Huawei CH121 V5 (Intel Xeon Silver 4209T)

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>SPECspeed2017_int_base</th>
<th>SPECspeed2017_int_peak</th>
</tr>
</thead>
<tbody>
<tr>
<td>perlbench</td>
<td>16</td>
<td>5.34</td>
<td>Not Run</td>
</tr>
<tr>
<td>gcc</td>
<td>16</td>
<td>7.71</td>
<td></td>
</tr>
<tr>
<td>mcf</td>
<td>16</td>
<td>4.89</td>
<td></td>
</tr>
<tr>
<td>omnetpp_s</td>
<td>16</td>
<td>10.2</td>
<td></td>
</tr>
<tr>
<td>xalancbmk</td>
<td>16</td>
<td>11.3</td>
<td></td>
</tr>
<tr>
<td>x264_s</td>
<td>16</td>
<td>4.56</td>
<td></td>
</tr>
<tr>
<td>deepsjeng_s</td>
<td>16</td>
<td>3.90</td>
<td></td>
</tr>
<tr>
<td>leela_s</td>
<td>16</td>
<td>11.5</td>
<td></td>
</tr>
<tr>
<td>exchange2_s</td>
<td>16</td>
<td>16.4</td>
<td></td>
</tr>
<tr>
<td>xz_s</td>
<td>16</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Hardware
- **CPU Name:** Intel Xeon Silver 4209T
- **Max MHz.:** 3200
- **Nominal:** 2200
- **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:** 11 MB I+D on chip per chip
- **Other:** None
- **Memory:** 384 GB (24 x 16 GB 2Rx8 PC4-2933Y-R, running at 2400)
- **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:** jemalloc memory allocator V5.0.1
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Huawei CH121 V5 (Intel Xeon Silver 4209T)

SPEC CPU2017 Integer Speed Result

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SPECspeed2017_int_base = 7.79
SPECspeed2017_int_peak = Not Run

CPU2017 License: 3175
Test Sponsor: Huawei
Test Date: Apr-2019
Tested by: Huawei
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>
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<tbody>
<tr>
<td>600.perlbench_s</td>
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<td>605.mcf_s</td>
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<td>623.xalancbmk_s</td>
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<td>10.1</td>
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<td>139</td>
<td>10.2</td>
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<tr>
<td>625.x264_s</td>
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<td>156</td>
<td>11.3</td>
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<td>11.3</td>
<td>156</td>
<td>11.3</td>
</tr>
<tr>
<td>631.deepsjeng_s</td>
<td>16</td>
<td>314</td>
<td>4.56</td>
<td>314</td>
<td>4.56</td>
<td>314</td>
<td>4.56</td>
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<tr>
<td>641.leela_s</td>
<td>16</td>
<td>437</td>
<td>3.90</td>
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<tr>
<td>648.exchange2_s</td>
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<td>11.5</td>
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<tr>
<td>657.xz_s</td>
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<td>377</td>
<td>16.4</td>
<td>377</td>
<td>16.4</td>
</tr>
</tbody>
</table>

SPECspeed2017_int_base = 7.79
SPECspeed2017_int_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,1,0"
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.
jemalloc, a general purpose malloc implementation
built with the RedHat Enterprise 7.5, and the system compiler gcc 4.8.5
<table>
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<td>Hardware Availability: Apr-2019</td>
</tr>
<tr>
<td>Tested by: Huawei</td>
<td>Software Availability: Dec-2018</td>
</tr>
</tbody>
</table>

**Platform Notes**

BIOS configuration:
Power Policy Set to Load Balance
Hyper-Threadin Set to Disable
XPT Prefetch Set to Enabled
Sysinfo program /spec2017/bin/sysinfo
Rev: r5974 of 2018-05-19 9bcde8f2999c33d61f64985e45859ea9
running on sles12sp4 Mon Apr 8 16:32:07 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) Silver 4209T CPU @ 2.20GHz
  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 4 5 6 7
  physical 1: cores 0 1 2 3 4 5 6 7
```

