Huawei

Huawei 2288H V5 (Intel Xeon Gold 6244)

SPECspeed2017_fp_base = 108
SPECspeed2017_fp_peak = Not Run

CPU2017 License: 3175
Test Date: Feb-2019
Test Sponsor: Huawei
Hardware Availability: Apr-2019
Tested by: Huawei
Software Availability: Dec-2018

Threads

<table>
<thead>
<tr>
<th>Test</th>
<th>Base</th>
<th>Peak</th>
</tr>
</thead>
<tbody>
<tr>
<td>603.bwaves_s</td>
<td>16</td>
<td>0</td>
</tr>
<tr>
<td>607.cactuBSSN_s</td>
<td>16</td>
<td>110</td>
</tr>
<tr>
<td>619.lbm_s</td>
<td>16</td>
<td>89.7</td>
</tr>
<tr>
<td>621.wrf_s</td>
<td>16</td>
<td>93.1</td>
</tr>
<tr>
<td>627.cam4_s</td>
<td>16</td>
<td>59.5</td>
</tr>
<tr>
<td>628.pop2_s</td>
<td>16</td>
<td>69.3</td>
</tr>
<tr>
<td>638.imagick_s</td>
<td>16</td>
<td>77.1</td>
</tr>
<tr>
<td>644.nab_s</td>
<td>16</td>
<td>139</td>
</tr>
<tr>
<td>649.fotonik3d_s</td>
<td>16</td>
<td>86.6</td>
</tr>
<tr>
<td>654.roms_s</td>
<td>16</td>
<td>122</td>
</tr>
</tbody>
</table>

**Hardware**

CPU Name: Intel Xeon Gold 6244
Max MHz.: 4400
Nominal: 3600
Enabled: 16 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: 24.75 MB I+D on chip per chip
Other: None
Memory: 768 GB (24 x 32 GB 2Rx4 PC4-2933Y-R)
Storage: 1 x 1200 GB SAS, 10000 RPM
Other: None

**Software**

OS: SUSE Linux Enterprise Server 12 SP4 (x86_64)
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: Yes
Firmware: Version 6.36 Released Feb-2019
File System: xfs
System State: Run level 3 (multi-user)
Base Pointers: 64-bit
Peak Pointers: Not Applicable
Other: None
SPEC CPU2017 Floating Point Speed Result

Huawei

Huawei 2288H V5 (Intel Xeon Gold 6244)

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

Test Date: Feb-2019
Hardware Availability: Apr-2019
Software Availability: Dec-2018

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>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Base</td>
<td>Peak</td>
<td></td>
<td>Base</td>
<td>Peak</td>
<td></td>
<td></td>
</tr>
<tr>
<td>603.bwaves_s</td>
<td>16</td>
<td>121</td>
<td>486</td>
<td>121</td>
<td>487</td>
<td>122</td>
<td>483</td>
</tr>
<tr>
<td>607.cactuBSSN_s</td>
<td>16</td>
<td>152</td>
<td>109</td>
<td>151</td>
<td>111</td>
<td></td>
<td></td>
</tr>
<tr>
<td>619.lbm_s</td>
<td>16</td>
<td>58.6</td>
<td>89.5</td>
<td>58.4</td>
<td>89.7</td>
<td>58.4</td>
<td>89.7</td>
</tr>
<tr>
<td>621.wrf_s</td>
<td>16</td>
<td>142</td>
<td>93.1</td>
<td>142</td>
<td>93.0</td>
<td>140</td>
<td>94.3</td>
</tr>
<tr>
<td>627.cam4_s</td>
<td>16</td>
<td>149</td>
<td>59.3</td>
<td>149</td>
<td>59.5</td>
<td>149</td>
<td>59.5</td>
</tr>
<tr>
<td>628.pop2_s</td>
<td>16</td>
<td>171</td>
<td>69.3</td>
<td>171</td>
<td>69.3</td>
<td>172</td>
<td>68.9</td>
</tr>
<tr>
<td>638.imagick_s</td>
<td>16</td>
<td>187</td>
<td>77.3</td>
<td>187</td>
<td>77.1</td>
<td>187</td>
<td>77.1</td>
</tr>
<tr>
<td>644.nab_s</td>
<td>16</td>
<td>125</td>
<td>139</td>
<td>125</td>
<td>139</td>
<td>125</td>
<td>139</td>
</tr>
<tr>
<td>649.fotonik3d_s</td>
<td>16</td>
<td>105</td>
<td>86.6</td>
<td>104</td>
<td>87.9</td>
<td>106</td>
<td>86.2</td>
</tr>
<tr>
<td>654.roms_s</td>
<td>16</td>
<td>129</td>
<td>122</td>
<td>130</td>
<td>121</td>
<td>129</td>
<td>122</td>
</tr>
</tbody>
</table>

