Huawei

Huawei XH628 V5 (Intel Xeon Gold 6138)

SPECrater2017_int_base = 178
SPECrater2017_int_peak = 189

Huawei

CPU2017 License: 3175
Test Sponsor: Huawei
Tested by: Huawei
Test Date: Sep-2018
Hardware Availability: Aug-2018
Software Availability: Mar-2018

CPU Name: Intel Xeon Gold 6138
Max MHz.: 3700
Nominal: 2000
Enabled: 40 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: 27.5 MB I+D on chip per chip
Other: None
Memory: 384 GB (12 x 32 GB 2Rx4 PC4-2666V-R)
Storage: 1 x 1800 GB SAS, 10000 RPM
Other: None

OS: Red Hat Enterprise Linux Server release 7.4 (Maipo)
Compiler: C/C++: Version 18.0.2.199 of Intel C/C++
Compiler for Linux: Fortran: Version 18.0.2.199 of Intel Fortran
Compiler for Linux
Parallel: No
Firmware: Version 0.86 Released Aug-2018
File System: xfs
System State: Run level 3 (multi-user)
Base Pointers: 64-bit
Peak Pointers: 32/64-bit
Other: jemalloc memory allocator V5.0.1
Huawei

Huawei XH628 V5 (Intel Xeon Gold 6138)

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

Results Table

<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>
</tr>
</thead>
<tbody>
<tr>
<td>500.perlbench_r</td>
<td>80</td>
<td>932</td>
<td>137</td>
<td>937</td>
<td>136</td>
<td>933</td>
<td>136</td>
</tr>
<tr>
<td>502.gcc_r</td>
<td>80</td>
<td>738</td>
<td>154</td>
<td>733</td>
<td>155</td>
<td>736</td>
<td>154</td>
</tr>
<tr>
<td>505.mcf_r</td>
<td>80</td>
<td>589</td>
<td>220</td>
<td>607</td>
<td>213</td>
<td>610</td>
<td>212</td>
</tr>
<tr>
<td>520.omnetpp_r</td>
<td>80</td>
<td>879</td>
<td>119</td>
<td>879</td>
<td>119</td>
<td>878</td>
<td>120</td>
</tr>
<tr>
<td>523.xalanbmk_r</td>
<td>80</td>
<td>496</td>
<td>170</td>
<td>499</td>
<td>169</td>
<td>494</td>
<td>171</td>
</tr>
<tr>
<td>525.x264_r</td>
<td>80</td>
<td>385</td>
<td>364</td>
<td>387</td>
<td>362</td>
<td>386</td>
<td>362</td>
</tr>
<tr>
<td>531.deepsjeng_r</td>
<td>80</td>
<td>585</td>
<td>157</td>
<td>601</td>
<td>152</td>
<td>615</td>
<td>149</td>
</tr>
<tr>
<td>541.leela_r</td>
<td>80</td>
<td>871</td>
<td>152</td>
<td>885</td>
<td>150</td>
<td>866</td>
<td>153</td>
</tr>
<tr>
<td>548.exchange2_r</td>
<td>80</td>
<td>612</td>
<td>343</td>
<td>608</td>
<td>345</td>
<td>611</td>
<td>343</td>
</tr>
<tr>
<td>557.xz_r</td>
<td>80</td>
<td>641</td>
<td>135</td>
<td>697</td>
<td>124</td>
<td>692</td>
<td>125</td>
</tr>
</tbody>
</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 i7-6700K CPU + 32GB RAM memory using Redhat Enterprise Linux 7.5
Transparent Huge Pages enabled by default
Prior to runcpu invocation
Filesyan 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>
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)

(Continued on next page)
Huawei
Huawei XH628 V5 (Intel Xeon Gold 6138)

CPU2017 License: 3175
Test Sponsor: Huawei
Test Date: Sep-2018
Tested by: Huawei
Hardware Availability: Aug-2018
Software Availability: Mar-2018

General Notes (Continued)

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

Platform Notes

BIOS configuration:
Power Policy Set to Performance
SNC Set to Enabled
IMC Interleaving Set to 1-way Interleave
XPT Prefetch Set to Enabled

