Huawei

Huawei 2288H V5 (Intel Xeon Gold 5220)

<table>
<thead>
<tr>
<th>Test Date:</th>
<th>Mar-2019</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Sponsor:</td>
<td>Huawei</td>
</tr>
<tr>
<td>Tested by:</td>
<td>Huawei</td>
</tr>
<tr>
<td>Hardware Availability:</td>
<td>Apr-2019</td>
</tr>
<tr>
<td>Software Availability:</td>
<td>Dec-2018</td>
</tr>
</tbody>
</table>

### Hardware

<table>
<thead>
<tr>
<th>Threads</th>
<th>SPECspeed2017_int_base (9.98)</th>
<th>SPECspeed2017_int_peak (10.2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>600.perlbench_s 36</td>
<td>6.79</td>
<td>7.96</td>
</tr>
<tr>
<td>602.gcc_s 36</td>
<td>9.90</td>
<td>10.2</td>
</tr>
<tr>
<td>605.mcf_s 36</td>
<td>12.75</td>
<td>12.7</td>
</tr>
<tr>
<td>620.omnetpp_s 36</td>
<td>7.75</td>
<td>7.91</td>
</tr>
<tr>
<td>623.xalancbmk_s 36</td>
<td>12.5</td>
<td>12.6</td>
</tr>
<tr>
<td>625.x264_s 36</td>
<td>14.5</td>
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</tr>
<tr>
<td>631.deepsjeng_s 36</td>
<td>5.48</td>
<td>5.48</td>
</tr>
<tr>
<td>641.leela_s 36</td>
<td>4.78</td>
<td>4.78</td>
</tr>
<tr>
<td>648.exchange2_s 36</td>
<td>14.1</td>
<td>14.1</td>
</tr>
<tr>
<td>657.xz_s 36</td>
<td>22.3</td>
<td>22.6</td>
</tr>
</tbody>
</table>

### Software

| CPU Name: | Intel Xeon Gold 5220 |
| Nominal: | 2200 |
| Max MHz.: | 3900 |
| Enabled: | 36 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: | 24.75 MB I+D on chip per chip |
| Other: | None |
| Memory: | 384 GB (24 x 16 GB 2Rx8 PC4-2933Y-R, running at 2666) |
| Storage: | 1 x 1200 GB SAS, 10000 RPM |
| Other: | None |

| OS: | SUSE Linux Enterprise Server 12 SP4 (x86_64) |
| 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 |
| Firmware: | Version 6.36 Released Feb-2019 |
| File System: | xfs |
| System State: | Run level 3 (multi-user) |
| Base Pointers: | 64-bit |
| Peak Pointers: | 64-bit |
| Other: | jemalloc memory allocator V5.0.1 |
## SPEC CPU2017 Integer Speed Result

**Huawei**

**Huawei 2288H V5 (Intel Xeon Gold 5220)**

<table>
<thead>
<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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<tr>
<td>600.perlbench_s</td>
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<td>6.74</td>
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<td>6.83</td>
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<td>7.96</td>
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<td>10.2</td>
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<td>10.1</td>
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<td>36</td>
<td>373</td>
<td>12.7</td>
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<td>12.8</td>
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<td>274</td>
<td>22.6</td>
<td>275</td>
<td>22.5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Results 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,1,0"
- LD_LIBRARY_PATH = "/spec/lib/ia32:/spec/lib/intel64:/spec/je5.0.1-32:/spec/je5.0.1-64"
- OMP_STACKSIZE = "192M"

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
```

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.

# SPEC CPU2017 Integer Speed Result

## Huawei

### Huawei 2288H V5 (Intel Xeon Gold 5220)

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<th>SPECspeed2017_int_base</th>
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</table>

### CPU2017 License: 3175

**Test Sponsor:** Huawei  
**Test Date:** Mar-2019  
**Tested by:** Huawei  
**Hardware Availability:** Apr-2019  
**Software Availability:** Dec-2018

---

## Platform Notes

BIOS configuration:
- Power Policy Set to Load Balance
- Hyper-Threading Set to Disable
- XPT Prefetch Set to Enabled

Sysinfo program /spec/bin/sysinfo  
Rev: r5974 of 2018-05-19 9bcde8f2999c33d61f64985e45859ea9  
running on linux-7ejo Wed Mar 20 10:11:53 2019

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](https://www.spec.org/cpu2017/Docs/config.html#sysinfo)

From /proc/cpuinfo:

