



SPEC CPU®2017 Integer Rate Result

Copyright 2017-2020 Standard Performance Evaluation Corporation

New H3C Technologies Co., Ltd.

SPECrate®2017_int_base = 361

H3C UniServer R6900 G3 (Intel Xeon Platinum 8253)

SPECrate®2017_int_peak = 371

CPU2017 License: 9066

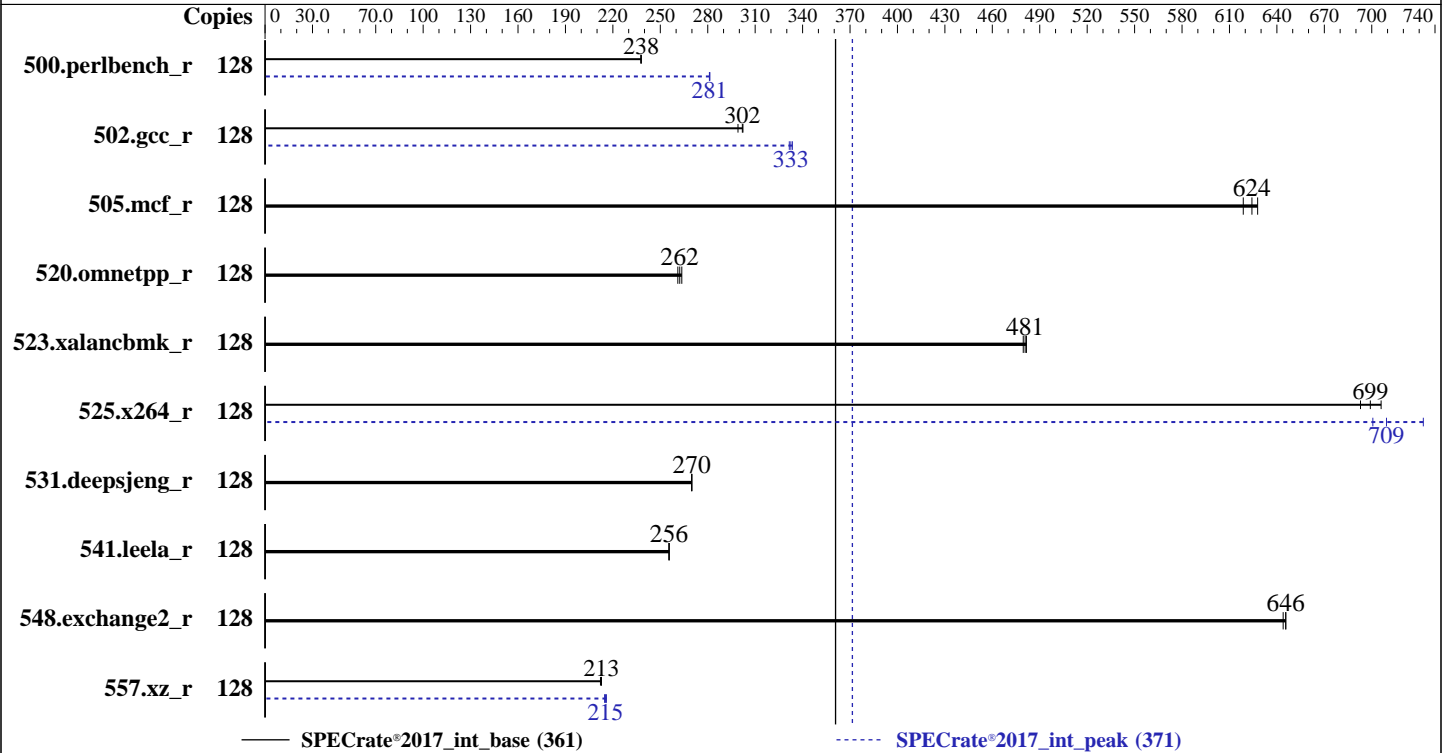
Test Date: Nov-2020

Test Sponsor: New H3C Technologies Co., Ltd.

Hardware Availability: Jun-2019

Tested by: New H3C Technologies Co., Ltd.

