Huawei 2288 V5 (Intel Xeon Gold 6230)  

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

<table>
<thead>
<tr>
<th>SPECspeed2017_int_base</th>
<th>SPECspeed2017_int_peak</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.48</td>
<td>9.80</td>
</tr>
</tbody>
</table>

### Hardware

<table>
<thead>
<tr>
<th>CPU Name</th>
<th>Intel Xeon Gold 6230</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max MHz.</td>
<td>3900</td>
</tr>
<tr>
<td>Nominal</td>
<td>2100</td>
</tr>
<tr>
<td>Enabled</td>
<td>40 cores, 2 chips</td>
</tr>
<tr>
<td>Orderable</td>
<td>1,2 chips</td>
</tr>
<tr>
<td>Cache L1</td>
<td>32 KB I + 32 KB D on chip per core</td>
</tr>
<tr>
<td>Cache L2</td>
<td>1 MB I+D on chip per core</td>
</tr>
<tr>
<td>Cache L3</td>
<td>27.5 MB I+D on chip per core</td>
</tr>
<tr>
<td>Other</td>
<td>None</td>
</tr>
<tr>
<td>Memory</td>
<td>192 GB (12 x 16 GB 2Rx8 PC4-2933Y-R)</td>
</tr>
<tr>
<td>Storage</td>
<td>1 x 1200 GB SAS, 10000 RPM</td>
</tr>
<tr>
<td>Other</td>
<td>None</td>
</tr>
</tbody>
</table>

### Software

<table>
<thead>
<tr>
<th>OS</th>
<th>SUSE Linux Enterprise Server 12 SP4 (x86_64) 4.12.14-94.41-default</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compiler</td>
<td>C/C++: Version 19.0.0.117 of Intel C/C++ Compiler Build 20180804 for Linux; Fortran: Version 19.0.0.117 of Intel Fortran Compiler Build 20180804 for Linux</td>
</tr>
<tr>
<td>Parallel</td>
<td>Yes</td>
</tr>
<tr>
<td>Firmware</td>
<td>Version 6.29 Released Jan-2019</td>
</tr>
<tr>
<td>File System</td>
<td>btrfs</td>
</tr>
<tr>
<td>System State</td>
<td>Run level 3 (multi-user)</td>
</tr>
<tr>
<td>Base Pointers</td>
<td>64-bit</td>
</tr>
<tr>
<td>Peak Pointers</td>
<td>32/64-bit</td>
</tr>
<tr>
<td>Other</td>
<td>jemalloc memory allocator V5.0.1</td>
</tr>
</tbody>
</table>
Huawei
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CPU2017 License: 3175
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SPECspeed2017_int_base = 9.48
SPECspeed2017_int_peak = 9.80

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>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>600.perlbench_s</td>
<td>40</td>
<td>271</td>
<td>6.54</td>
<td>273</td>
<td>6.51</td>
<td>271</td>
<td>6.55</td>
<td>40</td>
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<td>7.87</td>
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<td>7.86</td>
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<tr>
<td>602.gcc_s</td>
<td>40</td>
<td>402</td>
<td>9.90</td>
<td>398</td>
<td>10.0</td>
<td>406</td>
<td>9.82</td>
<td>40</td>
<td>393</td>
<td>10.1</td>
<td>393</td>
<td>10.1</td>
<td>385</td>
<td>10.3</td>
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<tr>
<td>605.mcf_s</td>
<td>40</td>
<td>410</td>
<td>11.5</td>
<td>408</td>
<td>11.6</td>
<td>410</td>
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<td>40</td>
<td>404</td>
<td>11.7</td>
<td>402</td>
<td>11.7</td>
<td>400</td>
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<tr>
<td>623.xalanchmk_s</td>
<td>40</td>
<td>143</td>
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<td>9.90</td>
<td>142</td>
<td>9.99</td>
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<td>133</td>
<td>10.7</td>
<td>132</td>
<td>10.7</td>
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<tr>
<td>625.x264_s</td>
<td>40</td>
<td>128</td>
<td>13.7</td>
<td>128</td>
<td>13.8</td>
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<td>13.8</td>
<td>40</td>
<td>128</td>
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<td>13.8</td>
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<tr>
<td>631.deepsjeng_s</td>
<td>40</td>
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<td>5.45</td>
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<td>263</td>
<td>5.45</td>
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<td>641.leela_s</td>
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<td>4.73</td>
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<td>4.73</td>
<td>361</td>
<td>4.73</td>
<td>361</td>
<td>4.73</td>
</tr>
<tr>
<td>648.exchange2_s</td>
<td>40</td>
<td>213</td>
<td>13.8</td>
<td>213</td>
<td>13.8</td>
<td>213</td>
<td>13.8</td>
<td>40</td>
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<td>13.8</td>
<td>213</td>
<td>13.8</td>
</tr>
<tr>
<td>657.xz_s</td>
<td>40</td>
<td>273</td>
<td>22.6</td>
<td>273</td>
<td>22.6</td>
<td>273</td>
<td>22.6</td>
<td>40</td>
<td>267</td>
<td>23.1</td>
<td>267</td>
<td>23.1</td>
<td>267</td>
<td>23.2</td>
</tr>
</tbody>
</table>

SPECspeed2017_int_base = 9.48
SPECspeed2017_int_peak = 9.80

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 = "/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 i9-799X 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 2288 V5 (Intel Xeon Gold 6230)**

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<th>3175</th>
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<td>Test Sponsor:</td>
<td>Huawei</td>
</tr>
<tr>
<td>Tested by:</td>
<td>Huawei</td>
</tr>
</tbody>
</table>

