



SPEC CPU®2017 Integer Rate Result

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Huawei

(Test Sponsor: China Academy of Information and Communications Technology)

SPECrate®2017_int_base = 137

SPECrate®2017_int_peak = 142

Huawei 2288H V5 (Intel Xeon Gold 6234)

CPU2017 License: 6177

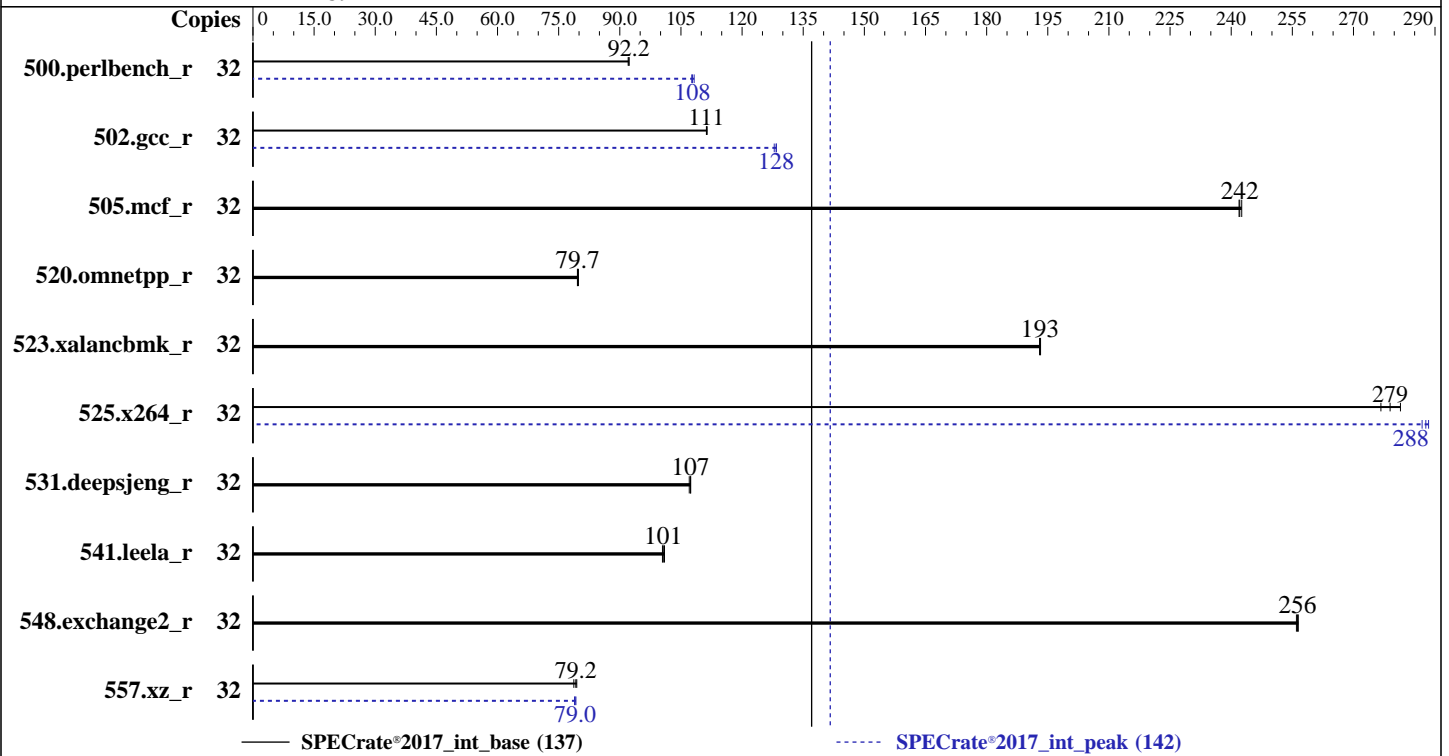
Test Sponsor: China Academy of Information and Communications Technology

Tested by: China Academy of Information and Communications Technology

Test Date: Jul-2020

Hardware Availability: Apr-2019

Software Availability: Apr-2020



Hardware

CPU Name: Intel Xeon Gold 6234
 Max MHz: 4000
 Nominal: 3300
 Enabled: 16 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 PC4-2933Y-R)
 Storage: 1 x 800 GB SAS SSD
 Other: None

Software

OS: SUSE Linux Enterprise Server 12 SP4 (x86_64)
 Kernel 4.12.14-94.41-default
 Compiler: C/C++: Version 19.1.1.217 of Intel C/C++ Compiler for Linux;
 Fortran: Version 19.1.1.217 of Intel Fortran Compiler for Linux
 Parallel: No
 Firmware: Version 6.83 released Jun-2019
 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
 Power Management: BIOS set to prefer performance at the cost of additional power usage.