Software Availability: Apr-2020



Hardware

CPU Name: Intel Xeon Platinum 8253
 Max MHz: 3000
 Nominal: 2200
 Enabled: 64 cores, 4 chips, 2 threads/core
 Orderable: 1,2,3,4 chips
 Cache L1: 32 KB I + 32 KB D on chip per core
 L2: 1 MB I+D on chip per core
 L3: 22 MB I+D on chip per chip
 Other: None
 Memory: 384 GB (24 x 16 GB 2Rx8 PC4-2933V-R)
 Storage: 1 x 960 GB SATA SSD
 Other: None

Software

OS: Red Hat Enterprise Linux release 8.2 (Ootpa)
 4.18.0-193.el8.x86_64
 Compiler: C/C++: Version 19.1.1.217 of Intel C/C++
 Compiler Build 20200306 for Linux;
 Fortran: Version 19.1.1.217 of Intel Fortran
 Compiler Build 20200306 for Linux
 Parallel: No
 Firmware: Version 2.00.33 released Aug-2019 BIOS
 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 | 128 | 857 | 238 | 857 | 238 | 856 | 238 | 128 | 725 | 281 | 724 | 281 | 725 | 281 |
| 502.gcc_r | 128 | 606 | 299 | 600 | 302 | 600 | 302 | 128 | 545 | 333 | 543 | 334 | 547 | 332 |
| 505.mcf_r | 128 | 329 | 628 | 331 | 624 | 334 | 619 | 128 | 329 | 628 | 331 | 624 | 334 | 619 |
| 520.omnetpp_r | 128 | 640 | 262 | 643 | 261 | 637 | 264 | 128 | 640 | 262 | 643 | 261 | 637 | 264 |
| 523.xalancbmk_r | 128 | 281 | 482 | 282 | 480 | 281 | 481 | 128 | 281 | 482 | 282 | 480 | 281 | 481 |
| 525.x264_r | 128 | 323 | 693 | 321 | 699 | 317 | 706 | 128 | 320 | 701 | 316 | 709 | 306 | 733 |
| 531.deepsjeng_r | 128 | 543 | 270 | 544 | 270 | 543 | 270 | 128 | 543 | 270 | 544 | 270 | 543 | 270 |
| 541.leela_r | 128 | 829 | 256 | 829 | 256 | 830 | 255 | 128 | 829 | 256 | 829 | 256 | 830 | 255 |
| 548.exchange2_r | 128 | 521 | 644 | 519 | 646 | 519 | 646 | 128 | 521 | 644 | 519 | 646 | 519 | 646 |
| 557.xz_r | 128 | 650 | 213 | 652 | 212 | 650 | 213 | 128 | 640 | 216 | 644 | 215 | 642 | 215 |

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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

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 =
"/home/speccpu/lib/intel64:/home/speccpu/lib/ia32:/home/speccpu/je5.0.1-32"
MALLOC_CONF = "retain:true"



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General Notes

Binaries compiled on a system with 1x Intel Core i9-7980XE CPU + 64GB RAM memory using Redhat Enterprise Linux 8.0

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.

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>
```

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 settings:

- Set SNC to Enabled
- Set IMC Interleaving to 1-way Interleave
- Set Patrol Scrub to Disabled

Sysinfo program /home/speccpu/bin/sysinfo

```
Rev: r6365 of 2019-08-21 295195f888a3d7edble6e46a485a0011
running on localhost.localdomain Wed Nov 11 09:28:42 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) Platinum 8253 CPU @ 2.20GHz
 4 "physical id"s (chips)
128 "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 : 16
siblings  : 32
physical 0: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
physical 1: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
physical 2: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
physical 3: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
```

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Platform Notes (Continued)

From lscpu:

