



SPEC CPU®2017 Integer Rate Result

Copyright 2017-2020 Standard Performance Evaluation Corporation

New H3C Technologies Co., Ltd.

(Test Sponsor: New H3C Technologies Co., Ltd.)

SPECrate®2017_int_base = 239

SPECrate®2017_int_peak = 249

H3C UniServer R4900 G3 (Intel Xeon Platinum 8160)

CPU2017 License: 9066

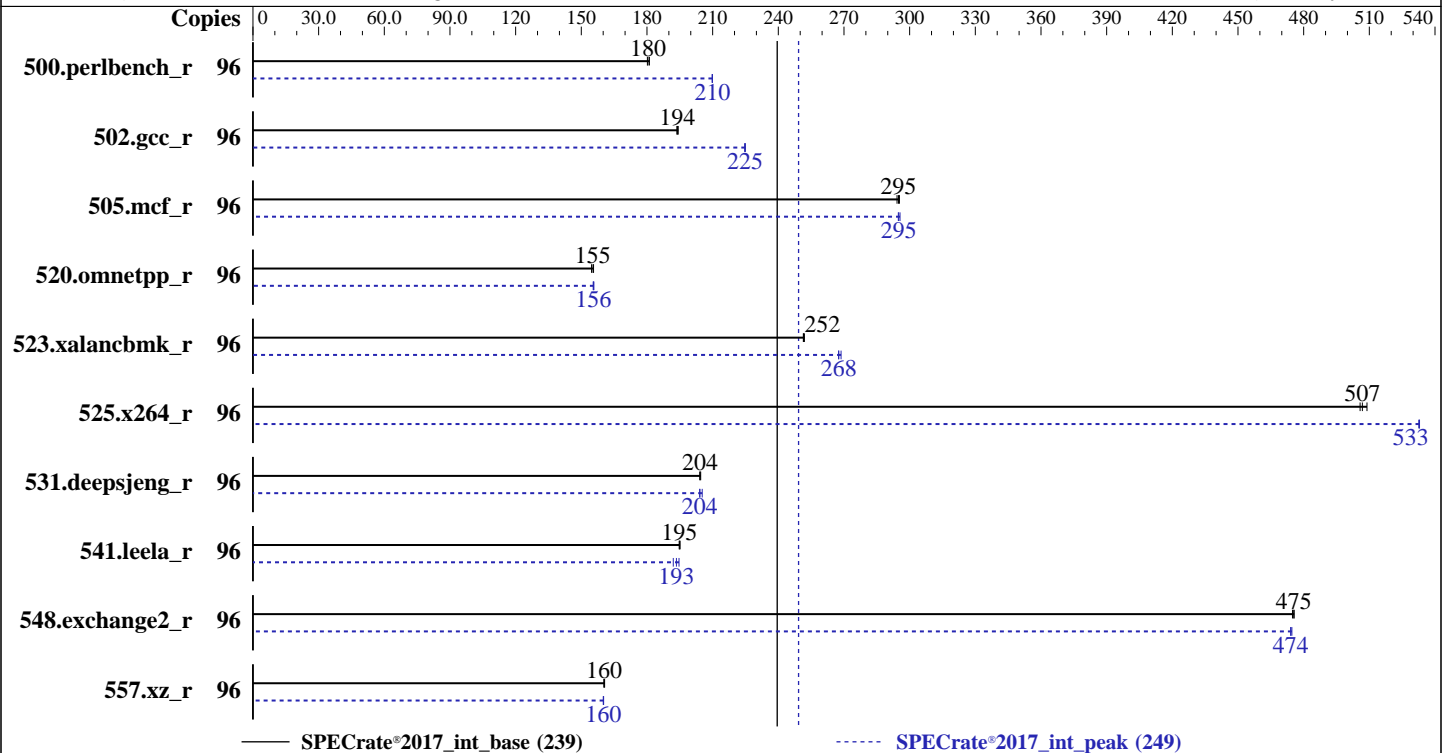
Test Sponsor: New H3C Technologies Co., Ltd.

