



# SPEC® CPU2017 Floating Point Rate Result

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**Huawei**  
(Test Sponsor: Huawei)

SPECrate2017\_fp\_base = 367

**Huawei 5885H V5 (Intel Xeon Gold 6240)**

SPECrate2017\_fp\_peak = Not Run

CPU2017 License: 3175

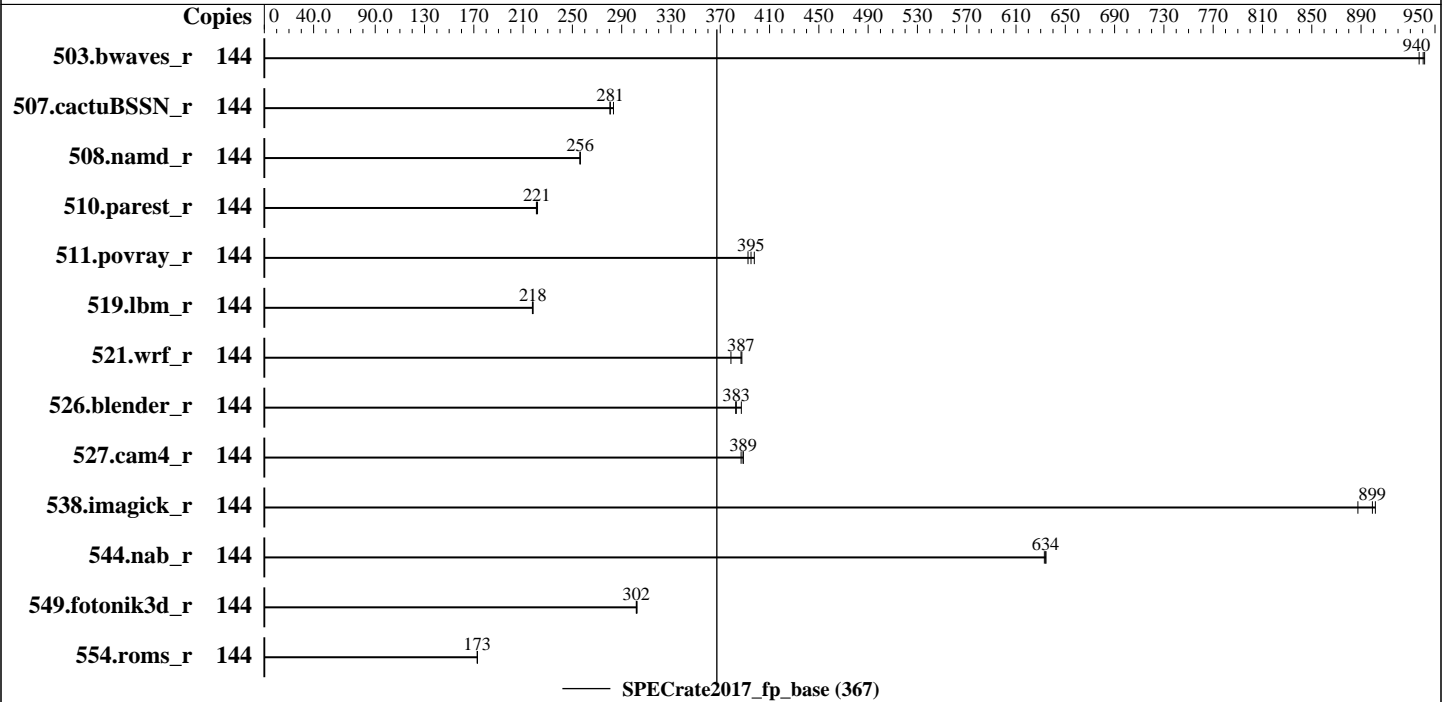
Test Date: Mar-2019

Test Sponsor: Huawei

Hardware Availability: Apr-2019

Tested by: Huawei

Software Availability: Dec-2018



## Hardware

CPU Name: Intel Xeon Gold 6240  
 Max MHz.: 3900  
 Nominal: 2600  
 Enabled: 72 cores, 4 chips, 2 threads/core  
 Orderable: 2,4 chips  
 Cache L1: 32 KB I + 32 KB D on chip per core  
 L2: 1 MB I+D on chip per core  
 L3: 24.75 MB I+D on chip per chip  
 Other: None  
 Memory: 768 GB (48 x 16 GB 1Rx4 PC4-2933Y-R)  
 Storage: 1 x 1TB SATA HDD 10K RPM, RAID 0  
 Other: None

