## SPEC® CPU2017 Floating Point Speed Result

### Hardware

<table>
<thead>
<tr>
<th>CPU Name:</th>
<th>Intel Xeon Gold 6144</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max MHz.:</td>
<td>4200</td>
</tr>
<tr>
<td>Nominal:</td>
<td>3500</td>
</tr>
<tr>
<td>Enabled:</td>
<td>16 cores, 2 chips</td>
</tr>
<tr>
<td>Orderable:</td>
<td>1.2 chips</td>
</tr>
<tr>
<td>Cache L1:</td>
<td>32 KB I + 32 KB D on chip per core</td>
</tr>
<tr>
<td>L2:</td>
<td>1 MB I+D on chip per core</td>
</tr>
<tr>
<td>L3:</td>
<td>24.75 MB I+D on chip per chip</td>
</tr>
<tr>
<td>Other:</td>
<td>None</td>
</tr>
<tr>
<td>Memory:</td>
<td>384 GB (24 x 16 GB 2Rx8 PC4-2666V-R)</td>
</tr>
<tr>
<td>Storage:</td>
<td>1 x 1200 GB SAS, 10000 RPM</td>
</tr>
<tr>
<td>Other:</td>
<td>None</td>
</tr>
</tbody>
</table>

### 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

<table>
<thead>
<tr>
<th>Huawei CH121 V5 (Intel Xeon Gold 6144)</th>
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<tbody>
<tr>
<td>SPECspeed2017_fp_base = 88.9</td>
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<tr>
<td>SPECspeed2017_fp_peak = 91.3</td>
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<table>
<thead>
<tr>
<th>Threads</th>
<th>SPECspeed2017_fp_base</th>
<th>SPECspeed2017_fp_peak</th>
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<tbody>
<tr>
<td>16</td>
<td>103</td>
<td>(88.9)</td>
</tr>
<tr>
<td>16</td>
<td>106</td>
<td>(91.3)</td>
</tr>
<tr>
<td>16</td>
<td>42.7</td>
<td>(88.9)</td>
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<tr>
<td>16</td>
<td>42.9</td>
<td>(91.3)</td>
</tr>
<tr>
<td>16</td>
<td>63.5</td>
<td>(88.9)</td>
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<tr>
<td>16</td>
<td>74.0</td>
<td>(91.3)</td>
</tr>
<tr>
<td>16</td>
<td>54.7</td>
<td>(88.9)</td>
</tr>
<tr>
<td>16</td>
<td>54.7</td>
<td>(91.3)</td>
</tr>
<tr>
<td>16</td>
<td>64.2</td>
<td>(88.9)</td>
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<tr>
<td>16</td>
<td>66.1</td>
<td>(91.3)</td>
</tr>
<tr>
<td>16</td>
<td>68.7</td>
<td>(88.9)</td>
</tr>
<tr>
<td>16</td>
<td>80.9</td>
<td>(91.3)</td>
</tr>
<tr>
<td>16</td>
<td>80.9</td>
<td>(88.9)</td>
</tr>
<tr>
<td>16</td>
<td>107</td>
<td>(88.9)</td>
</tr>
<tr>
<td>16</td>
<td>113</td>
<td>(91.3)</td>
</tr>
</tbody>
</table>
Huawei CH121 V5 (Intel Xeon Gold 6144)

Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Base</th>
<th>Peak</th>
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<tbody>
<tr>
<td></td>
<td>Threads</td>
<td>Seconds</td>
</tr>
<tr>
<td>603.bwaves_s</td>
<td>16</td>
<td>137</td>
</tr>
<tr>
<td>607.cactuBSSN_s</td>
<td>16</td>
<td>162</td>
</tr>
<tr>
<td>619.lbm_s</td>
<td>16</td>
<td>122</td>
</tr>
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<td>621.wrf_s</td>
<td>16</td>
<td>208</td>
</tr>
<tr>
<td>627.cam4_s</td>
<td>16</td>
<td>161</td>
</tr>
<tr>
<td>628.pop2_s</td>
<td>16</td>
<td>185</td>
</tr>
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<td>638.imagick_s</td>
<td>16</td>
<td>212</td>
</tr>
<tr>
<td>644.nab_s</td>
<td>16</td>
<td>143</td>
</tr>
<tr>
<td>649.fotonik3d_s</td>
<td>16</td>
<td>113</td>
</tr>
<tr>
<td>654.roms_s</td>
<td>16</td>
<td>146</td>
</tr>
</tbody>
</table>

SPECspeed2017_fp_base = 88.9
SPECspeed2017_fp_peak = 91.3

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-Threading Set to Disable

(Continued on next page)
Huawei CH121 V5 (Intel Xeon Gold 6144)

**SPECspeed2017_fp_peak = 91.3**

**SPECspeed2017_fp_base = 88.9**

---

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

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**Platform Notes (Continued)**

XPT Prefetch Set to Enabled  
Sysinfo program /spec2017/bin/sysinfo  
Rev: r5797 of 2017-06-14 96c45e4568ad54c135fd618bcc091c0f  
running on localhost.localdomain Wed Jul 11 01:03:35 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) Gold 6144 CPU @ 3.50GHz  
  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 10 11 24 27
physical 1: cores 0 4 5 6 16 19 20 22

