SPEC® CPU2017 Floating Point Rate Result

Huawei
Huawei XH321 V5 (Intel Xeon Silver 4208)

<table>
<thead>
<tr>
<th>SPECrate2017_fp_base</th>
<th>80.1</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECrate2017_fp_peak</td>
<td>Not Run</td>
</tr>
</tbody>
</table>

CPU2017 License: 3175  
Test Sponsor: Huawei  
Tested by: Huawei  
Test Date: Oct-2018  
Hardware Availability: Apr-2019  
Software Availability: Dec-2018

### Hardware

- **CPU Name:** Intel Xeon Silver 4208
- **Max MHz:** 3200
- **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
- **L2:** 1 MB I+D on chip per core
- **L3:** 11 MB I+D on chip per chip
- **Memory:** 384 GB (12 x 32 GB 2Rx4 PC4-2933Y-R, running at 2400)
- **Storage:** 1 x 1800 GB SAS, 10000 RPM
- **Other:** None

### Software

- **OS:** SUSE Linux Enterprise Server 12 SP4 (x86_64)  
  4.12.14-94.41-default
- **Compiler:** C/C++: Version 19.0.1.144 of Intel C/C++  
  Compiler Build 20181018 for Linux;  
  Fortran: Version 19.0.1.144 of Intel Fortran  
  Compiler Build 20181018 for Linux
- **Parallel:** No
- **Firmware:** Version 6.52 Released Mar-2019
- **File System:** xfs
- **System State:** Run level 3 (multi-user)
- **Base Pointers:** 64-bit
- **Peak Pointers:** Not Applicable
- **Other:** None

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![Graph](image-url)
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Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Copies</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Base Copies</th>
<th>Seconds</th>
<th>Ratio</th>
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</thead>
<tbody>
<tr>
<td>503.bwaves_r</td>
<td>32</td>
<td>1505</td>
<td>213</td>
<td>1506</td>
<td>213</td>
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<tr>
<td>507.cactuBSSN_r</td>
<td>32</td>
<td>599</td>
<td>67.7</td>
<td>598</td>
<td>67.8</td>
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<tr>
<td>508.namd_r</td>
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<td>523</td>
<td>58.1</td>
<td>516</td>
<td>58.9</td>
<td>518</td>
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<td>510.parest_r</td>
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<td>806</td>
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<td>809</td>
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<tr>
<td>519.lbm_r</td>
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<td>717</td>
<td>47.0</td>
<td>712</td>
<td>47.4</td>
<td>718</td>
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<td>521.wrf_r</td>
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<tr>
<td>526.blender_r</td>
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<td>85.0</td>
<td>574</td>
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<td>527.cam4_r</td>
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<td>538.imagick_r</td>
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<td>544.nab_r</td>
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<td>421</td>
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<td>554.roms_r</td>
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<td>38.5</td>
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<td>38.9</td>
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</tr>
</tbody>
</table>

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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:
LD_LIBRARY_PATH = "/spec2017/lib/ia32:/spec2017/lib/intel64"

Binaries compiled on a system with 1x Intel Core i9-7900X 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
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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: r5974 of 2018-05-19 9bced8f2999c33d61f64985e45859ea9
running on spec2 Mon Oct 1 19:49:05 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 4208 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 4208 CPU @ 2.10GHz
Stepping: 6
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Hardware Availability: Apr-2019
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Platform Notes (Continued)

CPU MHz: 2100.000
CPU max MHz: 3200.0000
CPU min MHz: 800.0000
BogoMIPS: 4200.00
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 cpuid
agpfmaperf pni pclmulqdq dtes64 ds_cpl vmx smx est tm2 ssse3 sdbg fma cx16 xtpr pdcm
pcid dca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave avx f16c
rdram lahf_lm abm 3dnowprefetch cpuid_fault ebpx cat_13 cdp_13 invpcid_single ssbd
mba ibrs ibpb stibp tpr_shadow vnmi flexpriority ept vpid fsgsbase tsc_adjust bmul
hle avx2 smep bmi2 erms invpcid rtm cqm mpx rdt_a avx512f avx512dq rdseed adx smap
cflushopt clwb intel_pt avx512cd avx512bw avx512vl xsaveopt xsavec xgetbv1 xsaves
cqm_llc cqm_occup_llc cqm_mbb_total cqm_mbb_local dtherm ida arat pln pts pku ospe
avx512_vnni flush_l1d arch_capabilities