Sysinfo program /spec2017/bin/sysinfo
Rev: r5797 of 2017-06-14 96c45e4568ad54c135fd618bcc091c0f
running on localhost.localdomain Tue Sep  4 13:19:16 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 6138 CPU @ 2.00GHz
  2 "physical id"s (chips)
  80 "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 : 20
siblings : 40
physical 0: cores 0 1 2 3 4 8 9 10 11 12 16 17 18 19 20 24 25 26 27 28
physical 1: cores 0 1 2 3 4 8 9 10 11 12 16 17 18 19 20 24 25 26 27 28

From lscpu:
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 80
On-line CPU(s) list: 0-79
Thread(s) per core: 2
Core(s) per socket: 20
Socket(s): 2
NUMA node(s): 4
Vendor ID: GenuineIntel
CPU family: 6
Model: 85
Model name: Intel(R) Xeon(R) Gold 6138 CPU @ 2.00GHz
Stepping: 4

(Continued on next page)
Huawei

Huawei XH628 V5 (Intel Xeon Gold 6138)

| SPECrate2017_int_base | 178 |
| SPECrate2017_int_peak | 189 |

**CPU2017 License:** 3175  
**Test Sponsor:** Huawei  
**Tested by:** Huawei  
**Test Date:** Sep-2018  
**Hardware Availability:** Aug-2018  
**Software Availability:** Mar-2018

---

### Platform Notes (Continued)

```
CPU MHz: 2000.000
BogoMIPS: 4000.00
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 28160K
NUMA node0 CPU(s): 0-2,5,6,10-12,15,16,40-42,45,46,50-52,55,56
NUMA node1 CPU(s): 3,4,7-9,13,14,17-19,43,44,47-49,53,54,57-59
NUMA node2 CPU(s): 20-22,25,26,30-32,35,36,60-62,65,66,70-72,75,76
NUMA node3 CPU(s): 23,24,27-29,33,34,37-39,63,64,67-69,73,74,77-79
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 tsart arch_perfmon pebs bts rep_good nopl xtopology nonstop tsc
aperfmpref eagerfpu pni pclmulqdq dtes64 ds_cpl vmx smx est tm2 ssse3 fma cx16 xtpr
pdcm pcid dca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave avx
f16c rdrand lahf_lm abm 3dnowprefetch epb cat l3 cdp l3 invpd_single intel_pt
spec_ctrl ibpb_support tpr_shadow vnmi flexpriority ept vpid fsgsbase tsc_adjust
bmi1 hle avx2 smep bmi2 ets invpcid rtm cqm mpx rdt_a avx512f avx512dq rdseed adx
smap cflushopt clwb avx512cd avx512bw avx512vl vsxvec xsaveopt xsave vfpv1 cqm_llc
cqm_occput llc cqm_mbb_total cqm_mbb_local dtherm ida arat pni pts

/proc/cpuinfo cache data
  cache size : 28160 KB
```

From numactl --hardware WARNING: a numactl 'node' might or might not correspond to a physical chip.
```
available: 4 nodes (0-3)
  node 0 cpus: 0 1 2 5 6 10 11 12 15 16 40 41 42 45 46 50 51 52 55 56
  node 0 size: 96437 MB
  node 0 free: 93825 MB
  node 1 cpus: 3 4 7 8 9 13 14 17 18 19 43 44 47 48 49 53 54 57 58 59
  node 1 size: 98304 MB
  node 1 free: 96012 MB
  node 2 cpus: 20 21 22 25 26 30 31 32 35 36 60 61 62 65 66 70 71 72 75 76
  node 2 size: 98304 MB
  node 2 free: 95361 MB
  node 3 cpus: 23 24 27 28 29 33 34 37 38 39 63 64 67 68 69 73 74 77 78 79
  node 3 size: 98304 MB
  node 3 free: 95958 MB
  node distances:
```
(Continued on next page)
Huawei

Huawei XH628 V5 (Intel Xeon Gold 6138)

SPECrate2017_int_base = 178

SPECrate2017_int_peak = 189

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

Platform Notes (Continued)

