Huawei XH321 V5 (Intel Xeon Bronze 3106)

<table>
<thead>
<tr>
<th>SPECspeed2017_fp_base</th>
<th>45.6</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECspeed2017_fp_peak</td>
<td>46.5</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Hardware</th>
<th>Software</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU Name: Intel Xeon Bronze 3106</td>
<td>OS: Red Hat Enterprise Linux Server release 7.3 (Maipo)</td>
</tr>
<tr>
<td>Max MHz.: 1700</td>
<td>3.10.0-693.11.6.el7.x86_64</td>
</tr>
<tr>
<td>Nominal: 1700</td>
<td>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</td>
</tr>
<tr>
<td>Enabled: 16 cores, 2 chips</td>
<td>Parallel: Yes</td>
</tr>
<tr>
<td>Orderable: 1,2 chips</td>
<td>Firmware: Version 0.59 Released Feb-2018</td>
</tr>
<tr>
<td>Cache L1: 32 KB I + 32 KB D on chip per core</td>
<td>File System: xfs</td>
</tr>
<tr>
<td>L2: 1 MB I+D on chip per core</td>
<td>System State: Run level 3 (multi-user)</td>
</tr>
<tr>
<td>L3: 11 MB I+D on chip per core</td>
<td>Base Pointers: 64-bit</td>
</tr>
<tr>
<td>Other: None</td>
<td>Peak Pointers: 64-bit</td>
</tr>
<tr>
<td>Memory: 384 GB (12 x 32 GB 2Rx4 PC4-2666V-R, running at 2133)</td>
<td>Other: None</td>
</tr>
<tr>
<td>Storage: 1 x 1200 GB SAS, 10000 RPM</td>
<td></td>
</tr>
<tr>
<td>Other: None</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
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<th>Hardware</th>
</tr>
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<td>45.6</td>
</tr>
<tr>
<td>SPECspeed2017_fp_peak</td>
<td>46.5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Threads</th>
<th>SPECspeed2017_fp_base (45.6)</th>
<th>SPECspeed2017_fp_peak (46.5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>603.bwaves_s 16</td>
<td>56.4</td>
<td>56.4</td>
</tr>
<tr>
<td>607.cactuBSSN_s 16</td>
<td>28.3</td>
<td>28.3</td>
</tr>
<tr>
<td>619.lbm_s 16</td>
<td>32.6</td>
<td>32.6</td>
</tr>
<tr>
<td>621.wrf_s 16</td>
<td>33.3</td>
<td>33.3</td>
</tr>
<tr>
<td>627.cam4_s 16</td>
<td>22.6</td>
<td>22.6</td>
</tr>
<tr>
<td>628.pop2_s 16</td>
<td>32.1</td>
<td>32.1</td>
</tr>
<tr>
<td>638.imagick_s 16</td>
<td>28.9</td>
<td>28.9</td>
</tr>
<tr>
<td>644.nab_s 16</td>
<td>51.9</td>
<td>51.9</td>
</tr>
<tr>
<td>649.fotonik3d_s 16</td>
<td>49.7</td>
<td>49.7</td>
</tr>
<tr>
<td>654.roms_s 16</td>
<td>51.3</td>
<td>51.3</td>
</tr>
</tbody>
</table>

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

Test Sponsor: Huawei
Hardware Availability: Jul-2017
Software Availability: Jan-2018
## SPEC CPU2017 Floating Point Speed Result

### Huawei

Huawei XH321 V5 (Intel Xeon Bronze 3106)

