## SPEC® CPU2017 Floating Point Speed Result

**Huawei**

Huawei 5288 V5 (Intel Xeon Silver 4112)

<table>
<thead>
<tr>
<th>Software</th>
<th>Specspeed2017_fp_base = 42.2</th>
<th>Specspeed2017_fp_peak = 43.4</th>
</tr>
</thead>
</table>

### Hardware

- **CPU Name:** Intel Xeon Silver 4112
- **Max MHz.:** 3000
- **Nominal:** 2600
- **Enabled:** 8 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 (24 x 16 GB 2Rx8 PC4-2666V-R, running at 2400)
- **Storage:** 1 x 1200 GB SAS, 10000 RPM
- **Other:** None

### Software

- **OS:** Red Hat Enterprise Linux Server release 7.4 (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 0.62 Released Mar-2018
- **File System:** xfs
- **System State:** Run level 3 (multi-user)
- **Base Pointers:** 64-bit
- **Peak Pointers:** 64-bit
- **Other:** None

### Test Details

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

### Benchmarks

- 603.bwaves_s
- 607.cactuBSSN_s
- 619.hm9_s
- 621.wrf_s
- 627.cam4_s
- 628.pop2_s
- 638.imagick_s
- 644.nab_s
- 649.fotonik3d_s
- 654.roms_s

### SPECspeed Results

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>SPECspeed2017_fp_base</th>
<th>SPECspeed2017_fp_peak</th>
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<tr>
<td>603.bwaves_s</td>
<td>8</td>
<td>48.3</td>
<td>49.9</td>
</tr>
<tr>
<td>607.cactuBSSN_s</td>
<td>8</td>
<td>28.6</td>
<td>28.6</td>
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<tr>
<td>619.hm9_s</td>
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<td>53.3</td>
<td>53.3</td>
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<td>621.wrf_s</td>
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<td>627.cam4_s</td>
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<td>638.imagick_s</td>
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<td>45.0</td>
<td>45.1</td>
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<tr>
<td>644.nab_s</td>
<td>8</td>
<td>50.7</td>
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<td>649.fotonik3d_s</td>
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<td>43.1</td>
</tr>
<tr>
<td>654.roms_s</td>
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</tr>
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</table>

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**Notes:**

1. **Threads** column shows the number of threads used for each benchmark.
2. **SPECspeed2017_fp_base** and **SPECspeed2017_fp_peak** represent the base and peak performance scores respectively.
3. **CPU2017 License:** 3175
4. **Test Sponsor:** Huawei
5. **Test Date:** Jul-2018
6. **Hardware Availability:** Jul-2017
7. **Software Availability:** Jan-2018
Huawei
Huawei 5288 V5 (Intel Xeon Silver 4112)

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

SPECspeed2017_fp_base = 42.2
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Results Table

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<tr>
<td></td>
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<tr>
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<td>365</td>
<td>43.1</td>
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<td>43.1</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"
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 Load Balance
Hyper-Threadig Set to Disable

(Continued on next page)
Huawei 5288 V5 (Intel Xeon Silver 4112)

<table>
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<tr>
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CPU2017 License: 3175
Test Sponsor: Huawei
Tested by: Huawei

Huawei

CPU:
- Intel Xeon Silver 4112
- CPU @ 2.60GHz
- 8 processors
- 4 cores, 4 siblings
- CPU MHz: 2601.000
- BogoMIPS: 5200.00
- Virtualization: VT-x
- L1d cache: 32K
- L1i cache: 32K
- L2 cache: 1024K
- L3 cache: 8448K
- NUMA node0 CPU(s): 0-3
- NUMA node1 CPU(s): 4-7
- CPU op-mode(s): 32-bit, 64-bit
- Thread(s) per core: 1
- Core(s) per socket: 4
- CPU(s): 8
- On-line CPU(s) list: 0-7
- Flags: fpu vme de pse tsc msr pae mce cx8 apic sep mtrr pge mca cmov

Platform Notes (Continued)

XPT Prefetch Set to Enabled
Sysinfo program /spec2017/bin/sysinfo
Rev: r5797 of 2017-06-14 96c45e4568ad54c135fd618bcc091c0f
running on localhost.localdomain Sun Jul 15 02:38:49 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 4112 CPU @ 2.60GHz
- 2 "physical id"s (chips)
- 8 "processors"
- cores, siblings (Caution: counting these is hw and system dependent. Use with caution.)
  - physical 0: cores 0 1 4 5
  - physical 1: cores 0 2 3 4

From lscpu:
- Architecture: x86_64
- CPU op-mode(s): 32-bit, 64-bit
- Byte Order: Little Endian
- CPU(s): 8
- On-line CPU(s) list: 0-7
- Thread(s) per core: 1
- Core(s) per socket: 4
- Socket(s): 2
- NUMA node(s): 2
- Vendor ID: GenuineIntel
- CPU family: 6
- Model: 85
- Model name: Intel(R) Xeon(R) Silver 4112 CPU @ 2.60GHz
- Stepping: 4
- CPU MHz: 2601.000
- CPU max MHz: 2601.0000
- CPU min MHz: 800.0000
- BogoMIPS: 5200.00
- Flags: fpu vme de pse tsc msr pae mce cx8 apic sep mtrr pge mca cmov