```

Architecture:          x86_64
CPU op-mode(s):       32-bit, 64-bit
Byte Order:           Little Endian
CPU(s):               128
On-line CPU(s) list: 0-127
Thread(s) per core:   2
Core(s) per socket:   16
Socket(s):            4
NUMA node(s):        8
Vendor ID:            GenuineIntel
CPU family:           6
Model:               85
Model name:           Intel(R) Xeon(R) Platinum 8253 CPU @ 2.20GHz
Stepping:            6
CPU MHz:              2549.141
CPU max MHz:          3000.0000
CPU min MHz:          1000.0000
BogoMIPS:             4400.00
Virtualization:       VT-x
L1d cache:           32K
L1i cache:           32K
L2 cache:            1024K
L3 cache:            22528K
NUMA node0 CPU(s):   0-3,8-11,64-67,72-75
NUMA node1 CPU(s):   4-7,12-15,68-71,76-79
NUMA node2 CPU(s):   16-19,24-27,80-83,88-91
NUMA node3 CPU(s):   20-23,28-31,84-87,92-95
NUMA node4 CPU(s):   32-35,40-43,96-99,104-107
NUMA node5 CPU(s):   36-39,44-47,100-103,108-111
NUMA node6 CPU(s):   48-51,56-59,112-115,120-123
NUMA node7 CPU(s):   52-55,60-63,116-119,124-127
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 monitor 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 fl6c rdrand lahf_lm abm 3dnowprefetch cpuid_fault epb cat_l3 cdp_l3
invpcid_single intel_ppin ssbd mba ibrs ibpb stibp ibrs_enhanced tpr_shadow vnmi
flexpriority ept vpid fsgsbase tsc_adjust bmi1 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 md_clear flush_l1d
arch_capabilities

```

```

/proc/cpuinfo cache data
cache size : 22528 KB

```

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Platform Notes (Continued)

From numactl --hardware WARNING: a numactl 'node' might or might not correspond to a physical chip.

```

available: 8 nodes (0-7)
node 0 cpus: 0 1 2 3 8 9 10 11 64 65 66 67 72 73 74 75
node 0 size: 46686 MB
node 0 free: 46196 MB
node 1 cpus: 4 5 6 7 12 13 14 15 68 69 70 71 76 77 78 79
node 1 size: 48380 MB
node 1 free: 48243 MB
node 2 cpus: 16 17 18 19 24 25 26 27 80 81 82 83 88 89 90 91
node 2 size: 48380 MB
node 2 free: 47234 MB
node 3 cpus: 20 21 22 23 28 29 30 31 84 85 86 87 92 93 94 95
node 3 size: 48380 MB
node 3 free: 48226 MB
node 4 cpus: 32 33 34 35 40 41 42 43 96 97 98 99 104 105 106 107
node 4 size: 48380 MB
node 4 free: 48209 MB
node 5 cpus: 36 37 38 39 44 45 46 47 100 101 102 103 108 109 110 111
node 5 size: 48380 MB
node 5 free: 48258 MB
node 6 cpus: 48 49 50 51 56 57 58 59 112 113 114 115 120 121 122 123
node 6 size: 48352 MB
node 6 free: 48157 MB
node 7 cpus: 52 53 54 55 60 61 62 63 116 117 118 119 124 125 126 127
node 7 size: 48379 MB
node 7 free: 48205 MB
node distances:
node  0  1  2  3  4  5  6  7
  0: 10 11 21 21 21 21 21 21
  1: 11 10 21 21 21 21 21 21
  2: 21 21 10 11 21 21 21 21
  3: 21 21 11 10 21 21 21 21
  4: 21 21 21 21 10 11 21 21
  5: 21 21 21 21 11 10 21 21
  6: 21 21 21 21 21 21 10 11
  7: 21 21 21 21 21 21 11 10

```

```

From /proc/meminfo
MemTotal:      394568676 kB
HugePages_Total:      0
Hugepagesize:    2048 kB

```