```
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) Silver 4209T CPU @ 2.20GHz
Stepping:              6
CPU MHz:               2200.000
CPU max MHz:           3200.0000
CPU min MHz:           1000.0000
BogoMIPS:              4400.00
Virtualization:        VT-x
L1d cache:             32K
L1i cache:             32K
L2 cache:              1024K
L3 cache:              11264K
```

(Continued on next page)
Huawei CH121 V5 (Intel Xeon Silver 4209T)  

**SPEC CPU2017 Integer Speed Result**  
**Copyright 2017-2019 Standard Performance Evaluation Corporation**

Huawei  

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

Platform Notes (Continued)

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  
- 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 cpuid  
- aperfmpref perf pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg fma cx16  
- xptr 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 tpr_shadow vmmi flexpriority ept vpid  
- fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid ftm cqm mpx rdt_a avx512f  
- avx512dq rdseed adx smap clflushopt clwb intel_pt avx512cd avx512bw avx512vl  
- xsaveopt xsavec xgetbv1 xsaves cqm_llc cqm_occu llc cqm_mbb _total cqm_mbb _local  
- dtherm ida arat pln pts pku ospke avx512_vnni flush_l1d arch_capabilities  

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: 191906 MB  
- node 0 free: 190900 MB  
- node 1 cpus: 8 9 10 11 12 13 14 15  
- node 1 size: 193282 MB  
- node 1 free: 191389 MB  
- node distances:  
- node 0 1  
  0: 10 21  
  1: 21 10  

From /proc/meminfo  
MemTotal: 394433308 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"  

(Continued on next page)
# SPEC CPU2017 Integer Speed Result

## Huawei

### Huawei CH121 V5 (Intel Xeon Silver 4209T)

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- **CPU2017 License:** 3175  
- **Test Date:** Apr-2019  
- **Test Sponsor:** Huawei  
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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:
  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 Apr 8 06:58**

**SPEC is set to:** /spec2017

<table>
<thead>
<tr>
<th>Filesystem</th>
<th>Type</th>
<th>Size</th>
<th>Used</th>
<th>Avail</th>
<th>Use%</th>
<th>Mounted on</th>
</tr>
</thead>
<tbody>
<tr>
<td>/dev/sda3</td>
<td>xfs</td>
<td>700G</td>
<td>31G</td>
<td>670G</td>
<td>5%</td>
<td>/</td>
</tr>
</tbody>
</table>

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 2400

(End of data from sysinfo program)

## Compiler Version Notes

```
==============================================================================
<table>
<thead>
<tr>
<th>CC  600.perlbench_s(base) 602.gcc_s(base) 605.mcf_s(base) 625.x264_s(base) 657.xz_s(base)</th>
</tr>
</thead>
</table>

==============================================================================
```

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.

```
==============================================================================
<table>
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<tr>
<th>CXXC 620.omnetpp_s(base) 623.xalancbmk_s(base) 631.deepsjeng_s(base) 641.leela_s(base)</th>
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```

*(Continued on next page)*
Huawei CH121 V5 (Intel Xeon Silver 4209T)

**SPECspeed2017_int_base = 7.79**

**SPECspeed2017_int_peak = Not Run**

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

---

**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.

------------------------------------------------------------------------------

FC 648.exchange2_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:
```shell
icc -m64 -std=c11
```

C++ benchmarks:
```shell
icpc -m64
```

Fortran benchmarks:
```shell
ifort -m64
```

---

**Base Portability Flags**

600.perlbench_s: -DSPEC_LP64 -DSPEC_LINUX_X64
602.gcc_s: -DSPEC_LP64
605.mcf_s: -DSPEC_LP64
620.omnetpp_s: -DSPEC_LP64
623.xalancbmk_s: -DSPEC_LP64 -DSPEC_LINUX
625.x264_s: -DSPEC_LP64
631.deepsjeng_s: -DSPEC_LP64
641.leela_s: -DSPEC_LP64
648.exchange2_s: -DSPEC_LP64
657.xz_s: -DSPEC_LP64
**Huawei**

**Huawei CH121 V5 (Intel Xeon Silver 4209T)**

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

**C benchmarks:**
- `-Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div`  
- `-qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP`  
- `-L/usr/local/je5.0.1-64/lib -ljemalloc`

**C++ benchmarks:**
- `-Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div`  
- `-qopt-mem-layout-trans=4`  
- `-L/usr/local/IntelCompiler19/compilers_and_libraries_2019.1.144/linux/compiler/lib/intel64 -lqkmalloc`

**Fortran benchmarks:**
- `-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-mem-layout-trans=4`  
- `-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:

**Base Optimization Flags**