Huawei

Huawei CH225 V5 (Intel Xeon Silver 4110)

SPECspeed2017_fp_base = 63.6
SPECspeed2017_fp_peak = 64.2

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

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

<table>
<thead>
<tr>
<th>Software</th>
<th>Hardware</th>
</tr>
</thead>
<tbody>
<tr>
<td>OS: Red Hat Enterprise Linux Server release 7.4 (Maipo) 3.10.0-693.11.6.el7.x86_64</td>
<td>CPU Name: Intel Xeon Silver 4110</td>
</tr>
<tr>
<td>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</td>
<td>Max MHz.: 3000</td>
</tr>
<tr>
<td>Parallel: Yes</td>
<td>Nominal: 2100</td>
</tr>
<tr>
<td>Firmware: Version 0.80 Released Jun-2018</td>
<td>Enabled: 16 cores, 2 chips, 2 threads/core</td>
</tr>
<tr>
<td>File System: xfs</td>
<td>Orderable: 1,2 chips</td>
</tr>
<tr>
<td>System State: Run level 3 (multi-user)</td>
<td>Cache L1: 32 KB I + 32 KB D on chip per core</td>
</tr>
<tr>
<td>Base Pointers: 64-bit</td>
<td>L2: 1 MB I-D on chip per core</td>
</tr>
<tr>
<td>Peak Pointers: 64-bit</td>
<td>L3: 11 MB I+D on chip per chip</td>
</tr>
<tr>
<td>Other: None</td>
<td>Other: None</td>
</tr>
</tbody>
</table>

Memory: 768 GB (24 x 32 GB 2Rx4 PC4-2666V-R, running at 2400)

Storage: 1 x 1200 GB SAS, 10000 RPM

Other: jemalloc memory allocator V5.0.1

Threads

<table>
<thead>
<tr>
<th>603.bwaves_s 32</th>
<th>SPECspeed2017_fp_base (63.6)</th>
</tr>
</thead>
<tbody>
<tr>
<td>607.cactuBSSN_s 32</td>
<td></td>
</tr>
<tr>
<td>619.lbm_s 32</td>
<td></td>
</tr>
<tr>
<td>621.wrf_s 32</td>
<td></td>
</tr>
<tr>
<td>627.cam4_s 32</td>
<td></td>
</tr>
<tr>
<td>628.pop2_s 32</td>
<td></td>
</tr>
<tr>
<td>638.imagick_s 32</td>
<td></td>
</tr>
<tr>
<td>644.nab_s 32</td>
<td></td>
</tr>
<tr>
<td>649.fotonik3d_s 32</td>
<td></td>
</tr>
<tr>
<td>654.roms_s 32</td>
<td></td>
</tr>
</tbody>
</table>

---

SPEC® CPU2017 Floating Point Speed Result
Copyright 2017-2018 Standard Performance Evaluation Corporation

---
Huawei

Huawei CH225 V5 (Intel Xeon Silver 4110)

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Base Seconds</th>
<th>Ratio</th>
<th>Base Seconds</th>
<th>Ratio</th>
<th>Base Seconds</th>
<th>Ratio</th>
<th>Peak Seconds</th>
<th>Ratio</th>
<th>Peak Seconds</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>603.bwaves_s</td>
<td>32</td>
<td>186</td>
<td>317</td>
<td>186</td>
<td>317</td>
<td>186</td>
<td>317</td>
<td>32</td>
<td></td>
<td>186</td>
<td>317</td>
</tr>
<tr>
<td>607.cactuBSSN_s</td>
<td>32</td>
<td>205</td>
<td>81.4</td>
<td>204</td>
<td>81.7</td>
<td>204</td>
<td>81.8</td>
<td>32</td>
<td></td>
<td>205</td>
<td>81.4</td>
</tr>
<tr>
<td>619.lbm_s</td>
<td>32</td>
<td>163</td>
<td>32.1</td>
<td>163</td>
<td>32.2</td>
<td>164</td>
<td>32.0</td>
<td>32</td>
<td></td>
<td>163</td>
<td>32.1</td>
</tr>
<tr>
<td>621.wrf_s</td>
<td>32</td>
<td>248</td>
<td>53.4</td>
<td>245</td>
<td>53.9</td>
<td>246</td>
<td>53.7</td>
<td>32</td>
<td></td>
<td>234</td>
<td>56.5</td>
</tr>
<tr>
<td>627.cam4_s</td>
<td>32</td>
<td>209</td>
<td>42.4</td>
<td>210</td>
<td>42.3</td>
<td>209</td>
<td>42.4</td>
<td>32</td>
<td></td>
<td>208</td>
<td>42.5</td>
</tr>
<tr>
<td>628.pop2_s</td>
<td>32</td>
<td>262</td>
<td>45.4</td>
<td>263</td>
<td>45.2</td>
<td>264</td>
<td>44.9</td>
<td>32</td>
<td></td>
<td>250</td>
<td>47.4</td>
</tr>
<tr>
<td>638.imagick_s</td>
<td>32</td>
<td>357</td>
<td>40.4</td>
<td>357</td>
<td>40.4</td>
<td>356</td>
<td>40.5</td>
<td>32</td>
<td></td>
<td>357</td>
<td>40.4</td>
</tr>
<tr>
<td>644.nab_s</td>
<td>32</td>
<td>183</td>
<td>95.4</td>
<td>184</td>
<td>94.8</td>
<td>185</td>
<td>94.7</td>
<td>32</td>
<td></td>
<td>183</td>
<td>95.4</td>
</tr>
<tr>
<td>649.fotonik3d_s</td>
<td>32</td>
<td>170</td>
<td>53.8</td>
<td>169</td>
<td>54.0</td>
<td>170</td>
<td>53.8</td>
<td>32</td>
<td></td>
<td>170</td>
<td>53.8</td>
</tr>
<tr>
<td>654.roms_s</td>
<td>32</td>
<td>257</td>
<td>61.3</td>
<td>257</td>
<td>61.3</td>
<td>255</td>
<td>61.7</td>
<td>32</td>
<td></td>
<td>256</td>
<td>61.5</td>
</tr>
</tbody>
</table>