**SPECspeed2017_fp_base = 45.6**

**SPECspeed2017_fp_peak = 46.5**

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Base</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Base</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Base</th>
<th>Seconds</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>603.bwaves_s</td>
<td>16</td>
<td>220</td>
<td>219</td>
<td>269</td>
<td>220</td>
<td>268</td>
<td></td>
<td>16</td>
<td>220</td>
<td>269</td>
</tr>
<tr>
<td>607.cactuBSSN_s</td>
<td>16</td>
<td>295</td>
<td>295</td>
<td>56.4</td>
<td>296</td>
<td>56.3</td>
<td></td>
<td>16</td>
<td>289</td>
<td>57.6</td>
</tr>
<tr>
<td>619.llvm_s</td>
<td>16</td>
<td>185</td>
<td>185</td>
<td>28.3</td>
<td>185</td>
<td>28.3</td>
<td></td>
<td>16</td>
<td>185</td>
<td>28.3</td>
</tr>
<tr>
<td>621.wrf_s</td>
<td>16</td>
<td>407</td>
<td>403</td>
<td>32.8</td>
<td>406</td>
<td>32.6</td>
<td></td>
<td>16</td>
<td>397</td>
<td>33.3</td>
</tr>
<tr>
<td>627.cam4_s</td>
<td>16</td>
<td>393</td>
<td>392</td>
<td>22.6</td>
<td>392</td>
<td>22.6</td>
<td></td>
<td>16</td>
<td>393</td>
<td>22.6</td>
</tr>
<tr>
<td>628.pop2_s</td>
<td>16</td>
<td>364</td>
<td>370</td>
<td>32.1</td>
<td>372</td>
<td>31.9</td>
<td></td>
<td>16</td>
<td>341</td>
<td>34.8</td>
</tr>
<tr>
<td>638.imagick_s</td>
<td>16</td>
<td>498</td>
<td>498</td>
<td>28.9</td>
<td>499</td>
<td>28.9</td>
<td></td>
<td>16</td>
<td>499</td>
<td>28.9</td>
</tr>
<tr>
<td>644.nab_s</td>
<td>16</td>
<td>337</td>
<td>337</td>
<td>51.9</td>
<td>337</td>
<td>51.9</td>
<td></td>
<td>16</td>
<td>337</td>
<td>51.9</td>
</tr>
<tr>
<td>649.fotonik3d_s</td>
<td>16</td>
<td>183</td>
<td>184</td>
<td>49.8</td>
<td>184</td>
<td>49.7</td>
<td></td>
<td>16</td>
<td>183</td>
<td>49.8</td>
</tr>
<tr>
<td>654.roms_s</td>
<td>16</td>
<td>307</td>
<td>307</td>
<td>51.3</td>
<td>307</td>
<td>51.3</td>
<td></td>
<td>16</td>
<td>280</td>
<td>56.1</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,compact"
- 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
```

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.

### Platform Notes

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

(Continued on next page)
Huawei

Huawei XH321 V5 (Intel Xeon Bronze 3106)

SPECspeed2017_fp_base = 45.6
SPECspeed2017_fp_peak = 46.5

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

Platform Notes (Continued)

Sysinfo program /spec/bin/sysinfo
Rev: r5797 of 2017-06-14 96c45e4568ad54c135fd618bcc091c0f
running on localhost.localdomain Tue Jun 26 01:28:20 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) Bronze 3106 CPU @ 1.70GHz
  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) Bronze 3106 CPU @ 1.70GHz
Stepping: 4
CPU MHz: 1700.000
BogoMIPS: 3404.94
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

/proc/cpuinfo cache data
  cache size : 11264 KB

(Continued on next page)
Huawei

Huawei XH321 V5 (Intel Xeon Bronze 3106)

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Platform Notes (Continued)

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: 189304 MB
node 1 cpus: 8 9 10 11 12 13 14 15
node 1 size: 196608 MB
node 1 free: 191824 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 25 14:59

SPEC is set to: /spec

Filesystem Type Size Used Avail Use% Mounted on
/dev/sda8 xfs 325G 114G 211G 36% /

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.

(Continued on next page)
Huawei XH321 V5 (Intel Xeon Bronze 3106)

**SPECspeed2017_fp_base** = 45.6

**SPECspeed2017_fp_peak** = 46.5

**CPU2017 License:** 3175

**Test Sponsor:** Huawei

**Test Date:** Jun-2018

**Hardware Availability:** Jul-2017

**Tested by:** Huawei

**Software Availability:** Jan-2018

---

**Platform Notes (Continued)**

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 2133

(End of data from sysinfo program)

---

**Compiler Version Notes**

