## Huawei CH121 V5 (Intel Xeon Silver 4110)

**Copyright 2017-2018 Standard Performance Evaluation Corporation**

### SPECrate2017_int_base = 74.9

### SPECrate2017_int_peak = 79.6

| Test Sponsor | Huawei
| Test Date | Jan-2018
| Hardware Availability | Jul-2017
| Software Availability | Sep-2017

| Software | OS: SUSE Linux Enterprise Server 12 SP2 (x86_64)
| Compiler: C/C++: Version 18.0.0.128 of Intel C/C++
| Compiler for Linux: Fortran: Version 18.0.0.128 of Intel Fortran
| Firmware: Version 0.31 Released Sep-2017
| File System: xfs
| System State: Run level 3 (multi-user)
| Base Pointers: 64-bit
| Peak Pointers: 32/64-bit
| Other: jemalloc: jemalloc memory allocator library V5.0.1

| Hardware | CPU Name: Intel Xeon Silver 4110
| Max MHz.: 3000
| Nominal: 2100
| Enabled: 16 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: 11 MB I+D on chip per chip
| Other: None
| Memory: 384 GB (24 x 16 GB 2Rx8 PC4-2666V-R, running at 2400)
| Storage: 1 x 1200 GB SAS, 10000 RPM
| Other: None

| Copies | SPECrate2017_int_base (74.9) | SPECrate2017_int_peak (79.6)
|---|---|---
| 500.perlbench_r | 32 | 56.2 |
| 502.gcc_r | 32 | 69.5 | 69.4 |
| 505.mcf_r | 32 | 30.4 |
| 520.omnetpp_r | 32 | 51.6 |
| 523.xalancbmk_r | 32 | 52.0 |
| 525.x264_r | 32 | 78.0 |
| 531.deepsjeng_r | 32 | 63.9 |
| 541.leela_r | 32 | 57.1 |
| 548.exchange2_r | 32 | 58.0 |
| 557.xz_r | 32 | 55.9 |
Huawei CH121 V5 (Intel Xeon Silver 4110)

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Copies</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Benchmark</th>
<th>Copies</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>500.perlbench_r</td>
<td>32</td>
<td>907</td>
<td>56.2</td>
<td>908</td>
<td>56.1</td>
<td>897</td>
<td>56.8</td>
<td>502.gcc_r</td>
<td>32</td>
<td>652</td>
<td>69.5</td>
<td>653</td>
<td>69.4</td>
<td>655</td>
<td>69.2</td>
</tr>
<tr>
<td>505.mcf_r</td>
<td>32</td>
<td>554</td>
<td>93.4</td>
<td>559</td>
<td>92.5</td>
<td>538</td>
<td>96.1</td>
<td>520.omnetpp_r</td>
<td>32</td>
<td>813</td>
<td>51.6</td>
<td>812</td>
<td>51.7</td>
<td>813</td>
<td>51.6</td>
</tr>
<tr>
<td>523.xalancbmk_r</td>
<td>32</td>
<td>435</td>
<td>77.7</td>
<td>433</td>
<td>78.0</td>
<td>433</td>
<td>78.1</td>
<td>525.x264_r</td>
<td>32</td>
<td>409</td>
<td>137</td>
<td>404</td>
<td>139</td>
<td>401</td>
<td>140</td>
</tr>
<tr>
<td>531.deepsjeng_r</td>
<td>32</td>
<td>574</td>
<td>63.9</td>
<td>574</td>
<td>63.9</td>
<td>574</td>
<td>63.9</td>
<td>541.leela_r</td>
<td>32</td>
<td>928</td>
<td>57.1</td>
<td>924</td>
<td>57.4</td>
<td>930</td>
<td>57.0</td>
</tr>
<tr>
<td>548.exchange2_r</td>
<td>32</td>
<td>623</td>
<td>135</td>
<td>622</td>
<td>135</td>
<td>624</td>
<td>134</td>
<td>557.xz_r</td>
<td>32</td>
<td>619</td>
<td>55.8</td>
<td>618</td>
<td>55.9</td>
<td>619</td>
<td>55.9</td>
</tr>
</tbody>
</table>

