarks using both C and C++:

```bash
icpc icc
```

Benchmarks using Fortran, C, and C++:

```bash
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

---

**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
```
SPEC CPU2017 Floating Point Rate Result

Huawei

Huawei 2288H V5 (Intel Xeon Silver 4108)

<table>
<thead>
<tr>
<th>SPECrate2017_fp_base = 78.4</th>
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CPU2017 License: 3175
Test Sponsor: Huawei
Tested by: Huawei
Test Date: Jul-2018
Hardware Availability: Jul-2017
Software Availability: Jan-2018

Base Optimization Flags (Continued)

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

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

Peak Compiler Invocation

C benchmarks:
icc

C++ benchmarks:
icpc

Fortran benchmarks:
ifort

(Continued on next page)
## Huawei

### Huawei 2288H V5 (Intel Xeon Silver 4108)

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### Peak Compiler Invocation (Continued)

Benchmarks using both Fortran and C:

```bash
test

ifort icc
```

Benchmarks using both C and C++:

```bash
icpc icc
```

Benchmarks using Fortran, C, and C++:

```bash
icpc icc ifort
```

### Peak Portability Flags

Same as Base Portability Flags

### Peak Optimization Flags

**C benchmarks:**

```bash
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
```

```bash
538.imagick_r: -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=3
```

```bash
544.nab_r: Same as 519.lbm_r
```

**C++ benchmarks:**

```bash
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
```

**Fortran benchmarks:**

```bash
503.bwaves_r: -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=3
```

```bash
549.fotonik3d_r: basepeak = yes
```

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Huawei
Huawei 2288H V5 (Intel Xeon Silver 4108)

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Peak Optimization Flags (Continued)

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 -nstandard-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 -nstandard-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

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

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

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
Huawei

Huawei 2288H V5 (Intel Xeon Silver 4108)

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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

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