```
CC 619.lbm_s(base) 638.imagick_s(base, peak) 644.nab_s(base, peak)
-----------------------------------------------
icc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
-----------------------------------------------

CC 619.lbm_s(peak)
-----------------------------------------------
icc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
-----------------------------------------------

FC 607.cactuBSSN_s(base)
-----------------------------------------------
icpc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
icc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
ifort (IFORT) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
-----------------------------------------------

FC 607.cactuBSSN_s(peak)
-----------------------------------------------
icpc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
icc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
ifort (IFORT) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
-----------------------------------------------
```

(Continued on next page)
Huawei

Huawei XH321 V5 (Intel Xeon Bronze 3106)

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

---

**Compiler Version Notes (Continued)**

<table>
<thead>
<tr>
<th>FC</th>
<th>603.bwaves_s(base)</th>
<th>649.fotonik3d_s(base)</th>
<th>654.roms_s(base)</th>
</tr>
</thead>
</table>
| ifort (IFORT) 18.0.0 20170811  
Copyright (C) 1985-2017 Intel Corporation. All rights reserved. |

<table>
<thead>
<tr>
<th>FC</th>
<th>603.bwaves_s(peak)</th>
<th>649.fotonik3d_s(peak)</th>
<th>654.roms_s(peak)</th>
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</table>
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<table>
<thead>
<tr>
<th>CC</th>
<th>621.wrf_s(base)</th>
<th>627.cam4_s(base, peak)</th>
<th>628.pop2_s(base)</th>
</tr>
</thead>
</table>
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Copyright (C) 1985-2017 Intel Corporation. All rights reserved.  
icc (ICC) 18.0.0 20170811  
Copyright (C) 1985-2017 Intel Corporation. All rights reserved. |

<table>
<thead>
<tr>
<th>CC</th>
<th>621.wrf_s(peak)</th>
<th>628.pop2_s(peak)</th>
</tr>
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</table>
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Copyright (C) 1985-2017 Intel Corporation. All rights reserved.  
icc (ICC) 18.0.0 20170811  
Copyright (C) 1985-2017 Intel Corporation. All rights reserved. |

---

**Base Compiler Invocation**

**C benchmarks:**

| icc |

**Fortran benchmarks:**

| ifort |

**Benchmarks using both Fortran and C:**

| ifort icc |

**Benchmarks using Fortran, C, and C++:**

| icpc icc ifort |
## SPEC CPU2017 Floating Point Speed Result

<table>
<thead>
<tr>
<th>Huawei XH321 V5 (Intel Xeon Bronze 3106)</th>
<th>SPECspeed2017_fp_base = 45.6</th>
</tr>
</thead>
</table>

### CPU2017 License: 3175

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<th>Test Date: Jun-2018</th>
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</thead>
</table>

<table>
<thead>
<tr>
<th>Tested by: Huawei</th>
<th>Hardware Availability: Jul-2017</th>
</tr>
</thead>
</table>

### Base Portability Flags

- 603.bwaves_s: -DSPEC_LP64
- 607.cactuBSSN_s: -DSPEC_LP64
- 619.lbm_s: -DSPEC_LP64
- 621.wrf_s: -DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian
- 627.cam4_s: -DSPEC_LP64 -DSPEC_CASE_FLAG
- 628.pop2_s: -DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian
- 638.imagick_s: -DSPEC_LP64 -DSPEC_CASE_FLAG
- 644.nab_s: -DSPEC_LP64
- 649.fotonik3d_s: -DSPEC_LP64