SPECspeed2017_fp_base = 108
SPECspeed2017_fp_peak = Not Run

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"
LD_LIBRARY_PATH = "/spec2017/lib/ia32:/spec2017/lib/intel64"
OMP_STACKSIZE = "192M"

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

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)
## SPEC CPU2017 Floating Point Speed Result

### Huawei

**Huawei 2288H V5 (Intel Xeon Gold 6244)**

<table>
<thead>
<tr>
<th>SPECspeed2017_fp_base =</th>
<th>108</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECspeed2017_fp_peak =</td>
<td>Not Run</td>
</tr>
</tbody>
</table>

**CPU2017 License:** 3175  
**Test Sponsor:** Huawei  
**Tested by:** Huawei  
**Test Date:** Feb-2019  
**Hardware Availability:** Apr-2019  
**Software Availability:** Dec-2018

### Platform Notes (Continued)

- XPT Prefetch Set to Enabled
- Sysinfo program /spec2017/bin/sysinfo
- Rev: r5797 of 2017-06-14 96c45e4568ad54c135fd618b6c091c0f  
  running on linux-xz5s Tue Dec 4 10:24:07 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 6244 CPU @ 3.60GHz
- 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 2 3 9 11 17 24 27
  - physical 1: cores 4 8 17 18 19 24 25 27

**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 6244 CPU @ 3.60GHz
- Stepping: 6
- CPU MHz: 3600.000
- CPU max MHz: 4400.0000
- CPU min MHz: 1200.0000
- BogoMIPS: 7200.00
- 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 2288H V5 (Intel Xeon Gold 6244)

SPECspeed2017_fp_base = 108
SPECspeed2017_fp_peak = Not Run

CPU2017 License: 3175
Test Date: Feb-2019
Test Sponsor: Huawei
Tested by: Huawei
Hardware Availability: Apr-2019
Software Availability: Dec-2018

Platform Notes (Continued)

pat pse36 clflush dts acpi xmm fxsr sse sse2 ss ht tm pbe syscall nx pdentgb rdtscp
lm constant_tsc arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc cpuid
aperfmpref pni pclmulqdq dtes64 monitor ds CPL vmx smx est tm2 sse3 sdbg fma cx16
xtrp pdcm pcid dca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave
avx f16c rdrcr lahf_lm abm 3dnowprefetch cpuid_fault epb cat_l3 cdpl3
invpcid_single ssbd mba ibrs ibpb tpr_shadow vnumi flexpriority ept vpid
fsqsbasis tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid rtm cqm mpx rdt_a avx512f
avx512dq rdseed adx clflushopt clwb intel_pt avx512cd avx512bw avx512vl
xsavopt xsavec xgetbv1 xsavec cqm_llc cqm_occup_llc cqm_mbm_total cqm_mbm_local
dtherm ida arat pln pts pku ospke avx512_vnni flush_l1d 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: 2 nodes (0-1)
  node 0 cpus: 0 1 2 3 4 5 6 7
  node 0 size: 385471 MB
  node 0 free: 382753 MB
  node 1 cpus: 8 9 10 11 12 13 14 15
  node 1 size: 386787 MB
  node 1 free: 379810 MB
  node distances:
  node 0 1
  0: 10 21
  1: 21 10

