**Huawei XH628 V5 (Intel Xeon Platinum 8170)**

**Hardware**

- **CPU Name:** Intel Xeon Platinum 8170  
  **Max MHz.:** 3700  
  **Nominal:** 2100  
  **Enabled:** 52 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:** 35.75 MB I+D on chip per chip  
  **Memory:** 384 GB (12 x 32 GB 2Rx4 PC4-2666V-R)  
  **Storage:** 1 x 1800 GB SAS, 10000 RPM  
  **Other:** None

**Software**

- **OS:** Red Hat Enterprise Linux Server release 7.4 (Maipo)  
  **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 0.86 Released Aug-2018  
  **File System:** xfs  
  **System State:** Run level 3 (multi-user)  
  **Base Pointers:** 64-bit  
  **Peak Pointers:** 64-bit  
  **Other:** None

<table>
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<tr>
<th>Test Name</th>
<th>Benchmark</th>
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<th>SPECrate2017_fp_base</th>
<th>SPECrate2017_fp_peak</th>
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**CPU2017 License:** 3175  
**Test Date:** Aug-2018  
**Software Availability:** Mar-2018

**Test Sponsor:** Huawei  
**Hardware Availability:** Aug-2018  
**Tested by:** Huawei
**Huawei**

**Huawei XH628 V5 (Intel Xeon Platinum 8170)**

SPECrate2017_fp_base = 230

SPECrate2017_fp_peak = 234

Results Table

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<td>1679</td>
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</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 i7-6700K 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.
SPEC CPU2017 Floating Point Rate Result

Huawei
Huawei XH628 V5 (Intel Xeon Platinum 8170)

SPECrate2017_fp_base = 230
SPECrate2017_fp_peak = 234

CPU2017 License: 3175
Test Sponsor: Huawei
Test Date: Aug-2018
Hardware Availability: Aug-2018
Tested by: Huawei
Software Availability: Mar-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
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 Aug 11 04:31:17 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) Platinum 8170 CPU @ 2.10GHz
  2 "physical id"s (chips)
  104 "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 : 26
  siblings : 52
  physical 0: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 16 17 18 19 20 21 22 24 25 26 27 28 29
  physical 1: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 16 17 18 19 20 21 22 24 25 26 27 28 29

From lscpu:
  Architecture: x86_64
  CPU op-mode(s): 32-bit, 64-bit
  Byte Order: Little Endian
  CPU(s): 104
  On-line CPU(s) list: 0-103
  Thread(s) per core: 2
  Core(s) per socket: 26
  Socket(s): 2
  NUMA node(s): 4
  Vendor ID: GenuineIntel
  CPU family: 6
  Model: 85

(Continued on next page)
Platform Notes (Continued)

Model name: Intel(R) Xeon(R) Platinum 8170 CPU @ 2.10GHz
Stepping: 4
CPU MHz: 2100.000
BogoMIPS: 4200.00
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 36608K
NUMA node0 CPU(s): 0-3,7-9,13-15,20-22,52-55,59-61,65-67,72-74
NUMA node1 CPU(s): 4-6,10-12,16-19,23-25,29-31,33-35,39-41,46-48,78-81,85-87,91-93,98-100
NUMA node2 CPU(s): 26-29,33-35,39-41,46-48,78-81,85-87,91-93,98-100
NUMA node3 CPU(s): 30-32,36-38,42-45,49-51,82-84,88-90,94-97,101-103
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 aperf perfctr eagerfpu pni pclmulqdq dtes64 ds_cpl vmx smx est tm2 ssse3 fma cx16 xtpr pdcm pcid dca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave avx f16c rdrnd lahf_lm abm 3nowprefetch epb cat_l3 cdp_l3 invpcid_single intel_pt spec_ctrl ibpb_support tpr_shadow vnmi flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 ets invpcid rtm cqm mpx rdkey rt_a avx512f avx512dq rdseed adx smap clflushopt clwb avx512cd avx512bw avx512vl xsaveopt xsavec xgetbv1 cqm_llc cqm_occup_llc cqm_mbb_total cqm_mbb_local dtherm ida arat pln pts

/proc/cpuinfo cache data
cache size: 36608 KB

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 3 7 8 9 13 14 15 20 21 22 52 53 54 55 59 60 61 65 66 67 72 73 74
node 0 size: 96437 MB
node 0 free: 93150 MB
node 1 cpus: 4 5 6 10 11 12 16 17 18 19 23 24 25 56 57 58 62 63 64 68 69 70 71 75 76 77
node 1 size: 98304 MB
node 1 free: 94575 MB
node 2 cpus: 26 27 28 29 33 34 35 39 40 41 46 47 48 78 79 80 81 85 86 87 91 92 93 98 99 100
node 2 size: 98304 MB
node 2 free: 95393 MB
node 3 cpus: 30 31 32 36 37 38 42 43 44 45 49 50 51 82 83 84 88 89 90 94 95 96 97 101
node 3 size: 98304 MB
node 3 free: 95367 MB
node distances:
node 0 1 2 3
0: 10 11 21 21