From /proc/meminfo
MemTotal: 394174368 kB
HugePages_Total: 0
Hugepagesize: 2048 kB

From /etc/*release* /etc/*version*
   os-release:
      NAME="Red Hat Enterprise Linux Server"
      VERSION="7.4 (Maipo)"
      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 Sep 4 13:17

SPEC is set to: /spec2017
Filesystem Type Size Used Avail Use% Mounted on
/dev/sda4 xfs 553G 7.3G 546G 2% /

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. 0.86 08/06/2018
Memory:
4x NO DIMM NO DIMM
12x Samsung M393A4K40BB2-CTD 32 GB 2 rank 2666

(End of data from sysinfo program)

Compiler Version Notes

==============================================================================
CC 500.perlbench_r(base) 502.gcc_r(base) 505.mcf_r(base) 525.x264_r(base)
557.xz_r(base)
==============================================================================

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

## Huawei

Huawei XH628 V5 (Intel Xeon Gold 6138)

**SPECrate2017_int_base** = 178  
**SPECrate2017_int_peak** = 189

**CPU2017 License**: 3175  
**Test Date**: Sep-2018  
**Test Sponsor**: Huawei  
**Hardware Availability**: Aug-2018  
**Tested by**: Huawei  
**Software Availability**: Mar-2018

### Compiler Version Notes (Continued)

icc (ICC) 18.0.2 20180210  
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.

---

CC 500.perlbench_r(peak) 502.gcc_r(peak) 505.mcf_r(peak) 525.x264_r(peak)  
557.xz_r(peak)

---

icc (ICC) 18.0.2 20180210  
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.

---

CXXC 520.omnetpp_r(base) 523.xalancbmk_r(base) 531.deepsjeng_r(base)  
541.leela_r(base)

---

icpc (ICC) 18.0.2 20180210  
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.

---

CXXC 520.omnetpp_r(peak) 523.xalancbmk_r(peak) 531.deepsjeng_r(peak)  
541.leela_r(peak)

---

icpc (ICC) 18.0.2 20180210  
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.

---

FC 548.exchange2_r(base)

---

ifort (IFORT) 18.0.2 20180210  
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.

---

FC 548.exchange2_r(peak)

---

ifort (IFORT) 18.0.2 20180210  
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.

---

### Base Compiler Invocation

C benchmarks:

```bash
icc -m64 -std=c11
```

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

**Huawei XH628 V5 (Intel Xeon Gold 6138)**

<table>
<thead>
<tr>
<th>SPECrate2017_int_base</th>
<th>SPECrate2017_int_peak</th>
</tr>
</thead>
<tbody>
<tr>
<td>178</td>
<td>189</td>
</tr>
</tbody>
</table>

**CPU2017 License:** 3175  
**Test Sponsor:** Huawei  
**Test Date:** Sep-2018  
**Hardware Availability:** Aug-2018  
**Tested by:** Huawei  
**Software Availability:** Mar-2018  

### Base Compiler Invocation (Continued)

C++ benchmarks:

```bash
icpc -m64
```

Fortran benchmarks:

```bash
ifort -m64
```

### Base Portability Flags

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Flags</th>
</tr>
</thead>
<tbody>
<tr>
<td>perlbench</td>
<td>-DSPEC_LP64 -DSPEC_LINUX_X64</td>
</tr>
<tr>
<td>gcc</td>
<td>-DSPEC_LP64</td>
</tr>
<tr>
<td>mcf</td>
<td>-DSPEC_LP64</td>
</tr>
<tr>
<td>omnetpp</td>
<td>-DSPEC_LP64</td>
</tr>
<tr>
<td>xalancbmk</td>
<td>-DSPEC_LP64 -DSPEC_LINUX</td>
</tr>
<tr>
<td>x264</td>
<td>-DSPEC_LP64</td>
</tr>
<tr>
<td>deepsjeng</td>
<td>-DSPEC_LP64</td>
</tr>
<tr>
<td>leela</td>
<td>-DSPEC_LP64</td>
</tr>
<tr>
<td>exchange2</td>
<td>-DSPEC_LP64</td>
</tr>
<tr>
<td>xz</td>
<td>-DSPEC_LP64</td>
</tr>
</tbody>
</table>

