Huawei

Huawei XH321 V5 (Intel Xeon Silver 4110)

**SPECspeed2017_int_base = 6.93**

**SPECspeed2017_int_peak = 7.16**

<table>
<thead>
<tr>
<th>Test Date:</th>
<th>Hardware Availability:</th>
<th>Software Availability:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jun-2018</td>
<td>Jul-2017</td>
<td>Jan-2018</td>
</tr>
</tbody>
</table>

**CPU2017 License:** 3175

**Test Sponsor:** Huawei

**Tested by:** Huawei

**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

**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

**Operating System:**

Red Hat Enterprise Linux Server release 7.3 (Maipo)

3.10.0-693.11.6.el7.x86_64

**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

---

**Threads**

<table>
<thead>
<tr>
<th>Test</th>
<th>Name</th>
<th>Value</th>
<th>SPECspeed2017_int_base (6.93)</th>
<th>SPECspeed2017_int_peak (7.16)</th>
</tr>
</thead>
<tbody>
<tr>
<td>600</td>
<td>perlbench_s</td>
<td>4.90</td>
<td>5.83</td>
<td>7.40</td>
</tr>
<tr>
<td>602</td>
<td>gcc_s</td>
<td>7.59</td>
<td>9.29</td>
<td></td>
</tr>
<tr>
<td>605</td>
<td>mcf_s</td>
<td>4.23</td>
<td>4.30</td>
<td></td>
</tr>
<tr>
<td>620</td>
<td>omnetpp_s</td>
<td>7.63</td>
<td>8.24</td>
<td></td>
</tr>
<tr>
<td>623</td>
<td>xalancbmk_s</td>
<td>4.28</td>
<td>4.90</td>
<td></td>
</tr>
<tr>
<td>625</td>
<td>x264_s</td>
<td>3.49</td>
<td></td>
<td></td>
</tr>
<tr>
<td>631</td>
<td>deepsjeng_s</td>
<td>10.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>641</td>
<td>leela_s</td>
<td>10.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>648</td>
<td>exchange2_s</td>
<td>15.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>657</td>
<td>xz_s</td>
<td>16.3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

**Software**

**OS:**

Red Hat Enterprise Linux Server release 7.3

3.10.0-693.11.6.el7.x86_64

**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

**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

---

**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

**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

3.10.0-693.11.6.el7.x86_64

**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
## SPEC CPU2017 Integer Speed Result

**Huawei**

**Huawei XH321 V5 (Intel Xeon Silver 4110)**

<table>
<thead>
<tr>
<th>CPU2017 License:</th>
<th>3175</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Sponsor:</td>
<td>Huawei</td>
</tr>
<tr>
<td>Tested by:</td>
<td>Huawei</td>
</tr>
</tbody>
</table>

**Test Date:** Jun-2018  
**Hardware Availability:** Jul-2017  
**Software Availability:** Jan-2018

### Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Base</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>16</td>
<td>363</td>
<td>362</td>
<td>4.90</td>
<td>362</td>
<td>4.90</td>
<td></td>
<td></td>
</tr>
<tr>
<td>602.gcc_s</td>
<td>16</td>
<td>539</td>
<td>538</td>
<td>7.40</td>
<td>536</td>
<td>7.43</td>
<td></td>
<td></td>
</tr>
<tr>
<td>605.mcf_s</td>
<td>16</td>
<td>508</td>
<td>507</td>
<td>9.32</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>620.omnetpp_s</td>
<td>16</td>
<td>385</td>
<td>385</td>
<td>4.23</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>623.xalanchmk_s</td>
<td>16</td>
<td>185</td>
<td>186</td>
<td>7.63</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>625.x264_s</td>
<td>16</td>
<td>191</td>
<td>192</td>
<td>9.21</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>631.deepsjeng_s</td>
<td>16</td>
<td>335</td>
<td>335</td>
<td>4.28</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>641.leela_s</td>
<td>16</td>
<td>488</td>
<td>488</td>
<td>3.49</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>648.exchange2_s</td>
<td>16</td>
<td>269</td>
<td>270</td>
<td>10.9</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>657.xz_s</td>
<td>16</td>
<td>394</td>
<td>393</td>
<td>15.7</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**SPECspeed2017_int_base = 6.93**  
**SPECspeed2017_int_peak = 7.16**

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:
- System 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

Huawei XH321 V5 (Intel Xeon Silver 4110)

