Huawei

Huawei XH321 V5 (Intel Xeon Silver 4114)

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

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

SPECrate2017_fp_base = 102  
SPECrate2017_fp_peak = 104

<table>
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<tr>
<th>Benchmark</th>
<th>Copies</th>
<th>SPECrate2017_fp_base</th>
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<tr>
<td>rons_r</td>
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</table>

**Hardware**

- **CPU Name:** Intel Xeon Silver 4114  
- **Max MHz.:** 3000  
- **Nominal:** 2200  
- **Enabled:** 20 cores, 2 chips, 2 threads/core  
- **Orderable:** 1.2 chips  
- **Cache L1:** 32 KB I + 32 KB D on chip per core  
- **Cache L2:** 1 MB I+D on chip per core  
- **Cache L3:** 13.75 MB I+D on chip per chip  
- **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:** No  
- **File System:** xfs  
- **System State:** Run level 3 (multi-user)  
- **Base Pointers:** 64-bit  
- **Peak Pointers:** 64-bit  
- **Other:** None
Huawei

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<table>
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<tr>
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<th>Seconds</th>
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<td>57.2</td>
<td>1110</td>
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</tbody>
</table>

Results appear in the order in which they were run. Bold underlined text indicates a median measurement.

Submit Notes

The numactl mechanism was used to bind copies to processors. The config file option 'submit' was used to generate numactl commands to bind each copy to a specific processor.

For details, please see the config file.

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:
LD_LIBRARY_PATH = "/spec/lib/ia32:/spec/lib/intel64:/spec/je5.0.1-32:/spec/je5.0.1-64"

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
runcpu command invoked through numactl i.e.:
numactl --interleave=all runcpu <etc>
Yes: The test sponsor attests, as of date of publication, that CVE-2017-5754 (Meltdown) is mitigated in the system as tested and documented.
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SPECrate2017_fp_peak = 104

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

General Notes (Continued)
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 Performance
SNC Set to Enabled
IMC Interleaving Set to 1-way Interleave
XPT Prefetch Set to Enabled
ADDDC Sparing Set to Disabled
Sysinfo program /spec/bin/sysinfo
Rev: r5797 of 2017-06-14 96c45e4568ad54c135fd618bcc091c0f
running on localhost.localdomain Sat Jun 9 06:29:18 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 4114 CPU @ 2.20GHz
 2 "physical id"s (chips)
 40 "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 : 10
siblings : 20
 physical 0: cores 0 1 2 3 4 8 9 10 11 12
 physical 1: cores 0 1 2 3 4 8 9 10 11 12

From lscpu:
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 40
On-line CPU(s) list: 0-39
Thread(s) per core: 2
Core(s) per socket: 10
Socket(s): 2
NUMA node(s): 2
Vendor ID: GenuineIntel
CPU family: 6
Model: 85
Model name: Intel(R) Xeon(R) Silver 4114 CPU @ 2.20GHz

(Continued on next page)
Huawei XH321 V5 (Intel Xeon Silver 4114)

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CPU2017 License: 3175  
Test Sponsor: Huawei  
Hardware Availability: Jul-2017  
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Platform Notes (Continued)

- Stepping: 4
- CPU MHz: 2200.000
- BogoMIPS: 4405.17
- Virtualization: VT-x
- L1d cache: 32K
- L1i cache: 32K
- L2 cache: 1024K
- L3 cache: 14080K
- NUMA node0 CPU(s): 0-9,20-29
- NUMA node1 CPU(s): 10-19,30-39

```
/proc/cpuinfo cache data  
cache size : 14080 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 20 21 22 23 24 25 26 27 28 29  
node 0 size: 194741 MB  
node 0 free: 136418 MB  
node 1 cpus: 10 11 12 13 14 15 16 17 18 19 30 31 32 33 34 35 36 37 38 39  
node 1 size: 196608 MB  
node 1 free: 141574 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*  
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)  
```

(Continued on next page)
Huawei

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</tbody>
</table>

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 Jun 7 15:00
```

```
SPEC is set to: /spec
Filesystem     Type  Size  Used  Avail  Use%  Mounted on
/dev/sda8      xfs   325G  133G   193G  41%  /
```

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  519.lbm_r(base) 538.imagick_r(base, peak) 544.nab_r(base)
------------------------------------------------------------------------------
icc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------

==============================================================================
CXXC 508.namd_r(base) 510.parest_r(base)
------------------------------------------------------------------------------
```

(Continued on next page)
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CPU2017 License: 3175
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Tested by: Huawei

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

Compiler Version Notes (Continued)

icpc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.

---

cc 511.povray_r(base) 526.blender_r(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.

---

cc 511.povray_r(peak) 526.blender_r(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.

---

fc 507.cactuBSSN_r(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 507.cactuBSSN_r(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.

