 SPEC® CPU2017 Floating Point Speed Result

Huawei

Huawei CH242 V5 (Intel Xeon Platinum 8168)

<table>
<thead>
<tr>
<th>SPECspeed2017_fp_base</th>
<th>SPECspeed2017_fp_peak</th>
</tr>
</thead>
<tbody>
<tr>
<td>166</td>
<td>168</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Threads</th>
<th>SPECspeed2017_fp_base</th>
<th>SPECspeed2017_fp_peak</th>
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<tr>
<td>96</td>
<td>239</td>
<td>243</td>
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<tr>
<td>96</td>
<td>81.6</td>
<td>84.9</td>
</tr>
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<td>69.3</td>
<td>71.4</td>
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<tr>
<td>96</td>
<td>60.0</td>
<td>60.0</td>
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<tr>
<td>96</td>
<td>238</td>
<td>242</td>
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<tr>
<td>96</td>
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<tr>
<td>96</td>
<td>125</td>
<td>132</td>
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<table>
<thead>
<tr>
<th>Hardware</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU Name: Intel Xeon Platinum 8168</td>
</tr>
<tr>
<td>Max MHz.: 3700</td>
</tr>
<tr>
<td>Nominal: 2700</td>
</tr>
<tr>
<td>Enabled: 96 cores, 4 chips</td>
</tr>
<tr>
<td>Orderable: 2,4 chips</td>
</tr>
<tr>
<td>Cache L1: 32 KB I + 32 KB D on chip per core</td>
</tr>
<tr>
<td>L2: 1 MB I+D on chip per core</td>
</tr>
<tr>
<td>L3: 33 MB I+D on chip per chip</td>
</tr>
<tr>
<td>Other: None</td>
</tr>
<tr>
<td>Memory: 1536 GB (48 x 32 GB 2Rx4 PC4-2666V-R)</td>
</tr>
<tr>
<td>Storage: 1 x 1200 GB SAS, 10000 RPM</td>
</tr>
<tr>
<td>Other: None</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Software</th>
</tr>
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<tbody>
<tr>
<td>OS: Red Hat Enterprise Linux Server release 7.3 (Maipo) 3.10.0-693.11.6.el7.x86_64</td>
</tr>
<tr>
<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>Parallel: Yes</td>
</tr>
<tr>
<td>Firmware: Version 0.84 Released Mar-2018</td>
</tr>
<tr>
<td>File System: xfs</td>
</tr>
<tr>
<td>System State: Run level 3 (multi-user)</td>
</tr>
<tr>
<td>Base Pointers: 64-bit</td>
</tr>
<tr>
<td>Peak Pointers: 64-bit</td>
</tr>
<tr>
<td>Other: None</td>
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</tbody>
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**SPECspeed2017_fp_base = 166**

**SPECspeed2017_fp_peak = 168**

---

**Results Table**

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
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<th>Seconds</th>
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<tbody>
<tr>
<td>603.bwaves_s</td>
<td>96</td>
<td>69.1</td>
<td>854</td>
<td>69.6</td>
<td>847</td>
<td>69.5</td>
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<td>68.8</td>
<td>857</td>
<td>69.8</td>
<td>845</td>
<td>68.8</td>
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<tr>
<td>607.cactuBSSN_s</td>
<td>96</td>
<td>64.1</td>
<td>81.7</td>
<td>64.2</td>
<td>81.6</td>
<td>67.7</td>
<td>77.4</td>
<td>96</td>
<td>64.1</td>
<td>81.7</td>
<td>64.2</td>
<td>81.6</td>
<td>67.7</td>
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<tr>
<td>619.libm_s</td>
<td>96</td>
<td>64.1</td>
<td>81.7</td>
<td>64.2</td>
<td>81.6</td>
<td>67.7</td>
<td>77.4</td>
<td>96</td>
<td>64.1</td>
<td>81.7</td>
<td>64.2</td>
<td>81.6</td>
<td>67.7</td>
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<tr>
<td>621.wrf_s</td>
<td>96</td>
<td>179</td>
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<td>199</td>
<td>66.4</td>
<td>191</td>
<td>69.3</td>
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<td>188</td>
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<td>185</td>
<td>71.4</td>
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<td>627.cam4_s</td>
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<td>54.0</td>
<td>164</td>
<td>54.3</td>
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<td>164</td>
<td>96</td>
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<td>628.pop2_s</td>
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<td>197</td>
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<td>638.imagick_s</td>
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<td>241</td>
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<td>644.nab_s</td>
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<td>40.7</td>
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<td>40.6</td>
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<tr>
<td>649.fotonik3d_s</td>
<td>96</td>
<td>84.6</td>
<td>108</td>
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<td>654.roms_s</td>
<td>96</td>
<td>126</td>
<td>125</td>
<td>133</td>
<td>118</td>
<td>124</td>
<td>127</td>
<td>96</td>
<td>113</td>
<td>140</td>
<td>119</td>
<td>132</td>
<td>141</td>
</tr>
</tbody>
</table>

