Huawei

Huawei CH225 V5 (Intel Xeon Silver 4112)

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

### SPECspeed2017_fp_base = 43.1

<table>
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<tr>
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<th>Hardware</th>
</tr>
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<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 4112 Max MHz.: 3000 Nominal: 2600 Enabled: 8 cores, 2 chips 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: 8.25 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</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>OS: Red Hat Enterprise Linux Server release 7.4 (Maipo) 3.10.0-693.11.6.el7.x86_64</td>
</tr>
<tr>
<td>Firmware: Version 0.80 Released Jun-2018</td>
<td>System State: Run level 3 (multi-user) Base Pointers: 64-bit Peak Pointers: 64-bit Other: jemalloc memory allocator V5.0.1</td>
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### SPECspeed2017_fp_peak = 44.0

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Huawei
Huawei CH225 V5 (Intel Xeon Silver 4112)

SPECspeed2017_fp_base = 43.1
SPECspeed2017_fp_peak = 44.0

Results Table

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<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
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<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
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<td>607.cactuBSSN_s</td>
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<td>315</td>
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<td>627.cam4_s</td>
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<td>649.fotonik3d_s</td>
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<td>51.4</td>
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<tr>
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<td>388</td>
<td>40.5</td>
<td>389</td>
<td>40.4</td>
</tr>
</tbody>
</table>

Results appear in the order in which they were run. Bold underlined text indicates a median measurement.

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.
Huawei

Huawei CH225 V5 (Intel Xeon Silver 4112)

<table>
<thead>
<tr>
<th>SPECspeed2017_fp_base = 43.1</th>
<th>SPECspeed2017_fp_peak = 44.0</th>
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</thead>
</table>

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

Platform Notes

BIOS configuration:
Power Policy Set to Load Balance
Hyper-Threading Set to Disable
XPT Prefetch Set to Enabled
Sysinfo program /spec2017/bin/sysinfo
Rev: r5797 of 2017-06-14 96c45e4568ad54c135fd618b8cc091c0f
running on localhost.localdomain Tue Aug 28 18:19:27 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 4112 CPU @ 2.60GHz
        2 "physical id"s (chips)
        8 "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: 4
    siblings: 4
    physical 0: cores 0 1 4 5
    physical 1: cores 0 2 3 4

From lscpu:
    Architecture: x86_64
    CPU op-mode(s): 32-bit, 64-bit
    Byte Order: Little Endian
    CPU(s): 8
    On-line CPU(s) list: 0-7
    Thread(s) per core: 1
    Core(s) per socket: 4
    Socket(s): 2
    NUMA node(s): 2
    Vendor ID: GenuineIntel
    CPU family: 6
    Model: 85
    Model name: Intel(R) Xeon(R) Silver 4112 CPU @ 2.60GHz
    Stepping: 4
    CPU MHz: 2601.000
    CPU max MHz: 2601.0000
    CPU min MHz: 800.0000
    BogoMIPS: 5200.00
    Virtualization: VT-x
    L1d cache: 32K
    L1i cache: 32K
    L2 cache: 1024K
    L3 cache: 8448K
Huawei

Huawei CH225 V5 (Intel Xeon Silver 4112)

SPECspeed2017_fp_base = 43.1
SPECspeed2017_fp_peak = 44.0

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

Platform Notes (Continued)

NUMA node0 CPU(s): 0-3
NUMA node1 CPU(s): 4-7
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 pdpellgb rdtscp
lm constant_tsc art arch_perfmon pebs bts rep_good ntopology nonstop_tsc
aperfmrperf eagerfpu pni pclmulqdq dtes64 msr cx16 xtpr
pdcm pcid dca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave avx
f16c rdrand lahf_lm abm 3dnowprefetch epb cat_l3 cdp_l3 invpcid_single intel_pt
spec_ctrl lbbp_support tpr_shadow vnmi flexpriority ept vpid fsqsvbase tsc_adjust
bm1 hle avx2 smep bmi2 ets invpcid rtm cqm mpx rdt_a avx512f avx512dq rdseed adx
smap clflushopt clwb avx512cd avx512bw avx512vl xsaveopt xsavec xgetbv1 cqm_1lc
cqm_occup_llc cqm_mbm_total cqm_mbm_local dtherm ida arat pln pts

