### SPEC® CPU2017 Integer Rate Result

**Huawei**

**Huawei 2288H V5 (Intel Xeon Platinum 8156)**

| SPECrate2017_int_base | 57.1 |
| SPECrate2017_int_peak | 60.6 |

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

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#### Hardware

- **CPU Name:** Intel Xeon Platinum 8156  
- **Max MHz.:** 3700  
- **Nominal:** 3600  
- **Enabled:** 8 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:** 16.5 MB I+D on chip per chip  
- **Other:** None  
- **Memory:** 384 GB (24 x 16 GB 2Rx8 PC4-2666V-R)  
- **Storage:** 1 x 1200 GB SAS, 10000 RPM  
- **Other:** None

#### Software

- **OS:** Red Hat Enterprise Linux Server release 7.3 (Maipo)  
- **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 0.31 Released Sep-2017  
- **File System:** ext4  
- **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

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**Copies**

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Copies</th>
<th>SPECrate2017_int_base</th>
<th>SPECrate2017_int_peak</th>
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<tbody>
<tr>
<td>perlbench_r</td>
<td>500.</td>
<td>41.3</td>
<td>52.2</td>
</tr>
<tr>
<td>gcc_r</td>
<td>502.</td>
<td>52.7</td>
<td></td>
</tr>
<tr>
<td>mcf_r</td>
<td>505.</td>
<td>35.4</td>
<td></td>
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<tr>
<td>omnetpp_r</td>
<td>520.</td>
<td>56.6</td>
<td></td>
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<tr>
<td>xalancbmk_r</td>
<td>523.</td>
<td>64.8</td>
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<tr>
<td>x264_r</td>
<td>525.</td>
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<tr>
<td>deepsjeng_r</td>
<td>531.</td>
<td>47.4</td>
<td></td>
</tr>
<tr>
<td>leela_r</td>
<td>541.</td>
<td>44.4</td>
<td></td>
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<tr>
<td>exchange2_r</td>
<td>548.</td>
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<tr>
<td>xz_r</td>
<td>557.</td>
<td>41.2</td>
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**Graph**: SPECrate2017_int_base (57.1) vs SPECrate2017_int_peak (60.6)
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SPECrate2017_int_base = 57.1
SPECrate2017_int_peak = 60.6

Results Table

<table>
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<tr>
<th>Benchmark</th>
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<tr>
<td>500.perlbench_r</td>
<td>16</td>
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<td>541.leela_r</td>
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<td>548.exchange2_r</td>
<td>16</td>
<td>401</td>
<td>105</td>
<td>402</td>
<td>104</td>
<td>399</td>
<td>105</td>
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<tr>
<td>557.xz_r</td>
<td>16</td>
<td>420</td>
<td>41.2</td>
<td>418</td>
<td>41.3</td>
<td>419</td>
<td>41.2</td>
</tr>
</tbody>
</table>

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
Filesyste 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
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<table>
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<td>60.6</td>
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CPU2017 License: 3175
Test Sponsor: Huawei
Tested by: Huawei

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
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 Jan  9 21:50:22 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) Platinum 8156 CPU @ 3.60GHz
  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 : 4
siblings : 8

(Continued on next page)
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Hardware Availability: Jul-2017
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Platform Notes (Continued)

physical 0: cores 0 3 10 13
physical 1: cores 5 8 10 11

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: 2
Core(s) per socket: 4
Socket(s): 2
NUMA node(s): 4
Vendor ID: GenuineIntel
CPU family: 6
Model: 85
Model name: Intel(R) Xeon(R) Platinum 8156 CPU @ 3.60GHz
Stepping: 4
CPU MHz: 3600.000
BogoMIPS: 7206.22
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 16896K
NUMA node0 CPU(s): 0,2,8,10
NUMA node1 CPU(s): 1,3,9,11
NUMA node2 CPU(s): 4,7,12,15
NUMA node3 CPU(s): 5,6,13,14

/proc/cpuinfo cache data
  cache size: 16896 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 2 8 10
  node 0 size: 96405 MB
  node 0 free: 93837 MB
  node 1 cpus: 1 3 9 11
  node 1 size: 98304 MB
  node 1 free: 95965 MB
  node 2 cpus: 4 7 12 15
  node 2 size: 98304 MB
  node 2 free: 96083 MB
  node 3 cpus: 5 6 13 14
  node 3 size: 98304 MB

(Continued on next page)
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Platform Notes (Continued)

node 3 free: 96019 MB
node distances:
node  0  1  2  3
  0: 10 11 21 21
  1: 11 10 21 21
  2: 21 21 10 11
  3: 21 21 11 10

From /proc/meminfo
MemTotal: 394144364 kB
HugePages_Total: 0
Hugepagesize: 2048 kB

From /etc/*release* /etc/*version*
NAME="Red Hat Enterprise Linux Server"
VERSION="7.3 (Maipo)"
ID=rhel
ID_LIKE="fedora"
VERSION_ID="7.3"
PRETTY_NAME="Red Hat Enterprise Linux Server 7.3 (Maipo)"
ANSI_COLOR="0;31"
CPE_NAME="cpe:/o:redhat:enterprise_linux:7.3:GA:server"
redhat-release: Red Hat Enterprise Linux Server release 7.3 (Maipo)
system-release: Red Hat Enterprise Linux Server release 7.3 (Maipo)

uname -a:
Linux localhost.localdomain 3.10.0-514.el7.x86_64 #1 SMP Wed Oct 19 11:24:13 EDT 2016
x86_64 x86_64 x86_64 GNU/Linux

run-level 3 Jan 9 21:48

SPEC is set to: /spec2017

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

(End of data from sysinfo program)
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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

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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-AVX512 -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-AVX512 -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-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

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### 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-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

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### Peak Optimization Flags (Continued)

505.mcf_r: basepeak = yes

525.x264_r: -Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-mem-layout-trans=3 -fno-alias -L/usr/local/je5.0.1-64/lib -ljemalloc

557.xz_r: -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:

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


531.deepsjeng_r: Same as 520.omnetpp_r

541.leela_r: Same as 520.omnetpp_r

Fortran benchmarks:


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### 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

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

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
http://www.spec.org/cpu2017/flags/Huawei-Platform-Settings-SKL-V1.7.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-V1.7.xml

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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 2018-01-09 21:50:22-0500.
Originally published on 2018-02-27.