## Software

OS: SUSE Linux Enterprise Server 12 SP4  
 4.12.14-94.41-default  
 Compiler: C/C++: Version 19.0.1.144 of Intel C/C++  
 Compiler Build 20181018 for Linux;  
 Fortran: Version 19.0.1.144 of Intel Fortran  
 Compiler Build 20181018 for Linux  
 Parallel: No  
 Firmware: Version 6.20 released Feb-2019  
 File System: btrfs  
 System State: Run level 5 (multi-user)  
 Base Pointers: 64-bit  
 Peak Pointers: Not Applicable  
 Other: None



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## Results Table

| Benchmark       | Base   |                   |                   |                    |                   |                   |                   | Peak   |         |       |         |       |         |       |
|-----------------|--------|-------------------|-------------------|--------------------|-------------------|-------------------|-------------------|--------|---------|-------|---------|-------|---------|-------|
|                 | Copies | Seconds           | Ratio             | Seconds            | Ratio             | Seconds           | Ratio             | Copies | Seconds | Ratio | Seconds | Ratio | Seconds | Ratio |
| 503.bwaves_r    | 144    | 1534              | 942               | <b><u>1536</u></b> | <b><u>940</u></b> | 1541              | 937               |        |         |       |         |       |         |       |
| 507.cactuBSSN_r | 144    | 650               | 280               | <b><u>649</u></b>  | <b><u>281</u></b> | 643               | 283               |        |         |       |         |       |         |       |
| 508.namd_r      | 144    | <b><u>534</u></b> | <b><u>256</u></b> | 534                | 256               | 534               | 256               |        |         |       |         |       |         |       |
| 510.parest_r    | 144    | 1699              | 222               | <b><u>1703</u></b> | <b><u>221</u></b> | 1706              | 221               |        |         |       |         |       |         |       |
| 511.povray_r    | 144    | 857               | 393               | <b><u>851</u></b>  | <b><u>395</u></b> | 846               | 398               |        |         |       |         |       |         |       |
| 519.lbm_r       | 144    | <b><u>696</u></b> | <b><u>218</u></b> | 696                | 218               | 698               | 218               |        |         |       |         |       |         |       |
| 521.wrf_r       | 144    | <b><u>834</u></b> | <b><u>387</u></b> | 832                | 388               | 852               | 379               |        |         |       |         |       |         |       |
| 526.blender_r   | 144    | <b><u>573</u></b> | <b><u>383</u></b> | 573                | 383               | 567               | 387               |        |         |       |         |       |         |       |
| 527.cam4_r      | 144    | 648               | 389               | 651                | 387               | <b><u>648</u></b> | <b><u>389</u></b> |        |         |       |         |       |         |       |
| 538.imagick_r   | 144    | 404               | 887               | 397                | 902               | <b><u>398</u></b> | <b><u>899</u></b> |        |         |       |         |       |         |       |
| 544.nab_r       | 144    | 382               | 634               | <b><u>382</u></b>  | <b><u>634</u></b> | 383               | 633               |        |         |       |         |       |         |       |
| 549.fotonik3d_r | 144    | 1859              | 302               | <b><u>1858</u></b> | <b><u>302</u></b> | 1855              | 302               |        |         |       |         |       |         |       |
| 554.roms_r      | 144    | 1323              | 173               | <b><u>1324</u></b> | <b><u>173</u></b> | 1324              | 173               |        |         |       |         |       |         |       |

SPECrate2017\_fp\_base = 367

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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 = "/home/cpu2017/lib/ia32:/home/cpu2017/lib/intel64"

Binaries compiled on a system with 1x Intel Core i9-7900X CPU + 32GB RAM memory using Redhat Enterprise Linux 7.5

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>
```

(Continued on next page)



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**Test Date:** Mar-2019  
**Hardware Availability:** Apr-2019  
**Software Availability:** Dec-2018

## General Notes (Continued)

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:

Sub NUMA Cluster (SNC) set to enabled  
IMC (Integrated memory controller) Interleaving set to 1 way interleave  
Xtended Prediction Table (XPT) Prefetch set to Enable  
Memory Patrol Scrub set to Disable  
Last Level Cache (LLC) Prefetch set to Disable  
Sysinfo program /home/cpu2017/bin/sysinfo  
Rev: r5797 of 2017-06-14 96c45e4568ad54c135fd618bcc091c0f  
running on linux-t60c Sat Mar 2 11:56:45 2019

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 6240 CPU @ 2.60GHz
 4 "physical id"s (chips)
144 "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 : 18
siblings : 36
physical 0: cores 0 1 2 3 4 8 9 10 11 16 17 18 19 20 24 25 26 27
physical 1: cores 0 1 2 3 4 8 9 10 11 16 17 18 19 20 24 25 26 27
physical 2: cores 0 1 2 3 4 8 9 10 11 16 17 18 19 20 24 25 26 27
physical 3: cores 0 1 2 3 4 8 9 10 11 16 17 18 19 20 24 25 26 27
```

