Huawei XH321 V5 (Intel Xeon Bronze 3104)

CPU2017 License: Huawei
Test Sponsor: Huawei
Hardware Availability: Jul-2017
Software Availability: Jan-2018

CPU Name: Intel Xeon Bronze 3104
Max MHz.: 1700
Nominal: 1700
Enabled: 12 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: 8.25 MB I+D on chip per chip
Other: None
Memory: 384 GB (12 x 32 GB 2Rx4 PC4-2666V-R, running at 2133)
Storage: 1 x 1200 GB SAS, 10000 RPM
Other: None

Software
OS: 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: 64-bit
Other: None

Specspeed2017_fp_peak = 34.2
Specspeed2017_fp_base = 33.5
Huawei XH321 V5 (Intel Xeon Bronze 3104)

SPECspeed2017_fp_base = 33.5
SPECspeed2017_fp_peak = 34.2

Results Table

| Benchmark   | Threads | Base | Seconds | Ratio | | Seconds | Ratio | | Seconds | Ratio | | Seconds | Ratio |
|-------------|---------|------|---------|-------| |----------|-------| |----------|-------| |----------|-------|
| 603.bwaves_s | 12      | 325  | 182     | 325   | 181     | 326     | 181     | 12       | 325   | 182     | 325   | 181     |
| 607.cactuBSSN_s | 12      | 380  | 43.9    | 379   | 44.0    | 382     | 43.7    | 12       | 378   | 44.1    | 377   | 44.3    |
| 619.lbm_s     | 12      | 295  | 17.8    | 296   | 17.7    | 298     | 17.6    | 12       | 295   | 17.8    | 296   | 17.7    |
| 621.wrf_s     | 12      | 490  | 27.0    | 497   | 26.6    | 506     | 26.2    | 12       | 477   | 27.8    | 476   | 27.8    |
| 627.cam4_s    | 12      | 524  | 16.9    | 522   | 17.0    | 521     | 17.0    | 12       | 524   | 16.9    | 522   | 17.0    |
| 628.pop2_s    | 12      | 429  | 27.6    | 464   | 25.6    | 429     | 27.7    | 12       | 397   | 29.9    | 396   | 30.0    |
| 638.imagick_s | 12      | 660  | 21.9    | 649   | 22.2    | 648     | 22.3    | 12       | 649   | 22.2    | 652   | 22.1    |
| 644.nab_s     | 12      | 443  | 39.5    | 443   | 39.4    | 442     | 39.5    | 12       | 443   | 39.5    | 442   | 39.5    |
| 649.fotonik3d_s | 12      | 265  | 34.4    | 271   | 33.7    | 273     | 33.5    | 12       | 265   | 34.4    | 271   | 33.7    |
| 654.roms_s    | 12      | 450  | 35.0    | 459   | 34.3    | 454     | 34.7    | 12       | 427   | 36.9    | 427   | 36.9    |

SPECspeed2017_fp_base = 33.5
SPECspeed2017_fp_peak = 34.2

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)
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**SPECspeed2017_fp_base** = 33.5

**SPECspeed2017_fp_peak** = 34.2

**CPU2017 License**: 3175

**Test Sponsor**: Huawei

**Test Date**: Jun-2018

**Hardware Availability**: Jul-2017

**Tested by**: Huawei

**Software Availability**: Jan-2018

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**Platform Notes (Continued)**

Sysinfo program /spec/bin/sysinfo

Rev: r5797 of 2017-06-14 96c45e4568ad54c135fd618bcc091c0f

running on localhost.localdomain Fri Jun 15 20:12:13 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 3104 CPU @ 1.70GHz
2 "physical id"s (chips)
12 "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: 6
siblings: 6
physical 0: cores 0 1 2 3 4 5
physical 1: cores 0 1 2 3 4 5
```

From lscpu:

```
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 12
On-line CPU(s) list: 0-11
Thread(s) per core: 1
Core(s) per socket: 6
Socket(s): 2
NUMA node(s): 2
Vendor ID: GenuineIntel
CPU family: 6
Model: 85
Model name: Intel(R) Xeon(R) Bronze 3104 CPU @ 1.70GHz
Stepping: 4
CPU MHz: 1700.000
BogoMIPS: 3405.15
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 8448K
NUMA node0 CPU(s): 0-5
NUMA node1 CPU(s): 6-11
```

/proc/cpuinfo cache data