- 654.roms_s: -DSPEC_LP64

### Base Optimization Flags

**C benchmarks:**

- -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
- -qopt-mem-layout-trans=3 -qopenmp -DSPEC_OPENMP

**Fortran benchmarks:**

- -DSPEC_OPENMP -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch
- -ffinite-math-only -qopt-mem-layout-trans=3 -qopenmp
- -nostandard-realloc-lhs -align array32byte

**Benchmarks using both Fortran and C:**

- -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
- -qopt-mem-layout-trans=3 -qopenmp -DSPEC_OPENMP
- -nostandard-realloc-lhs -align array32byte

**Benchmarks using Fortran, C, and C++:**

- -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
- -qopt-mem-layout-trans=3 -qopenmp -DSPEC_OPENMP
- -nostandard-realloc-lhs -align array32byte

### Base Other Flags

**C benchmarks:**

- -m64 -std=c11

**Fortran benchmarks:**

- -m64

(Continued on next page)
Huawei
Huawei XH321 V5 (Intel Xeon Bronze 3106)

SPECspeed2017_fp_base = 45.6
SPECspeed2017_fp_peak = 46.5

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

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

Base Other Flags (Continued)

Benchmarks using both Fortran and C:
-m64 -std=c11

Benchmarks using Fortran, C, and C++:
-m64 -std=c11

Peak Compiler Invocation

C benchmarks:
icc

Fortran benchmarks:
ifort

Benchmarks using both Fortran and C:
ifort icc

Benchmarks using Fortran, C, and C++:
icpc icc ifort

Peak Portability Flags

Same as Base Portability Flags

Peak Optimization Flags

C benchmarks:
619.lbm_s: -prof-gen(pass 1) -prof-use(pass 2) -O2 -xCORE-AVX2
-qopt-prefetch -ipo -O3 -ffinite-math-only -no-prec-div
-qopt-mem-layout-trans=3 -DSPEC_SUPPRESS_OPENMP -qopenmp
-DSPEC_OPENMP

638.imagick_s: -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=3 -qopenmp
-DSPEC_OPENMP

644.nab_s: Same as 638.imagick_s

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

Fortran benchmarks:

603.bwaves_s: -prof-gen(pass 1) -prof-use(pass 2) -DSPEC_SUPPRESS_OPENMP
-DSPEC_OPENMP -O2 -xCORE-AVX2 -qopt-prefetch -ipo -O3
-ffinite-math-only -no-prec-div -qopt-mem-layout-trans=3
-qopenmp -nostandard-realloc-lhs -align array32byte

649.fotonik3d_s: basepeak = yes

654.roms_s: Same as 603.bwaves_s

Benchmarks using both Fortran and C:

621.wrf_s: -prof-gen(pass 1) -prof-use(pass 2) -O2 -xCORE-AVX2
-qopt-prefetch -ipo -O3 -ffinite-math-only -no-prec-div
-qopt-mem-layout-trans=3 -DSPEC_SUPPRESS_OPENMP -qopenmp
-DSPEC_OPENMP -nostandard-realloc-lhs -align array32byte

627.cam4_s: -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=3 -qopenmp
-DSPEC_OPENMP -nostandard-realloc-lhs -align array32byte

628.pop2_s: Same as 621.wrf_s

Benchmarks using Fortran, C, and C++:

-prof-gen(pass 1) -prof-use(pass 2) -O2 -xCORE-AVX2 -qopt-prefetch
-ipo -O3 -ffinite-math-only -no-prec-div -qopt-mem-layout-trans=3
-DSPEC_SUPPRESS_OPENMP -qopenmp -DSPEC_OPENMP -nostandard-realloc-lhs
-align array32byte

Peak Other Flags

C benchmarks:

-m64 -std=c11

Fortran benchmarks:

-m64

Benchmarks using both Fortran and C:

-m64 -std=c11

Benchmarks using Fortran, C, and C++:

-m64 -std=c11
Huawei

Huawei XH321 V5 (Intel Xeon Bronze 3106)

| SPECspeed2017_fp_base | 45.6 |
| SPECspeed2017_fp_peak | 46.5 |

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

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

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 2018-06-26 01:28:19-0400.
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