SPEC CPU2017 Integer Speed Result

Copyright 2017-2018 Standard Performance Evaluation Corporation

Huawei

Huawei XH321 V5 (Intel Xeon Silver 4110)

SPECspeed2017_int_base = 6.93
SPECspeed2017_int_peak = 7.16

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

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 96c45e4568ad54c135fd618b88e1c0f
running on localhost.localdomain Fri Jun 22 18:11:04 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 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
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 4110 CPU @ 2.10GHz
Stepping: 4
CPU MHz: 2101.000
BogoMIPS: 4205.34
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 11264K
NUMA node0 CPU(s): 0-7
NUMA node1 CPU(s): 8-15

(Continued on next page)
Huawei

Huawei XH321 V5 (Intel Xeon Silver 4110)

<table>
<thead>
<tr>
<th>CPU2017 License: 3175</th>
<th>Test Date: Jun-2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Sponsor: Huawei</td>
<td>Hardware Availability: Jul-2017</td>
</tr>
<tr>
<td>Tested by: Huawei</td>
<td>Software Availability: Jan-2018</td>
</tr>
</tbody>
</table>

**SPEC CPU2017 Integer Speed Result**

**Huawei XH321 V5 (Intel Xeon Silver 4110)**

<table>
<thead>
<tr>
<th>SPECspeed2017_int_base</th>
<th>SPECspeed2017_int_peak</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.93</td>
<td>7.16</td>
</tr>
</tbody>
</table>

Platform Notes (Continued)

/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: 194741 MB
  node 0 free: 189890 MB
  node 1 cpus: 8 9 10 11 12 13 14 15
  node 1 size: 196608 MB
  node 1 free: 192010 MB

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

From `/etc/*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 22 18:10

SPEC set to: /spec

<table>
<thead>
<tr>
<th>Filesystem</th>
<th>Type</th>
<th>Size</th>
<th>Used</th>
<th>Avail</th>
<th>Use%</th>
<th>Mounted on</th>
</tr>
</thead>
<tbody>
<tr>
<td>/dev/sda8</td>
<td>xfs</td>
<td>325G</td>
<td>151G</td>
<td>175G</td>
<td>47%</td>
<td>/</td>
</tr>
</tbody>
</table>

(Continued on next page)
Huawei XH321 V5 (Intel Xeon Silver 4110)

 SPECspeed2017_int_base =  6.93
 SPECspeed2017_int_peak =  7.16

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

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 M393A4K4OBB2-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)

(Continued on next page)
Huawei

Huawei XH321 V5 (Intel Xeon Silver 4110)

<table>
<thead>
<tr>
<th>SPECspeed2017_int_base</th>
<th>6.93</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECspeed2017_int_peak</td>
<td>7.16</td>
</tr>
</tbody>
</table>

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

Compiler Version Notes (Continued)

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

Base Optimization Flags

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

(Continued on next page)
Huawei

Huawei XH321 V5 (Intel Xeon Silver 4110)

SPECspeed2017_int_base = 6.93
SPECspeed2017_int_peak = 7.16

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

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.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
Huawei

Huawei XH321 V5 (Intel Xeon Silver 4110)

<table>
<thead>
<tr>
<th>SPECspeed2017_int_base</th>
<th>SPECspeed2017_int_peak</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.93</td>
<td>7.16</td>
</tr>
</tbody>
</table>

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/jf5.0.1-64/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/jf5.0.1-64/lib -ljemalloc

605.mcf_s: basepeak = yes

625.x264_s: basepeak = yes

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/jf5.0.1-64/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/jf5.0.1-32/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/jf5.0.1-64/lib -ljemalloc
Huawei XH321 V5 (Intel Xeon Silver 4110)  

**SPEC CPU2017 Integer Speed Result**

<table>
<thead>
<tr>
<th>SPECspeed2017_int_base</th>
<th>SPECspeed2017_int_peak</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.93</td>
<td>7.16</td>
</tr>
</tbody>
</table>

Copyright 2017-2018 Standard Performance Evaluation Corporation

Huawei

Huawei XH321 V5 (Intel Xeon Silver 4110)

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

- **Test Date:** Jun-2018  
- **Hardware Availability:** Jul-2017  
- **Software Availability:** Jan-2018

---

### 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

---

SPEC is a registered trademark of the Standard Performance Evaluation Corporation. All other brand and product names appearing in this result are trademarks or registered trademarks of their respective holders.

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 2018-06-22 18:11:04-0400.  
Originally published on 2018-07-10.