Tested by: New H3C Technologies Co., Ltd.

Test Date: Jun-2020

Hardware Availability: Mar-2019

Software Availability: May-2019



Hardware

CPU Name: Intel Xeon Platinum 8160
 Max MHz: 3700
 Nominal: 2100
 Enabled: 48 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: 33 MB I+D on chip per chip
 Other: None
 Memory: 384 GB (12 x 32 GB 2Rx4 PC4-2933V-R, running at 2666)
 Storage: 1 x 480 GB SATA SSD
 Other: None

Software

OS: SUSE Linux Enterprise Server 12 SP4
 4.12.14-94.41-default
 Compiler: C/C++: Version 19.0.4.227 of Intel C/C++
 Compiler Build 20190416 for Linux;
 Fortran: Version 19.0.4.227 of Intel Fortran
 Compiler Build 20190416 for Linux
 Parallel: No
 Firmware: Version 2.00.41 released Jun-2020 BIOS
 File System: btrfs
 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	96	848	180	844	181	847	180	96	728	210	728	210	728	210
502.gcc_r	96	701	194	702	194	700	194	96	604	225	605	225	605	225
505.mcf_r	96	526	295	525	295	527	294	96	526	295	525	296	526	295
520.omnetpp_r	96	814	155	809	156	811	155	96	810	155	810	156	809	156
523.xalancbmk_r	96	403	251	402	252	403	252	96	379	268	377	269	379	268
525.x264_r	96	332	507	332	506	330	509	96	315	533	316	533	315	533
531.deepsjeng_r	96	539	204	538	205	539	204	96	536	205	539	204	539	204
541.leela_r	96	816	195	815	195	816	195	96	828	192	822	193	817	195
548.exchange2_r	96	529	475	529	476	530	475	96	530	474	530	475	531	474
557.xz_r	96	647	160	645	161	646	160	96	648	160	648	160	647	160

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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"

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"
```

General Notes

Binaries compiled on a system with 1x Intel Core i9-7900X 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.:

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General Notes (Continued)

numactl --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) 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 Settings:

Set SNC to Enabled

Set IMC Interleaving to 1-way Interleave

Set XPT Prefetcher to Enabled

Set Patrol Scrub to Disabled

Set Autonomous Core C-State to Enabled

Sysinfo program /home/speccpu/bin/sysinfo

Rev: r6365 of 2019-08-21 295195f888a3d7edble6e46a485a0011

running on linux-wax3 Wed Jun 24 11:13:24 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 8160 CPU @ 2.10GHz

2 "physical id"s (chips)

96 "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 : 24

siblings : 48

physical 0: cores 0 1 2 3 4 5 8 9 10 11 12 13 16 17 18 19 20 21 24 25 26 27 28 29

physical 1: cores 0 1 2 3 4 5 8 9 10 11 12 13 16 17 18 19 20 21 24 25 26 27 28 29

From lscpu:

Architecture: x86_64

CPU op-mode(s): 32-bit, 64-bit

Byte Order: Little Endian

CPU(s): 96

On-line CPU(s) list: 0-95

Thread(s) per core: 2

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Platform Notes (Continued)

```

Core(s) per socket:      24
Socket(s):               2
NUMA node(s):           4
Vendor ID:               GenuineIntel
CPU family:              6
Model:                   85
Model name:              Intel(R) Xeon(R) Platinum 8160 CPU @ 2.10GHz
Stepping:                4
CPU MHz:                 2100.000
CPU max MHz:             3700.0000
CPU min MHz:             1000.0000
BogoMIPS:                4200.00
Virtualization:         VT-x
L1d cache:               32K
L1i cache:               32K
L2 cache:                1024K
L3 cache:                33792K
NUMA node0 CPU(s):      0-2,6-8,12-14,18-20,48-50,54-56,60-62,66-68
NUMA node1 CPU(s):      3-5,9-11,15-17,21-23,51-53,57-59,63-65,69-71
NUMA node2 CPU(s):      24-26,30-32,36-38,42-44,72-74,78-80,84-86,90-92
NUMA node3 CPU(s):      27-29,33-35,39-41,45-47,75-77,81-83,87-89,93-95
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 f16c rdrand lahf_lm abm 3dnowprefetch cpuid_fault epb cat_l3 cdp_l3
invpcid_single pti intel_ppin ssbd mba ibrs ibpb stibp 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 hwp hwp_act_window hwp_epp hwp_pkg_req pku ospke flush_lld

```

