## Huawei 2288H V5 (Intel Xeon Silver 4108)

<table>
<thead>
<tr>
<th>SPECspeed2017_int_base</th>
<th>SPECspeed2017_int_peak</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.86</td>
<td>7.11</td>
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<tr>
<th><strong>CPU2017 License:</strong></th>
<th>3175</th>
</tr>
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<tbody>
<tr>
<td><strong>Test Date:</strong></td>
<td>Aug-2018</td>
</tr>
<tr>
<td><strong>Hardware Availability:</strong></td>
<td>Jul-2017</td>
</tr>
<tr>
<td><strong>Software Availability:</strong></td>
<td>Jan-2018</td>
</tr>
</tbody>
</table>

### Hardware

- **CPU Name:** Intel Xeon Silver 4108
- **Max MHz.:** 3000
- **Nominal:** 1800
- **Enabled:** 16 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:** 11 MB I+D on chip per chip
- **Other:** None
- **Memory:** 768 GB (24 x 32 GB 2Rx4 PC4-2666V-R, running at 2400)
- **Storage:** 1 x 1200 GB SAS, 10000 RPM
- **Other:** None

### Software

- **OS:** Red Hat Enterprise Linux Server release 7.4 (Maipo) 3.10.0-693.11.6.el7.x86_64
- **Compiler:** C/C++: Version 18.0.0.128 of Intel C/C++ Compiler for Linux; Fortran: Version 18.0.0.128 of Intel Fortran Compiler for Linux
- **Parallel:** Yes
- **Firmware:** Version 0.81 Released Jul-2018
- **File System:** xfs
- **System State:** Run level 3 (multi-user)
- **Base Pointers:** 64-bit
- **Peak Pointers:** 32/64-bit
- **Other:** jemalloc: jemalloc memory allocator library V5.0.1;

### SPEC CPU2017 Integer Speed Result

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>SPECspeed2017_int_base</th>
<th>SPECspeed2017_int_peak</th>
</tr>
</thead>
<tbody>
<tr>
<td>perlbench_s</td>
<td>600</td>
<td>4.86</td>
<td>7.23</td>
</tr>
<tr>
<td>gcc_s</td>
<td>602</td>
<td>3.82</td>
<td>7.52</td>
</tr>
<tr>
<td>mcf_s</td>
<td>605</td>
<td>4.19</td>
<td>9.19</td>
</tr>
<tr>
<td>omnetpp_s</td>
<td>620</td>
<td>4.58</td>
<td>9.19</td>
</tr>
<tr>
<td>xalancbmk_s</td>
<td>623</td>
<td>7.60</td>
<td>8.23</td>
</tr>
<tr>
<td>x264_s</td>
<td>625</td>
<td>9.21</td>
<td></td>
</tr>
<tr>
<td>deepsjeng_s</td>
<td>631</td>
<td>4.27</td>
<td></td>
</tr>
<tr>
<td>leela_s</td>
<td>641</td>
<td>3.49</td>
<td></td>
</tr>
<tr>
<td>exchange2_s</td>
<td>648</td>
<td>10.9</td>
<td></td>
</tr>
<tr>
<td>xz_s</td>
<td>657</td>
<td>15.1</td>
<td></td>
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Huawei 2288H V5 (Intel Xeon Silver 4108)
SPEC CPU2017 Integer Speed Result

Huawei

Huawei 2288H V5 (Intel Xeon Silver 4108)