### Base Optimization Flags

#### C benchmarks:

```bash
-W1,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div  
-qopt-mem-layout-trans=3 -L/usr/local/je5.0.1-64/lib -ljemalloc
```

#### C++ benchmarks:

```bash
-W1,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div  
-qopt-mem-layout-trans=3 -L/usr/local/je5.0.1-64/lib -ljemalloc
```

#### Fortran benchmarks:

```bash
-W1,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div  
-qopt-mem-layout-trans=3 -nostandard-realloc-lhs  
-L/usr/local/je5.0.1-64/lib -ljemalloc
```

### Peak Compiler Invocation

C benchmarks (except as noted below):

```bash
icc -m64 -std=c11
```

(Continued on next page)
SPEC CPU2017 Integer Rate Result

Huawei
Huawei XH628 V5 (Intel Xeon Gold 6138)

<table>
<thead>
<tr>
<th>SPECrate2017_int_base</th>
<th>SPECrate2017_int_peak</th>
</tr>
</thead>
<tbody>
<tr>
<td>178</td>
<td>189</td>
</tr>
</tbody>
</table>

CPU2017 License: 3175
Test Sponsor: Huawei
Test Date: Sep-2018
Hardware Availability: Aug-2018
Tested by: Huawei
Software Availability: Mar-2018

Peak Compiler Invocation (Continued)

502.gcc_r: icc -m32 -std=cl11 -L/home/prasadj/specdev/IC18u2_Internal/lin_18_0_20180210/compiler/lib/ia32_lin
C++ benchmarks (except as noted below):
icpc -m64
523.xalancbmk_r: icpc -m32 -L/home/prasadj/specdev/IC18u2_Internal/lin_18_0_20180210/compiler/lib/ia32_lin
Fortran benchmarks:
ifort -m64

Peak Portability Flags

500.perlbench_r: -D SPEC_LP64 -D SPEC_LINUX_X64
502.gcc_r: -D_FILE_OFFSET_BITS=64
505.mcf_r: -D SPEC_LP64
520.omnetpp_r: -D SPEC_LP64
523.xalancbmk_r: -D_FILE_OFFSET_BITS=64 -D SPEC_LINUX
525.x264_r: -D SPEC_LP64
531.deepsjeng_r: -D SPEC_LP64
541.leela_r: -D SPEC_LP64
548.exchange2_r: -D SPEC_LP64
557.xz_r: -D SPEC_LP64

Peak Optimization Flags

C benchmarks:

500.perlbench_r: -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -ipo
-xCORE-AVX512 -O3 -no-prec-div -qopt-mem-layout-trans=3
-fno-strict-overflow -L/usr/local/je5.0.1-64/lib
-ljemalloc

502.gcc_r: -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -ipo
-xCORE-AVX512 -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

(Continued on next page)
SPEC CPU2017 Integer Rate Result

Huawei
Huawei XH628 V5 (Intel Xeon Gold 6138)

<table>
<thead>
<tr>
<th>SPECrate2017_int_base</th>
<th>Huawei XH628 V5 (Intel Xeon Gold 6138)</th>
</tr>
</thead>
<tbody>
<tr>
<td>178</td>
<td>SPECrate2017_int_peak = 189</td>
</tr>
</tbody>
</table>

CPU2017 License: 3175
Test Sponsor: Huawei
Test Date: Sep-2018
Hardware Availability: Aug-2018
Tested by: Huawei
Software Availability: Mar-2018

Peak Optimization Flags (Continued)

557.xz_r: basepeak = yes

C++ benchmarks:

520.omnetpp_r: basepeak = yes

523.xalancbmk_r: -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -ipo
-xCORE-AVX512 -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: -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -ipo
-xCORE-AVX512 -O3 -no-prec-div -qopt-mem-layout-trans=3
-L/usr/local/je5.0.1-64/lib -ljemalloc

Fortran benchmarks:

548.exchange2_r: basepeak = yes

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/Intel-ic18.0-official-linux64.2017-12-21.xml
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 2018-09-04 09:19:15-0400.