SPEC® CPU2017 Floating Point Rate Result

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Huawei

Huawei CH225 V5 (Intel Xeon Gold 6140)

<table>
<thead>
<tr>
<th>SPECrate2017_fp_base</th>
<th>194</th>
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<tbody>
<tr>
<td>SPECrate2017_fp_peak</td>
<td>198</td>
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</tbody>
</table>

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

Tested by: Huawei
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
File System: xfs
System State: Run level 3 (multi-user)
Base Pointers: 64-bit
Peak Pointers: 64-bit
Other: None

Hardware
CPU Name: Intel Xeon Gold 6140
Max MHz.: 3700
Nominal: 2300
Enabled: 36 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: 24.75 MB I+D on chip per chip
Other: None
Memory: 768 GB (24 x 32 GB 2Rx4 PC4-2666V-R)
Storage: 1 x 1200 GB SAS, 10000 RPM
Other: None

503.bwaves_r  72
507.cactuBSSN_r  72
508.namd_r  72
510.parest_r  72
511.povray_r  72
519.lbm_r  72
521.wrf_r  72
526.blender_r  72
527.cam4_r  72
538.imagick_r  72
544.nab_r  72
549.fotonik3d_r  72
554.roms_r  72

0 20.0 40.0 60.0 80.0 100 120 140 160 180 200 220 240 260 280 300 320 340 360 380 400 420 440 460 480
Copies

SPECrate2017_fp_base (194)
SPECrate2017_fp_peak (198)
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### Results Table

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<td>526.blender_r</td>
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<td>538.imagick_r</td>
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<td>379</td>
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<td>544.nab_r</td>
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<td>1316</td>
<td>86.9</td>
<td>1314</td>
<td>87.1</td>
</tr>
</tbody>
</table>

### 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.
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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 Sun Oct  7 16:42:07 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) Gold 6140 CPU @ 2.30GHz
  2. "physical id"s (chips)
  72 "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 : 18
siblings : 36
physical 0: cores 0 1 2 3 4 8 9 10 11 16 17 18 19 20 24 25 26 27
physical 1: cores 0 1 2 3 4 8 9 10 11 16 17 18 19 20 24 25 26 27

From lscpu:
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 72
On-line CPU(s) list: 0-71
Thread(s) per core: 2
Core(s) per socket: 18
Socket(s): 2
NUMA node(s): 4
Vendor ID: GenuineIntel
CPU family: 6
Model: 85
Model name: Intel(R) Xeon(R) Gold 6140 CPU @ 2.30GHz
Stepping: 4

(Continued on next page)
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Tested by: Huawei

Platform Notes (Continued)

CPU MHz: 2300.000
BogoMIPS: 4600.00
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 25344K
NUMA node0 CPU(s): 0-2, 5, 6, 9, 10, 14, 15, 36-38, 41, 42, 45, 46, 50, 51
NUMA node1 CPU(s): 3, 4, 7, 8, 11-13, 16, 17, 39, 40, 43, 44, 47-49, 52, 53
NUMA node2 CPU(s): 18-20, 23, 24, 27, 28, 32, 33, 54-56, 59, 60, 63, 64, 68, 69
NUMA node3 CPU(s): 21, 22, 25, 26, 29-31, 34, 35, 37, 57, 58, 61, 62, 65-67, 70, 71
Flags: fpu vme de pse mce 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 nopl xtopology nonstop_tsc aperfmperf 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 ifl6c rdrand lahf_lm abm 3dnowprefetch epb cat_l3 cdp_l3 invpcid_single intel_pt spec_ctrl ibpb_support tpr_shadow vmx flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2  crms invpcid rtms cmx mxp rdt_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 pni pts

/proc/cpuinfo cache data
cache size: 25344 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 5 6 9 10 14 15 36 37 38 41 42 45 46 50 51
node 0 size: 194741 MB
node 0 free: 190065 MB
node 1 cpus: 3 4 7 8 11 12 13 16 17 39 40 43 44 47 48 49 52 53
node 1 size: 196608 MB
node 1 free: 191793 MB
node 2 cpus: 18 19 20 23 24 27 28 32 33 54 55 56 59 60 63 64 68 69
node 2 size: 196608 MB
node 2 free: 188996 MB
node 3 cpus: 21 22 25 26 29 30 31 34 35 57 58 61 62 65 66 67 70 71
node 3 size: 196608 MB
node 3 free: 192162 MB
node distances:
node 0 1 2 3
0: 10 11 21 21
1: 11 10 21 21
2: 21 21 10 11
3: 21 21 11 10

(Continued on next page)
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**SPECrater2017_fp_base = 194**

**SPECrater2017_fp_peak = 198**

CPU2017 License: 3175
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**Platform Notes (Continued)**

- From /proc/meminfo
  - MemTotal: 790510360 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)

- 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 Oct 6 23:05

- SPEC is set to: /spec2017
  - Filesystem Type Size Used Avail Use% Mounted on
  - /dev/sda2 xfs 720G 123G 597G 18% /

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

(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
```

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**Test Sponsor**: Huawei

**Test Date**: Oct-2018

**Hardware Availability**: Jul-2017

**Tested by**: Huawei

**Software Availability**: Mar-2018

---

**Compiler Version Notes (Continued)**

```plaintext

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

-------------------------------------------------------------------------
CC  511.povray_r(base) 526.blender_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.

-------------------------------------------------------------------------
CC  511.povray_r(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.

-------------------------------------------------------------------------
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

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```
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Compiler Version Notes (Continued)

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)
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ifort (IFORT) 18.0.2 20180210
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
---
CC 521.wrf_r(base) 527.cam4_r(base)
---
ifort (IFORT) 18.0.2 20180210
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icc (ICC) 18.0.2 20180210
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icc (ICC) 18.0.2 20180210
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---

Base Compiler Invocation

C benchmarks:
icc -m64 -std=c11

C++ benchmarks:
icpc -m64

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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 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.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 -03 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=3

C++ benchmarks:
-xCORE-AVX2 -ipo -03 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=3

Fortran benchmarks:
-xCORE-AVX2 -ipo -03 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=3 -auto -nostandard-realloc-lhs

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</table>

### 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`  
- `-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

### Peak Optimization Flags

C benchmarks:

(Continued on next page)
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</tr>
</tbody>
</table>

**Peak Optimization Flags (Continued)**

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: basepeak = yes

544.nab_r: basepeak = yes

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: 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_f: 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++:

-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=3 -auto -nostandard-realloc-lhs
Huawei

Huawei CH225 V5 (Intel Xeon Gold 6140)

SPECrate2017_fp_base = 194
SPECrate2017_fp_peak = 198

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

Test Date: Oct-2018
Hardware Availability: Jul-2017
Software Availability: Mar-2018

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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For questions about this result, please contact the tester. For other inquiries, please contact info@spec.org.

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