---

fc 503.bwaves_r(base, peak) 549.fotonik3d_r(base, peak) 554.roms_r(base)

(Continued on next page)
SPEC CPU2017 Floating Point Rate Result

Huawei
Huawei XH321 V5 (Intel Xeon Silver 4114)

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

Compiler Version Notes (Continued)

~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
ifort (IFORT) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
FC 554.roms_r(peak)

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

~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
CC 521.wrf_r(base) 527.cam4_r(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.
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~

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CC 521.wrf_r(peak) 527.cam4_r(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

C++ benchmarks:
icpc

Fortran benchmarks:
ifort

Benchmarks using both Fortran and C:
ifort icc

Benchmarks using both C and C++:
icpc icc

(Continued on next page)
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**Base Compiler Invocation (Continued)**

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

**Base Portability Flags**

- 503.bwaves_r: -DSPEC_LP64
- 507.cactuBSSN_r: -DSPEC_LP64
- 508.namd_r: -DSPEC_LP64
- 510.parest_r: -DSPEC_LP64
- 511.povray_r: -DSPEC_LP64
- 519.lbm_r: -DSPEC_LP64
- 521.wrf_r: -DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian
- 526.blender_r: -DSPEC_LP64 -DSPEC_LINUX -funsigned-char
- 527.cam4_r: -DSPEC_LP64 -DSPEC_CASE_FLAG
- 538.imagick_r: -DSPEC_LP64
- 544.nab_r: -DSPEC_LP64
- 549.fotonik3d_r: -DSPEC_LP64
- 554.roms_r: -DSPEC_LP64

**Base Optimization Flags**

**C benchmarks:**
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=3

**C++ benchmarks:**
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=3

**Fortran benchmarks:**
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=3 -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 -nostandard-realloc-lhs -align array32byte

**Benchmarks using both C and C++:**
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=3

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### Base Optimization Flags (Continued)

Benchmarks using Fortran, C, and C++:
-xCORE-AVX2  -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only  
-qopt-mem-layout-trans=3 -nostandard-realloc-lhs -align array32byte

### Base Other Flags

C benchmarks:  
-m64  -std=c11

C++ benchmarks:  
-m64

Fortran benchmarks:  
-m64

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

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

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

### Peak Compiler Invocation

C benchmarks:  
icc

C++ benchmarks:  
icpc

Fortran benchmarks:  
ifort

Benchmarks using both Fortran and C:  
ifort icc

Benchmarks using both C and C++:  
icpc icc

(Continued on next page)
### SPEC CPU2017 Floating Point Rate Result

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---

**Peak Compiler Invocation (Continued)**

Benchmarks using Fortran, C, and C++:

- icpc icc ifort

---

**Peak Portability Flags**

Same as Base Portability Flags

---

**Peak Optimization Flags**

**C benchmarks:**

- `519.lbm_r`: `-prof-gen(pass 1) -prof-use(pass 2) -ipo -xCORE-AVX2 -O3 -no-prec-div -qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=3`

- `538.imagick_r`: `-ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=3`

- `544.nab_r`: Same as `519.lbm_r`

**C++ benchmarks:**

- `-prof-gen(pass 1) -prof-use(pass 2) -ipo -xCORE-AVX2 -O3 -no-prec-div -qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=3`

**Fortran benchmarks:**

- `503.bwaves_r`: `-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=3 -nostandard-realloc-lhs -align array32byte`

- `549.fotonik3d_r`: `basepeak = yes`

- `554.roms_r`: `-prof-gen(pass 1) -prof-use(pass 2) -ipo -xCORE-AVX2 -O3 -no-prec-div -qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=3 -nostandard-realloc-lhs -align array32byte`

**Benchmarks using both Fortran and C:**

- `-prof-gen(pass 1) -prof-use(pass 2) -ipo -xCORE-AVX2 -O3`

(Continued on next page)
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<td>SPECrate2017.fp_peak = 104</td>
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**Huawei**

**Huawei XH321 V5 (Intel Xeon Silver 4114)**

<table>
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<tr>
<th>CPU2017 License:</th>
<th>3175</th>
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<td>Test Sponsor:</td>
<td>Huawei</td>
</tr>
<tr>
<td>Tested by:</td>
<td>Huawei</td>
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**Peak Optimization Flags ( Continued )**

Benchmarks using both Fortran and C (continued):

- no-prec-div
- qopt-prefetch
- ffinite-math-only
- qopt-mem-layout-trans=3
- nostandard-realloc-lhs
- align array32byte

Benchmarks using both C and C++:

- prof-gen(pass 1)
- prof-use(pass 2)
- ipo
- xCORE-AVX2
- O3
- no-prec-div
- qopt-prefetch
- ffinite-math-only
- qopt-mem-layout-trans=3

Benchmarks using Fortran, C, and C++:

- m64/507.cactuBSSN_r:basepeak = yes

**Peak Other Flags**

C benchmarks:

- m64
- std=c11

C++ benchmarks:

- m64

Fortran benchmarks:

- m64

Benchmarks using both Fortran and C:

- m64
- std=c11

Benchmarks using both C 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](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/Intel-ic18.0-official-linux64.xml)
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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

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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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