SPECspeed2017_fp_base = 63.6
SPECspeed2017_fp_peak = 64.2

Results Table

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:
KMP_AFFINITY = "granularity=fine,compact"
OMP_STACKSIZE = "192M"

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
Yes: The test sponsor attests, as of date of publication, that CVE-2017-5754 (Meltdown) is mitigated in the system as tested and documented.
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.
jemalloc, a general purpose malloc implementation built with the RedHat Enterprise 7.5, and the system compiler gcc 4.8.5
Huawei

Huawei CH225 V5 (Intel Xeon Silver 4110)

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

SPECspeed2017_fp_base = 63.6
SPECspeed2017_fp_peak = 64.2

Platform Notes

BIOS configuration:
Power Policy Set to Load Balance
XPT Prefetch Set to Enabled
Sysinfo program /spec2017/bin/sysinfo
Rev: r5797 of 2017-06-14 96c45e4568ad54c135fd618bccc091c0f
running on localhost.localdomain Mon Sep 3 01:41:53 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
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: 2101.000
CPU max MHz: 2101.0000
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

(Continued on next page)
Platform Notes (Continued)

NUMA node 1 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 nopl xtopology nonstop_tsc
aperfmpref eagerfpu pni pclmulqdq dtes64 ds_cpl vmx smx est tm2 ssse3 fma cx16 xtpr
pdcm pclid dca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave avx
f16c rdrand lahf_lm abm 3nowprefetch epb cat_l3 cdp_l3 invpcid_single intel_pt
spec_ctrl ibpb_support tpr_shadow vmn flexpriority ept vpid fsgsbase tsc_adjust
bm1 hle avx2 smep bmi2 erts invpcid rtm cqm mpx rt_d_a avx512f avx512dq rdseed adx
smap clflushopt clwb avx512cd avx512bw avx512vl xsaveopt xsaves xgetbv1 cqm_llc
cqm_occop_1lc cqm_mbm_total cqm_mbm_local dtherm ida arat p1n pts

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: 380395 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: 376306 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"
        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

    (Continued on next page)
Huawei

Huawei CH225 V5 (Intel Xeon Silver 4110)

**SPECspeed2017_fp_base** = 63.6

**SPECspeed2017_fp_peak** = 64.2

<table>
<thead>
<tr>
<th>CPU2017 License</th>
<th>Test Date</th>
<th>Test Sponsor</th>
<th>Hardware Availability</th>
<th>Tested by</th>
<th>Software Availability</th>
</tr>
</thead>
<tbody>
<tr>
<td>3175</td>
<td>Sep-2018</td>
<td>Huawei</td>
<td>Jul-2017</td>
<td>Huawei</td>
<td>Mar-2018</td>
</tr>
</tbody>
</table>

### Platform Notes (Continued)

```
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 2 17:39

SPEC is set to: /spec2017
    Filesystem  Type  Size  Used Avail Use% Mounted on
    /dev/sda2    xfs   720G   66G  655G  10% /

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   619.lbm_s(base) 638.imagick_s(base, peak) 644.nab_s(base, peak)
------------------------------------------------------------------------------
icc (ICC) 18.0.2 20180210
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------

==============================================================================
CC   619.lbm_s(peak)
------------------------------------------------------------------------------
icc (ICC) 18.0.2 20180210
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------

==============================================================================
FC   607.cactuBSSN_s(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.
```

(Continued on next page)
Huawei

Huawei CH225 V5 (Intel Xeon Silver 4110)

SPECspeed2017_fp_base = 63.6
SPECspeed2017_fp_peak = 64.2

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

Compiler Version Notes (Continued)

