



# SPEC CPU®2017 Floating Point Speed Result

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## New H3C Technologies Co., Ltd.

H3C UniServer R6900 G5 (Intel Xeon Platinum 8360HL)

**SPECSpeed®2017\_fp\_base = 235**

**SPECSpeed®2017\_fp\_peak = 238**

CPU2017 License: 9066

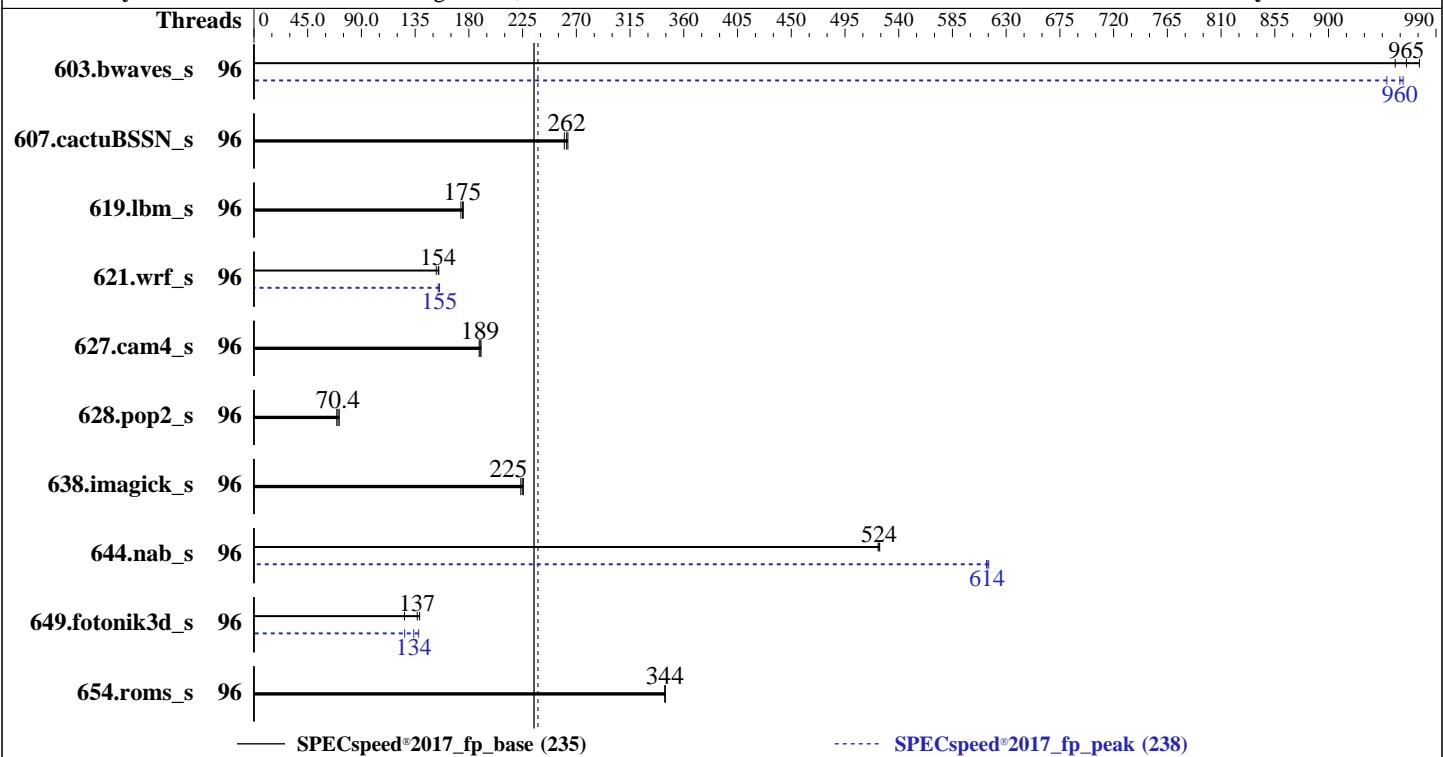
Test Sponsor: New H3C Technologies Co., Ltd.

Tested by: New H3C Technologies Co., Ltd.

