## SPEC® CPU2017 Integer Speed Result

**Huawei**

Huawei XH321 V5 (Intel Xeon Gold 5120T)  

<table>
<thead>
<tr>
<th>SPECspeed2017_int_base</th>
<th>7.66</th>
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<tbody>
<tr>
<td>SPECspeed2017_int_peak</td>
<td>7.90</td>
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</tbody>
</table>

| CPU2017 License: | 3175 |
| Test Sponsor: | Huawei |
| Tested by: | Huawei |
| Test Date: | Jun-2018 |
| Hardware Availability: | Jul-2017 |
| Software Availability: | Jan-2018 |

### Hardware

- **CPU Name:** Intel Xeon Gold 5120T  
- **Max MHz.:** 3200  
- **Nominal:** 2200  
- **Enabled:** 28 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:** 19.25 MB I+D on chip per chip  
- **Other:** None  
- **Memory:** 384 GB (12 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 7.3 (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 0.59 Released Feb-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;
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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>
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<tr>
<td>600.perlbench_s</td>
<td>28</td>
<td>331</td>
<td>5.37</td>
<td>330</td>
<td>5.39</td>
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<tr>
<td>602.gcc_s</td>
<td>28</td>
<td>484</td>
<td>8.22</td>
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<tr>
<td>620.omnetpp_s</td>
<td>28</td>
<td>323</td>
<td>5.05</td>
<td>312</td>
<td>5.22</td>
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<td>5.20</td>
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<tr>
<td>623.xalanchmk_s</td>
<td>28</td>
<td>171</td>
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<td>631.deepsjeng_s</td>
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<td>641.leea_s</td>
<td>28</td>
<td>458</td>
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<td>648.exchange2_s</td>
<td>28</td>
<td>253</td>
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<td>319</td>
<td>19.4</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 = "/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 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)
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.
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**Platform Notes**

BIOS configuration:
Power Policy Set to Custom
Hyper-Threading Set to Disable
ADDDC Sparing Set to Disabled

Sysinfo program /spec/bin/sysinfo
Rev: r5797 of 2017-06-14 96c45e4568ad54c135fd618bcc091c0f
running on localhost.localdomain Tue Jun 19 10:25:21 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) Gold 5120T CPU @ 2.20GHz
  2 "physical id"s (chips)
  28 "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 : 14
  siblings : 14
  physical 0: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14
  physical 1: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14
```

From lscpu:

```
Architecture:        x86_64
CPU op-mode(s):      32-bit, 64-bit
Byte Order:          Little Endian
CPU(s):              28
On-line CPU(s) list: 0-27
Thread(s) per core:  1
Core(s) per socket:  14
Socket(s):           2
NUMA node(s):        2
Vendor ID:           GenuineIntel
CPU family:          6
Model:               85
Model name:          Intel(R) Xeon(R) Gold 5120T CPU @ 2.20GHz
Stepping:            4
CPU MHz:             2201.000
BogoMIPS:            4405.47
Virtualization:     VT-x
L1d cache:           32K
L1i cache:           32K
L2 cache:            1024K
L3 cache:            19712K
NUMA node0 CPU(s):   0-13
NUMA node1 CPU(s):   14-27
```

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Platform Notes (Continued)

/proc/cpuinfo cache data

    cache size : 19712 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
  node 0 size: 194741 MB
  node 0 free: 189751 MB
  node 1 cpus: 14 15 16 17 18 19 20 21 22 23 24 25 26 27
  node 1 size: 196608 MB
  node 1 free: 192024 MB
node distances:
  node 0 1
  0: 10 21
  1: 21 10

From /proc/meminfo
    MemTotal: 394174996 kB
    HugePages_Total: 0
    Hugepagesize: 2048 kB

From /etc/*release* /etc/*version*
    os-release:
      NAME="Red Hat Enterprise Linux Server"
      VERSION="7.3 (Maipo)"
      ID="rhel"
      ID_LIKE="fedora"
      VERSION_ID="7.3"
      PRETTY_NAME="Red Hat Enterprise Linux Server 7.3 (Maipo)"
      ANSI_COLOR="0;31"
      CPE_NAME="cpe:/o:redhat:enterprise_linux:7.3:ga:server"
    redhat-release: Red Hat Enterprise Linux Server release 7.3 (Maipo)
    system-release: Red Hat Enterprise Linux Server release 7.3 (Maipo)

    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 Jun 19 10:23

    SPEC is set to: /spec

      Filesystem    Type  Size  Used Avail Use% Mounted on
      /dev/sda8      xfs  325G  114G  212G  36% /

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Platform Notes (Continued)

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. 0.59 02/24/2018
Memory:
  4x NO DIMM NO DIMM
  12x 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.

==============================================================================
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)
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Compiler Version Notes (Continued)

```text
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

```text
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

```text
C benchmarks:
-W1, -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:
-W1, -z, muldefs -xCORE-AVX2 -ipo -O3 -no-prec-div
-qopt-mem-layout-trans=3 -L/usr/local/je5.0.1-64/lib -ljemalloc
```

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### Base Optimization Flags (Continued)

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
602.gcc_s: -DSPEC_LP64
605.mcf_s: -DSPEC_LP64
620.omnetpp_s: -DSPEC_LP64
623.xalanchmk_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
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---

## 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` 
  - `-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` 
  - `-L/usr/local/je5.0.1-64/lib` 
  - `-ljemalloc`

- **605.mcf_s**: basepeak = yes

- **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`

- **623.xalancbk_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:

- `-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`
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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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