



SPEC CPU®2017 Integer Rate Result

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New H3C Technologies Co., Ltd.

SPECrate®2017_int_base = 439

H3C UniServer R6900 G3 (Intel Xeon Gold 6230)

SPECrate®2017_int_peak = 446

CPU2017 License: 9066

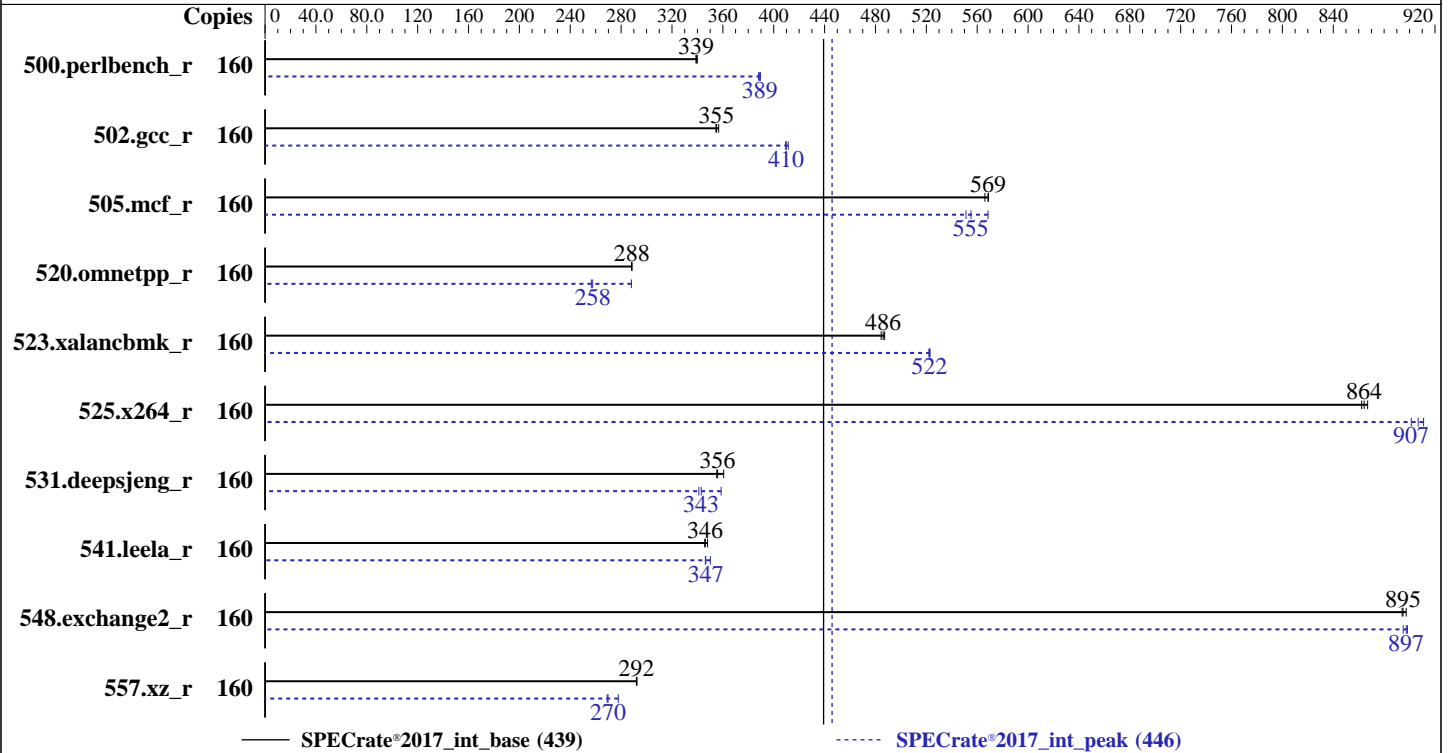
Test Sponsor: New H3C Technologies Co., Ltd.

Tested by: New H3C Technologies Co., Ltd.