------------------------------------------------------------------------------
FC  603.bwaves_s(base) 649.fotonik3d_s(base) 654.roms_s(base, peak)
------------------------------------------------------------------------------
ifort (IFORT) 18.0.2 20180210
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------
FC  603.bwaves_s(peak) 649.fotonik3d_s(peak)
------------------------------------------------------------------------------
ifort (IFORT) 18.0.2 20180210
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------
CC  621.wrf_s(base) 627.cam4_s(base, peak) 628.pop2_s(base)
------------------------------------------------------------------------------
ifort (IFORT) 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.
------------------------------------------------------------------------------
CC  621.wrf_s(peak) 628.pop2_s(peak)
------------------------------------------------------------------------------
ifort (IFORT) 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.
------------------------------------------------------------------------------

Base Compiler Invocation

C benchmarks:
icc -m64 -std=c11

Fortran benchmarks:
ifort -m64

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

(Continued on next page)
# SPEC CPU2017 Floating Point Speed Result

## Huawei

<table>
<thead>
<tr>
<th>Huawei CH225 V5 (Intel Xeon Silver 4110)</th>
<th>SPECspeed2017_fp_base = 63.6</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SPECspeed2017_fp_peak = 64.2</td>
</tr>
</tbody>
</table>

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

### Base Compiler Invocation (Continued)

Benchmarks using Fortran, C, and C++:

```bash
icpc -m64 icc -m64 -std=c11 ifort -m64
```

### Base Portability Flags

- 603.bwaves_s: -DSPEC_LP64
- 607.cactuBSSN_s: -DSPEC_LP64
- 619.lbm_s: -DSPEC_LP64
- 621.wrf_s: -DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian -assume byterecl
- 627.cam4_s: -DSPEC_LP64 -DSPEC_CASE_FLAG
- 628.pop2_s: -DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian -assume byterecl
- 638.imagick_s: -DSPEC_LP64
- 644.nab_s: -DSPEC_LP64
- 649.fotonik3d_s: -DSPEC_LP64
- 654.roms_s: -DSPEC_LP64

### Base Optimization Flags

**C benchmarks:**

```bash
-W1,-z,muldefs -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=3 -gopenmp -DSPEC_OPENMP
-L/usr/local/je5.0.1-64/lib -ljemalloc
```

**Fortran benchmarks:**

```bash
-W1,-z,muldefs -DSPEC_OPENMP -xCORE-AVX2 -ipo -O3 -no-prec-div
-qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=3 -gopenmp
-nostandard-realloc-lhs -L/usr/local/je5.0.1-64/lib -ljemalloc
```

**Benchmarks using both Fortran and C:**

```bash
-W1,-z,muldefs -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=3 -gopenmp -DSPEC_OPENMP
-nostandard-realloc-lhs -L/usr/local/je5.0.1-64/lib -ljemalloc
```

**Benchmarks using Fortran, C, and C++:**

```bash
-W1,-z,muldefs -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=3 -gopenmp -DSPEC_OPENMP
-nostandard-realloc-lhs -L/usr/local/je5.0.1-64/lib -ljemalloc
```
Huawei CH225 V5 (Intel Xeon Silver 4110)

SPECspeed2017_fp_base = 63.6
SPECspeed2017_fp_peak = 64.2

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

Peak Compiler Invocation

C benchmarks:
icc -m64 -std=c11

Fortran benchmarks:
ifort -m64

Benchmarks using both Fortran and C:
ifort -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:
619.lbm_s: basepeak = yes
638.imagick_s: basepeak = yes
644.nab_s: basepeak = yes

Fortran benchmarks:
603.bwaves_s: basepeak = yes
649.fotonik3d_s: basepeak = yes
654.roms_s: -DSPEC_OPENMP -xCORE-AVX2 -ipo -O3 -no-prec-div
-qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=3
-qopenmp -nostandard-realloc-lhs

Benchmarks using both Fortran and C:
621.wrf_s: -prof-gen(pass 1) -prof-use(pass 2) -O2 -xCORE-AVX2
-qopt-prefetch -ipo -O3 -ffinite-math-only -no-prec-div
-qopt-mem-layout-trans=3 -DSPEC_SUPPRESS_OPENMP -qopenmp
-DSPEC_OPENMP -nostandard-realloc-lhs

(Continued on next page)
Huawei CH225 V5 (Intel Xeon Silver 4110)

SPECspeed2017_fp_base = 63.6
SPECspeed2017_fp_peak = 64.2

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

Peak Optimization Flags (Continued)

627.cam4_s: -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=3 -qopenmp
-DSPEC_OPENMP -nostandard-realloc-lhs

628.pop2_s: Same as 621.wrf_s

Benchmarks using Fortran, C, and C++:
607.cactuBSSN_s: 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

SPEC is a registered trademark of the Standard Performance Evaluation Corporation. All other brand and product names appearing in this result are trademarks or registered trademarks of their respective holders.

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

Tested with SPEC CPU2017 v1.0.2 on 2018-09-03 01:41:52-0400.
Originally published on 2018-10-02.