```
cache size: 8448 KB
```

(Continued on next page)
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SPECspeed2017_fp_base = 33.5
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Test Date: Jun-2018
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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
node 0 size: 195701 MB
node 0 free: 190521 MB
node 1 cpus: 6 7 8 9 10 11
node 1 size: 196608 MB
node 1 free: 191605 MB
node distances:
node 0 1
0: 10 21
1: 21 10

From /proc/meminfo
MemTotal: 395141652 kB
HugePages_Total: 0
Hugepagesize: 2048 kB

From /etc/*release* /etc/*version*
oo-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)"
ANSl_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 15 09:21

SPEC is set to: /spec
Filesystem Type Size Used Avail Use% Mounted on
/dev/sda8 xfs 325G 114G 212G 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)
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<table>
<thead>
<tr>
<th>SPECspeed2017_fp_base</th>
<th>SPECspeed2017_fp_peak</th>
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CPU2017 License: 3175
Test Sponsor: Huawei
Test Date: Jun-2018
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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.
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Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
ifort (IFORT) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.

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Huawei XH321 V5 (Intel Xeon Bronze 3104)

 SPEC CPU2017 Floating Point Speed Result

 SPECspeed2017_fp_base = 33.5
 SPECspeed2017_fp_peak = 34.2

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)

FC  603.bwaves_s(base) 649.fotonik3d_s(base) 654.roms_s(base)

ifort (IFORT) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.

--------------------------------------------------------------------------------

FC  603.bwaves_s(peak) 649.fotonik3d_s(peak) 654.roms_s(peak)

ifort (IFORT) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.

--------------------------------------------------------------------------------

CC  621.wrf_s(base) 627.cam4_s(base, peak) 628.pop2_s(base)

ifort (IFORT) 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.

--------------------------------------------------------------------------------

CC  621.wrf_s(peak) 628.pop2_s(peak)

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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
<table>
<thead>
<tr>
<th>Base Portability Flags</th>
</tr>
</thead>
<tbody>
<tr>
<td>603.bwaves_s: -DSPEC_LP64</td>
</tr>
<tr>
<td>607.cactuBSSN_s: -DSPEC_LP64</td>
</tr>
<tr>
<td>619.lbm_s: -DSPEC_LP64</td>
</tr>
<tr>
<td>621.wrf_s: -DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian</td>
</tr>
<tr>
<td>627.cam4_s: -DSPEC_LP64 -DSPEC_CASE_FLAG</td>
</tr>
<tr>
<td>628.pop2_s: -DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian</td>
</tr>
<tr>
<td>-assume byterecl</td>
</tr>
<tr>
<td>638.imagick_s: -DSPEC_LP64</td>
</tr>
<tr>
<td>644.nab_s: -DSPEC_LP64</td>
</tr>
<tr>
<td>649.fotonik3d_s: -DSPEC_LP64</td>
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<tr>
<td>654.roms_s: -DSPEC_LP64</td>
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</tbody>
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<tr>
<td>C benchmarks:</td>
</tr>
<tr>
<td>-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only</td>
</tr>
<tr>
<td>-qopt-mem-layout-trans=3 -qopenmp -DSPEC_OPENMP</td>
</tr>
<tr>
<td>Fortran benchmarks:</td>
</tr>
<tr>
<td>-DSPEC_OPENMP -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch</td>
</tr>
<tr>
<td>-ffinite-math-only -qopt-mem-layout-trans=3 -qopenmp</td>
</tr>
<tr>
<td>-nostandard-realloc-lhs -align array32byte</td>
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<tr>
<td>Benchmarks using both Fortran and C:</td>
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<td>-nostandard-realloc-lhs -align array32byte</td>
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</tbody>
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<table>
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<th>Base Other Flags</th>
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<tr>
<td>C benchmarks:</td>
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<tr>
<td>-m64 -std=c11</td>
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<tr>
<td>Fortran benchmarks:</td>
</tr>
<tr>
<td>-m64</td>
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SPECspeed2017_fp_base = 33.5
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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:  basepeak = yes

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

Fortran benchmarks:

603.bwaves_s:  basepeak = yes

(Continued on next page)
Huawei

Huawei XH321 V5 (Intel Xeon Bronze 3104)

SPECspeed2017_fp_base = 33.5
SPECspeed2017_fp_peak = 34.2

Peak Optimization Flags (Continued)

649.fotonik3d_s: basepeak = yes

654.roms_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

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: basepeak = yes

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

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
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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/Huawei-Platform-Settings-SKL-V1.9-revC.xml

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