(Continued on next page)
**Huawei 5288 V5 (Intel Xeon Silver 4112)**

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### Platform Notes (Continued)

```bash
pat pse36 clflush dts acpi mmx fxsr sse sse2 ss ht tm pbe syscall nx pdpe1gb rdtsscp 
lm constant_tsc arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc 
aperfmonf eagerfpu pni pclmulqdq dtes64 msr pmx smx est tm2 ssse3 fma cx16 xtpr 
pdcn pdcm pca dca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave avx 
f16c rdrand lahf_lm abm 3dnowprefetch epb cat_l3 cdp_l3 invpcid_single intel_pt 
spec_ctrl ibpb_support tpr_shadow vnumi flexpriority ept vpid fsgsbase tsc_adjust 
bmi1 hle avx2 smep bmi2 erms invpccd rtm cmq mpx rdtd a avx512f avx512dq rdseed adx 
smap clflushopt clwb avx512cd avx512bw avx512v l xsaveopt xsave c qml cqm llc 
cqm_occup_llc cqm_mbm_total cqm_mbm_local dtm idm idm pln pts
```

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 |
| node 0 size | 194741 MB |
| node 0 free | 189020 MB |
| node 1 cpus | 4 5 6 7 |
| node 1 size | 196608 MB |
| node 1 free | 190771 MB |
| node distances: |
| node 0 | 1 |
| node 1 | 21 10 |

From /proc/meminfo

| MemTotal: | 394174584 kB |
| HugePages_Total: | 0 |
| Hugepagesize: | 2048 kB |

From /etc/*release* /etc/*version*

```
NAME="Red Hat Enterprise Linux Server"
VERSION="7.4 (Maipo)"
ID="rhel"
ID_LIKE="fedora"
VARIANT="Server"
VARIANT_ID="server"
VERSION_ID="7.4"
PRETTY_NAME="Red Hat Enterprise Linux Server 7.4 (Maipo)"
redhat-release: Red Hat Enterprise Linux Server release 7.4 (Maipo)
system-release: Red Hat Enterprise Linux Server release 7.4 (Maipo)
system-release-cpe: cpe:/o:redhat:enterprise_linux:7.4:ga:server
```

```
uname -a:
```

(Continued on next page)
Spec CPU2017 Floating Point Speed Result

Huawei 5288 V5 (Intel Xeon Silver 4112)

SPECspeed2017_fp_base = 42.2
SPECspeed2017_fp_peak = 43.4

Huawei

Huawei 5288 V5 (Intel Xeon Silver 4112)

Copyright 2017-2018 Standard Performance Evaluation Corporation

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

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

Platform Notes (Continued)

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 Jul 13 05:39

SPEC is set to: /spec2017

/specinfo

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. 0.62 03/26/2018
Memory:
24x Samsung M393A2K43BB1-CTD 16 GB 2 rank 2666, configured at 2400

(platform notes continued)

Platform Notes (Continued)

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

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BIOS INSYDE Corp. 0.62 03/26/2018
Memory:
24x Samsung M393A2K43BB1-CTD 16 GB 2 rank 2666, configured at 2400

(platform notes continued)

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.
------------------------------------------------------------------------------

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| 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) |
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Test Sponsor: Huawei
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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

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
-assume bytelecl
638.imagick_s: -DSPEC_LP64
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 -DSPEC_OPENMP
-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

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

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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 -qopenmp -DSPEC_OPENMP`  
- `-nostandard-realloc-lhs -align array32byte`

### Base 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`  

### 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
Huawei 5288 V5 (Intel Xeon Silver 4112)

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Flags</th>
</tr>
</thead>
<tbody>
<tr>
<td>619.lbm_s:619.lbm_s</td>
<td>-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</td>
</tr>
<tr>
<td>638.imagick_s:638.imagick_s</td>
<td>-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=3 -qopenmp -DSPEC_OPENMP</td>
</tr>
<tr>
<td>644.nab_s:644.nab_s</td>
<td>Same as 638.imagick_s</td>
</tr>
</tbody>
</table>

Fortran benchmarks:

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Flags</th>
</tr>
</thead>
<tbody>
<tr>
<td>603.bwaves_s:603.bwaves_s</td>
<td>-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</td>
</tr>
<tr>
<td>649.fotonik3d_s:649.fotonik3d_s</td>
<td>basepeak = yes</td>
</tr>
<tr>
<td>654.roms_s:654.roms_s</td>
<td>Same as 603.bwaves_s</td>
</tr>
</tbody>
</table>

Benchmarks using both Fortran and C:

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Flags</th>
</tr>
</thead>
<tbody>
<tr>
<td>621.wrf_s:621.wrf_s</td>
<td>-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</td>
</tr>
<tr>
<td>627.cam4_s:627.cam4_s</td>
<td>-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</td>
</tr>
<tr>
<td>628.pop2_s:628.pop2_s</td>
<td>Same as 621.wrf_s</td>
</tr>
</tbody>
</table>

Benchmarks using Fortran, C, and C++:

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Flags</th>
</tr>
</thead>
<tbody>
<tr>
<td>621.wrf_s:621.wrf_s</td>
<td>-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</td>
</tr>
</tbody>
</table>
## Huawei 5288 V5 (Intel Xeon Silver 4112)

<table>
<thead>
<tr>
<th>SPECspeed2017_fp_peak</th>
<th>SPECspeed2017_fp_base</th>
</tr>
</thead>
<tbody>
<tr>
<td>43.4</td>
<td>42.2</td>
</tr>
</tbody>
</table>

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

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### 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](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)