SPECspeed2017_int_base = 6.86
SPECspeed2017_int_peak = 7.11

Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
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<tr>
<td>600.perlbench_s</td>
<td>16</td>
<td>366</td>
<td><strong>4.86</strong></td>
<td>368</td>
<td>4.82</td>
<td>362</td>
<td>4.90</td>
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<td>602.gcc_s</td>
<td>16</td>
<td>544</td>
<td>7.32</td>
<td>552</td>
<td>7.21</td>
<td><strong>551</strong></td>
<td><strong>7.23</strong></td>
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<tr>
<td>605.mcf_s</td>
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<td>512</td>
<td>9.22</td>
<td><strong>513</strong></td>
<td><strong>9.19</strong></td>
<td>513</td>
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<td>620.omnetpp_s</td>
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<td>389</td>
<td><strong>4.19</strong></td>
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<td>4.20</td>
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<td>623.xalanchmk_s</td>
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<td>7.61</td>
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<tr>
<td>625.x264_s</td>
<td>16</td>
<td>192</td>
<td><strong>9.21</strong></td>
<td>191</td>
<td>9.22</td>
<td>192</td>
<td>9.21</td>
</tr>
<tr>
<td>631.deepsjeng_s</td>
<td>16</td>
<td>335</td>
<td>4.28</td>
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<td>4.27</td>
<td><strong>335</strong></td>
<td><strong>4.27</strong></td>
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<tr>
<td>641.leela_s</td>
<td>16</td>
<td>490</td>
<td>3.48</td>
<td><strong>489</strong></td>
<td><strong>3.49</strong></td>
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<td>3.49</td>
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<tr>
<td>648.exchange2_s</td>
<td>16</td>
<td>271</td>
<td>10.9</td>
<td><strong>270</strong></td>
<td><strong>10.9</strong></td>
<td>269</td>
<td>10.9</td>
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<tr>
<td>657.xz_s</td>
<td>16</td>
<td>409</td>
<td><strong>15.1</strong></td>
<td>407</td>
<td>15.2</td>
<td>410</td>
<td>15.1</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,scatter"
LD_LIBRARY_PATH = "/usr/lib64:/usr/lib:/usr/local/lib64:/usr/local/lib:
OMP_STACKSIZE = "192M"

Binaries compiled on a system with 1x Intel Core i7-4790 CPU + 32GB RAM
memory using Redhat Enterprise Linux 7.4
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
jemalloc: configured and built at default for
32bit (i686) and 64bit (x86_64) targets;
jemalloc: built with the RedHat Enterprise 7.4,
and the system compiler gcc 4.8.5;
jemalloc: sources available from jemalloc.net or
Yes: The test sponsor attests, as of date of publication, that CVE-2017-5754 (Meltdown)
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)
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)
mitigated in the system as tested and documented.
SPEC CPU2017 Integer Speed Result

Huawei
Huawei 2288H V5 (Intel Xeon Silver 4108)

SPECspeed2017_int_base = 6.86
SPECspeed2017_int_peak = 7.11

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

Test Date: Aug-2018
Hardware Availability: Jul-2017
Software Availability: Jan-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 96c45e4568ad54c135fd618bcc091c0f
running on localhost.localdomain Fri Aug 3 00:37:41 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 4108 CPU @ 1.80GHz
2 "physical id"s (chips)
16 "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 : 8
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): 16
On-line CPU(s) list: 0-15
Thread(s) per core: 1
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 4108 CPU @ 1.80GHz
Stepping: 4
CPU MHz: 1801.000
CPU max MHz: 1801.0000
CPU min MHz: 800.0000
BogoMIPS: 3600.00
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 11264K

(Continued on next page)
Huawei 2288H V5 (Intel Xeon Silver 4108)

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CPU2017 License: 3175  
Test Date: Aug-2018  
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Platform Notes (Continued)

NUMA node0 CPU(s): 0-7  
NUMA node1 CPU(s): 8-15  
Flags: fpu vme de pse tsc msr pae mce cx8 apic sep mtrr pge mca cmov  
pat pse36 ccfush dtsc acpi mmx fxsr sse sse2 ss ht tm pbe syscall nx pdpe1gb rdtscp  
llm constant_tsc art arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc  
aperfmonf eagerfpu eagerfpu sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave avx  
f16c rdrand lahf_lm abm 3dnowprefetch epb cat13 cd13 invpcid_single intel_pt  
spec_ctrl ibpb_support tpr_shadow vnmi flexpriority ept vpid fsgsbase tsc_adjust  
bmi1 hel avx2 smep bmi2 erms invpcid rtm cmq mpx rdt_a avx512f avx512dq rdseed adx  
smap cifuoshopt clwb avx512cd avx512bw avx512vl xsaveopt xsavevc xgetbv1 cmq_llc  
cqmmoqumon_llc cmq_mbm_total cmq_mbm_local dtherm ida arat pln 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  
node 0 size: 391349 MB  
node 0 free: 380069 MB  
node 1 cpus: 8 9 10 11 12 13 14 15  
node 1 size: 393216 MB  
node 1 free: 379849 MB  
node distances:  
node 0 1  
0: 10 21  
1: 21 10