From lscpu:

```
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 144
On-line CPU(s) list: 0-143
Thread(s) per core: 2
Core(s) per socket: 18
Socket(s): 4
NUMA node(s): 8
```

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## Platform Notes (Continued)

```

Vendor ID:           GenuineIntel
CPU family:         6
Model:              85
Model name:         Intel(R) Xeon(R) Gold 6240 CPU @ 2.60GHz
Stepping:           5
CPU MHz:            2600.000
CPU max MHz:        3900.0000
CPU min MHz:        1000.0000
BogoMIPS:           5200.00
Virtualization:     VT-x
L1d cache:          32K
L1i cache:          32K
L2 cache:           1024K
L3 cache:           25344K
NUMA node0 CPU(s): 0-2,5,6,9,10,14,15,72-74,77,78,81,82,86,87
NUMA node1 CPU(s): 3,4,7,8,11-13,16,17,75,76,79,80,83-85,88,89
NUMA node2 CPU(s): 18-20,23,24,27,28,32,33,90-92,95,96,99,100,104,105
NUMA node3 CPU(s): 21,22,25,26,29-31,34,35,93,94,97,98,101-103,106,107
NUMA node4 CPU(s): 36-38,41,42,45,46,50,51,108-110,113,114,117,118,122,123
NUMA node5 CPU(s): 39,40,43,44,47-49,52,53,111,112,115,116,119-121,124,125
NUMA node6 CPU(s): 54-56,59,60,63,64,68,69,126-128,131,132,135,136,140,141
NUMA node7 CPU(s): 57,58,61,62,65-67,70,71,129,130,133,134,137-139,142,143
Flags:              fpu vme de pse tsc msr pae mce cx8 apic sep mtrr pge mca cmov
pat pse36 clflush dts acpi mmx fxsr sse sse2 ss ht tm pbe syscall nx pdpe1gb rdtscp
lm constant_tsc art arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc cpuid
aperfmpperf pni pclmulqdq dtes64 ds_cpl vmx smx est tm2 ssse3 sdbg 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 cpuid_fault epb cat_l3 cdp_l3 invpcid_single ssbd
mba ibrs ibpb stibp tpr_shadow vnmi flexpriority ept vpid fsgsbase tsc_adjust bmi1
hle avx2 smep bmi2 erms invpcid rtm cqm mpx rdt_a avx512f avx512dq rdseed adx smap
clflushopt clwb intel_pt avx512cd avx512bw avx512vl xsaveopt xsavec xgetbv1 xsaves
cqm_llc cqm_occup_llc cqm_mbm_total cqm_mbm_local dtherm ida arat pln pts pku ospke
flush_lld arch_capabilities

```

```
/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: 8 nodes (0-7)
node 0 cpus: 0 1 2 5 6 9 10 14 15 72 73 74 77 78 81 82 86 87
node 0 size: 95196 MB
node 0 free: 93591 MB
node 1 cpus: 3 4 7 8 11 12 13 16 17 75 76 79 80 83 84 85 88 89
node 1 size: 96754 MB
node 1 free: 95865 MB
node 2 cpus: 18 19 20 23 24 27 28 32 33 90 91 92 95 96 99 100 104 105

```

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## Platform Notes (Continued)

```

node 2 size: 96754 MB
node 2 free: 96075 MB
node 3 cpus: 21 22 25 26 29 30 31 34 35 93 94 97 98 101 102 103 106 107
node 3 size: 96754 MB
node 3 free: 96127 MB
node 4 cpus: 36 37 38 41 42 45 46 50 51 108 109 110 113 114 117 118 122 123
node 4 size: 96725 MB
node 4 free: 95936 MB
node 5 cpus: 39 40 43 44 47 48 49 52 53 111 112 115 116 119 120 121 124 125
node 5 size: 96754 MB
node 5 free: 96178 MB
node 6 cpus: 54 55 56 59 60 63 64 68 69 126 127 128 131 132 135 136 140 141
node 6 size: 96754 MB
node 6 free: 95926 MB
node 7 cpus: 57 58 61 62 65 66 67 70 71 129 130 133 134 137 138 139 142 143
node 7 size: 96526 MB
node 7 free: 95743 MB
node distances:
node  0  1  2  3  4  5  6  7
 0: 10 11 21 21 21 21 21 21
 1: 11 10 21 21 21 21 21 21
 2: 21 21 10 11 21 21 21 21
 3: 21 21 11 10 21 21 21 21
 4: 21 21 21 21 10 11 21 21
 5: 21 21 21 21 11 10 21 21
 6: 21 21 21 21 21 21 10 11
 7: 21 21 21 21 21 21 11 10