**Test Date:** Jun-2021

**Hardware Availability:** Sep-2020

**Software Availability:** Dec-2020



### Hardware

CPU Name: Intel Xeon Platinum 8360HL  
 Max MHz: 4200  
 Nominal: 3000  
 Enabled: 96 cores, 4 chips  
 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: 33 MB I+D on chip per chip  
 Other: None  
 Memory: 768 GB (48 x 16 GB 2Rx8 PC4-3200V-R)  
 Storage: 1 x 1.0 TB 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 2021.1 of Intel oneAPI DPC++/C++ Compiler Build 20201113 for Linux; Fortran: Version 2021.1 of Intel Fortran Compiler Classic Build 20201112 for Linux; C/C++: Version 2021.1 of Intel C/C++ Compiler Classic Build 20201112 for Linux;  
 Parallel: Yes  
 Firmware: Version 5.15 released Mar-2021 BIOS  
 File System: xfs  
 System State: Run level 3 (multi-user)  
 Base Pointers: 64-bit  
 Peak Pointers: 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						
	Threads	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Threads	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
603.bwaves_s	96	<b>61.1</b>	<b>965</b>	60.4	976	61.7	956	96	<b>61.5</b>	<b>960</b>	62.2	949	61.3	962
607.cactuBSSN_s	96	64.1	260	63.4	263	<b>63.7</b>	<b>262</b>	96	64.1	260	63.4	263	<b>63.7</b>	<b>262</b>
619.lbm_s	96	30.2	173	<b>30.0</b>	<b>175</b>	29.9	175	96	30.2	173	<b>30.0</b>	<b>175</b>	29.9	175
621.wrf_s	96	86.6	153	85.4	155	<b>85.7</b>	<b>154</b>	96	85.1	155	<b>85.1</b>	<b>155</b>	85.7	154
627.cam4_s	96	47.0	189	<b>46.8</b>	<b>189</b>	46.6	190	96	47.0	189	<b>46.8</b>	<b>189</b>	46.6	190
628.pop2_s	96	166	71.4	171	69.4	<b>169</b>	<b>70.4</b>	96	166	71.4	171	69.4	<b>169</b>	<b>70.4</b>
638.imagick_s	96	63.9	226	64.6	223	<b>64.2</b>	<b>225</b>	96	63.9	226	64.6	223	<b>64.2</b>	<b>225</b>
644.nab_s	96	33.4	523	<b>33.4</b>	<b>524</b>	33.3	524	96	28.4	615	<b>28.5</b>	<b>614</b>	28.5	614
649.fotonik3d_s	96	<b>66.7</b>	<b>137</b>	65.7	139	72.3	126	96	72.2	126	66.1	138	<b>68.1</b>	<b>134</b>
654.roms_s	96	<b>45.7</b>	<b>344</b>	45.7	344	45.7	344	96	<b>45.7</b>	<b>344</b>	45.7	344	45.7	344
<b>SPECSpeed®2017_fp_base = 235</b>														
<b>SPECSpeed®2017_fp_peak = 238</b>														

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

## 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:

KMP\_AFFINITY = "granularity=fine,compact"

LD\_LIBRARY\_PATH = "/home/speccpu/lib/intel64:/home/speccpu/je5.0.1-64"

MALLOC\_CONF = "retain:true"

OMP\_STACKSIZE = "192M"

## 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

jemalloc, a general purpose malloc implementation

built with the RedHat Enterprise 7.5, and the system compiler gcc 4.8.5

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## General Notes (Continued)

sources available from [jemalloc.net](http://jemalloc.net) or <https://github.com/jemalloc/jemalloc/releases>

## Platform Notes

BIOS Settings:

Set Hyper-Threading to Disabled

Set Power Performance Tuning to BIOS Controls EPB

Set Energy Performance BIAS to Performance

Set Patrol Scrub to Disabled

Sysinfo program /home/speccpu/bin/sysinfo

Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16acaf64d

running on localhost.localdomain Thu Jun 3 21:40:36 2021

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 8360HL CPU @ 3.00GHz
        4 "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    : 24
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
physical 2: 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 3: 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 from util-linux 2.32.1:

```
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:  1
Core(s) per socket:  24
Socket(s):            4
NUMA node(s):         4
Vendor ID:            GenuineIntel
CPU family:           6
Model:                85
Model name:           Intel(R) Xeon(R) Platinum 8360HL CPU @ 3.00GHz
Stepping:              11
```

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## Platform Notes (Continued)

CPU MHz: 1200.104  
CPU max MHz: 4200.0000  
CPU min MHz: 1200.0000  
BogoMIPS: 6000.00  
Virtualization: VT-x  
L1d cache: 32K  
L1i cache: 32K  
L2 cache: 1024K  
L3 cache: 33792K  
NUMA node0 CPU(s): 0-23  
NUMA node1 CPU(s): 24-47  
NUMA node2 CPU(s): 48-71  
NUMA node3 CPU(s): 72-95

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 aperfmpfperf 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\_13 cdp\_13 invpcid\_single intel\_ppin ssbd mba ibrs ibpb stibp ibrs\_enhanced tpr\_shadow vnmi flexpriority ept vpid fsgsbbase tsc\_adjust bmi1 hle avx2 smep bmi2 erms invpcid rtm cqm mpq rdt\_a avx512f avx512dq rdseed adx smap clflushopt clwb intel\_pt avx512cd avx512bw avx512vl xsavect xsaveopt xsavec xgetbv1 xsaves cqm\_llc cqm\_occup\_llc cqm\_mbm\_total cqm\_mbm\_local avx512\_bf16 dtherm ida arat pln pts hwp hwp\_act\_window hwp\_epp hwp\_pkg\_req pku ospke avx512\_vnni md\_clear flush\_l1d arch\_capabilities