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Results Table

Benchmark	Base							Peak						
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
500.perlbench_r	32	553	92.1	<u>552</u>	<u>92.2</u>	552	92.3	32	471	108	473	108	<u>472</u>	<u>108</u>
502.gcc_r	32	<u>407</u>	<u>111</u>	407	111	407	111	32	353	128	354	128	<u>353</u>	<u>128</u>
505.mcf_r	32	214	242	213	243	<u>214</u>	<u>242</u>	32	214	242	213	243	<u>214</u>	<u>242</u>
520.omnetpp_r	32	527	79.6	526	79.9	<u>527</u>	<u>79.7</u>	32	527	79.6	526	79.9	<u>527</u>	<u>79.7</u>
523.xalancbmk_r	32	<u>175</u>	<u>193</u>	175	193	175	193	32	<u>175</u>	<u>193</u>	175	193	175	193
525.x264_r	32	202	277	<u>201</u>	<u>279</u>	199	282	32	195	287	194	288	<u>195</u>	<u>288</u>
531.deepsjeng_r	32	<u>342</u>	<u>107</u>	341	107	343	107	32	<u>342</u>	<u>107</u>	341	107	343	107
541.leela_r	32	<u>526</u>	<u>101</u>	525	101	527	100	32	<u>526</u>	<u>101</u>	525	101	527	100
548.exchange2_r	32	<u>327</u>	<u>256</u>	327	256	327	256	32	<u>327</u>	<u>256</u>	327	256	327	256
557.xz_r	32	439	78.7	<u>436</u>	<u>79.2</u>	435	79.4	32	<u>437</u>	<u>79.0</u>	436	79.2	438	78.9

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

Compiler Notes

The inconsistent Compiler version information under Compiler Version section is due to a discrepancy in Intel Compiler. The correct version of C/C++ compiler is: Version 19.1.1.217 Build 20200306 Compiler for Linux. The correct version of Fortran compiler is: Version 19.1.1.217 Build 20200306 Compiler for Linux. SPEC has learned that this result, which used an evaluation compiler, was submitted contrary to the compiler license terms. Intel has granted a one-time waiver for this result.

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"

Environment Variables Notes

Environment variables set by runcpu before the start of the run:
LD_LIBRARY_PATH =
"/opt/intel/compilers_and_libraries_2020.1.217/linux/compiler/lib/intel64:/opt/intel/compilers_and_libraries_2020.1.217/linux/compiler/lib/ia32:/usr/local/jemalloc32-5.0.1"

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Environment Variables Notes (Continued)

MALLOC_CONF = "retain:true"

General Notes

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>
 NA: 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.
 jemalloc, a general purpose malloc implementation
 built with the RedHat Enterprise 7.5, and the system compiler gcc 4.8.5
 sources available from jemalloc.net or <https://github.com/jemalloc/jemalloc/releases>

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: r6365 of 2019-08-21 295195f888a3d7edble6e46a485a0011
 running on linux-r48i Tue Jul 21 15:59:13 2020

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 6234 CPU @ 3.30GHz
 2 "physical id"s (chips)
 32 "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

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Platform Notes (Continued)

```
siblings      : 16
physical 0: cores 2 3 17 18 24 25 27
physical 1: cores 2 3 4 9 20 24 25 27
```

