## CPU2017 Integer Rate Result

### Huawei

**Huawei 2288H V5 (Intel Xeon Gold 6146)**

<table>
<thead>
<tr>
<th>SPECrate2017_int_base</th>
<th>159</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECrate2017_int_peak</td>
<td>165</td>
</tr>
</tbody>
</table>

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

### Hardware

<table>
<thead>
<tr>
<th>CPU Name</th>
<th>Intel Xeon Gold 6146</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max MHz.</td>
<td>4200</td>
</tr>
<tr>
<td>Nominal</td>
<td>3200</td>
</tr>
<tr>
<td>Enabled</td>
<td>24 cores, 2 chips, 2 threads/core</td>
</tr>
<tr>
<td>Orderable</td>
<td>1.2 chips</td>
</tr>
<tr>
<td>Cache L1</td>
<td>32 KB I + 32 KB D on chip per core</td>
</tr>
<tr>
<td>L2</td>
<td>1 MB I+D on chip per core</td>
</tr>
<tr>
<td>L3</td>
<td>24.75 MB I+D on chip per chip</td>
</tr>
<tr>
<td>Other</td>
<td>None</td>
</tr>
<tr>
<td>Memory</td>
<td>384 GB (24 x 16 GB 2Rx8 PC4-2666V-R)</td>
</tr>
<tr>
<td>Storage</td>
<td>1 x 2000 GB SATA, 7200 RPM</td>
</tr>
<tr>
<td>Other</td>
<td>None</td>
</tr>
</tbody>
</table>

### Software

<table>
<thead>
<tr>
<th>OS</th>
<th>Red Hat Enterprise Linux Server release 7.4 (Maipo) 3.10.0-693.11.6.el7.x86_64</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compiler</td>
<td>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</td>
</tr>
<tr>
<td>Parallel</td>
<td>No</td>
</tr>
<tr>
<td>Firmware</td>
<td>Version 0.62 Released Mar-2018</td>
</tr>
<tr>
<td>File System</td>
<td>xfs</td>
</tr>
<tr>
<td>System State</td>
<td>Run level 3 (multi-user)</td>
</tr>
<tr>
<td>Base Pointers</td>
<td>64-bit</td>
</tr>
<tr>
<td>Peak Pointers</td>
<td>32/64-bit</td>
</tr>
<tr>
<td>Other</td>
<td>jemalloc: jemalloc memory allocator library V5.0.1;</td>
</tr>
</tbody>
</table>
## Huawei