---

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 Load Balance
Hyper-Threading Set to Disable

(Continued on next page)
Huawei CH242 V5 (Intel Xeon Platinum 8168)

**SPECspeed2017_fp_base = 166**

**SPECspeed2017_fp_peak = 168**

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

**Platform Notes (Continued)**

XPT Prefetch Set to Enabled
Sysinfo program /spec/bin/sysinfo
Rev: r5797 of 2017-06-14 96c45e4568ad54c135fd618bcc091c0f
running on localhost.localdomain Tue Jul 3 07:25:21 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) Platinum 8168 CPU @ 2.70GHz
  4 "physical id"s (chips)
  96 "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 : 24
          siblings : 24
        physical 0: cores 0 1 2 3 4 5 8 9 10 11 12 13 16 17 18 19 20 21 24 25 26 27 28 29
        physical 1: cores 0 1 2 3 4 5 8 9 10 11 12 13 16 17 18 19 20 21 24 25 26 27 28 29
        physical 2: cores 0 1 2 3 4 5 8 9 10 11 12 13 16 17 18 19 20 21 24 25 26 27 28 29
        physical 3: cores 0 1 2 3 4 5 8 9 10 11 12 13 16 17 18 19 20 21 24 25 26 27 28 29

From lscpu:
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 96
On-line CPU(s) list: 0-95
Thread(s) per core: 1
Core(s) per socket: 24
Socket(s): 4
NUMA node(s): 4
Vendor ID: GenuineIntel
CPU family: 6
Model: 85
Model name: Intel(R) Xeon(R) Platinum 8168 CPU @ 2.70GHz
Stepping: 4
CPU MHz: 2701.000
BogoMIPS: 5406.71
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 33792K
NUMA node0 CPU(s): 0-23
NUMA node1 CPU(s): 24-47
NUMA node2 CPU(s): 48-71

(Continued on next page)
Huawei

Huawei CH242 V5 (Intel Xeon Platinum 8168)

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Software Availability: Jan-2018

Platform Notes (Continued)

    NUMA node3 CPU(s): 72–95

    /proc/cpuinfo cache data
        cache size : 33792 KB

From numactl --hardware WARNING: a numactl 'node' might or might not correspond to a
physical chip.
available: 4 nodes (0-3)
    node 0 cpus: 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23
    node 0 size: 391577 MB
    node 0 free: 382382 MB
    node 1 cpus: 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47
    node 1 size: 393216 MB
    node 1 free: 383930 MB
    node 2 cpus: 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71
    node 2 size: 393216 MB
    node 2 free: 384226 MB
    node 3 cpus: 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95
    node 3 size: 393216 MB
    node 3 free: 384120 MB
    node distances:
        node 0 1 2 3
    0: 10 21 21 21
    1: 21 10 21 21
    2: 21 21 10 21
    3: 21 21 21 10

From /proc/meminfo
    MemTotal: 1583346560 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:

(Continued on next page)
Huawei CH242 V5 (Intel Xeon Platinum 8168)

Huawei

spec

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Huawei

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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 3 02:28

SPEC is set to: /spec
FileSystem Type Size Used Avail Use% Mounted on
/dev/sda4 xfs 400G 22G 378G 6% /

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. 0.84 03/26/2018
Memory:
48x Samsung M393A4K40BB2-CTD 32 GB 2 rank 2666

(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.
iccc (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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(Continued on next page)
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<tbody>
<tr>
<td>SPECspeed2017_fp_peak</td>
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</tbody>
</table>

**Compiler Version Notes (Continued)**

```plaintext
---
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.
---

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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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 byterecl
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
-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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### 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
Huawei CH242 V5 (Intel Xeon Platinum 8168)

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| SPECspeed2017_fp_peak = 168 |

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**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:

-.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-prefetch -qopt-mem-layout-trans=3 -qopenmp -nstandard-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 -nstandard-realloc-lhs -align array32byte

627.cam4_s: basepeak = yes

628.pop2_s: Same as 621.wrf_s

---

**Peak Other Flags**

C benchmarks:

-m64 -std=c11

Fortran benchmarks:

-m64

Benchmarks using both Fortran and C:

-m64 -std=c11

(Continued on next page)
## Huawei CH242 V5 (Intel Xeon Platinum 8168)

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**Peak Other Flags (Continued)**

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)