From lscpu:

```
Architecture:          x86_64
CPU op-mode(s):        32-bit, 64-bit
Byte Order:            Little Endian
CPU(s):                32
On-line CPU(s) list:   0-31
Thread(s) per core:    2
Core(s) per socket:    8
Socket(s):             2
NUMA node(s):         4
Vendor ID:             GenuineIntel
CPU family:            6
Model:                85
Model name:            Intel(R) Xeon(R) Gold 6234 CPU @ 3.30GHz
Stepping:              7
CPU MHz:               3300.000
CPU max MHz:           4000.0000
CPU min MHz:           1200.0000
BogoMIPS:              6600.00
Virtualization:        VT-x
L1d cache:             32K
L1i cache:             32K
L2 cache:              1024K
L3 cache:              25344K
NUMA node0 CPU(s):    0,3,5,6,16,19,21,22
NUMA node1 CPU(s):    1,2,4,7,17,18,20,23
NUMA node2 CPU(s):    8,11,13,14,24,27,29,30
NUMA node3 CPU(s):    9,10,12,15,25,26,28,31
```

```
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 cpuid
aperfmpperf pni pclmulqdq dtes64 ds_cpl vmx smx est tm2 ssse3 sdbg 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 cpuid_fault epb cat_l3 cdp_l3 invpcid_single ssbd
mba ibrs ibpb stibp tpr_shadow vnmi flexpriority ept vpid fsgsbase tsc_adjust bml
hle avx2 smep bmi2 erms invpcid rtm cqm mpx rdt_a avx512f avx512dq rdseed adx smap
clflushopt clwb intel_pt avx512cd avx512bw avx512vl xsaveopt xsavec xgetbv1 xsaves
cqm_llc cqm_occup_llc cqm_mbm_total cqm_mbm_local dtherm ida arat pln pts pku ospke
avx512_vnni flush_l1d arch_capabilities
```

/proc/cpuinfo cache data

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Platform Notes (Continued)

cache size : 25344 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 3 5 6 16 19 21 22
node 0 size: 191975 MB
node 0 free: 191683 MB
node 1 cpus: 1 2 4 7 17 18 20 23
node 1 size: 193533 MB
node 1 free: 193315 MB
node 2 cpus: 8 11 13 14 24 27 29 30
node 2 size: 193504 MB
node 2 free: 193173 MB
node 3 cpus: 9 10 12 15 25 26 28 31
node 3 size: 193324 MB
node 3 free: 193087 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:      790872868 kB
HugePages_Total:      0
Hugepagesize:    2048 kB

```

```

From /etc/*release* /etc/*version*
SuSE-release:
  SUSE Linux Enterprise Server 12 (x86_64)
  VERSION = 12
  PATCHLEVEL = 4
  # This file is deprecated and will be removed in a future service pack or release.
  # Please check /etc/os-release for details about this release.
os-release:
NAME="SLES"
VERSION="12-SP4"
VERSION_ID="12.4"
PRETTY_NAME="SUSE Linux Enterprise Server 12 SP4"
ID="sles"
ANSI_COLOR="0;32"
CPE_NAME="cpe:/o:suse:sles:12:sp4"

```

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Platform Notes (Continued)

```
uname -a:
Linux linux-r48i 4.12.14-94.41-default #1 SMP Wed Oct 31 12:25:04 UTC 2018 (3090901)
x86_64 x86_64 x86_64 GNU/Linux
```

Kernel self-reported vulnerability status:

```
CVE-2018-3620 (L1 Terminal Fault):          Not affected
Microarchitectural Data Sampling:         No status reported
CVE-2017-5754 (Meltdown):                 Not affected
CVE-2018-3639 (Speculative Store Bypass): Mitigation: Speculative Store Bypass disabled
                                              via prctl and seccomp
CVE-2017-5753 (Spectre variant 1):        Mitigation: __user pointer sanitization
CVE-2017-5715 (Spectre variant 2):        Mitigation: Indirect Branch Restricted
                                              Speculation, IBPB, IBRS_FW
```

```
run-level 3 Jul 21 15:56
```

```
SPEC is set to: /spec2017
Filesystem      Type  Size  Used Avail Use% Mounted on
/dev/sda3       xfs   730G  119G  612G  17% /
```

```
From /sys/devices/virtual/dmi/id
BIOS:          INSYDE Corp. 6.83 06/29/2019
Vendor:        Huawei
Product:       2288H V5
Product Family: Purley
Serial:        Huawei
```

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.