Test Date: Sep-2020

Hardware Availability: Mar-2019

Software Availability: May-2019



Hardware

CPU Name: Intel Xeon Gold 6230
 Max MHz: 3900
 Nominal: 2100
 Enabled: 80 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: 27.5 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 Server release 7.6 (Maipo)
 3.10.0-957.el7.x86_64
 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 2.00.33 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	160	751	339	<u>751</u>	<u>339</u>	749	340	160	654	390	<u>655</u>	<u>389</u>	656	388
502.gcc_r	160	639	355	635	357	<u>638</u>	<u>355</u>	160	551	411	<u>553</u>	<u>410</u>	553	409
505.mcf_r	160	455	569	457	566	<u>455</u>	<u>569</u>	160	455	569	<u>466</u>	<u>555</u>	469	551
520.omnetpp_r	160	<u>728</u>	<u>288</u>	728	288	728	288	160	729	288	<u>815</u>	<u>258</u>	818	257
523.xalancbmk_r	160	349	484	347	487	<u>348</u>	<u>486</u>	160	323	523	<u>323</u>	<u>522</u>	324	522
525.x264_r	160	323	867	325	862	<u>324</u>	<u>864</u>	160	311	901	<u>309</u>	<u>907</u>	308	911
531.deepsjeng_r	160	<u>515</u>	<u>356</u>	516	355	508	361	160	511	359	537	341	<u>535</u>	<u>343</u>
541.leela_r	160	<u>765</u>	<u>346</u>	766	346	761	348	160	765	346	<u>764</u>	<u>347</u>	757	350
548.exchange2_r	160	467	897	<u>468</u>	<u>895</u>	469	894	160	468	895	<u>467</u>	<u>897</u>	467	898
557.xz_r	160	591	292	<u>591</u>	<u>292</u>	592	292	160	622	278	<u>641</u>	<u>270</u>	642	269

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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

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)

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General Notes (Continued)

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
```

 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 295195f888a3d7edb1e6e46a485a0011
 running on localhost.localdomain Wed Sep 2 21:06:57 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 6230 CPU @ 2.10GHz
 4 "physical id"s (chips)
160 "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 : 20
siblings : 40
physical 0: cores 0 1 2 3 4 8 9 10 11 12 16 17 18 19 20 24 25 26 27 28
physical 1: cores 0 1 2 3 4 8 9 10 11 12 16 17 18 19 20 24 25 26 27 28
physical 2: cores 0 1 2 3 4 8 9 10 11 12 16 17 18 19 20 24 25 26 27 28
physical 3: cores 0 1 2 3 4 8 9 10 11 12 16 17 18 19 20 24 25 26 27 28
```

From lscpu:

```
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 160
On-line CPU(s) list: 0-159
Thread(s) per core: 2
Core(s) per socket: 20
Socket(s): 4
```

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Platform Notes (Continued)

```

NUMA node(s):      8
Vendor ID:         GenuineIntel
CPU family:        6
Model:             85
Model name:        Intel(R) Xeon(R) Gold 6230 CPU @ 2.10GHz
Stepping:          7
CPU MHz:           2101.000
CPU max MHz:       2101.0000
CPU min MHz:       800.0000
BogoMIPS:          4200.00
Virtualization:    VT-x
L1d cache:         32K
L1i cache:         32K
L2 cache:          1024K
L3 cache:          28160K
NUMA node0 CPU(s): 0-2,5,6,10-12,15,16,80-82,85,86,90-92,95,96
NUMA node1 CPU(s): 3,4,7-9,13,14,17-19,83,84,87-89,93,94,97-99
NUMA node2 CPU(s): 20-22,25,26,30-32,35,36,100-102,105,106,110-112,115,116
NUMA node3 CPU(s): 23,24,27-29,33,34,37-39,103,104,107-109,113,114,117-119
NUMA node4 CPU(s): 40-42,45,46,50-52,55,56,120-122,125,126,130-132,135,136
NUMA node5 CPU(s): 43,44,47-49,53,54,57-59,123,124,127-129,133,134,137-139
NUMA node6 CPU(s): 60-62,65,66,70-72,75,76,140-142,145,146,150-152,155,156
NUMA node7 CPU(s): 63,64,67-69,73,74,77-79,143,144,147-149,153,154,157-159
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
aperfmpperf eagerfpu 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 epb cat_l3 cdp_l3 intel_ppin
intel_pt ssbd mba ibrs ibpb stibp ibrs_enhanced tpr_shadow vnmi flexpriority ept
vpid fsgsbase tsc_adjust bmil hle avx2 smep bmi2 erms invpcid rtm cqm mpx rdt_a
avx512f avx512dq rdseed adx smap clflushopt clwb avx512cd avx512bw avx512vl xsaveopt
xsavec xgetbv1 cqm_llc cqm_occup_llc cqm_mbm_total cqm_mbm_local dtherm ida arat pln
pts pku ospke avx512_vnni spec_ctrl intel_stibp flush_lld arch_capabilities