/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: 192848 MB
  node 0 free: 191897 MB
  node 1 cpus: 8 9 10 11 12 13 14 15 24 25 26 27 28 29 30 31
  node 1 size: 193279 MB
  node 1 free: 192165 MB
  node distances:
    node 0 1
      0: 10 21
      1: 21 10

From /proc/meminfo
  MemTotal: 395395008 kB
  HugePages_Total: 0
  Hugepagesize: 2048 kB

From /etc/*release* /etc/*version*
  SuSE-release:

(Continued on next page)
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Platform Notes (Continued)

SUSE Linux Enterprise Server 12 (x86_64)
VERSION = 12
PATCHLEVEL = 4
# This file is deprecated and will be removed in a future service pack or release.
# Please check /etc/os-release for details about this release.

```
NAME="SLES"
VERSION="12-SP4"
VERSION_ID="12.4"
PRETTY_NAME="SUSE Linux Enterprise Server 12 SP4"
ID="sles"
ANSI_COLOR="0;32"
CPE_NAME="cpe:/o:suse:sles:12:sp4"
```

```
uname -a:
x86_64 x86_64 GNU/Linux
```

Kernel self-reported vulnerability status:

CVE-2017-5754 (Meltdown): Not affected
CVE-2017-5753 (Spectre variant 1): Mitigation: __user pointer sanitization
CVE-2017-5715 (Spectre variant 2): Mitigation: Indirect Branch Restricted Speculation, IBPB, IBRS_FW

```
runc-level 3 Oct 1 14:33
```

```
SPEC is set to: /spec2017
```

```
Filesystem Type Size Used Avail Use% Mounted on
/dev/sda2 xfs 1.7T 11G 1.7T 1% /
```

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. 6.52 03/16/2019
Memory:
  4x NO DIMM NO DIMM
  12x Samsung M393A4K40CB2-CVF 32 GB 2 rank 2933, configured at 2400
```

(End of data from sysinfo program)

Compiler Version Notes

==============================================================================
CC  519.lbm_r(base) 538.imagick_r(base) 544.nab_r(base)
(Continued on next page)
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### Compiler Version Notes (Continued)

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Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,  
Version 19.0.1.144 Build 20181018  
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CXXC 508.namd_r(base) 510.parest_r(base)

---

Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64,  
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Copyright (C) 1985-2018 Intel Corporation. All rights reserved.

CC 511.povray_r(base) 526.blender_r(base)

---

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Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,  
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FC 507.cactuBSSN_r(base)

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Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64,  
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Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,  
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Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R) 64,  
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Copyright (C) 1985-2018 Intel Corporation. All rights reserved.

---

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

---

Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R) 64,  
Version 19.0.1.144 Build 20181018  
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
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Compiler Version Notes (Continued)

Intel (R) Fortran Intel (R) 64 Compiler for applications running on Intel (R)
64, Version 19.0.1.144 Build 20181018
Copyright (C) 1985–2018 Intel Corporation. All rights reserved.
Intel (R) C Intel (R) 64 Compiler for applications running on Intel (R) 64,
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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

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.ibm_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

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Base Portability Flags (Continued)

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=4

C++ benchmarks:
-xCORE-AVX2 -ipo -03 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=4

Fortran benchmarks:
-xCORE-AVX2 -ipo -03 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=4 -auto -nostandard-realloc-lhs
-align array32byte

Benchmarks using both Fortran and C:
-xCORE-AVX2 -ipo -03 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=4 -auto -nostandard-realloc-lhs
-align array32byte

Benchmarks using both C and C++:
-xCORE-AVX2 -ipo -03 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=4

Benchmarks using Fortran, C, and C++:
-xCORE-AVX2 -ipo -03 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=4 -auto -nostandard-realloc-lhs
-align array32byte

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/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.

Tested with SPEC CPU2017 v1.0.5 on 2018-10-01 19:49:04-0400.