(Continued on next page)
**SPEC CPU2017 Floating Point Rate Result**

**Huawei**

Huawei XH628 V5 (Intel Xeon Platinum 8170)

**SPECrate2017_fp_base** = 230

**SPECrate2017_fp_peak** = 234

<table>
<thead>
<tr>
<th>CPU2017 License: 3175</th>
<th>Test Date: Aug-2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Sponsor: Huawei</td>
<td>Hardware Availability: Aug-2018</td>
</tr>
<tr>
<td>Tested by: Huawei</td>
<td>Software Availability: Mar-2018</td>
</tr>
</tbody>
</table>

**Platform Notes (Continued)**

```
1:  11  10  21  21
2:  21  21  10  11
3:  21  21  11  10
```

From /proc/meminfo

```
MemTotal:       394174368 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"
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 Aug 10 16:22
```

```
SPEC is set to: /spec2017
Filesstem     Type  Size  Used  Avail  Use%  Mounted on
/dev/sda4     xfs  553G  6.8G  546G  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. 0.86 08/06/2018

Memory:
4x NO DIMM NO DIMM
12x Samsung M393A4K40BB2-CTD 32 GB 2 rank 2666

(End of data from sysinfo program)
# Huawei XH628 V5 (Intel Xeon Platinum 8170)

## SPEC CPU2017 Floating Point Rate Result

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<td>Software Availability:</td>
<td>Mar-2018</td>
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### SPECrate2017_fp_peak = 234

### SPECrate2017_fp_base = 230

## 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.

---

**CC** 519.lbm_r(peak)

---

icc (ICC) 18.0.2 20180210
Copyright (C) 1985–2018 Intel Corporation. All rights reserved.

---

**CXXC** 508.namd_r(base) 510.parest_r(base, peak)

---

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

---

**CXXC** 508.namd_r(peak)

---

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

---

**CC** 511.povray_r(base) 526.blender_r(base, peak)

---

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

---

icc (ICC) 18.0.2 20180210
Copyright (C) 1985–2018 Intel Corporation. All rights reserved.

---

**CC** 511.povray_r(peak)

---

icpc (ICC) 18.0.2 20180210
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---

icc (ICC) 18.0.2 20180210
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(Continued on next page)
Huawei
Huawei XH628 V5 (Intel Xeon Platinum 8170)

SPEC CPU2017 Floating Point Rate Result
Copyright 2017-2019 Standard Performance Evaluation Corporation

Huawei

SPECrate2017_fp_base = 230
SPECrate2017_fp_peak = 234

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

Test Date: Aug-2018
Hardware Availability: Aug-2018
Software Availability: Mar-2018

Compiler Version Notes (Continued)

FC 507.cactuBSSN_r(base, peak)

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

FC 503.bwaves_r(base, peak) 549.fotonik3d_r(base, peak) 554.roms_r(base)

ifort (IFORT) 18.0.2 20180210
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.

FC 554.roms_r(peak)

ifort (IFORT) 18.0.2 20180210
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.

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

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

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

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

Base Compiler Invocation

C benchmarks:
icc -m64 -std=c11

(Continued on next page)
SPEC CPU2017 Floating Point Rate Result

Huawei
Huawei XH628 V5 (Intel Xeon Platinum 8170)

SPECrate2017_fp_base = 230
SPECrate2017_fp_peak = 234

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

Test Date: Aug-2018
Hardware Availability: Aug-2018
Software Availability: Mar-2018

Base Compiler Invocation (Continued)

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

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
519.1bm_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

(Continued on next page)
### Huawei

**Huawei XH628 V5 (Intel Xeon Platinum 8170)**

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

### Base Optimization Flags (Continued)

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`

### 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
### Huawei

**Huawei XH628 V5 (Intel Xeon Platinum 8170)**

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

#### SPEC CPU2017 Floating Point Rate Result

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>SPECrate2017_fp_base</th>
<th>SPECrate2017_fp_peak</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>230</td>
<td>234</td>
</tr>
</tbody>
</table>

#### 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 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`

- **510.parest_r**:
  - `-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch`  
  - `-ffinite-math-only -qopt-mem-layout-trans=3`

**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**:
  - `basepeak = yes`

- **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`

(Continued on next page)
Huawei

Huawei XH628 V5 (Intel Xeon Platinum 8170)

SPECrate2017_fp_base = 230
SPECrate2017_fp_peak = 234

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

Test Date: Aug-2018
Hardware Availability: Aug-2018
Software Availability: Mar-2018

Peak Optimization Flags (Continued)

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

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

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