**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: r5797 of 2017-06-14 96c45e4568ad54c135fd618bce091c0f
running on linux-42gj Thu Feb 21 17:34:02 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

From /proc/cpuinfo
- `model name`: Intel(R) Xeon(R) Gold 6230 CPU @ 2.10GHz
  - 2 "physical id"s (chips)
  - 40 "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`: 20
  - `siblings`: 20
  - `physical 0`: cores 0 1 2 3 4 8 9 10 11 12 16 17 18 19 20 24 25 26 27 28
  - `physical 1`: cores 0 1 2 3 4 8 9 10 11 12 16 17 18 19 20 24 25 26 27 28

From lscpu:
- Architecture: x86_64
- CPU op-mode(s): 32-bit, 64-bit
- Byte Order: Little Endian
- CPU(s): 40
- On-line CPU(s) list: 0-39
- Thread(s) per core: 1
- Core(s) per socket: 20
- Socket(s): 2
- NUMA node(s): 2
- Vendor ID: GenuineIntel
- CPU family: 6
- Model: 85
- Model name: Intel(R) Xeon(R) Gold 6230 CPU @ 2.10GHz
- Stepping: 6
- CPU MHz: 2100.000
- CPU max MHz: 3900.0000
- CPU min MHz: 800.0000
- BogoMIPS: 4200.00
- Virtualization: VT-x
- L1d cache: 32K
- L1i cache: 32K
- L2 cache: 1024K
- L3 cache: 28160K

(Continued on next page)
Huawei 2288 V5 (Intel Xeon Gold 6230)

### SPEC CPU2017 Integer Speed Result

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---

### Platform Notes (Continued)

NUMA node0 CPU(s): 0-19
NUMA node1 CPU(s): 20-39

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
```

```
lahf_lm abm 3dnowprefetch cpuid_fault epb cat_13 cdp_13
```

```
invpcid_single ssbd mba ibrs ibpb tpr_shadow vmmi flexpriority ept vpd
```

```
fsqsbase tsc_adjust bmi1 hle avx2 smep bmi2 rome invpcid rtm cmq mpx rdt_a avx512f
```

```
avx512dq rdseed adx smash clflushopt clwb intel_pt avx512cd avx512bw avx512vl
```

```
xsaves opt xsave xgetbv1 xsaves cqm_llc cqm_occup_llc cqm_mbmn_total cqm_mbmn_local
dtherm ida arat pin pts pku ospke avx512_vnni flush_l1d arch_capabilities
```

/proc/cpuinfo cache data

```
cache size: 28160 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 18 19
node 0 size: 95136 MB
node 0 free: 94673 MB
node 1 cpus: 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39
node 1 size: 96526 MB
node 1 free: 95908 MB
node distances:
node 0 1
 0: 10 21
 1: 21 10
```

From /proc/meminfo

```
MemTotal: 196262512 kB
HugePages_Total: 0
Hugepagesize: 2048 kB
```

From /etc/*release* /etc/*version*

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

(Continued on next page)
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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"

uname -a:
        x86_64 x86_64 x86_64 GNU/Linux

run-level 3 Feb 21 17:32
SPEC is set to: /spec
Filesystem Type Size Used Avail Use% Mounted on
/dev/sda3 btrfs 41G 22G 18G 56% /

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. 6.29 2019/01/22
    Memory:
        4x NO DIMM NO DIMM
        12x Samsung M393A2K43CB2-CVF 16 GB 2 rank 2933

(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 19.0.0.117 Build 20180804
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)
------------------------------------------------------------------------------
Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
    Version 19.0.0.117 Build 20180804
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------------------------------------------------------------------------------

(Continued on next page)
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CPU2017 License: 3175
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Test Date: Mar-2019
Tested by: Huawei
Hardware Availability: Apr-2019
Software Availability: Dec-2018

Compiler Version Notes (Continued)

CXXC 623.xalancbmk_s(peak)
==============================================================================
Intel(R) C++ Intel(R) 64 Compiler for applications running on IA-32, Version 19.0.0.117 Build 20180804
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
==============================================================================
CXXC 620.omnetpp_s(base) 623.xalancbmk_s(base) 631.deepsjeng_s(base) 641.leela_s(base)
==============================================================================
Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64, Version 19.0.0.117 Build 20180804
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
==============================================================================
CXXC 620.omnetpp_s(peak) 631.deepsjeng_s(peak) 641.leela_s(peak)
==============================================================================
Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64, Version 19.0.0.117 Build 20180804
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 19.0.0.117 Build 20180804
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
Huawei
Huawei 2288 V5 (Intel Xeon Gold 6230)

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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-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

Peak Compiler Invocation
C benchmarks:
icc -m64 -std=c11

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

623.xalancbmk_s: icpc -m32 -L/usr/local/IntelCompiler19/compilers_and_libraries_2019.0.117/linux/compiler/lib/ia32_lin

Fortran benchmarks:
ifort -m64
Huawei

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Peek 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: -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 -03
-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 -03
-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: -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

657.xz_s: Same as 602.gcc_s

C++ benchmarks:

620.omnetpp_s: basepeak = yes

623.xalancbmk_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

(Continued on next page)
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SPEC CPU2017 Integer Speed Result
Copyright 2017-2019 Standard Performance Evaluation Corporation

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Peak Optimization Flags (Continued)

623.xalancbmk_s (continued):
-LL/usr/local/je5.0.1-32/lib -ljemalloc

631.deepsjeng_s: basepeak = yes

641.leela_s: basepeak = yes

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

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 v1.0.2 on 2019-02-21 04:34:02-0500.