SPECrate2017_int_base = 74.9
SPECrate2017_int_peak = 79.6

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>

jemalloc: configured and built at default for
32bit (i686) and 64bit (x86_64) targets;
jemalloc: built with the RedHat Enterprise 7.4,
and the system compiler gcc 4.8.5;
jemalloc: sources available from jemalloc.net
(Continued on next page)
General Notes (Continued)


No: The test sponsor attests, as of date of publication, that CVE-2017-5754 (Meltdown) is mitigated in the system as tested and documented.
No: 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.
No: 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.

This benchmark result is intended to provide perspective on past performance using the historical hardware and/or software described on this result page.

The system as described on this result page was formerly generally available. At the time of this publication, it may not be shipping, and/or may not be supported, and/or may fail to meet other tests of General Availability described in the SPEC OSG Policy document, http://www.spec.org/osg/policy.html

This measured result may not be representative of the result that would be measured were this benchmark run with hardware and software available as of the publication date.

Platform Notes

BIOS configuration:
Power Policy Set to Performance
XPT Prefetch Set to Enabled
Sysinfo program /spec2017/bin/sysinfo
Rev: r5797 of 2017-06-14 96c45e4568ad54c135fd618bcc091c0f
running on linux-hyq4 Sat Jan 27 17:33:41 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) Silver 4110 CPU @ 2.10GHz
  2 "physical id"s (chips)
  32 "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 : 16
  physical 0: cores 0 1 2 3 4 5 6 7
  physical 1: cores 0 1 2 3 4 5 6 7
Huawei

Huawei CH121 V5 (Intel Xeon Silver 4110)

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

Huawei CH121 V5 (Intel Xeon Silver 4110)

SPECrate2017_int_base = 74.9
SPECrate2017_int_peak = 79.6

Hardware Availability: Jul-2017
Software Availability: Sep-2017

Platform Notes (Continued)

From lscpu:
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 32
On-line CPU(s) list: 0-31
Thread(s) per core: 2
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 4110 CPU @ 2.10GHz
Stepping: 4
CPU MHz: 2100.096
BogoMIPS: 4200.19
Virtualization: VT-x
LLd cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 11264K
NUMA node0 CPU(s): 0-7,16-23
NUMA node1 CPU(s): 8-15,24-31
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 rdttsc
lm constant_tsc art arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc
aperfmpref eagerfpu pni pclmulqdq dtes64 ds_cpl vmx smx est tm2 ssse3 sdbg fma cx16
xtrm pdcn pcic dca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave
avx f16c rdrand lahf_lm abm 3dnowprefetch ida arat epb pni pts dtherm intel_pt
pr_shadow vnumm_flexpriority ept vpid fsgsbase tsfc_adjust bni hle avx2 smep bmi2
emms invpcid rtm cmq mpx avx512f avx512dq rdseed adx smap clflushopt clwb avx512cd
avx512bw avx512vl xsaveopt xsavec xgetbv1 cmq_llc cmq_occup_llc

/proc/cpuinfo cache data
  cache size : 11264 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 16 17 18 19 20 21 22 23
  node 0 size: 191498 MB
  node 0 free: 190733 MB
  node 1 cpus: 8 9 10 11 12 13 14 15 24 25 26 27 28 29 30 31
  node 1 size: 193412 MB
  node 1 free: 192747 MB

(Continued on next page)
Huawei

Huawei CH121 V5 (Intel Xeon Silver 4110)

| SPECrate2017_int_base = 74.9 |
| SPECrate2017_int_peak = 79.6 |

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

Platform Notes (Continued)

node distances:
    node  0   1
    0:  10  21
    1:  21  10

From /proc/meminfo
    MemTotal:        394148704 kB
    HugePages_Total:       0
    Hugepagesize:       2048 kB