### Huawei 2288H V5 (Intel Xeon Gold 6146)

**SPECrate2017_int_base = 159**

**SPECrate2017_int_peak = 165**

<table>
<thead>
<tr>
<th>Benchmark</th>
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<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
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<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>48</td>
<td>636</td>
<td>120</td>
<td>660</td>
<td>116</td>
<td>650</td>
<td>118</td>
<td>48</td>
<td>517</td>
<td>148</td>
<td>522</td>
<td>146</td>
<td>523</td>
<td>146</td>
</tr>
<tr>
<td>502.gcc_r</td>
<td>48</td>
<td>497</td>
<td>137</td>
<td>498</td>
<td>136</td>
<td>503</td>
<td>135</td>
<td>48</td>
<td>418</td>
<td>163</td>
<td>418</td>
<td>162</td>
<td>418</td>
<td>162</td>
</tr>
<tr>
<td>505.mcf_r</td>
<td>48</td>
<td>385</td>
<td>201</td>
<td>387</td>
<td>200</td>
<td>398</td>
<td>195</td>
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<td>399</td>
<td>194</td>
<td>406</td>
<td>191</td>
<td>405</td>
<td>191</td>
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<tr>
<td>520.omnetpp_r</td>
<td>48</td>
<td>661</td>
<td>95.3</td>
<td>664</td>
<td>94.8</td>
<td>663</td>
<td>95.0</td>
<td>48</td>
<td>701</td>
<td>89.9</td>
<td>712</td>
<td>88.4</td>
<td>709</td>
<td>88.9</td>
</tr>
<tr>
<td>523.xalancbmk_r</td>
<td>48</td>
<td>312</td>
<td>163</td>
<td>312</td>
<td>163</td>
<td>311</td>
<td>163</td>
<td>48</td>
<td>259</td>
<td>196</td>
<td>258</td>
<td>196</td>
<td>258</td>
<td>196</td>
</tr>
<tr>
<td>525.x264_r</td>
<td>48</td>
<td>259</td>
<td>324</td>
<td>262</td>
<td>321</td>
<td>259</td>
<td>324</td>
<td>48</td>
<td>250</td>
<td>336</td>
<td>252</td>
<td>333</td>
<td>252</td>
<td>334</td>
</tr>
<tr>
<td>531.deepsjeng_r</td>
<td>48</td>
<td>397</td>
<td>139</td>
<td>398</td>
<td>138</td>
<td>398</td>
<td>138</td>
<td>48</td>
<td>410</td>
<td>134</td>
<td>409</td>
<td>135</td>
<td>410</td>
<td>134</td>
</tr>
<tr>
<td>541.leela_r</td>
<td>48</td>
<td>614</td>
<td>129</td>
<td>607</td>
<td>131</td>
<td>602</td>
<td>132</td>
<td>48</td>
<td>601</td>
<td>132</td>
<td>605</td>
<td>131</td>
<td>604</td>
<td>132</td>
</tr>
<tr>
<td>557.xz_r</td>
<td>48</td>
<td>448</td>
<td>116</td>
<td>449</td>
<td>115</td>
<td>482</td>
<td>107</td>
<td>48</td>
<td>487</td>
<td>106</td>
<td>487</td>
<td>106</td>
<td>488</td>
<td>106</td>
</tr>
</tbody>
</table>

**SPECrate2017_int_base = 159**

**SPECrate2017_int_peak = 165**

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 syncd 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;


(Continued on next page)
SPEC CPU2017 Integer Rate Result  
Copyright 2017-2018 Standard Performance Evaluation Corporation

Huawei
Huawei 2288H V5 (Intel Xeon Gold 6146)  
SPECrate2017_int_base = 159
SPECrate2017_int_peak = 165

CPU2017 License: 3175  
Test Sponsor: Huawei  
Tested by: Huawei  
Test Date: Jun-2018  
Hardware Availability: Jul-2017  
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
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 Wed Jun 20 18:50:05 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 6146 CPU @ 3.20GHz
  2 "physical id"s (chips)
  48 "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 : 12
  siblings : 24
  physical 0: cores 0 1 2 3 4 9 10 16 18 19 25 26
  physical 1: cores 0 1 2 3 8 9 10 11 18 19 24 27

From lscpu:
  Architecture: x86_64
  CPU op-mode(s): 32-bit, 64-bit
  Byte Order: Little Endian
  CPU(s): 48
  On-line CPU(s) list: 0-47
  Thread(s) per core: 2
  Core(s) per socket: 12
  Socket(s): 2
  NUMA node(s): 4
  Vendor ID: GenuineIntel
  CPU family: 6
  Model: 85

(Continued on next page)
Huawei

Huawei 2288H V5 (Intel Xeon Gold 6146)

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

<table>
<thead>
<tr>
<th>Platform Notes (Continued)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model name: Intel(R) Xeon(R) Gold 6146 CPU @ 3.20GHz</td>
</tr>
<tr>
<td>Stepping: 4</td>
</tr>
<tr>
<td>CPU MHz: 3200.000</td>
</tr>
<tr>
<td>BogoMIPS: 6400.00</td>
</tr>
<tr>
<td>Virtualization: VT-x</td>
</tr>
<tr>
<td>L1d cache: 32K</td>
</tr>
<tr>
<td>L1i cache: 32K</td>
</tr>
<tr>
<td>L2 cache: 1024K</td>
</tr>
<tr>
<td>L3 cache: 25344K</td>
</tr>
<tr>
<td>NUMA node0 CPU(s): 0-2,5,7,10,24-26,29,31,34</td>
</tr>
<tr>
<td>NUMA node1 CPU(s): 3,4,6,8,9,11,27,28,30,32,33,35</td>
</tr>
<tr>
<td>NUMA node2 CPU(s): 12-14,16,17,22,36-38,40,41,46</td>
</tr>
<tr>
<td>NUMA node3 CPU(s): 15,18-21,23,39,42-45,47</td>
</tr>
<tr>
<td>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 art arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc aperfmperf eagerfpu pni pclmulqdq dtes64 msr pdcm pdcm pccid dca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave avx f16c rdrand lahf_lm lahflm abtm 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 erms invpcid rtm cqm mpx rd先前_a avx512f avx512dq rdseed adx smap clflushopt clwb avx512cd avx512bw avx512vl xsaveopt xsaves xstate xgetbv1 cqm_llc cqm_occup_llc cqm_mbb_re total cqm_mbb_local dtherm ida arat pln pts</td>
</tr>
<tr>
<td>/proc/cpuinfo cache data</td>
</tr>
<tr>
<td>cache size: 25344 KB</td>
</tr>
</tbody>
</table>