```

```

/proc/cpuinfo cache data
cache size : 28160 KB

```

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 5 6 10 11 12 15 16 80 81 82 85 86 90 91 92 95 96
node 0 size: 47767 MB
node 0 free: 38882 MB
node 1 cpus: 3 4 7 8 9 13 14 17 18 19 83 84 87 88 89 93 94 97 98 99
node 1 size: 49152 MB
node 1 free: 42572 MB

```

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Platform Notes (Continued)

```

node 2 cpus: 20 21 22 25 26 30 31 32 35 36 100 101 102 105 106 110 111 112 115 116
node 2 size: 49152 MB
node 2 free: 42615 MB
node 3 cpus: 23 24 27 28 29 33 34 37 38 39 103 104 107 108 109 113 114 117 118 119
node 3 size: 49152 MB
node 3 free: 42533 MB
node 4 cpus: 40 41 42 45 46 50 51 52 55 56 120 121 122 125 126 130 131 132 135 136
node 4 size: 49152 MB
node 4 free: 42580 MB
node 5 cpus: 43 44 47 48 49 53 54 57 58 59 123 124 127 128 129 133 134 137 138 139
node 5 size: 49152 MB
node 5 free: 41912 MB
node 6 cpus: 60 61 62 65 66 70 71 72 75 76 140 141 142 145 146 150 151 152 155 156
node 6 size: 49152 MB
node 6 free: 42598 MB
node 7 cpus: 63 64 67 68 69 73 74 77 78 79 143 144 147 148 149 153 154 157 158 159
node 7 size: 49152 MB
node 7 free: 42518 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:      394621364 kB
HugePages_Total:      0
Hugepagesize:    2048 kB

```

```

From /etc/*release* /etc/*version*
os-release:
NAME="Red Hat Enterprise Linux Server"
VERSION="7.6 (Maipo)"
ID="rhel"
ID_LIKE="fedora"
VARIANT="Server"
VARIANT_ID="server"
VERSION_ID="7.6"
PRETTY_NAME="Red Hat Enterprise Linux Server 7.6 (Maipo)"
redhat-release: Red Hat Enterprise Linux Server release 7.6 (Maipo)
system-release: Red Hat Enterprise Linux Server release 7.6 (Maipo)
system-release-cpe: cpe:/o:redhat:enterprise_linux:7.6:ga:server

```

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Platform Notes (Continued)

uname -a:

```
Linux localhost.localdomain 3.10.0-957.el7.x86_64 #1 SMP Thu Oct 4 20:48:51 UTC 2018
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: Load fences, __user pointer sanitization
CVE-2017-5715 (Spectre variant 2):	Mitigation: Enhanced IBRS

run-level 3 Sep 2 14:56

SPEC is set to: /home/speccpu

Filesystem	Type	Size	Used	Avail	Use%	Mounted on
/dev/mapper/rhel-home	xfs	839G	95G	745G	12%	/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
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.

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 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.
```

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Compiler Version Notes (Continued)

```
=====
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          | 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.
-----
```

```
=====
C++       | 523.xalancbmk_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.xalancbmk_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.xalancbmk_r(peak)
-----
```

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Compiler Version Notes (Continued)

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.xalancbmk_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.

=====
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

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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

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Base Portability Flags (Continued)

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

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  
-lqkmalloc
```

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
```

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
```



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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: -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
```

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SPEC CPU®2017 Integer Rate Result

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New H3C Technologies Co., Ltd.

SPECrate®2017_int_base = 439

H3C UniServer R6900 G3 (Intel Xeon Gold 6230)

SPECrate®2017_int_peak = 446

CPU2017 License: 9066

Test Sponsor: New H3C Technologies Co., Ltd.

Tested by: New H3C Technologies Co., Ltd.

Test Date: Sep-2020

Hardware Availability: Mar-2019

Software Availability: May-2019

Peak Optimization Flags (Continued)

```
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

Fortran benchmarks:

```
-w1, -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
```

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-V1.4-CLX-RevB.html

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

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

Tested with SPEC CPU®2017 v1.1.0 on 2020-09-02 09:06:56-0400.

Report generated on 2020-09-29 15:21:46 by CPU2017 PDF formatter v6255.

Originally published on 2020-09-29.