```

/proc/cpuinfo cache data
cache size : 33792 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 1 2 6 7 8 12 13 14 18 19 20 48 49 50 54 55 56 60 61 62 66 67 68
node 0 size: 95257 MB
node 0 free: 94615 MB
node 1 cpus: 3 4 5 9 10 11 15 16 17 21 22 23 51 52 53 57 58 59 63 64 65 69 70 71
node 1 size: 96753 MB
node 1 free: 96460 MB
node 2 cpus: 24 25 26 30 31 32 36 37 38 42 43 44 72 73 74 78 79 80 84 85 86 90 91 92
node 2 size: 96753 MB

```

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Platform Notes (Continued)

```

node 2 free: 96493 MB
node 3 cpus: 27 28 29 33 34 35 39 40 41 45 46 47 75 76 77 81 82 83 87 88 89 93 94 95
node 3 size: 96519 MB
node 3 free: 96265 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:      394530568 kB
HugePages_Total:      0
Hugepagesize:    2048 kB

```

```

/usr/bin/lsb_release -d
SUSE Linux Enterprise Server 12 SP4

```

```

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"

```

```

uname -a:
Linux linux-wax3 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):      Mitigation: PTE Inversion; VMX: conditional
cache flushes, SMT vulnerable
Microarchitectural Data Sampling:      No status reported
CVE-2017-5754 (Meltdown):              Mitigation: PTI
CVE-2018-3639 (Speculative Store Bypass): Mitigation: Speculative Store Bypass disabled
via prctl and seccomp

```

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Platform Notes (Continued)

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 Jun 24 11:10

SPEC is set to: /home/speccpu

Filesystem	Type	Size	Used	Avail	Use%	Mounted on
/dev/md126p1	btrfs	401G	11G	389G	3%	/home

From /sys/devices/virtual/dmi/id

```

BIOS: American Megatrends Inc. 2.00.41 06/09/2020
Vendor: New H3C Technologies Co., Ltd.
Product: UniServer R4900 G3
Product Family: Rack
Serial: 210231A6T3H19B000065

```

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:

```

12x Micron 36ASF4G72PZ-2G9E2 32 GB 2 rank 2933, configured at 2666
12x NO DIMM NO DIMM

```

(End of data from sysinfo program)

Compiler Version Notes

```

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

```

```

Intel(R) C Intel(R) 64 Compiler for applications running on IA-32, Version
19.0.4.227 Build 20190416
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.
-----

```

```

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

```

```

Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
Version 19.0.4.227 Build 20190416
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.
-----

```

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Compiler Version Notes (Continued)

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Intel(R) C Intel(R) 64 Compiler for applications running on IA-32, Version
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Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

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

Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
Version 19.0.4.227 Build 20190416
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

=====
C++ | 523.xalanbmk_r(peak)

Intel(R) C++ Intel(R) 64 Compiler for applications running on IA-32, Version
19.0.4.227 Build 20190416
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

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

Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64,
Version 19.0.4.227 Build 20190416
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

=====
C++ | 523.xalanbmk_r(peak)

Intel(R) C++ Intel(R) 64 Compiler for applications running on IA-32, Version
19.0.4.227 Build 20190416
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

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

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

(Continued on next page)



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Compiler Version Notes (Continued)

Version 19.0.4.227 Build 20190416
Copyright (C) 1985-2019 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 19.0.4.227 Build 20190416
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

Base Compiler Invocation

C benchmarks:

icc -m64 -std=c11

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=4

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Base Optimization Flags (Continued)

C benchmarks (continued):

