Huawei 5288 V5 (Intel Xeon Gold 6150)

**CPU2017 License:** 3175

**Test Sponsor:** Huawei

**Tested by:** Huawei

**Test Date:** Jul-2018

**CPU Name:** Intel Xeon Gold 6150

**Max MHz.:** 3700

**Nominal:** 2700

**Enabled:** 36 cores, 2 chips, 2 threads/core

**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:** 24.75 MB I+D on chip per chip

**Other:** None

**Memory:** 384 GB (24 x 16 GB 2Rx8 PC4-2666V-R)

**Storage:** 1 x 1200 GB SAS, 10000 RPM

**Other:** None

**Hardware**

**Software**

**OS:** Red Hat Enterprise Linux Server release 7.4 (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

**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

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<table>
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<th>SPECrate2017_fp_peak</th>
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SPEC CPU2017 Floating Point Rate Result

Huawei

Huawei 5288 V5 (Intel Xeon Gold 6150)

SPECrate2017_fp_base = 193
SPECrate2017_fp_peak = 197

Results Table

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</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:

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.

(Continued on next page)
Huawei

Huawei 5288 V5 (Intel Xeon Gold 6150)

SPEC CPU2017 Floating Point Rate Result

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SPECrate2017_fp_base = 193
SPECrate2017_fp_peak = 197

CPU2017 License: 3175
Test Sponsor: Huawei
Test Date: Jul-2018
Hardware Availability: Jul-2017
Tested by: Huawei
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
Sysinfo program /spec2017/bin/sysinfo
Rev: r5797 of 2017-06-14 96c45e4568ad54c135fd618bcc091c0f
running on localhost.localdomain Thu Jul 19 15:58:29 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 6150 CPU @ 2.70GHz
  2 "physical id"s (chips)
    72 "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

From lscpu:
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 72
On-line CPU(s) list: 0-71
Thread(s) per core: 2
Core(s) per socket: 18
Socket(s): 2
NUMA node(s): 4
Vendor ID: GenuineIntel
CPU family: 6
Model: 85
Model name: Intel(R) Xeon(R) Gold 6150 CPU @ 2.70GHz
Stepping: 4

(Continued on next page)
Huawei 5288 V5 (Intel Xeon Gold 6150)

SPECrate2017_fp_base = 193
SPECrate2017_fp_peak = 197

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

CPU MHz: 2700.000
BogoMIPS: 5400.00
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 25344K
NUMA node0 CPU(s): 0-2,5,6,9,10,14,15,36-38,41,42,45,46,50,51
NUMA node1 CPU(s): 3,4,7,8,11-13,16,17,39,40,43,44,47-49,52,53
NUMA node2 CPU(s): 18-20,23,24,27,28,32,33,54-56,59,60,63,64,68,69
NUMA node3 CPU(s): 21,22,25,26,29-31,34,35,37,57,58,61,62,65-67,70,71

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
- arch_perfmon
- pebs
- bts
- rep_good
- nopl
- xtopology
- nonstop_tsc
- aperfmperf
- eagerfpu
- pni
- pclmulqdq
- dtes64
- ds_cpl
- vmx
- smx
- est
- tm2
- ssse3
- fma
- cx16
- xtopr
- pdcm
- pcd
cda
- sse4_1
- sse4_2
- x2apic
- movbe
- popcnt
- tsc_deadline_timer
- aes
- avx
- f16c
- rdrand
- lahf_lm
- abm
- 3dnowprefetch
- epb
- cat_l3
- cdp_l3
- invpcid_single
- intel_pt
- spec_ctrl
- ibpb_support
- tpr_shadow
- vnmi
- flexpriority
- ept
- fsgsbase
- tsc_adjust
- bmi1
- hle
- avx2
- smep
- bmi2
- erms
- invpcid
- rtm
- cqm
- mpx
- rdt_a
- avx512f
- avx512dq
- rdseed
- adx
- smap
- clflushopt
- cwb
- avx512cd
- avx512bw
- avx512vl
- xsaveopt
- xsavec
- xgetbv1
- cqm_llc
- cqm_occup_llc
- cqm_mbb_total
- cqm_mbb_local
- dtherm
- ida
- arat
- pln
- pts

