## SPEC® CPU2017 Integer Rate Result

**Huawei**

**Huawei CH225 V5 (Intel Xeon Gold 6140)**

<table>
<thead>
<tr>
<th>SPECrate2017_int_base</th>
<th>188</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECrate2017_int_peak</td>
<td>200</td>
</tr>
</tbody>
</table>

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

### Hardware

- **CPU Name:** Intel Xeon Gold 6140  
- **Max MHz.:** 3700  
- **Nominal:** 2300  
- **Enabled:** 36 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:** 24.75 MB I+D on chip per chip  
- **Other:** None  
- **Memory:** 768 GB (24 x 32 GB 2Rx4 PC4-2666V-R)  
- **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 18.0.2.199 of Intel C/C++  
  Compiler for Linux: Fortran: Version 18.0.2.199 of Intel Fortran  
  Compiler for Linux  
- **Parallel:** No  
- **Firmware:** Version 0.80 Released Jun-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
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**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>
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</tr>
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<tbody>
<tr>
<td>500.perlbench_r</td>
<td>72</td>
<td>786</td>
<td>146</td>
<td>790</td>
<td>145</td>
<td>793</td>
<td>145</td>
</tr>
<tr>
<td>502.gcc_r</td>
<td>72</td>
<td>646</td>
<td>158</td>
<td>643</td>
<td>159</td>
<td>644</td>
<td>158</td>
</tr>
<tr>
<td>505.mcf_r</td>
<td>72</td>
<td>509</td>
<td>228</td>
<td>507</td>
<td>229</td>
<td>508</td>
<td>229</td>
</tr>
<tr>
<td>520.omnetpp_r</td>
<td>72</td>
<td>774</td>
<td>122</td>
<td>773</td>
<td>122</td>
<td>777</td>
<td>122</td>
</tr>
<tr>
<td>523.xalancbmk_r</td>
<td>72</td>
<td>431</td>
<td>176</td>
<td>429</td>
<td>177</td>
<td>432</td>
<td>176</td>
</tr>
<tr>
<td>525.x264_r</td>
<td>72</td>
<td>336</td>
<td>375</td>
<td>337</td>
<td>374</td>
<td>336</td>
<td>375</td>
</tr>
<tr>
<td>531.deepsjeng_r</td>
<td>72</td>
<td>498</td>
<td>166</td>
<td>497</td>
<td>166</td>
<td>496</td>
<td>166</td>
</tr>
<tr>
<td>541.leela_r</td>
<td>72</td>
<td>767</td>
<td>156</td>
<td>762</td>
<td>156</td>
<td>761</td>
<td>157</td>
</tr>
<tr>
<td>548.exchange2_r</td>
<td>72</td>
<td>525</td>
<td>359</td>
<td>526</td>
<td>359</td>
<td>525</td>
<td>359</td>
</tr>
<tr>
<td>557.xz_r</td>
<td>72</td>
<td>558</td>
<td>139</td>
<td>556</td>
<td>140</td>
<td>560</td>
<td>139</td>
</tr>
</tbody>
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**SPECrate2017_int_base = 188**

**SPECrate2017_int_peak = 200**

Results appear in the order in which they were run. Bold underlined text indicates a median measurement.

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

Filesystem page cache synced and cleared with:

```
sync; echo 3>/proc/sys/vm/drop_caches
```

runcpu command invoked through numactl i.e.:

```
umactl --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)
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**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**

<table>
<thead>
<tr>
<th>BIOS configuration:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power Policy Set to Performance</td>
</tr>
<tr>
<td>SNC Set to Enabled</td>
</tr>
<tr>
<td>IMC Interleaving Set to 1-way Interleave</td>
</tr>
<tr>
<td>XPT Prefetch Set to Enabled</td>
</tr>
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</table>

Sysinfo program /spec2017/bin/sysinfo
Rev: r5797 of 2017-06-14 96c45e4568ad54c135fd618bcc091c0f
running on localhost.localdomain Fri Sep 28 22:34:55 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

```
  "physical id"s (chips)
  72 "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 : 36
 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):                72
On-line CPU(s) list:   0-71
Thread(s) per core:    2
Core(s) per socket:    18
Socket(s):             2
NUMA node(s):          4
Vendor ID:             GenuineIntel
CPU family:            6
Model:                 85
Model name:            Intel(R) Xeon(R) Gold 6140 CPU @ 2.30GHz
Stepping:              4
```

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CPU MHz: 2300.000
BogoMIPS: 4600.00
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 25344K
NUMA node0 CPU(s): 0-2,5,6,9,10,14,15,36-38,41,42,45,46,50,51
NUMA node1 CPU(s): 3,4,7,8,11-13,16,17,39,40,43,44,47-49,52,53
NUMA node2 CPU(s): 18-20,23,24,27,28,32,33,54-56,59,60,63,64,68,69
NUMA node3 CPU(s): 21,22,25,26,29-31,34,35,57,58,61,62,65-67,70,71
Flags: fpu vme de pse msg 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
        aperfmperf eagerfpu pni pclmulqdq dtes64 bs_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 3nowprefetch epb cat_l3 cdp_l3 invpcid_single intel_pt
        spec_ctrl ibpb_support tpr_shadow vnmi flexpriority ept vpid fsgsbase tsc_adjust
        bmi1 hle avx2 smep bmi2  184 bms  avx512f, avx512dq rdseed adx smap clflushopt clwb
        avx512cd avx512bw avx512vl xsavesopt xsaveopt xsavec xgetbv1 cqm_llc
        cqm_occu_p LLC cqm_mbm_total cqm_mbm_local dtherm ida arat pln pts"
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Platform Notes (Continued)

From /proc/meminfo
MemTotal: 790510360 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 28 22:34

SPEC is set to: /spec2017
  Filesystem    Type  Size  Used  Avail  Use%  Mounted on
  /dev/sda2     xfs    720G  131G  589G  19%  /

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 DMTF SMBIOS" standard.
  BIOS INSYDE Corp. 0.80 06/27/2018
  Memory:
   24x 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)
==============================================================================

icc (ICC) 18.0.2 20180210

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Compiler Version Notes (Continued)

Base Compiler Invocation

C benchmarks:

icc -m64 -std=c11

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Base Compiler Invocation (Continued)

C++ benchmarks:
icpc -m64

Fortran benchmarks:
ifort -m64

---

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:
-Wl,-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:
-Wl,-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:
-Wl,-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):
icc -m64 -std=c11

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Peak Compiler Invocation (Continued)

C++ benchmarks (except as noted below):

502.gcc_r: icc -m32 -std=c11 -L/home/prasadj/specdev/IC18u2_Internal/lin_18_0_20180210/compiler/lib/ia32_lin

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: -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-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
557.xz_r: basepeak = yes

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### Peak Optimization Flags (Continued)

**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:


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For questions about this result, please contact the tester. For other inquiries, please contact info@spec.org.

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