```
model name : Intel(R) Xeon(R) Gold 5220 CPU @ 2.20GHz
  2  "physical id"s (chips)
  36 "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 : 18
  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): 36
On-line CPU(s) list: 0-35
Thread(s) per core: 1
Core(s) per socket: 18
Socket(s): 2
NUMA node(s): 2
Vendor ID: GenuineIntel
CPU family: 6
Model: 85
Model name: Intel(R) Xeon(R) Gold 5220 CPU @ 2.20GHz
Stepping: 6
CPU MHz: 2200.000
CPU max MHz: 3900.0000
CPU min MHz: 1000.0000
BogoMIPS: 4400.00
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 25344K
```
### SPEC CPU2017 Integer Speed Result

**Huawei**

Huawei 2288H V5 (Intel Xeon Gold 5220)

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---

**Platform Notes (Continued)**

- NUMA node0 CPU(s): 0-17
- NUMA node1 CPU(s): 18-35
- Flags:
  - fpu vme de pse tsc msr pae mce cx8 apic sep mtrr pge mca cmov
  - pat pse36 clflush dtc 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 cpuid
  - aperfmperf pni pclmulqdq dtes64 monitor 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 rdrand lahf_lm abml 3dnowprefetch cpuid_fault epb cat13 cdp13
  - invpcid_single ssbd mba ibpb stibp tpr_shadow vmi flexpriority ept vpid
  - fsgsb tsc_adjust bmi1 hle avx2 smep bmi2 ibrms invpd cmtp mxsr rdt_a avx512f
  - avx512dq rdseed adx smap clflushopt clwb intel_ptu avx512cd avx512bw avx512vl
  - xsaveopt xsaves xgetbv1 xsaves cqm_llc cqm_occu llc cqm_mbb_total cqm_mbb_local
  - dtherm ida arat pln pts pku ospke avx512_vnni flush_lld arch_capabilities

/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: 2 nodes (0-1)  
- node 0 cpus: 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17  
- node 0 size: 191933 MB  
- node 0 free: 185658 MB  
- node 1 cpus: 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35  
- node 1 size: 193250 MB  
- node 1 free: 192583 MB  
- node distances:  
  - node 0 1  
  - 0: 10 21  
  - 1: 21 10

From /proc/meminfo  
- MemTotal: 394428348 KB  
- HugePages_Total: 0  
- Hugepagesize: 2048 KB

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

- os-release:  
  - NAME="SLES"  
  - VERSION="12-SP4"  
  - VERSION_ID="12.4"

*(Continued on next page)*
### Platform Notes (Continued)

PRETTY_NAME="SUSE Linux Enterprise Server 12 SP4"
ID="sles"
ANSI_COLOR="0;32"
CPE_NAME="cpe:/o:suse:sles:12:sp4"

```shell
uname -a:
x86_64 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

run-level 3 Mar 20 10:06

SPEC is set to: /spec

```
Filesystem Type Size Used Avail Use% Mounted on
/dev/sda3 xfs 734G 79G 656G 11% /
```

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. 6.36 02/15/2019
- Memory:
  - 24x Samsung M393A2K43CB2-CVF 16 GB 2 rank 2933, configured at 2666

(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)
```

```
Intel(R) C 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.
```

```
CC 600.perlbench_s(peak) 602.gcc_s(peak) 605.mcf_s(peak) 657.xz_s(peak)
```
Huawei
Huawei 2288H V5 (Intel Xeon Gold 5220)

SPECspeed2017_int_base = 9.98
SPECspeed2017_int_peak = 10.2

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

Test Date: Mar-2019
Hardware Availability: Apr-2019
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Compiler Version Notes (Continued)

Intel(R) C 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.

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

Intel(R) C++ 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.

CXXC 620.omnetpp_s(peak)

Intel(R) C++ 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.

FC 648.exchange2_s(base, peak)

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.

Base Compiler Invocation

C benchmarks:
icc -m64 -std=c11

C++ benchmarks:
icpc -m64

Fortran benchmarks:
ifort -m64
SPEC CPU2017 Integer Speed Result

Huawei
Huawei 2288H V5 (Intel Xeon Gold 5220)

SPECspeed2017_int_base = 9.98
SPECspeed2017_int_peak = 10.2

CPU2017 License: 3175
Test Sponsor: Huawei
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Test Date: Mar-2019
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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

Base Optimization Flags

C benchmarks:
-Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div
-qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP
-llvm/lib/openmp/lib/libomp.a -ljemalloc

C++ benchmarks:
-Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div
-qopt-mem-layout-trans=4
-llvm/lib/openmp/lib/libomp.a

Fortran benchmarks:
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-mem-layout-trans=4

Peak Compiler Invocation

C benchmarks:
icc -m64 -std=c11

C++ benchmarks:
icpc -m64

Fortran benchmarks:
ifort -m64
### Huawei

**Huawei 2288H V5 (Intel Xeon Gold 5220)**

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**CPU2017 License:** 3175  
**Test Sponsor:** Huawei  
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#### Peak Portability Flags

Same as Base Portability Flags

#### Peak Optimization Flags

**C benchmarks:**

- `600.perlbench_s`: -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -O2 -xCORE-AVX512 -qopt-mem-layout-trans=4 -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-AVX512 -qopt-mem-layout-trans=4 -ipo -O3 -no-prec-div -DSPEC_SUPPRESS_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-AVX512 -O3 -no-prec-div -qopt-mem-layout-trans=4 -DSPEC_SUPPRESS_OPENMP -qopenmp -DSPEC_OPENMP -L/usr/local/je5.0.1-64/lib -ljemalloc
- `625.x264_s`: -Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP -L/usr/local/je5.0.1-64/lib -ljemalloc
- `657.xz_s`: -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -O2 -xCORE-AVX512 -qopt-mem-layout-trans=4 -ipo -O3 -no-prec-div -DSPEC_SUPPRESS_OPENMP -qopenmp -DSPEC_OPENMP -L/usr/local/je5.0.1-64/lib -ljemalloc

**C++ benchmarks:**

- `620.omnetpp_s`: -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -ipo -xCORE-AVX512 -O3 -no-prec-div -qopt-mem-layout-trans=4 -DSPEC_SUPPRESS_OPENMP -L/usr/local/IntelCompiler19/compilers_and_libraries_2019.1.144/linux/compiler/lib/intel64 -lqkmalloc

(Continued on next page)
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CPU2017 License: 3175  
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Test Date: Mar-2019  
Hardware Availability: Apr-2019  
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Peak Optimization Flags (Continued)

631.deepsjeng_s: Same as 623.xalancbmk_s

641.leela_s: Same as 623.xalancbmk_s

Fortran benchmarks:
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-mem-layout-trans=4  
-nostandard-realloc-lhs

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 2019-03-19 22:11:52-0400.  