Huawei CH121 V5 (Intel Xeon Bronze 3106)

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

SPEC® CPU2017 Integer Rate Result
Copyright 2017-2018 Standard Performance Evaluation Corporation

SPECrate2017_int_base = 44.0
SPECrate2017_int_peak = 46.1

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>500.perlbench_r</td>
<td>16</td>
</tr>
<tr>
<td>502.gcc_r</td>
<td>16</td>
</tr>
<tr>
<td>505.mcf_r</td>
<td>16</td>
</tr>
<tr>
<td>520.omnetpp_r</td>
<td>16</td>
</tr>
<tr>
<td>523.xalancbmk_r</td>
<td>16</td>
</tr>
<tr>
<td>525.x264_r</td>
<td>16</td>
</tr>
<tr>
<td>531.deepsjeng_r</td>
<td>16</td>
</tr>
<tr>
<td>541.leela_r</td>
<td>16</td>
</tr>
<tr>
<td>548.exchange2_r</td>
<td>16</td>
</tr>
<tr>
<td>557.xz_r</td>
<td>16</td>
</tr>
</tbody>
</table>

Hardware
- CPU Name: Intel Xeon Bronze 3106
- Max MHz.: 1700
- Nominal: 1700
- 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 PC4-2666V-R, running at 2133)
- Storage: 1 x 1200 GB SAS, 10000 RPM
- Other: None

Software
- OS: Red Hat Enterprise Linux Server release 7.4 (Maipo) 3.10.0-693.11.6.el7.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 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: 32/64-bit
- Other: jemalloc: jemalloc memory allocator library V5.0.1;
Huawei CH121 V5 (Intel Xeon Bronze 3106)

<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>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>16</td>
<td>695</td>
<td>36.6</td>
<td>690</td>
<td>36.9</td>
<td>689</td>
<td>37.0</td>
<td>16</td>
<td>582</td>
<td>43.8</td>
<td>582</td>
<td>43.8</td>
<td>582</td>
<td>43.8</td>
</tr>
<tr>
<td>502.gcc_r</td>
<td>16</td>
<td>542</td>
<td>41.8</td>
<td>540</td>
<td>42.0</td>
<td>535</td>
<td>42.3</td>
<td>16</td>
<td>469</td>
<td>48.3</td>
<td>469</td>
<td>48.3</td>
<td>470</td>
<td>48.3</td>
</tr>
<tr>
<td>505.mcf_r</td>
<td>16</td>
<td>507</td>
<td>51.0</td>
<td>502</td>
<td>51.5</td>
<td>504</td>
<td>51.3</td>
<td>16</td>
<td>507</td>
<td>51.0</td>
<td>502</td>
<td>51.5</td>
<td>504</td>
<td>51.3</td>
</tr>
<tr>
<td>520.omnetpp_r</td>
<td>16</td>
<td>684</td>
<td>30.7</td>
<td>675</td>
<td>31.1</td>
<td>675</td>
<td>31.1</td>
<td>16</td>
<td>659</td>
<td>31.8</td>
<td>662</td>
<td>31.7</td>
<td>659</td>
<td>31.9</td>
</tr>
<tr>
<td>523.xalancbmk_r</td>
<td>16</td>
<td>365</td>
<td>46.2</td>
<td>359</td>
<td>47.1</td>
<td>360</td>
<td>46.9</td>
<td>16</td>
<td>326</td>
<td>51.8</td>
<td>326</td>
<td>51.9</td>
<td>325</td>
<td>52.0</td>
</tr>
<tr>
<td>525.x264_r</td>
<td>16</td>
<td>349</td>
<td>80.4</td>
<td>349</td>
<td>80.3</td>
<td>350</td>
<td>80.2</td>
<td>16</td>
<td>349</td>
<td>80.4</td>
<td>349</td>
<td>80.3</td>
<td>350</td>
<td>80.2</td>
</tr>
<tr>
<td>531.deepsjeng_r</td>
<td>16</td>
<td>480</td>
<td>38.2</td>
<td>480</td>
<td>38.2</td>
<td>479</td>
<td>38.3</td>
<td>16</td>
<td>480</td>
<td>38.2</td>
<td>480</td>
<td>38.2</td>
<td>479</td>
<td>38.3</td>
</tr>
<tr>
<td>541.leela_r</td>
<td>16</td>
<td>868</td>
<td>30.5</td>
<td>869</td>
<td>30.5</td>
<td>866</td>
<td>30.6</td>
<td>16</td>
<td>856</td>
<td>30.9</td>
<td>859</td>
<td>30.8</td>
<td>860</td>
<td>30.8</td>
</tr>
<tr>
<td>548.exchange2_r</td>
<td>16</td>
<td>484</td>
<td>86.6</td>
<td>482</td>
<td>86.9</td>
<td>484</td>
<td>86.6</td>
<td>16</td>
<td>482</td>
<td>87.0</td>
<td>481</td>
<td>87.1</td>
<td>484</td>
<td>86.6</td>
</tr>
<tr>
<td>557.xz_r</td>
<td>16</td>
<td>594</td>
<td>29.1</td>
<td>592</td>
<td>29.2</td>
<td>593</td>
<td>29.1</td>
<td>16</td>
<td>593</td>
<td>29.1</td>
<td>593</td>
<td>29.2</td>
<td>592</td>
<td>29.2</td>
</tr>
</tbody>
</table>

**Results Table**

**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 or

(Continued on next page)
Huawei

Huawei CH121 V5 (Intel Xeon Bronze 3106)

