## SPEC® CPU2017 Integer Speed Result

### Huawei

**Huawei CH121 V5 (Intel Xeon Silver 4110)**

<table>
<thead>
<tr>
<th>SPECspeed2017_int_base</th>
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<tbody>
<tr>
<td>SPECspeed2017_int_peak</td>
<td>7.11</td>
</tr>
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**CPU2017 License:** 3175  
**Test Date:** Feb-2018  
**Test Sponsor:** Huawei  
**Hardware Availability:** Jul-2017  
**Tested by:** Huawei  
**Software Availability:** Sep-2017

### Threads

<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>32</td>
<td>4.87</td>
<td>5.79</td>
</tr>
<tr>
<td>gcc_s</td>
<td>32</td>
<td>7.40</td>
<td>7.37</td>
</tr>
<tr>
<td>mcf_s</td>
<td>32</td>
<td>4.18</td>
<td>4.24</td>
</tr>
<tr>
<td>omnetpp_s</td>
<td>32</td>
<td>7.61</td>
<td>8.24</td>
</tr>
<tr>
<td>xalancbmk_s</td>
<td>32</td>
<td>4.90</td>
<td>5.00</td>
</tr>
<tr>
<td>x264_s</td>
<td>32</td>
<td>9.17</td>
<td>9.17</td>
</tr>
<tr>
<td>deepsjeng_s</td>
<td>32</td>
<td>4.27</td>
<td>4.27</td>
</tr>
<tr>
<td>leela_s</td>
<td>32</td>
<td>3.49</td>
<td>3.49</td>
</tr>
<tr>
<td>exchange2_s</td>
<td>32</td>
<td>10.9</td>
<td>10.9</td>
</tr>
<tr>
<td>xz_s</td>
<td>32</td>
<td>15.5</td>
<td>16.0</td>
</tr>
</tbody>
</table>

### Hardware

- **CPU Name:** Intel Xeon Silver 4110  
- **Max MHz.:** 3000  
- **Nominal:** 2100  
- **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  
- **Memory:** 384 GB (24 x 16 GB 2Rx8 PC4-2666V-R, running at 2400)  
- **Storage:** 1 x 1200 GB SAS, 10000 RPM  
- **Other:** None

### Software

- **OS:** SUSE Linux Enterprise Server 12 SP2 (x86_64)  
- **Compiler:** C/C++: Version 18.0.0.128 of Intel C/C++  
- **Parallel:** Yes  
- **Firmware:** Version 0.31 Released Sep-2017  
- **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
Huawei
Huawei CH121 V5 (Intel Xeon Silver 4110)

SPECspeed2017_int_base = 6.90
SPECspeed2017_int_peak = 7.11

Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads Seconds</th>
<th>Seconds Ratio</th>
<th>Seconds</th>
<th>Seconds Ratio</th>
<th>Threads</th>
<th>Seconds</th>
<th>Seconds Ratio</th>
<th>Seconds</th>
<th>Seconds Ratio</th>
</tr>
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<tbody>
<tr>
<td>600.perlbench_s</td>
<td>32</td>
<td>365</td>
<td>4.87</td>
<td>368</td>
<td>4.83</td>
<td>364</td>
<td>4.88</td>
<td>32</td>
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<tr>
<td>602.gcc_s</td>
<td>32</td>
<td>538</td>
<td>7.40</td>
<td>537</td>
<td>7.42</td>
<td>547</td>
<td>7.28</td>
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<td>526</td>
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<tr>
<td>623.xalanchmk_s</td>
<td>32</td>
<td>185</td>
<td>7.64</td>
<td>186</td>
<td>7.61</td>
<td>186</td>
<td>7.60</td>
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<tr>
<td>631.deepsjeng_s</td>
<td>32</td>
<td>336</td>
<td>4.27</td>
<td>336</td>
<td>4.27</td>
<td>336</td>
<td>4.27</td>
<td>32</td>
<td>336</td>
</tr>
<tr>
<td>641.leela_s</td>
<td>32</td>
<td>488</td>
<td>3.49</td>
<td>489</td>
<td>3.49</td>
<td>488</td>
<td>3.49</td>
<td>32</td>
<td>488</td>
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<tr>
<td>648.exchange2_s</td>
<td>32</td>
<td>270</td>
<td>10.9</td>
<td>270</td>
<td>10.9</td>
<td>270</td>
<td>10.9</td>
<td>32</td>
<td>269</td>
</tr>
<tr>
<td>657.xz_s</td>
<td>32</td>
<td>398</td>
<td>15.5</td>
<td>399</td>
<td>15.5</td>
<td>401</td>
<td>15.4</td>
<td>32</td>
<td>387</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 = "/spec2017/lib/ia32;/spec2017/lib/intel64;/spec2017/je5.0.1-32;/spec2017/je5.0.1-64"
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