```
Memory:
24x Samsung M393A4K40CB2-CVF 32 GB 2 rank 2933
```

(End of data from sysinfo program)

Compiler Version Notes

```
=====
C          | 502.gcc_r(peak)
-----
Intel(R) C Compiler for applications running on IA-32, Version 2021.1 NextGen
Build 20200304
```

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Compiler Version Notes (Continued)

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```

=====
C          | 500.perlbench_r(base) 502.gcc_r(base) 505.mcf_r(base, peak)
          | 525.x264_r(base, peak) 557.xz_r(base)
=====

```

```

Intel(R) C Compiler for applications running on Intel(R) 64, Version 2021.1
NextGen Build 20200304
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
=====

```

```

=====
C          | 557.xz_r(peak)
=====

```

```

Intel(R) C Compiler for applications running on Intel(R) 64, Version 2021.1
NextGen Build 20200304
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
icc (NextGen): command line warning #10430: Unsupported command line options
encountered
These options as listed are not supported with the compiler selected.
For more information, use '-qnextgen-diag'.
option list:
-no-prec-div
=====

```

```

=====
C          | 500.perlbench_r(peak)
=====

```

```

Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
Version 19.1.1.217 Build 20200306
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
icc: NOTE: The evaluation period for this product ends on 30-jul-2020 UTC.
=====

```

```

=====
C          | 502.gcc_r(peak)
=====

```

```

Intel(R) C Compiler for applications running on IA-32, Version 2021.1 NextGen
Build 20200304
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
=====

```

```

=====
C          | 500.perlbench_r(base) 502.gcc_r(base) 505.mcf_r(base, peak)
=====

```

(Continued on next page)



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Compiler Version Notes (Continued)

| 525.x264_r(base, peak) 557.xz_r(base)

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NextGen Build 20200304
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

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C | 557.xz_r(peak)

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=====
C | 502.gcc_r(peak)

Intel(R) C Compiler for applications running on IA-32, Version 2021.1 NextGen
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=====
C | 500.perlbench_r(base) 502.gcc_r(base) 505.mcf_r(base, peak)
525.x264_r(base, peak) 557.xz_r(base)

Intel(R) C Compiler for applications running on Intel(R) 64, Version 2021.1
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C | 557.xz_r(peak)
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These options as listed are not supported with the compiler selected.
For more information, use '-qnextgen-diag'.
option list:
-no-prec-div
=====

=====
C | 500.perlbench_r(peak)
=====

Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
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=====

=====
C | 502.gcc_r(peak)
=====

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=====

=====
C | 500.perlbench_r(base) 502.gcc_r(base) 505.mcf_r(base, peak)
| 525.x264_r(base, peak) 557.xz_r(base)
=====

Intel(R) C Compiler for applications running on Intel(R) 64, Version 2021.1
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Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
=====

=====
C | 557.xz_r(peak)
=====

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Compiler Version Notes (Continued)

Intel(R) C Compiler for applications running on Intel(R) 64, Version 2021.1
NextGen Build 20200304

Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

icc (NextGen): command line warning #10430: Unsupported command line options encountered

These options as listed are not supported with the compiler selected.

For more information, use '-qnextgen-diag'.

option list:

-no-prec-div

=====
C | 500.perlbench_r(peak)

=====
Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
Version 19.1.1.217 Build 20200306

Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

icc: NOTE: The evaluation period for this product ends on 30-jul-2020 UTC.

=====
C++ | 520.omnetpp_r(base, peak) 523.xalancbmk_r(base, peak)
| 531.deepsjeng_r(base, peak) 541.leela_r(base, peak)

=====
Intel(R) C++ Compiler for applications running on Intel(R) 64, Version 2021.1
NextGen Build 20200304

Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

=====
Fortran | 548.exchange2_r(base, peak)

=====
Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)
64, Version 19.1.1.217 Build 20200306

Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

ifort: NOTE: The evaluation period for this product ends on 30-jul-2020 UTC.