/proc/cpuinfo cache data
    cache size : 8448 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
        node 0 size: 194741 MB
        node 0 free: 184034 MB
        node 1 cpus: 4 5 6 7
        node 1 size: 196608 MB
        node 1 free: 189770 MB
        node distances:
            node 0 1
            0: 10 21
            1: 21 10

From /proc/meminfo
    MemTotal: 394175288 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)

(Continued on next page)
Huawei

Huawei CH225 V5 (Intel Xeon Silver 4112)

SPECspeed2017_fp_base = 43.1
SPECspeed2017_fp_peak = 44.0

Platform Notes (Continued)

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 28 11:26

SPEC is set to: /spec2017

Filesystem Type Size Used Avail Use% Mounted on
/dev/mapper/rhel-root xfs 409G 25G 385G 6% /

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 M393A2K43BB1-CTD 16 GB 2 rank 2666, configured at 2400

(End of data from sysinfo program)

Compiler Version Notes

==============================================================================
<table>
<thead>
<tr>
<th>CC   619.lbm_s(base) 638.imagick_s(base, peak) 644.nab_s(base, peak)</th>
</tr>
</thead>
<tbody>
<tr>
<td>icc (ICC) 18.0.2 20180210</td>
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<tr>
<td>Copyright (C) 1985-2018 Intel Corporation. All rights reserved.</td>
</tr>
<tr>
<td>----------------------------------------------------------------------------</td>
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<tr>
<td>FC   607.cactuBSSN_s(base, peak)</td>
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<tr>
<td>ifort (IFORT) 18.0.2 20180210</td>
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(Continued on next page)
## Huawei CH225 V5 (Intel Xeon Silver 4112)

| SPECspeed2017_fp_base | 43.1 |
| SPECspeed2017_fp_peak  | 44.0 |

### Compiler Version Notes (Continued)

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

==============================================================================
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)
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CC  621.wrf_s(peak)  628.pop2_s(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.
```

### 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
  ```
Huawei

Huawei CH225 V5 (Intel Xeon Silver 4112)

**SPECspeed2017_fp_base** = 43.1

**SPECspeed2017_fp_peak** = 44.0

**CPU2017 License:** 3175

**Test Sponsor:** Huawei

**Test Date:** Aug-2018

**Hardware Availability:** Jul-2017

**Tested by:** Huawei

**Software Availability:** Mar-2018

### Base Compiler Invocation (Continued)

Benchmarks using Fortran, C, and C++:

```
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
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:**

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

**Fortran benchmarks:**

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

Benchmarks using both Fortran and C:

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

Benchmarks using Fortran, C, and C++:

```
-W1,-z,muldefs -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=3 -qopenmp -DSPEC_OPENMP
-nostandard-realloc-lhs -L/usr/local/je5.0.1-64/lib -ljemalloc
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| Test Sponsor:    | Huawei     |
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| Test Date:       | Aug-2018   |
| Hardware Availability: | Jul-2017 |
| Software Availability: | Mar-2018 |

### Peak Compiler Invocation

C benchmarks:

```shell
icc -m64 -std=c11
```

Fortran benchmarks:

```shell
ifort -m64
```

Benignmarks using both Fortran and C:

```shell
ifort -m64 icc -m64 -std=c11
```

Benignmarks using Fortran, C, and C++:

```shell
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: -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch
  -ffinite-math-only -qopt-mem-layout-trans=3 -qopenmp
  -DSPEC_OPENMP
- 644.nab_s: basepeak = yes

Fortran benchmarks:

- 603.bwaves_s: -prof-gen(pass 1) -prof-use(pass 2) -DSPEC.Suppress_OPENMP
  -DSPEC_OPENMP -O2 -xCORE-AVX2 -qopt-prefetch -ipo -O3
  -ffinite-math-only -no-prec-div -qopt-mem-layout-trans=3
  -qopenmp -nostandard-realloc-lhs
- 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

(Continued on next page)
## Huawei

**Huawei CH225 V5 (Intel Xeon Silver 4112)**

### SPEC CPU2017 Floating Point Speed Result

<table>
<thead>
<tr>
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<th>SPECspeed2017_fp_peak</th>
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<td>Software Availability:</td>
<td>Mar-2018</td>
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</tbody>
</table>

### Peak Optimization Flags (Continued)

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`
- 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:


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