No: The test sponsor attests, as of date of publication, that CVE-2017-5754 (Meltdown) is mitigated in the system as tested and documented.
No: 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.
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### General Notes (Continued)

No: 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.

This benchmark result is intended to provide perspective on past performance using the historical hardware and/or software described on this result page.

The system as described on this result page was formerly generally available. At the time of this publication, it may not be shipping, and/or may not be supported, and/or may fail to meet other tests of General Availability described in the SPEC OSG Policy document, [http://www.spec.org/osg/policy.html](http://www.spec.org/osg/policy.html)

This measured result may not be representative of the result that would be measured were this benchmark run with hardware and software available as of the publication date.

### Platform Notes

BIOS configuration:
- Power Efficiency Mode Set to Custom
- Hyper-Threading Set to Disable
- Sysinfo program /spec2017/bin/sysinfo
  - Rev: r5797 of 2017-06-14 96c45e4568ad54c135fd618bcc091c0f
  - running on linux-hyq4 Thu Feb 1 04:50:40 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](https://www.spec.org/cpu2017/Docs/config.html#sysinfo)

From /proc/cpuinfo:
- model name: Intel(R) Xeon(R) Silver 4110 CPU @ 2.10GHz
- 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

(Continued on next page)
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Software Availability: Sep-2017

Platform Notes (Continued)

<table>
<thead>
<tr>
<th>Field</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>On-line CPU(s) list</td>
<td>0-15</td>
</tr>
<tr>
<td>Thread(s) per core</td>
<td>1</td>
</tr>
<tr>
<td>Core(s) per socket</td>
<td>8</td>
</tr>
<tr>
<td>Socket(s)</td>
<td>2</td>
</tr>
<tr>
<td>NUMA node(s)</td>
<td>2</td>
</tr>
<tr>
<td>Vendor ID</td>
<td>GenuineIntel</td>
</tr>
<tr>
<td>CPU family</td>
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<tr>
<td>Model</td>
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<tr>
<td>Model name</td>
<td>Intel(R) Xeon(R) Silver 4110 CPU @ 2.10GHz</td>
</tr>
<tr>
<td>Stepping</td>
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<td>CPU MHz</td>
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<td>CPU min MHz</td>
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<td>L1d cache</td>
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<td>L2 cache</td>
<td>1024K</td>
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<td>L3 cache</td>
<td>11264K</td>
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<tr>
<td>NUMA node0 CPU(s)</td>
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<tr>
<td>NUMA node0 size</td>
<td>191498 MB</td>
</tr>
<tr>
<td>NUMA node0 free</td>
<td>190366 MB</td>
</tr>
<tr>
<td>NUMA node1 CPU(s)</td>
<td>8-15</td>
</tr>
<tr>
<td>NUMA node1 size</td>
<td>193412 MB</td>
</tr>
<tr>
<td>NUMA node1 free</td>
<td>192377 MB</td>
</tr>
<tr>
<td>Flags</td>
<td>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 aperfmperf eagerfpu pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg fma cx16 xtrunc pdcm ptdsc pcid dca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave avx f16c rdrand lahf_lm abm 3dnowprefetch ida arat epb pln pts dtherm intel_pt tpr_shadow vmmvms flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid rdtscp cqm mpx avx512f avx512dq rdseed adx smap clflushopt clwb avx512cd avx512bw avx512vl xsaveopt xsavec xgetbv1 cqm_llc cqm_occup_llc</td>
</tr>
</tbody>
</table>