From /proc/meminfo  
MemTotal: 790512260 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)
### Platform Notes (Continued)

```bash
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 2 18:07

SPEC is set to: /spec2017
```

Filesystem     Type  Size  Used Avail Use% Mounted on
/dev/sda2      xfs   781G  115G  667G  15% /

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. 0.81 07/02/2018
- Memory:
  - 24x Samsung M393A4K40BB2-CTD 32 GB 2 rank 2666, configured at 2400

(End of data from sysinfo program)

### Compiler Version Notes

 CC 600.perlbench_s(base) 602.gcc_s(base) 605.mcf_s(base) 625.x264_s(base, peak) 657.xz_s(base)

 ICC (ICC) 18.0.0 20170811
 Copyright (C) 1985-2017 Intel Corporation. All rights reserved.

 CC 600.perlbench_s(peak) 602.gcc_s(peak) 605.mcf_s(peak) 657.xz_s(peak)

 ICC (ICC) 18.0.0 20170811
 Copyright (C) 1985-2017 Intel Corporation. All rights reserved.

 CXXC 620.omnetpp_s(base) 623.xalancbmk_s(base) 631.deepsjeng_s(base) 641.leela_s(base)

 icpc (ICC) 18.0.0 20170811
 Copyright (C) 1985-2017 Intel Corporation. All rights reserved.

(Continued on next page)
### Compiler Version Notes (Continued)

```plaintext
CXXC 620.omnetpp_s(peak) 623.xalancbmk_s(peak) 631.deepsjeng_s(peak)
     641.leela_s(peak)
```

icpc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.

```plaintext
FC  648.exchange2_s(base, peak)
```

ifort (IFORT) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.

### Base Compiler Invocation

- **C benchmarks:**
  - icc

- **C++ benchmarks:**
  - icpc

- **Fortran benchmarks:**
  - ifort

### Base Portability Flags

- `600.perlbench_s: -DSPEC_LP64 -DSPEC_LINUX_X64`
- `602.gcc_s: -DSPEC_LP64`
- `605.mcf_s: -DSPEC_LP64`
- `620.omnetpp_s: -DSPEC_LP64`
- `623.xalancbmk_s: -DSPEC_LP64 -DSPEC_LINUX`
- `625.x264_s: -DSPEC_LP64`
- `631.deepsjeng_s: -DSPEC_LP64`
- `641.leela_s: -DSPEC_LP64`
- `648.exchange2_s: -DSPEC_LP64`
- `657.xz_s: -DSPEC_LP64`
## SPEC CPU2017 Integer Speed Result

**Huawei**

Huawei 2288H V5 (Intel Xeon Silver 4108) | SPECspeed2017_int_base = 6.86 | SPECspeed2017_int_peak = 7.11
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### Base Optimization Flags

C benchmarks:
- `-Wl,-z,muldefs` `-xCORE-AVX2` `-ipo` `-O3` `-no-prec-div`
- `-qopt-mem-layout-trans=3` `-qopenmp` `-DSPEC_OPENMP`
- `-L/usr/local/je5.0.1-64/lib` `-ljemalloc`

C++ benchmarks:
- `-Wl,-z,muldefs` `-xCORE-AVX2` `-ipo` `-O3` `-no-prec-div`
- `-qopt-mem-layout-trans=3` `-L/usr/local/je5.0.1-64/lib` `-ljemalloc`