From /etc/*release* /etc/*version*
    SuSE-release:
        SUSE Linux Enterprise Server 12 (x86_64)
        VERSION = 12
        PATCHLEVEL = 2
        # 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-SP2"
        VERSION_ID="12.2"
        PRETTY_NAME="SUSE Linux Enterprise Server 12 SP2"
        ID="sles"
        ANSI_COLOR="0;32"
        CPE_NAME="cpe:/o:suse:sles:12:sp2"

uname -a:
    Linux linux-hyq4 4.4.21-69-default #1 SMP Tue Oct 25 10:58:20 UTC 2016 (9464f67)
    x86_64 x86_64 x86_64 GNU/Linux

run-level 3 Jan 27 17:20

SPEC is set to: /spec2017
    Filesystem  Type  Size  Used  Avail  Use% Mounted on
    /dev/sda2    xfs  828G  57G  772G    7% /

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. 0.31 09/29/2017
    Memory:
        24x Samsung M393A2K43BB1-CTD 16 GB 2 rank 2666, configured at 2400

(End of data from sysinfo program)
Huawei CH121 V5 (Intel Xeon Silver 4110)

SPEC CPU2017 Integer Rate Result

SPECrate2017_int_base = 74.9
SPECrate2017_int_peak = 79.6

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

Compiler Version Notes

==============================================================================
CC  500.perlbench_r(base) 502.gcc_r(base) 505.mcf_r(base, peak)
    525.x264_r(base, peak) 557.xz_r(base, peak)
==============================================================================
icc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
==============================================================================

CC  500.perlbench_r(peak) 502.gcc_r(peak)
==============================================================================
icc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
==============================================================================

==============================================================================
CXXC 520.omnetpp_r(base) 523.xalancbmk_r(base) 531.deepsjeng_r(base)
    541.leela_r(base)
==============================================================================
icpc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
==============================================================================

==============================================================================
CXXC 520.omnetpp_r(peak) 523.xalancbmk_r(peak) 531.deepsjeng_r(peak)
    541.leela_r(peak)
==============================================================================
icpc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.

==============================================================================
FC  548.exchange2_r(base, peak)
==============================================================================
ifort (IFORT) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
==============================================================================

Base Compiler Invocation

C benchmarks:
icc

C++ benchmarks:
icpc

(Continued on next page)
Huawei

Huawei CH121 V5 (Intel Xeon Silver 4110)

<table>
<thead>
<tr>
<th>SPECrate2017_int_base = 74.9</th>
<th>SPECrate2017_int_peak = 79.6</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU2017 License: 3175</td>
<td>Test Date:</td>
</tr>
<tr>
<td>Test Sponsor: Huawei</td>
<td>Hardware Availability:</td>
</tr>
<tr>
<td>Tested by: Huawei</td>
<td>Software Availability:</td>
</tr>
<tr>
<td></td>
<td>Jan-2018</td>
</tr>
</tbody>
</table>

**Base Compiler Invocation (Continued)**

Fortran benchmarks:
ifort

**Base Portability Flags**

```
500.perlbench_r: -DSPEC_LP64 -DSPEC_LINUX_X64
502.gcc_r: -DSPEC_LP64
505.mcf_r: -DSPEC_LP64
520.omnetpp_r: -DSPEC_LP64
523.xalancbmk_r: -DSPEC_LP64 -DSPEC_LINUX
525.x264_r: -DSPEC_LP64
531.deepsjeng_r: -DSPEC_LP64
541.leela_r: -DSPEC_LP64
548.exchange2_r: -DSPEC_LP64
557.xz_r: -DSPEC_LP64
```

**Base Optimization Flags**

C benchmarks:
-W1,-z,muldefs -xCORE-AVX2 -ipo -O3 -no-prec-div
-qopt-mem-layout-trans=3 -L/usr/local/je5.0.1-64/lib -ljemalloc

C++ benchmarks:
-W1,-z,muldefs -xCORE-AVX2 -ipo -O3 -no-prec-div
-qopt-mem-layout-trans=3 -L/usr/local/je5.0.1-64/lib -ljemalloc

Fortran benchmarks:
-W1,-z,muldefs -xCORE-AVX2 -ipo -O3 -no-prec-div
-qopt-mem-layout-trans=3 -nostandard-realloc-lhs -align array32byte
-L/usr/local/je5.0.1-64/lib -ljemalloc