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 7 10 24 25 26 29 31 34 |
| node 0 size: 96437 MB |
| node 0 free: 93859 MB |
| node 1 cpus: 3 4 6 8 9 11 27 28 30 32 33 35 |
| node 1 size: 98304 MB |
| node 1 free: 95924 MB |
| node 2 cpus: 12 13 14 16 17 22 36 37 38 40 41 46 |
| node 2 size: 98304 MB |
| node 2 free: 96018 MB |
| node 3 cpus: 15 18 19 20 21 23 39 42 43 44 45 47 |
| node 3 size: 98304 MB |
| node 3 free: 95589 MB |
| node distances: |
| node 0 1 2 3 |
| 0: 10 11 21 21 |
| 1: 11 10 21 21 |
| 2: 21 21 10 11 |

(Continued on next page)
Huawei 2288H V5 (Intel Xeon Gold 6146)

SPECrate2017_int_base = 159
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CPU2017 License: 3175
Test Sponsor: Huawei
Tested by: Huawei

Platform Notes (Continued)

3:  21  21  11  10

From /proc/meminfo
MemTotal: 394174208 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 Jun 20 18:45

SPEC is set to: /spec2017
  Filesystem Type Size Used Avail Use% Mounted on
  /dev mapper/rhel root xfs 1.8T 36G 1.7T 3% /

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

(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)

(Continued on next page)
Huawei

Huawei 2288H V5 (Intel Xeon Gold 6146)

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
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<tbody>
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<td>SPECrate2017_int_peak</td>
<td>165</td>
</tr>
</tbody>
</table>

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

Compiler Version Notes (Continued)

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

Fortran benchmarks:
ifort
## SPEC CPU2017 Integer Rate Result

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<thead>
<tr>
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<tr>
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<td>SPECrate2017_int_peak = 165</td>
</tr>
</tbody>
</table>

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

### 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 -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
Huawei

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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
545.exchange2_r: -DSPEC_LP64
557.xz_r: -DSPEC_LP64

Peak Optimization Flags

C benchmarks:

500.perlbench_r: -Wl,-z,muldefs -prof-gen(pass I) -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: -L/opt/intel/compilers_and_libraries_2018/linux/lib/ia32
-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: -Wl,-z,muldefs -xCORE-AVX512 -ipo -03 -no-prec-div
-qopt-mem-layout-trans=3 -L/usr/local/je5.0.1-64/lib
-ljemalloc

525.x264_r: -Wl,-z,muldefs -xCORE-AVX512 -ipo -03 -no-prec-div
-qopt-mem-layout-trans=3 -fno-alias

(Continued on next page)
SPEC CPU2017 Integer Rate Result

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Peak Optimization Flags (Continued)

525.x264_r(continued):
- L/usr/local/je5.0.1-64/lib -ljemalloc

557.xz_r: Same as 505.mcf_r

C++ benchmarks:

520.omnetpp_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

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-AVX512 -O3 -no-prec-div -qopt-mem-layout-trans=3
-L/usr/local/je5.0.1-32/lib -ljemalloc

531.deepsjeng_r: Same as 520.omnetpp_r

541.leela_r: Same as 520.omnetpp_r

Fortran benchmarks:
-Wl,-z,muldefs -xCORE-AVX512 -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

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
Huawei

Huawei 2288H V5 (Intel Xeon Gold 6146)

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<td>165</td>
</tr>
</tbody>
</table>

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

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

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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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