## SPEC® CPU2017 Integer Speed Result

### Huawei

**Huawei 2288H V5 (Intel Xeon Silver 4109T)**

<table>
<thead>
<tr>
<th>Software Availability: Jan-2018</th>
<th>SPECspeed2017_int_base = 6.89</th>
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</thead>
<tbody>
<tr>
<td>SPECspeed2017_int_peak = 7.14</td>
<td></td>
</tr>
</tbody>
</table>

### Hardware

<table>
<thead>
<tr>
<th>Threads</th>
<th>SPECspeed2017_int_base (6.89)</th>
<th>SPECspeed2017_int_peak (7.14)</th>
</tr>
</thead>
<tbody>
<tr>
<td>600.perlbench_s 16</td>
<td>4.89</td>
<td>5.81</td>
</tr>
<tr>
<td>602.gcc_s 16</td>
<td>7.24</td>
<td>7.54</td>
</tr>
<tr>
<td>605.mcf_s 16</td>
<td>9.19</td>
<td>9.25</td>
</tr>
<tr>
<td>620.omnetpp_s 16</td>
<td>4.17</td>
<td>4.27</td>
</tr>
<tr>
<td>623.xalancbmk_s 16</td>
<td>7.60</td>
<td>8.23</td>
</tr>
<tr>
<td>625.x264_s 16</td>
<td>9.21</td>
<td>9.21</td>
</tr>
<tr>
<td>631.deepsjeng_s 16</td>
<td>4.27</td>
<td>4.27</td>
</tr>
<tr>
<td>641.leela_s 16</td>
<td>3.49</td>
<td>10.9</td>
</tr>
<tr>
<td>648.exchange2_s 16</td>
<td>3.49</td>
<td>10.9</td>
</tr>
<tr>
<td>657.xz_s 16</td>
<td>15.6</td>
<td>16.1</td>
</tr>
</tbody>
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### Software

| OS: Red Hat Enterprise Linux Server release 7.4 (Maipo) |
| 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 |

### CPU2017 License: 3175

| Test Sponsor: Huawei |
| Hardware Availability: Jul-2017 |
| Tested by: Huawei |
| Software Availability: Jan-2018 |

### Huawei 2288H V5 (Intel Xeon Silver 4109T)

| Tested Date: Aug-2018 |
| Hardware Availability: Jul-2017 |
| Tested by: Huawei |
| Software Availability: Jan-2018 |

### SPECspeed2017_int_base = 6.89

### SPECspeed2017_int_peak = 7.14

### Hardware

- **CPU Name:** Intel Xeon Silver 4109T
- **Max MHz.:** 3000
- **Nominal:** 2000
- **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)
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### Results Table

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<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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<tbody>
<tr>
<td>600.perlbench_s</td>
<td>16</td>
<td>365</td>
<td>4.87</td>
<td>362</td>
<td>4.90</td>
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<td>4.89</td>
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<tr>
<td>602.gcc_s</td>
<td>16</td>
<td>551</td>
<td>7.23</td>
<td>547</td>
<td>7.29</td>
<td>550</td>
<td>7.24</td>
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<tr>
<td>605.mcf_s</td>
<td>16</td>
<td>513</td>
<td><strong>9.19</strong></td>
<td>512</td>
<td>9.22</td>
<td>514</td>
<td>9.19</td>
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<tr>
<td>620.omnetpp_s</td>
<td>16</td>
<td>390</td>
<td>4.18</td>
<td>420</td>
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<tr>
<td>623.xalanchmk_s</td>
<td>16</td>
<td>187</td>
<td>7.60</td>
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<td>7.61</td>
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<tr>
<td>625.x264_s</td>
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<td><strong>9.21</strong></td>
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<td>9.20</td>
<td>191</td>
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<td>16</td>
<td>335</td>
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<td>641.leela_s</td>
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<td>490</td>
<td>3.48</td>
<td>488</td>
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<td><strong>269</strong></td>
<td><strong>10.9</strong></td>
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<td>10.9</td>
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<td>16</td>
<td>396</td>
<td>15.6</td>
<td>398</td>
<td>15.5</td>
<td><strong>396</strong></td>
<td><strong>15.6</strong></td>
</tr>
</tbody>
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**SPECspeed2017_int_base = 6.89**  
**SPECspeed2017_int_peak = 7.14**

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;  
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

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**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-Threadinng Set to Disable  
XPT Prefetch Set to Enabled

Sysinfo program /spec2017/bin/sysinfo  
Rev: r5797 of 2017-06-14 96c45e4568ad54c135fd618bcc091c0f  
running on localhost.localdomain Thu Aug 30 01:28:34 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 4109T CPU @ 2.00GHz
  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 4109T CPU @ 2.00GHz
Stepping:              4
CPU MHz:               2001.000
CPU max MHz:           2001.0000
CPU min MHz:           800.0000
BogoMIPS:              4000.00
Virtualization:        VT-x
L1d cache:             32K
L1i cache:             32K
L2 cache:              1024K
L3 cache:              11264K
```

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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 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 ds_cpl vmx smx est tm2 ssse3 fma cx16 xtpr
pdcm pclid dca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave avx
f16c rdrand lahf_lm abml3 3dnowprefetch epb cat_l3 cdp_l3 invpd single intel_pt
spec_ctrl ibpb_support tpr_shadow vnmi flexpriority ept vpid fsgsbase tsc_adjust
bm1 hle avx2 smep bmi2 erms invpcid rtm cqm mpx rdt_a avx512f avx512dq rdseed adx
map clflushopt clwb avx512cd avx512bw avx512vl xsaveopt xsavevc xgetbv1 cqm_llc
cqm_occup_llc cqm_mbm_total cqm_mbm_local dterm ida arat pln pts

/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: 391349 MB
Node 0 free: 378959 MB
Node 1 cpus: 8 9 10 11 12 13 14 15
Node 1 size: 393216 MB
Node 1 free: 380960 MB

Node distances:

<table>
<thead>
<tr>
<th>Node</th>
<th>Distance</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>10 21</td>
</tr>
<tr>
<td>1</td>
<td>21 10</td>
</tr>
</tbody>
</table>

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)
Huawei 2288H V5 (Intel Xeon Silver 4109T)

Huawei

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Platform Notes (Continued)

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 29 18:57

SPEC is set to: /spec2017

Filesystem Type Size Used Avail Use% Mounted on
/dev/sda2 xfs 781G 130G 652G 17% /

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.
==============================================================================
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.
==============================================================================

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Compiler Version Notes (Continued)

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
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
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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`

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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: -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: -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

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Peak Optimization Flags (Continued)

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: Same as 620.omnetpp_s

641.leela_s: basepeak = yes

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 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.

Tested with SPEC CPU2017 v1.0.2 on 2018-08-30 01:28:34-0400.
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