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) Gold 6144 CPU @ 3.50GHz
Stepping: 4
CPU MHz: 3501.000
CPU max MHz: 3501.0000
CPU min MHz: 1200.0000
BogoMIPS: 7000.00
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 25344K
NUMA node0 CPU(s): 0-7
NUMA node1 CPU(s): 8-15
Flags: fpu vme de pse tsc msr pae mce cx8 apic sep mtrr pge mca cmov

(Continued on next page)
Huawei

Huawei CH121 V5 (Intel Xeon Gold 6144)

SPECspeed2017_fp_base = 88.9

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Platform Notes (Continued)

pat pse36 clflush dts acpi mmx fxsr sse sse2 ss ht tm pbe syscall nx pdpe1gb rdtscp
lm constant_tsc arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc
aperf perf eagerfpui pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 sse3 fma
cx16 xtpr pdcm pcid dca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes
xsave avx f16c rdrand lahf_lm abm 3dnowprefetch epb cat_13 cdp_13 invpcid_single
intel_pt spec_ctrl ibpb_support tpr_shadow vnlmi flexpriority ept vpid fsgsbase
tsc_adjust bmi1 hle avx2 smep bmi2 erts invpcid rtm cqm mpx rdtd_a avx512f avx512dq
rdseed adx clmap clflushopt clwb avx512cd avx512bw avx512vl xsaveopt xsavec xgetbv1
cqm_llc cqm_occup_llc cqm_mbm_total cqm_mbm_local dtherm ida arat pln pts

/proc/cpuinfo cache data

cache size : 25344 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
node 0 size: 194741 MB
node 0 free: 188672 MB
node 1 cpus: 8 9 10 11 12 13 14 15
node 1 size: 196608 MB
node 1 free: 191007 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="7.4 (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)
### Huawei CH121 V5 (Intel Xeon Gold 6144)

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**CPU2017 License:** 3175  
**Test Sponsor:** Huawei  
**Test Date:** Jul-2018  
**Hardware Availability:** Jul-2017  
**Tested by:** Huawei  
**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 9 12:16

SPEC is set to: /spec2017

```
Filesystem Type Size Used Avail Use% Mounted on
/dev/mapper/rhel-root xfs 1.8T 34G 1.8T 2% /
```

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

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

(Continued on next page)
Huawei

Huawei CH121 V5 (Intel Xeon Gold 6144)

SPECspeed2017_fp_base = 88.9
SPECspeed2017_fp_peak = 91.3

CPU2017 License: 3175
Test Sponsor: Huawei
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Compiler Version Notes (Continued)

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

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</tbody>
</table>

---

**Base Compiler Invocation**

C benchmarks:

```bash
icc
```

Fortran benchmarks:

```bash
ifort
```

Benchmarks using both Fortran and C:

```bash
ifort icc
```

Benchmarks using Fortran, C, and C++:

```bash
icpc icc ifort
```

---

**Base Portability Flags**

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Flags</th>
</tr>
</thead>
<tbody>
<tr>
<td>603.bwaves_s</td>
<td>-DSPEC_LP64</td>
</tr>
<tr>
<td>607.cactuBSSN_s</td>
<td>-DSPEC_LP64</td>
</tr>
<tr>
<td>619.lbm_s</td>
<td>-DSPEC_LP64</td>
</tr>
<tr>
<td>621.wrf_s</td>
<td>-DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian</td>
</tr>
<tr>
<td>627.cam4_s</td>
<td>-DSPEC_LP64 -DSPEC_CASE_FLAG</td>
</tr>
<tr>
<td>628.pop2_s</td>
<td>-DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian -assume byterecl</td>
</tr>
<tr>
<td>638.imagick_s</td>
<td>-DSPEC_LP64</td>
</tr>
<tr>
<td>644.nab_s</td>
<td>-DSPEC_LP64</td>
</tr>
<tr>
<td>649.fotonik3d_s</td>
<td>-DSPEC_LP64</td>
</tr>
<tr>
<td>654.roms_s</td>
<td>-DSPEC_LP64</td>
</tr>
</tbody>
</table>

---

**Base Optimization Flags**

C benchmarks:

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

Fortran benchmarks:

```bash
-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:

```bash
-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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CPU2017 License: 3175  
Test Sponsor: Huawei  
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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 CH121 V5 (Intel Xeon Gold 6144)

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| Tested by:      | Huawei |
| Test Date:      | Jul-2018 |
| Hardware Availability: | Jul-2017 |
| Software Availability: | Jan-2018 |

**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: basepeak = yes

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

**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-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: -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

**Peak Other Flags**

**C benchmarks:**

-m64 -std=c11

(Continued on next page)
Huawei CH121 V5 (Intel Xeon Gold 6144)

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Test Sponsor: Huawei
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Test Date: Jul-2018
Hardware Availability: Jul-2017
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Peak Other Flags (Continued)

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

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 2018-07-11 01:03:34-0400.
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