SPECrate2017_int_base = 44.0
SPECrate2017_int_peak = 46.1

CPU2017 License: 3175
Test Date: Jun-2018
Test Sponsor: Huawei
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-2017-5754 (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 Performance
XPT Prefetch Set to Enabled
Sysinfo program /spec2017/bin/sysinfo
Rev: r5797 of 2017-06-14 96c45e4568ad54c135fd618bcc091c0f
running on localhost.localdomain Tue Jun 12 06:32:26 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) Bronze 3106 CPU @ 1.70GHz
  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) Bronze 3106 CPU @ 1.70GHz

(Continued on next page)
Huawei CH121 V5 (Intel Xeon Bronze 3106)

**SPECrate2017_int_base** = 44.0

**SPECrate2017_int_peak** = 46.1

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

---

**Platform Notes (Continued)**

Stepping: 4
CPU MHz: 1700.000
BogoMIPS: 3400.00
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 11264K
NUMA node0 CPU(s): 0-7
NUMA node1 CPU(s): 8-15
Flags: fpu vme de pse tsc msr pae 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 ksck mtm cpb ds_cpl vmx smx est tm2 ssse3 fma cx16 xtpr pdcm pcid dca sse4_1 mce x save avx f16c rdrand lahf_lm abm 3dnowprefetch ept _kd _d _ept _pd _pebs _t _shadow vnmi flexpriority ept _v _fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erm_s invpcid rtm cqm mpx rdt_a avx512f avx512dq rdseed adx smap cflshopt ciwb avx512cd avx512bw avx512v1 xsaveopt xsavec xgetbv1 cqm_llc cqm_occup_llc cqm_mmb_total cqm_mmb_local dtherm arat pln pts

/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
  node 0 size: 195701 MB
  node 0 free: 190761 MB
  node 1 cpus: 8 9 10 11 12 13 14 15
  node 1 size: 196608 MB
  node 1 free: 192031 MB
  node distances:
    node 0 1
    0: 10 21
    1: 21 10

From /proc/meminfo
  MemTotal:            395141240 kB
  HugePages_Total:       0
  Hugepagesize:         2048 kB

From /etc/*release* /etc/*version*
  os-release:
    NAME="Red Hat Enterprise Linux Server"
    VERSION="7.4 (Maipo)"

(Continued on next page)
Huawei

Huawei CH121 V5 (Intel Xeon Bronze 3106)

<table>
<thead>
<tr>
<th>SPECrate2017_int_base</th>
<th>44.0</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECrate2017_int_peak</td>
<td>46.1</td>
</tr>
</tbody>
</table>

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

Platform Notes (Continued)

```
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 Jun 12 05:57
```

SPEC is set to: /spec2017
```
Filesystem Type Size Used Avail Use% Mounted on
/dev/sda4 xfs 700G 35G 666G 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. 0.62 03/26/2018**
**Memory:**
```
24x Samsung M393A2K43BB1-CTD 16 GB 2 rank 2666, configured at 2133
```

(End of data from sysinfo program)

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.
```
```
```
```
## SPEC CPU2017 Integer Rate Result

**Huawei**

**Huawei CH121 V5 (Intel Xeon Bronze 3106)**

<table>
<thead>
<tr>
<th>CPU2017 License:</th>
<th>3175</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Sponsor:</td>
<td>Huawei</td>
</tr>
<tr>
<td>Tested by:</td>
<td>Huawei</td>
</tr>
</tbody>
</table>

**SPECrate2017_int_base = 44.0**

**SPECrate2017_int_peak = 46.1**

<table>
<thead>
<tr>
<th>Test Date:</th>
<th>Jun-2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hardware Availability:</td>
<td>Jul-2017</td>
</tr>
<tr>
<td>Software Availability:</td>
<td>Jan-2018</td>
</tr>
</tbody>
</table>

### Compiler Version Notes (Continued)

```
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

**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`

(Continued on next page)
**Huawei**

**Huawei CH121 V5 (Intel Xeon Bronze 3106)**

<table>
<thead>
<tr>
<th>SPECrate2017_int_base = 44.0</th>
<th>SPECrate2017_int_peak = 46.1</th>
</tr>
</thead>
</table>

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

### Base Portability Flags (Continued)

- 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:**
- -Wl,-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:**
- -Wl,-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:**
- -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

### Base Other Flags

**C benchmarks:**
- -m64 -std=c11

**C++ benchmarks:**
- -m64

**Fortran benchmarks:**
- -m64

### Peak Compiler Invocation

**C benchmarks:**
- icc

**C++ benchmarks:**
- icpc

(Continued on next page)
Huawei CH121 V5 (Intel Xeon Bronze 3106)

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

SPECrate2017_int_base = 44.0
SPECrate2017_int_peak = 46.1

Test Date: Jun-2018
Hardware Availability: Jul-2017
Software Availability: Jan-2018

Peak Compiler Invocation (Continued)

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

502.gcc_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

505.mcf_r: basepeak = yes
525.x264_r: basepeak = yes
557.xz_r: -Wl,-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:

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

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

520.omnetpp_r (continued):
- L/usr/local/je5.0.1-64/lib -ljemalloc

523.xalancbmk_r: -L/opt/intel/compilers_and_libraries_2018/linux/lib/ia32
-W1,-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:**
- 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

---

## 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.xalancbmkr: -m32

**Fortran benchmarks:**
- m64

---

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-revC.xml
Huawei

Huawei CH121 V5 (Intel Xeon Bronze 3106)

SPECrate2017_int_base = 44.0
SPECrate2017_int_peak = 46.1

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

Test Date: Jun-2018
Hardware Availability: Jul-2017
Software Availability: Jan-2018