/proc/cpuinfo cache data

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 5 6 9 10 14 15 36 37 38 41 42 45 46 50 51
node 0 size: 96437 MB
node 0 free: 92401 MB
node 1 cpus: 3 4 7 8 11 12 13 16 17 39 40 43 44 47 48 49 52 53
node 1 size: 98304 MB
node 1 free: 94984 MB
node 2 cpus: 18 19 20 23 24 27 28 32 33 54 55 56 59 60 63 64 68 69
node 2 size: 98304 MB
node 2 free: 95139 MB
node 3 cpus: 21 22 25 26 29 30 31 34 35 57 58 61 62 65 66 67 70 71
node 3 size: 98304 MB
node 3 free: 95098 MB
node distances:
node 0 1 2 3
0: 10 11 21 22
1: 11 10 21 22
2: 21 21 10 11
3: 21 21 11 10

(Continued on next page)
Huawei

Huawei 5288 V5 (Intel Xeon Gold 6150)

<table>
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</tbody>
</table>

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

Platform Notes (Continued)

From /proc/meminfo
MemTotal: 394174484 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:
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 16 11:43
SPEC is set to: /spec2017

Filesystem Type Size Used Avail Use% Mounted on
/dev/mapper/rhel-root xfs 1.8T 35G 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 519.ibm_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.
Huawei

Huawei 5288 V5 (Intel Xeon Gold 6150)

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

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** Compiler Version Notes (Continued) **

---

**CC** 519.lbm_r(peak) 544.nab_r(peak)  
icc (ICC) 18.0.0 20170811  
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.

---

**CXXC** 508.namd_r(base) 510.parest_r(base)  
icpc (ICC) 18.0.0 20170811  
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.

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**CXXC** 508.namd_r(peak) 510.parest_r(peak)  
icpc (ICC) 18.0.0 20170811  
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**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.

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**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.

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**FC** 507.cactuBSSN_r(base)  
icpc (ICC) 18.0.0 20170811  
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icc (ICC) 18.0.0 20170811  
(Continued on next page)
SPEC CPU2017 Floating Point Rate Result

Huawei

Huawei 5288 V5 (Intel Xeon Gold 6150)

SPECrate2017_fp_base = 193
SPECrate2017_fp_peak = 197

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

Compiler Version Notes (Continued)

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

==============================================================================
FC 507.cactuBSSN_r(peak)
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ifort (IFORT) 18.0.0 20170811
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icc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
## SPEC CPU2017 Floating Point Rate Result

**Huawei**

**Huawei 5288 V5 (Intel Xeon Gold 6150)**

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

**SPECrate2017_fp_base = 193**

**SPECrate2017_fp_peak = 197**

### 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

**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 -03 -no-prec-div -qopt-prefetch -ffinite-math-only`
- `-qopt-mem-layout-trans=3`

**C++ benchmarks:**
- `-xCORE-AVX2 -ipo -03 -no-prec-div -qopt-prefetch -ffinite-math-only`

*(Continued on next page)*
Base Optimization Flags (Continued)

C++ benchmarks (continued):
-qopt-mem-layout-trans=3

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

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

C++ benchmarks:
icpc

Fortran benchmarks:
ifort

Benchmarks using both Fortran and C:
ifort iccc

Benchmarks using both C and C++:
icpc iccc

Benchmarks using Fortran, C, and C++:
icpc iccc 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: -xCORE-AVX2 -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:

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

**Huawei**

**Huawei 5288 V5 (Intel Xeon Gold 6150)**

<table>
<thead>
<tr>
<th>SPECrate2017_fp_base</th>
<th>SPECrate2017_fp_peak</th>
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<tbody>
<tr>
<td>193</td>
<td>197</td>
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</table>

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

### Peak Optimization Flags (Continued)

- `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`: Same as `503.bwaves_r`

- `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 -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++:**

- `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`
## Huawei

<table>
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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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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 2018-07-19 15:58:28-0400.  
Originally published on 2018-08-22.