From /proc/meminfo
  MemTotal: 790792768 kB
  HugePages_Total: 0
  Hugepagesize: 2048 kB

From /etc/*release* /etc/*version*
  SuSE-release:
    SUSLE 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"
    PRETTY_NAME="SUSE Linux Enterprise Server 12 SP4"
    ID="sles"
    ANSI_COLOR="0;32"

(Continued on next page)
Huawei 2288H V5 (Intel Xeon Gold 6244)

<table>
<thead>
<tr>
<th>SPECspeed2017_fp_base</th>
<th>108</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECspeed2017_fp_peak</td>
<td>Not Run</td>
</tr>
</tbody>
</table>

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

**Platform Notes (Continued)**

```
cpe_NAME="cpe:/o:suse:sles:12:sp4"

uname -a:
x86_64 x86_64 x86_64 GNU/Linux

run-level 3 Dec 3 19:29

SPEC is set to: /spec2017
```

```
Filesystem     Type  Size  Used Avail Use% Mounted on
/dev/sda3      xfs   212G   73G  139G  35% /
```

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. 6.36 02/15/2019
- Memory:
  24x Samsung M393A4K40CB2-CVF 32 GB 2 rank 2933

(End of data from sysinfo program)

**Compiler Version Notes**

```
CC  619.lbm_s(base) 638.imagick_s(base) 644.nab_s(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.
```

```
FC  607.cactuBSSN_s(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) 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.
```

(Continued on next page)
Huawei 2288H V5 (Intel Xeon Gold 6244)

Spec CPU2017 Floating Point Speed Result
Copyright 2017-2019 Standard Performance Evaluation Corporation

Huawei

SPECspeed2017_fp_base = 108
SPECspeed2017_fp_peak = Not Run

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

Test Date: Feb-2019
Hardware Availability: Apr-2019
Software Availability: Dec-2018

Compiler Version Notes (Continued)

FC 603.bwaves_s(base) 649.fotonik3d_s(base) 654.roms_s(base)

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.

CC 621.wrf_s(base) 627.cam4_s(base) 628.pop2_s(base)

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.

Base Compiler Invocation

C benchmarks:
icc -m64 -std=c11

Fortran benchmarks:
ifort -m64

Benchmarks using both Fortran and C:
ifort -m64 icc -m64 -std=c11

Benchmarks using Fortran, C, and C++:
icpc -m64 icc -m64 -std=c11 ifort -m64

Base Portability Flags

603.bwaves_s: -DSPEC_LP64
607.cactuBSSN_s: -DSPEC_LP64
619.lbmn_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

(Continued on next page)
Huawei

Huawei 2288H V5 (Intel Xeon Gold 6244)

<table>
<thead>
<tr>
<th>SPECspeed2017_fp_base</th>
<th>108</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECspeed2017_fp_peak</td>
<td>Not Run</td>
</tr>
</tbody>
</table>

CPU2017 License: 3175
Test Sponsor: Huawei
Test Date: Feb-2019
Tested by: Huawei
Hardware Availability: Apr-2019
Software Availability: Dec-2018

Base Portability Flags (Continued)

644.nab_s: -DSPEC_LP64
649.fotonik3d_s: -DSPEC_LP64
654.roms_s: -DSPEC_LP64

Base Optimization Flags

C benchmarks:
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP

Fortran benchmarks:
-DSPEC_OPENMP -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp
-nostandard-realloc-lhs

Benchmarks using both Fortran and C:
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP
-nostandard-realloc-lhs

Benchmarks using Fortran, C, and C++:
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP
-nostandard-realloc-lhs

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

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2017/flags/Huawei-Platform-Settings-SKL-V1.9-revC.xml

SPEC is a registered trademark of the Standard Performance Evaluation Corporation. All other brand and product names appearing in this result are trademarks or registered trademarks of their respective holders.

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 2018-12-04 10:24:07-0500.