**Base Other Flags**

C benchmarks:
-m64 -std=c11

C++ benchmarks:
-m64

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

<table>
<thead>
<tr>
<th>Huawei CH121 V5 (Intel Xeon Silver 4110)</th>
<th>SPECrate2017_int_base = 74.9</th>
<th>SPECrate2017_int_peak = 79.6</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CPU2017 License:</strong> 3175</td>
<td><strong>Test Date:</strong> Jan-2018</td>
<td></td>
</tr>
<tr>
<td><strong>Test Sponsor:</strong> Huawei</td>
<td><strong>Hardware Availability:</strong> Jul-2017</td>
<td></td>
</tr>
<tr>
<td><strong>Tested by:</strong> Huawei</td>
<td><strong>Software Availability:</strong> Sep-2017</td>
<td></td>
</tr>
</tbody>
</table>

### Base Other Flags (Continued)

- Fortran benchmarks:
  - -m64

### Peak Compiler Invocation

- C benchmarks:
  - icc
- C++ benchmarks:
  - icpc
- Fortran benchmarks:
  - ifort

### Peak Portability Flags

- 500.perlbench_r: -DSPEC_LP64 -DSPEC_LINUX_X64
- 502.gcc_r: -D_FILE_OFFSET_BITS=64
- 505.mcf_r: -DSPEC_LP64
- 520.omnetpp_r: -DSPEC_LP64
- 523.xalancbmk_r: -D_FILE_OFFSET_BITS=64 -DSPEC_LINUX
- 525.x264_r: -DSPEC_LP64
- 531.deepsjeng_r: -DSPEC_LP64
- 541.leela_r: -DSPEC_LP64
- 548.exchange2_r: -DSPEC_LP64
- 557.xz_r: -DSPEC_LP64

### Peak Optimization Flags

- C benchmarks:
  - 500.perlbench_r: -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -ipo -xCORE-AVX2 -O3 -no-prec-div -qopt-mem-layout-trans=3 -fno-strict-overflow -L/usr/local/je5.0.1-64/lib -ljemalloc

(Continued on next page)
Peak Optimization Flags (Continued)

505.mcf_r: basepeak = yes

525.x264_r: -Wl,-z,muldefs -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-mem-layout-trans=3 -fno-alias
-L/usr/local/je5.0.1-64/lib -ljemalloc

557.xz_r: basepeak = yes

C++ benchmarks:

520.omnetpp_r: -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -ipo
-xCORE-AVX2 -O3 -no-prec-div -qopt-mem-layout-trans=3
-L/usr/local/je5.0.1-64/lib -ljemalloc

523.xalancbmk_r: -L/opt/intel/compilers_and_libraries_2018/linux/lib/ia32
-Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -ipo
-xCORE-AVX2 -O3 -no-prec-div -qopt-mem-layout-trans=3
-L/usr/local/je5.0.1-32/lib -ljemalloc

531.deepsjeng_r: basepeak = yes

541.leela_r: Same as 520.omnetpp_r

Fortran benchmarks:
-Wl,-z,muldefs -xCORE-AVX2 -ipo -O3 -no-prec-div
-qopt-mem-layout-trans=3 -nostandard-realloc-lhs -align array32byte
-L/usr/local/je5.0.1-64/lib -ljemalloc

Peak Other Flags

C benchmarks (except as noted below):
-m64 -std=c11

502.gcc_r: -m32 -std=c11

C++ benchmarks (except as noted below):
-m64

523.xalancbmk_r: -m32

Fortran benchmarks:
-m64
Huawei CH121 V5 (Intel Xeon Silver 4110)

<table>
<thead>
<tr>
<th>SPECrate2017_int_base = 74.9</th>
<th>SPECrate2017_int_peak = 79.6</th>
</tr>
</thead>
</table>

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

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

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/Huawei-Platform-Settings-SKL-V1.9.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 2018-01-27 04:33:40-0500.
Originally published on 2018-02-27.