Base Compiler Invocation

C benchmarks:

icc

(Continued on next page)



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Base Compiler Invocation (Continued)

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
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:

```
-m64 -qnextgen -std=c11
-Wl,-plugin-opt=-x86-branches-within-32B-boundaries -Wl,-z,muldefs
-xCORE-AVX512 -O3 -ffast-math -flto -mfpmath=sse -funroll-loops
-fuse-ld=gold -qopt-mem-layout-trans=4
-L/opt/intel/compilers_and_libraries_2020.1.217/linux/compiler/lib/intel64_lin
-lqkmalloc
```

C++ benchmarks:

```
-m64 -qnextgen -Wl,-plugin-opt=-x86-branches-within-32B-boundaries
-Wl,-z,muldefs -xCORE-AVX512 -O3 -ffast-math -flto -mfpmath=sse
-funroll-loops -fuse-ld=gold -qopt-mem-layout-trans=4
-L/opt/intel/compilers_and_libraries_2020.1.217/linux/compiler/lib/intel64_lin
-lqkmalloc
```

Fortran benchmarks:

```
-m64 -Wl,-plugin-opt=-x86-branches-within-32B-boundaries -Wl,-z,muldefs
-xCORE-AVX512 -O3 -ipo -no-prec-div -qopt-mem-layout-trans=4
-nostandard-realloc-lhs -align array32byte -auto
```

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Base Optimization Flags (Continued)

Fortran benchmarks (continued):

```
-mbranches-within-32B-boundaries
-L/opt/intel/compilers_and_libraries_2020.1.217/linux/compiler/lib/intel64_lin
-lqkmallocc
```

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: -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
```

Peak Optimization Flags

C benchmarks:

```
500.perlbench_r: -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2)
-xCORE-AVX512 -ipo -O3 -no-prec-div
-qopt-mem-layout-trans=4 -fno-strict-overflow
-mbranches-within-32B-boundaries
```

(Continued on next page)



SPEC CPU®2017 Integer Rate Result

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Huawei

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SPECrate®2017_int_base = 137

SPECrate®2017_int_peak = 142

Huawei 2288H V5 (Intel Xeon Gold 6234)

CPU2017 License: 6177

Test Sponsor: China Academy of Information and Communications Technology

Tested by: China Academy of Information and Communications Technology

Test Date: Jul-2020

Hardware Availability: Apr-2019

Software Availability: Apr-2020

Peak Optimization Flags (Continued)

500.perlbench_r (continued):

```
-L/opt/intel/compilers_and_libraries_2020.1.217/linux/compiler/lib/intel64_lin
-lqkmalloc
```

502.gcc_r: -m32

```
-L/opt/intel/compilers_and_libraries_2020.1.217/linux/compiler/lib/ia32_lin
-std=gnu89
-Wl,-plugin-opt=-x86-branches-within-32B-boundaries
-Wl,-z,muldefs -fprofile-generate(pass 1)
-fprofile-use=default.profdata(pass 2) -xCORE-AVX512 -flto
-Ofast(pass 1) -O3 -ffast-math -qnextgen -fuse-ld=gold
-qopt-mem-layout-trans=4 -L/usr/local/jemalloc32-5.0.1/
-ljemalloc
```

505.mcf_r: basepeak = yes

525.x264_r: -m64 -qnextgen -std=c11

```
-Wl,-plugin-opt=-x86-branches-within-32B-boundaries
-Wl,-z,muldefs -xCORE-AVX512 -flto -O3 -ffast-math
-fuse-ld=gold -qopt-mem-layout-trans=4 -fno-alias
-L/opt/intel/compilers_and_libraries_2020.1.217/linux/compiler/lib/intel64_lin
-lqkmalloc
```

557.xz_r: -m64 -qnextgen -std=c11

```
-Wl,-plugin-opt=-x86-branches-within-32B-boundaries
-Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div
-qopt-mem-layout-trans=4
-L/opt/intel/compilers_and_libraries_2020.1.217/linux/compiler/lib/intel64_lin
-lqkmalloc
```

C++ benchmarks:

520.omnetpp_r: basepeak = yes

523.xalancbmk_r: basepeak = yes

531.deepsjeng_r: basepeak = yes

541.leela_r: basepeak = yes

Fortran benchmarks:

548.exchange2_r: basepeak = yes



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The flags files that were used to format this result can be browsed at

http://www.spec.org/cpu2017/flags/Intel-ic19.1u1-official-linux64_revB.html

<http://www.spec.org/cpu2017/flags/CAICT-Platform-Settings-V1.0.2020-08-21.html>

You can also download the XML flags sources by saving the following links:

http://www.spec.org/cpu2017/flags/Intel-ic19.1u1-official-linux64_revB.xml

<http://www.spec.org/cpu2017/flags/CAICT-Platform-Settings-V1.0.2020-08-21.xml>

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