/proc/cpuinfo cache data
  cache size: 11264 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
  node 0 size: 191498 MB
  node 0 free: 190366 MB
  node 1 cpus: 8 9 10 11 12 13 14 15
  node 1 size: 193412 MB
  node 1 free: 192377 MB
  node distances:
    node 0 1
    0: 10 21
    1: 21 10

(Continued on next page)
Platform Notes (Continued)

From /proc/meminfo
MemTotal:       394148704 kB
HugePages_Total:       0
Hugepagesize:       2048 kB

From /etc/*release*/etc/*version*
SuSE-release:
   SUSE Linux Enterprise Server 12 (x86_64)
   VERSION = 12
   PATCHLEVEL = 2
   # 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-SP2"
   VERSION_ID="12.2"
   PRETTY_NAME="SUSE Linux Enterprise Server 12 SP2"
   ID="sles"
   ANSI_COLOR="0;32"
   CPE_NAME="cpe:/o:suse:sles:12:sp2"

uname -a:
   Linux linux-hyq4 4.4.21-69-default #1 SMP Tue Oct 25 10:58:20 UTC 2016 (9464f67)
   x86_64 x86_64 x86_64 GNU/Linux

run-level 3 Jan 31 15:53
SPEC is set to: /spec2017
   Filesystem     Type  Size  Used Avail Use% Mounted on
   /dev/sda2      xfs   828G  57G  772G   7% /

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. 0.31 09/29/2017
   Memory:
   24x Samsung M393A2K43BB1-CTD 16 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,

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

- **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.

- **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.

- **FC** 648.exchange2_s(base, peak)

- **ifort** (IFORT) 18.0.0 20170811
  
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### Base Compiler Invocation

**C benchmarks:**

- icc

**C++ benchmarks:**

- icpc

**Fortran benchmarks:**

- ifort
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Huawei
Huawei CH121 V5 (Intel Xeon Silver 4110)

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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

Base Other Flags

C benchmarks:
-m64 -std=c11

C++ benchmarks:
-m64

Fortran benchmarks:
-m64
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### Peak Compiler Invocation

- **C benchmarks:** icc
- **C++ benchmarks:** icpc
- **Fortran benchmarks:** ifort

### Peak Portability Flags

1. `600.perlbench_s`: `-DSPEC_LP64 -DSPEC_LINUX_X64`
2. `602.gcc_s`: `-DSPEC_LP64`
3. `605.mcf_s`: `-DSPEC_LP64`
4. `620.omnetpp_s`: `-DSPEC_LP64`
5. `623.xalancbmk_s`: `-D_FILE_OFFSET_BITS=64 -DSPEC_LINUX`
6. `625.x264_s`: `-DSPEC_LP64`
7. `631.deepsjeng_s`: `-DSPEC_LP64`
8. `641.leela_s`: `-DSPEC_LP64`
9. `648.exchange2_s`: `-DSPEC_LP64`
10. `657.xz_s`: `-DSPEC_LP64`

### Peak Optimization Flags

- **C benchmarks:**
  1. `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`
  2. `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`
  3. `605.mcf_s`: `basepeak = yes`
  4. `625.x264_s`: `basepeak = yes`

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*(Continued on next page)*
Peak Optimization Flags (Continued)

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
-DSPEC_SUPPRESS_OPENMP -qopenmp -DSPEC_OPENMP
-L/usr/local/je5.0.1-32/lib -ljemalloc

631.deepsjeng_s: basepeak = yes

641.leela_s: basepeak = yes

Fortran benchmarks:
-m64 -Xnomem -mcpu=corei7-9700k
-ipo -3 -nostd-mp -no-prec-div
-qopt-mem-layout-trans=3 -align array32byte
-L/usr/local/je5.0.1-64/lib -ljemalloc

Peak Other Flags

C benchmarks:
-m64

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-i7-9700k-official-linux64.html
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<th>Test Date: Feb-2018</th>
</tr>
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<td>Test Sponsor: Huawei</td>
<td>Hardware Availability: Jul-2017</td>
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<td>Tested by: Huawei</td>
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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/Intel-ic18.0-official-linux64.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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