```
-L/usr/local/IntelCompiler19/compilers_and_libraries_2019.4.227/linux/compiler/lib/intel64  
-lqkmallocc
```

C++ benchmarks:

```
-Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div  
-qopt-mem-layout-trans=4  
-L/usr/local/IntelCompiler19/compilers_and_libraries_2019.4.227/linux/compiler/lib/intel64  
-lqkmallocc
```

Fortran benchmarks:

```
-Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div  
-qopt-mem-layout-trans=4 -nostandard-realloc-lhs -align array32byte  
-L/usr/local/IntelCompiler19/compilers_and_libraries_2019.4.227/linux/compiler/lib/intel64  
-lqkmallocc
```

Peak Compiler Invocation

C benchmarks (except as noted below):

```
icc -m64 -std=c11
```

```
502.gcc_r: icc -m32 -std=c11 -L/usr/local/IntelCompiler19/compilers_and_libraries_2019.4.227/linux/compiler/lib/ia32_lin
```

C++ benchmarks (except as noted below):

```
icpc -m64
```

```
523.xalancbmk_r: icpc -m32 -L/usr/local/IntelCompiler19/compilers_and_libraries_2019.4.227/linux/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
```

(Continued on next page)



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Peak Portability Flags (Continued)

548.exchange2_r: -DSPEC_LP64

557.xz_r: -DSPEC_LP64

Peak Optimization Flags

C benchmarks:

500.perlbench_r: -w1,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -ipo

-xCORE-AVX512 -O3 -no-prec-div -qopt-mem-layout-trans=4

-fno-strict-overflow

-L/usr/local/IntelCompiler19/compilers_and_libraries_2019.4.227/linux/compiler/lib/intel64

-lqkmalloc

502.gcc_r: -w1,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -ipo

-xCORE-AVX512 -O3 -no-prec-div -qopt-mem-layout-trans=4

-L/usr/local/je5.0.1-32/lib -ljemalloc

505.mcf_r: -w1,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div

-qopt-mem-layout-trans=4

-L/usr/local/IntelCompiler19/compilers_and_libraries_2019.4.227/linux/compiler/lib/intel64

-lqkmalloc

525.x264_r: -w1,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div

-qopt-mem-layout-trans=4 -fno-alias

-L/usr/local/IntelCompiler19/compilers_and_libraries_2019.4.227/linux/compiler/lib/intel64

-lqkmalloc

557.xz_r: Same as 505.mcf_r

C++ benchmarks:

520.omnetpp_r: -w1,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div

-qopt-mem-layout-trans=4

-L/usr/local/IntelCompiler19/compilers_and_libraries_2019.4.227/linux/compiler/lib/intel64

-lqkmalloc

523.xalancbmk_r: -w1,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -ipo

-xCORE-AVX512 -O3 -no-prec-div -qopt-mem-layout-trans=4

-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

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Peak Optimization Flags (Continued)

Fortran benchmarks:

```
-Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div  
-qopt-mem-layout-trans=4 -nostandard-realloc-lhs -align array32byte  
-L/usr/local/IntelCompiler19/compilers_and_libraries_2019.4.227/linux/compiler/lib/intel64  
-lqkmalloc
```

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

<http://www.spec.org/cpu2017/flags/Intel-ic19.0u1-official-linux64.2019-07-09.html>

http://www.spec.org/cpu2017/flags/New_H3C-Platform-Settings-V1.3-SKL-RevE.html

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

<http://www.spec.org/cpu2017/flags/Intel-ic19.0u1-official-linux64.2019-07-09.xml>

http://www.spec.org/cpu2017/flags/New_H3C-Platform-Settings-V1.3-SKL-RevE.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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