Fortran benchmarks:
- `-Wl,-z,muldefs` `-xCORE-AVX2` `-ipo` `-O3` `-no-prec-div`
- `-qopt-mem-layout-trans=3` `-nostandard-realloc-lhs` `-align array32byte`
- `-L/usr/local/je5.0.1-64/lib` `-ljemalloc`

### Base Other Flags

C benchmarks:
- `-m64` `-std=c11`

C++ benchmarks:
- `-m64`

Fortran benchmarks:
- `-m64`

### Peak Compiler Invocation

C benchmarks:
- `icc`

C++ benchmarks:
- `icpc`

Fortran benchmarks:
- `ifort`

### Peak Portability Flags

600.perlbench_s: `-DSPEC_LP64` `-DSPEC_LINUX_X64`

(Continued on next page)
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Peak Portability Flags (Continued)

602.gcc_s: -DSPEC_LP64
605.mcf_s: -DSPEC_LP64
620.omnetpp_s: -DSPEC_LP64
623.xalancbmk_s: -D_FILE_OFFSET_BITS=64 -DSPEC_LINUX
625.x264_s: -DSPEC_LP64
631.deepsjeng_s: -DSPEC_LP64
641.leela_s: -DSPEC_LP64
648.exchange2_s: -DSPEC_LP64
657.xz_s: -DSPEC_LP64

Peak Optimization Flags

C benchmarks:

600.perlbench_s: -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -O2
-xCORE-AVX2 -qopt-mem-layout-trans=3 -ipo -O3
-no-prec-div -DSPEC_SUPPRESS_OPENMP -qopenmp
-DSPEC_OPENMP -fno-strict-overflow
-L/usr/local/je5.0.1-64/lib -ljemalloc

602.gcc_s: -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -O2
-xCORE-AVX2 -qopt-mem-layout-trans=3 -ipo -O3
-no-prec-div -DSPEC_SUPPRESS_OPENMP -qopenmp
-DSPEC_OPENMP -L/usr/local/je5.0.1-64/lib -ljemalloc

605.mcf_s: -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -ipo
-xCORE-AVX2 -O3 -no-prec-div -qopt-mem-layout-trans=3
-DSPEC_SUPPRESS_OPENMP -qopenmp -DSPEC_OPENMP
-L/usr/local/je5.0.1-64/lib -ljemalloc

625.x264_s: basepeak = yes

657.xz_s: Same as 602.gcc_s

C++ benchmarks:

620.omnetpp_s: -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -ipo
-xCORE-AVX2 -O3 -no-prec-div -qopt-mem-layout-trans=3
-DSPEC_SUPPRESS_OPENMP -qopenmp -DSPEC_OPENMP
-L/usr/local/je5.0.1-64/lib -ljemalloc

623.xalancbmk_s: -L/opt/intel/compilers_and_libraries_2018/linux/lib/ia32
-Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -ipo
-xCORE-AVX2 -O3 -no-prec-div -qopt-mem-layout-trans=3

(Continued on next page)
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CPU2017 License: 3175
Test Sponsor: Huawei
Tested by: Huawei

Peak Optimization Flags (Continued)

623.xalancbmk_s (continued):
-DSPEC_SUPPRESS_OPENMP -qopenmp -DSPEC_OPENMP
-L/usr/local/je5.0.1-32/lib -ljemalloc

631.deepsjeng_s: Same as 620.omnetpp_s

641.leela_s: basepeak = yes

Fortran benchmarks:
-W1,-z,muldefs -xCORE-AVX2 -ipo -O3 -no-prec-div
-qopt-mem-layout-trans=3 -nostandard-realloc-lhs -align array32byte
-L/usr/local/je5.0.1-64/lib -ljemalloc

Peak Other Flags

C benchmarks:
-m64 -std=c11

C++ benchmarks (except as noted below):
-m64

623.xalancbmk_s: -m32

Fortran benchmarks:
-m64

The flags files that were used to format this result can be browsed at
http://www.spec.org/cpu2017/flags/Intel-ic18.0-official-linux64.html

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2017/flags/Intel-ic18.0-official-linux64.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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