```

```

From /proc/meminfo
MemTotal:      790752676 kB
HugePages_Total:      0
Hugepagesize:    2048 kB

```

```

/usr/bin/lsb_release -d
SUSE Linux Enterprise Server 12 SP4

```

```

From /etc/*release* /etc/*version*
SuSE-release:
SUSE Linux Enterprise Server 12 (x86_64)
VERSION = 12
PATCHLEVEL = 4
# This file is deprecated and will be removed in a future service pack or release.
# Please check /etc/os-release for details about this release.
os-release:
NAME="SLES"
VERSION="12-SP4"
VERSION_ID="12.4"

```

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## Platform Notes (Continued)

```
PRETTY_NAME="SUSE Linux Enterprise Server 12 SP4"
ID="sles"
ANSI_COLOR="0;32"
CPE_NAME="cpe:/o:suse:sles:12:sp4"
```

```
uname -a:
Linux linux-t60c 4.12.14-94.41-default #1 SMP Wed Oct 31 12:25:04 UTC 2018 (3090901)
x86_64 x86_64 x86_64 GNU/Linux
```

```
run-level 5 Mar 1 15:14
```

```
SPEC is set to: /home/cpu2017
Filesystem      Type  Size  Used Avail Use% Mounted on
/dev/sda4       btrfs 805G   27G  776G   4% /home
```

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. 6.20 2019/02/01
Memory:
48x Samsung M393A2K40CB2-CVF 16 GB 1 rank 2933
```

(End of data from sysinfo program)

## Compiler Version Notes

```
=====
CC 519.lbm_r(base) 538.imagick_r(base) 544.nab_r(base)
-----
```

```
Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
Version 19.0.1.144 Build 20181018
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
-----
```

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

```
Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64,
Version 19.0.1.144 Build 20181018
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
-----
```

```
=====
CC 511.povray_r(base) 526.blender_r(base)
-----
```

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## Compiler Version Notes (Continued)

Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64,  
Version 19.0.1.144 Build 20181018  
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.  
Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,  
Version 19.0.1.144 Build 20181018  
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.

=====  
FC 507.cactuBSSN\_r(base)

-----  
Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64,  
Version 19.0.1.144 Build 20181018  
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.  
Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,  
Version 19.0.1.144 Build 20181018  
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.  
Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)  
64, Version 19.0.1.144 Build 20181018  
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.

=====  
FC 503.bwaves\_r(base) 549.fotonik3d\_r(base) 554.roms\_r(base)

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Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)  
64, Version 19.0.1.144 Build 20181018  
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=====  
CC 521.wrf\_r(base) 527.cam4\_r(base)

-----  
Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)  
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Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,  
Version 19.0.1.144 Build 20181018  
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## Base Compiler Invocation

C benchmarks:  
icc -m64 -std=c11

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## Base Compiler Invocation (Continued)

C++ benchmarks:

icpc -m64

Fortran benchmarks:

ifort -m64

Benchmarks using both Fortran and C:

ifort -m64 icc -m64 -std=c11

Benchmarks using both C and C++:

icpc -m64 icc -m64 -std=c11

Benchmarks using Fortran, C, and C++:

icpc -m64 icc -m64 -std=c11 ifort -m64

## 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=4

C++ benchmarks:

-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only  
-qopt-mem-layout-trans=4

(Continued on next page)





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## Base Optimization Flags (Continued)

Fortran benchmarks:

```
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=4 -auto -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=4 -auto -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=4
```

Benchmarks using Fortran, C, and C++:

```
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=4 -auto -nostandard-realloc-lhs
-align array32byte
```

The flags files that were used to format this result can be browsed at

<http://www.spec.org/cpu2017/flags/Intel-ic18.0-official-linux64.2019-04-02.html>

<http://www.spec.org/cpu2017/flags/Huawei-Platform-Settings-SKL-V1.9.html>

You can also download the XML flags sources by saving the following links:

<http://www.spec.org/cpu2017/flags/Intel-ic18.0-official-linux64.2019-04-02.xml>

<http://www.spec.org/cpu2017/flags/Huawei-Platform-Settings-SKL-V1.9.xml>

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Tested with SPEC CPU2017 v1.0.2 on 2019-03-01 22:56:44-0500.

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