/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 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23  
node 0 size: 191855 MB  
node 0 free: 191296 MB  
node 1 cpus: 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47  
node 1 size: 193503 MB  
node 1 free: 191019 MB  
node 2 cpus: 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71  
node 2 size: 193530 MB  
node 2 free: 187714 MB  
node 3 cpus: 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95  
node 3 size: 193530 MB  
node 3 free: 192002 MB  
node distances:  
node 0 1 2 3  
0: 10 20 20 20

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## Platform Notes (Continued)

```
1: 20 10 20 20  
2: 20 20 10 20  
3: 20 20 20 10
```

From /proc/meminfo

```
MemTotal: 790957244 kB  
HugePages_Total: 0  
Hugepagesize: 2048 kB
```

/sbin/tuned-adm active  
Current active profile: throughput-performance

/sys/devices/system/cpu/cpu\*/cpufreq/scaling\_governor has  
performance

From /etc/\*release\* /etc/\*version\*  
os-release:

```
NAME="Red Hat Enterprise Linux"  
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:

CVE-2018-12207 (iTLB Multihit):	Not affected
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

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## Platform Notes (Continued)

CVE-2020-0543 (Special Register Buffer Data Sampling): No status reported

CVE-2019-11135 (TSX Asynchronous Abort): Not affected

run-level 3 Jun 3 17:06

SPEC is set to: /home/speccpu

Filesystem	Type	Size	Used	Avail	Use%	Mounted on
/dev/mapper/rhel-home	xfs	876G	205G	672G	24%	/home

From /sys/devices/virtual/dmi/id  
Product Family: SYSTEM\_FAMILY

Additional information from dmidecode 3.2 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:

48x Micron 18ASF2G72PDZ-3G2E1 16 GB 2 rank 3200

BIOS:

BIOS Vendor:	American Megatrends International, LLC.
BIOS Version:	5.15
BIOS Date:	03/01/2021
BIOS Revision:	5.19

(End of data from sysinfo program)

## Compiler Version Notes

=====

C | 619.lbm\_s(base, peak) 638.imagick\_s(base, peak)  
| 644.nab\_s(base)

=====

-----  
Intel(R) C Intel(R) 64 Compiler Classic for applications running on Intel(R)  
64, Version 2021.1 Build 20201112\_000000  
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.  
-----

=====

C | 644.nab\_s(peak)

=====

-----  
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,  
Version 2021.1 Build 20201113  
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.  
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## Compiler Version Notes (Continued)

=====

C | 619.lbm\_s(base, peak) 638.imagick\_s(base, peak)  
| 644.nab\_s(base)

=====

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-----

=====

C | 644.nab\_s(peak)

=====

-----  
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,  
Version 2021.1 Build 20201113  
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.  
-----

=====

C++, C, Fortran | 607.cactuBSSN\_s(base, peak)

=====

-----  
Intel(R) C++ Intel(R) 64 Compiler Classic for applications running on  
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-----  
Intel(R) Fortran Intel(R) 64 Compiler Classic for applications running on  
Intel(R) 64, Version 2021.1 Build 20201112\_000000  
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.  
-----

=====

Fortran | 603.bwaves\_s(base, peak) 649.fotonik3d\_s(base, peak)  
| 654.roms\_s(base, peak)

=====

-----  
Intel(R) Fortran Intel(R) 64 Compiler Classic for applications running on  
Intel(R) 64, Version 2021.1 Build 20201112\_000000  
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.  
-----

=====

Fortran, C | 621.wrf\_s(base, peak) 627.cam4\_s(base, peak)  
| 628.pop2\_s(base, peak)

=====

-----  
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## Compiler Version Notes (Continued)

Intel(R) C Intel(R) 64 Compiler Classic for applications running on Intel(R)  
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## Base Compiler Invocation

C benchmarks:

icc

Fortran benchmarks:

ifort

Benchmarks using both Fortran and C:

ifort icc

Benchmarks using Fortran, C, and C++:

icpc icc ifort

## Base Portability Flags

603.bwaves\_s: -DSPEC\_LP64  
607.cactuBSSN\_s: -DSPEC\_LP64  
619.lbm\_s: -DSPEC\_LP64  
621.wrf\_s: -DSPEC\_LP64 -DSPEC\_CASE\_FLAG -convert big\_endian  
627.cam4\_s: -DSPEC\_LP64 -DSPEC\_CASE\_FLAG  
628.pop2\_s: -DSPEC\_LP64 -DSPEC\_CASE\_FLAG -convert big\_endian  
-assume byterecl  
638.imagick\_s: -DSPEC\_LP64  
644.nab\_s: -DSPEC\_LP64  
649.fotonik3d\_s: -DSPEC\_LP64  
654.roms\_s: -DSPEC\_LP64

## Base Optimization Flags

C benchmarks:

-m64 -std=c11 -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch  
-ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC\_OPENMP  
-mbanches-within-32B-boundaries

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## Base Optimization Flags (Continued)

Fortran benchmarks:

```
-m64 -Wl,-z,muldefs -DSPEC_OPENMP -xCORE-AVX512 -ipo -O3  
-no-prec-div -qopt-prefetch -ffinite-math-only  
-qopt-mem-layout-trans=4 -qopenmp -nostandard-realloc-lhs  
-mbranches-within-32B-boundaries -L/usr/local/jemalloc64-5.0.1/lib  
-ljemalloc
```

Benchmarks using both Fortran and C:

```
-m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div  
-qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp  
-DSPEC_OPENMP -mbranches-within-32B-boundaries -nostandard-realloc-lhs  
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc
```

Benchmarks using Fortran, C, and C++:

```
-m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div  
-qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp  
-DSPEC_OPENMP -mbranches-within-32B-boundaries -nostandard-realloc-lhs  
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc
```

## Peak Compiler Invocation

C benchmarks (except as noted below):

icc

644.nab\_s: icx

Fortran benchmarks:

ifort

Benchmarks using both Fortran and C:

ifort icc

Benchmarks using Fortran, C, and C++:

icpc icc ifort

## Peak Portability Flags

Same as Base Portability Flags



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## Peak Optimization Flags

C benchmarks:

619.lbm\_s: basepeak = yes

638.imagick\_s: basepeak = yes

644.nab\_s: -m64 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math  
-futo -mfpmath=sse -funroll-loops -fiopenmp  
-DSPEC\_OPENMP -qopt-mem-layout-trans=4  
-fimf-accuracy-bits=14:sqrt  
-mbranches-within-32B-boundaries  
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

Fortran benchmarks:

603.bwaves\_s: -m64 -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2)  
-DSPEC\_SUPPRESS\_OPENMP -DSPEC\_OPENMP -ipo -xCORE-AVX512  
-O3 -no-prec-div -qopt-prefetch -ffinite-math-only  
-qopt-mem-layout-trans=4 -qopenmp -nostandard-realloc-lhs  
-mbranches-within-32B-boundaries  
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

649.fotonik3d\_s: Same as 603.bwaves\_s

654.roms\_s: basepeak = yes

Benchmarks using both Fortran and C:

621.wrf\_s: -m64 -std=c11 -Wl,-z,muldefs -prof-gen(pass 1)  
-prof-use(pass 2) -ipo -xCORE-AVX512 -O3 -no-prec-div  
-qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4  
-DSPEC\_SUPPRESS\_OPENMP -qopenmp -DSPEC\_OPENMP  
-mbranches-within-32B-boundaries -nostandard-realloc-lhs  
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

627.cam4\_s: basepeak = yes

628.pop2\_s: basepeak = yes

Benchmarks using Fortran, C, and C++:

607.cactuBSSN\_s: basepeak = yes



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## New H3C Technologies Co., Ltd.

H3C UniServer R6900 G5 (Intel Xeon Platinum 8360HL)

SPECSpeed®2017\_fp\_base = 235

SPECSpeed®2017\_fp\_peak = 238

CPU2017 License: 9066

Test Date: Jun-2021

Test Sponsor: New H3C Technologies Co., Ltd.

Hardware Availability: Sep-2020

Tested by: New H3C Technologies Co., Ltd.

Software Availability: Dec-2020

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

[http://www.spec.org/cpu2017/flags/Intel-ic2021-official-linux64\\_revA.html](http://www.spec.org/cpu2017/flags/Intel-ic2021-official-linux64_revA.html)

[http://www.spec.org/cpu2017/flags/New\\_H3C-Platform-Settings-V1.0-CPX-RevC.html](http://www.spec.org/cpu2017/flags/New_H3C-Platform-Settings-V1.0-CPX-RevC.html)

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

[http://www.spec.org/cpu2017/flags/Intel-ic2021-official-linux64\\_revA.xml](http://www.spec.org/cpu2017/flags/Intel-ic2021-official-linux64_revA.xml)

[http://www.spec.org/cpu2017/flags/New\\_H3C-Platform-Settings-V1.0-CPX-RevC.xml](http://www.spec.org/cpu2017/flags/New_H3C-Platform-Settings-V1.0-CPX-RevC.xml)

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For questions about this result, please contact the tester. For other inquiries, please contact [info@spec.org](mailto:info@spec.org).

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