## Huawei CH121 V5 (Intel Xeon Gold 5220)

**SPECspeed2017_fp_base = 121**

**SPECspeed2017_fp_peak = Not Run**

<table>
<thead>
<tr>
<th>Threads</th>
<th>SPECspeed2017_fp_base (121)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>20.0</td>
</tr>
<tr>
<td>50.0</td>
<td>100</td>
</tr>
<tr>
<td>150</td>
<td>200</td>
</tr>
<tr>
<td>250</td>
<td>300</td>
</tr>
<tr>
<td>350</td>
<td>400</td>
</tr>
<tr>
<td>450</td>
<td>500</td>
</tr>
</tbody>
</table>

### Hardware

- **CPU Name:** Intel Xeon Gold 5220
- **Max MHz.:** 3900
- **Nominal:** 2200
- **Enabled:** 36 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:** 384 GB (24 x 16 GB 2Rx8 PC4-2933Y-R, running at 2666)
- **Storage:** 1 x 1200 GB SAS, 10000 RPM
- **Other:** None

### Software

- **OS:** SUSE Linux Enterprise Server 12 SP4 (x86_64) 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:** Yes
- **Firmware:** Version 6.52 Released Mar-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

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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>
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<tbody>
<tr>
<td>603.bwaves_s</td>
<td>36</td>
<td>121</td>
<td>487</td>
<td>120</td>
<td>490</td>
<td>120</td>
<td>492</td>
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<tr>
<td>607.cactuBSSN_s</td>
<td>36</td>
<td>121</td>
<td>138</td>
<td>121</td>
<td>138</td>
<td>121</td>
<td>138</td>
</tr>
<tr>
<td>619.lbm_s</td>
<td>36</td>
<td>56.6</td>
<td>92.5</td>
<td>55.9</td>
<td>93.7</td>
<td>56.0</td>
<td>93.6</td>
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<td>621.wrf_s</td>
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<td>627.cam4_s</td>
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<td>105</td>
<td>84.3</td>
<td>105</td>
<td>84.3</td>
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<tr>
<td>628.pop2_s</td>
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<td>189</td>
<td>62.7</td>
<td>192</td>
<td>62.0</td>
<td>196</td>
<td>60.7</td>
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<tr>
<td>638.imagick_s</td>
<td>36</td>
<td>139</td>
<td>104</td>
<td>139</td>
<td>104</td>
<td>139</td>
<td>104</td>
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<td>644.nab_s</td>
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<td>95.6</td>
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<td>649.fotonik3d_s</td>
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<td>110</td>
<td>82.7</td>
<td>110</td>
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<td>654.roms_s</td>
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<td>116</td>
<td>136</td>
<td>116</td>
<td>138</td>
<td>114</td>
</tr>
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SPECspeed2017_fp_base = 121
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 = "/spec/lib/ia32:/spec/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-Threaded Setting Set to Disable

(Continued on next page)
SPEC CPU2017 Floating Point Speed Result

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

Platform Notes (Continued)

XPT Prefetch Set to Enabled
Sysinfo program /spec/bin/sysinfo
Rev: r5974 of 2018-05-19 9bcde8f2999c33d61f64985e45859ea9
running on sles12sp4 Mon Apr 1 06:16:13 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 5220 CPU @ 2.20GHz
  2 "physical id"s (chips)
  36 "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 : 18
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): 36
On-line CPU(s) list: 0-35
Thread(s) per core: 1
Core(s) per socket: 18
Socket(s): 2
NUMA node(s): 2
Vendor ID: GenuineIntel
CPU family: 6
Model: 85
Model name: Intel(R) Xeon(R) Gold 5220 CPU @ 2.20GHz
Stepping: 6
CPU MHz: 2200.000
CPU max MHz: 3900.0000
CPU min MHz: 1000.0000
BogoMIPS: 4400.00
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 25344K
NUMA node0 CPU(s): 0-17
NUMA node1 CPU(s): 18-35
Flags: fpu vme de pse tsc msr pae mce cx8 apic sep mtrr pge mca cmov

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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 art arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc cpuid aperfmperf pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg fma cx16 xtrunc pdcm pclid 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 tpr_shadow vnuma flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 3dnowprefetch cmov rtm cmxrt rdt_a avx512f avx512dq rdseed adx xsaveopt xsaves cqm_llc cqm_occup_llc cqm_mbm_total cqm_mbm_local dtherm ida arat pfn pku ospke avx512_vnni

/test/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 8 9 10 11 12 13 14 15 16 17
  node 0 size: 191904 MB
  node 0 free: 187707 MB
  node 1 cpus: 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35
  node 1 size: 193278 MB
  node 1 free: 188808 MB
  node distances:
    node 0 1
    0: 10 21
    1: 21 10

From /proc/meminfo

    MemTotal:     394427492 kB
    HugePages_Total:     0
    Hugepagesize:     2048 kB

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"
    PRETTY_NAME="SUSE Linux Enterprise Server 12 SP4"
    ID="sles"
    ANSI_COLOR="0;32"

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Test Sponsor: Huawei
Tested by: Huawei

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

Platform Notes (Continued)

uname -a:
x86_64 x86_64 x86_64 GNU/Linux

Kernel self-reported vulnerability status:

CVE-2017-5754 (Meltdown): Not affected
CVE-2017-5753 (Spectre variant 1): Mitigation: __user pointer sanitization
CVE-2017-5715 (Spectre variant 2): Mitigation: Indirect Branch Restricted Speculation, IBPB, IBRS_FW

run-level 3 Mar 31 21:15

SPEC is set to: /spec
    Filesystem  Type  Size  Used Avail Use% Mounted on
    /dev/sda3   xfs   849G   38G  812G   5% /

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. 6.52 03/16/2019
Memory:
    24x Samsung M393A2K43CB2-CVF 16 GB 2 rank 2933, configured at 2666
(End of data from syinfo 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) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
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**Compiler Version Notes (Continued)**

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.

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
SPEC CPU2017 Floating Point Speed Result

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**Base Portability Flags (Continued)**

- 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-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:

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| Tested by:       | Huawei |

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

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Tested with SPEC CPU2017 v1.0.5 on 2019-04-01 06:16:13-0400.  