```

From /etc/*release* /etc/*version*
os-release:
NAME="Red Hat Enterprise Linux"

```

(Continued on next page)



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Platform Notes (Continued)

VERSION="8.2 (Ootpa)"

ID="rhel"

ID_LIKE="fedora"

VERSION_ID="8.2"

PLATFORM_ID="platform:el8"

PRETTY_NAME="Red Hat Enterprise Linux 8.2 (Ootpa)"

ANSI_COLOR="0;31"

redhat-release: Red Hat Enterprise Linux release 8.2 (Ootpa)

system-release: Red Hat Enterprise Linux release 8.2 (Ootpa)

system-release-cpe: cpe:/o:redhat:enterprise_linux:8.2:ga

uname -a:

Linux localhost.localdomain 4.18.0-193.el8.x86_64 #1 SMP Fri Mar 27 14:35:58 UTC 2020
x86_64 x86_64 x86_64 GNU/Linux

Kernel self-reported vulnerability status:

itlb_multihit:

KVM: Mitigation: Split huge pages

CVE-2018-3620 (L1 Terminal Fault):

Not affected

Microarchitectural Data Sampling:

Not affected

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: usercopy/swaps barriers and __user pointer sanitization

CVE-2017-5715 (Spectre variant 2):

Mitigation: Enhanced IBRS, IBPB: conditional, RSB filling

tsx_async_abort:

Vulnerable: Clear CPU buffers attempted, no microcode; SMT vulnerable

run-level 3 Nov 11 09:27

SPEC is set to: /home/speccpu

| Filesystem | Type | Size | Used | Avail | Use% | Mounted on |
|-----------------------|------|------|------|-------|------|------------|
| /dev/mapper/rhel-home | xfs | 839G | 143G | 697G | 17% | /home |

From /sys/devices/virtual/dmi/id

BIOS: American Megatrends Inc. 2.00.33 08/22/2019

Vendor: New H3C Technologies Co., Ltd.

Product: H3C UniServer R6900 G3

Product Family: Rack

Serial: 210235A3T0H204000004

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.

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Platform Notes (Continued)

Memory:

24x Micron 18ASF2G72PDZ-2G9E1 16 GB 2 rank 2933

24x NO DIMM NO DIMM

(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

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

=====
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 | 500.perlbench_r(peak) 557.xz_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.

=====
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)
| 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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Compiler Version Notes (Continued)

NextGen Build 20200304

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

C | 500.perlbench_r(peak) 557.xz_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.

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)
| 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 | 500.perlbench_r(peak) 557.xz_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.

C++ | 520.omnetpp_r(base, peak) 523.xalanbmk_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

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Compiler Version Notes (Continued)

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.

Base Compiler Invocation

C benchmarks:

icc

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/usr/local/IntelCompiler19/compilers_and_libraries_2020.1.217/linux/compiler/lib/intel64_lin
-lqkmalloc

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Base Optimization Flags (Continued)

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/usr/local/IntelCompiler19/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  
-mbranches-within-32B-boundaries  
-L/usr/local/IntelCompiler19/compilers_and_libraries_2020.1.217/linux/compiler/lib/intel64_lin  
-lqkmalloc
```

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
```



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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
-L/usr/local/IntelCompiler19/compilers_and_libraries_2020.1.217/linux/compiler/lib/intel64_lin
-lqkmalloc
```

```
502.gcc_r: -m32
-L/usr/local/IntelCompiler19/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/lib
-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/usr/local/IntelCompiler19/compilers_and_libraries_2020.1.217/linux/compiler/lib/intel64_lin
-lqkmalloc
```

```
557.xz_r: -Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div
-qopt-mem-layout-trans=4 -mbranches-within-32B-boundaries
-L/usr/local/IntelCompiler19/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:

(Continued on next page)



SPEC CPU®2017 Integer Rate Result

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SPECrate®2017_int_base = 361

H3C UniServer R6900 G3 (Intel Xeon Platinum 8253)

SPECrate®2017_int_peak = 371

CPU2017 License: 9066

Test Sponsor: New H3C Technologies Co., Ltd.

Tested by: New H3C Technologies Co., Ltd.

Test Date: Nov-2020

Hardware Availability: Jun-2019

Software Availability: Apr-2020

Peak Optimization Flags (Continued)

548.exchange2_r: basepeak = yes

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

http://www.spec.org/cpu2017/flags/Intel-ic19.1ul-official-linux64_revA.html

http://www.spec.org/cpu2017/flags/New_H3C-Platform-Settings-V1.4-CLX-RevB.html

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

http://www.spec.org/cpu2017/flags/Intel-ic19.1ul-official-linux64_revA.xml

http://www.spec.org/cpu2017/flags/New_H3C-Platform-Settings-V1.4-CLX-RevB.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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