# SPEC CPU®2017 Floating Point Speed Result

**New H3C Technologies Co., Ltd.**

**H3C UniServer R6900 G5 (Intel Xeon Platinum 8353H)**

<table>
<thead>
<tr>
<th>Test Date:</th>
<th>Mar-2021</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hardware Availability:</td>
<td>Sep-2020</td>
</tr>
<tr>
<td>Software Availability:</td>
<td>Dec-2020</td>
</tr>
</tbody>
</table>

### 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;
- **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.

### Hardware
- **CPU Name:** Intel Xeon Platinum 8353H
- **Max MHz:** 3800
- **Nominal:** 2500
- **Enabled:** 72 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:** 24.75 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

<table>
<thead>
<tr>
<th>Threads</th>
<th>SPECspec®2017_fp_base = 194</th>
</tr>
</thead>
<tbody>
<tr>
<td>603.bwaves_s</td>
<td>72</td>
</tr>
<tr>
<td>607.cactuBSSN_s</td>
<td>72</td>
</tr>
<tr>
<td>619.lbm_s</td>
<td>72</td>
</tr>
<tr>
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<td>72</td>
</tr>
<tr>
<td>627.cam4_s</td>
<td>72</td>
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<tr>
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<td>72</td>
</tr>
<tr>
<td>638.imagick_s</td>
<td>72</td>
</tr>
<tr>
<td>644.nab_s</td>
<td>72</td>
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<tr>
<td>649.fotonik3d_s</td>
<td>72</td>
</tr>
<tr>
<td>654.roms_s</td>
<td>72</td>
</tr>
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**SPECspeed®2017_fp_base = 194**
**SPECspeed®2017_fp_peak = 196**
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New H3C Technologies Co., Ltd.  
H3C UniServer R6900 G5 (Intel Xeon Platinum 8353H)

<table>
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<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
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<tr>
<td>603.bwaves_s</td>
<td>72</td>
<td>68.3</td>
<td>864</td>
<td>67.7</td>
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<td>68.2</td>
<td>865</td>
<td>68.3</td>
<td>864</td>
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<td>856</td>
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<tr>
<td>607.cactuBSSN_s</td>
<td>72</td>
<td>77.4</td>
<td>215</td>
<td>77.4</td>
<td>215</td>
<td>77.5</td>
<td>215</td>
<td>77.4</td>
<td>215</td>
<td>77.5</td>
<td>215</td>
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<tr>
<td>619.lbm_s</td>
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<td>37.3</td>
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<td>156</td>
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<tr>
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<td>89.1</td>
<td>148</td>
<td>90.1</td>
<td>147</td>
<td>88.7</td>
<td>149</td>
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<tr>
<td>627.cam4_s</td>
<td>72</td>
<td>56.6</td>
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<td>155</td>
<td>56.6</td>
<td>156</td>
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<tr>
<td>628.pop2_s</td>
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<td>90.4</td>
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<td>159</td>
<td>90.3</td>
<td>160</td>
<td>90.4</td>
<td>160</td>
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<tr>
<td>644.nab_s</td>
<td>72</td>
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<td>377</td>
<td>46.3</td>
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<tr>
<td>649.fotonik3d_s</td>
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<td>128</td>
<td>70.0</td>
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<td>127</td>
<td>72.1</td>
<td>126</td>
<td>70.7</td>
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<tr>
<td>654.roms_s</td>
<td>72</td>
<td>68.5</td>
<td>230</td>
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<td>69.6</td>
<td>226</td>
<td>68.5</td>
<td>230</td>
<td>68.8</td>
<td>229</td>
</tr>
</tbody>
</table>

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

(Continued on next page)
New H3C Technologies Co., Ltd. SPECspeed®2017_fp_base = 194

H3C UniServer R6900 G5 (Intel Xeon Platinum 8353H) SPECspeed®2017_fp_peak = 196

CPU2017 License: 9066
Test Date: Mar-2021
Test Sponsor: New H3C Technologies Co., Ltd.
Hardware Availability: Sep-2020
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General Notes (Continued)

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: r6538 of 2020-09-24 e8664e66d2d7080afeaa89d4b38e2f1c
running on localhost.localdomain Fri Mar 26 18:14:40 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 8353H CPU @ 2.50GHz
      4 "physical id"s (chips)
    72 "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 : 18
    siblings : 18
    physical 0: cores 0 1 2 3 4 8 9 10 11 16 17 18 19 20 24 25 26 27
    physical 1: cores 0 1 2 3 4 8 9 10 11 16 17 18 19 20 24 25 26 27
    physical 2: cores 0 1 2 3 4 8 9 10 11 16 17 18 19 20 24 25 26 27
    physical 3: cores 0 1 2 3 4 8 9 10 11 16 17 18 19 20 24 25 26 27

From lscpu:

    Architecture: x86_64
    CPU op-mode(s): 32-bit, 64-bit
    Byte Order: Little Endian
    CPU(s): 72
    On-line CPU(s) list: 0-71
    Thread(s) per core: 1
    Core(s) per socket: 18
    Socket(s): 4
    NUMA node(s): 4
    Vendor ID: GenuineIntel
    CPU family: 6
    Model: 85
    Model name: Intel(R) Xeon(R) Platinum 8353H CPU @ 2.50GHz
    Stepping: 11

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CPU MHz: 1349.666
CPU max MHz: 3800.000
CPU min MHz: 1000.0000
BogoMIPS: 5000.00
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 25344K
NUMA node0 CPU(s): 0-17
NUMA node1 CPU(s): 18-35
NUMA node2 CPU(s): 36-53
NUMA node3 CPU(s): 54-71

Flags: fpu vme de pse tsc msr pae mca cmov pat pse36 clflush dts acpi mpx cmov st sse sse2 ss ht tm pbe syscall nx pdpe1gb rdtscp lm constant_tsc arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc cpuid aperfmperf 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 abtm 3dmovprec mmx 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 abtm 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 abtm

FLAGS =
 /proc/cpuinfo cache data
 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 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17
 node 0 size: 191829 MB
 node 0 free: 191465 MB
 node 1 cpus: 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35
 node 1 size: 193531 MB
 node 1 free: 193220 MB
 node 2 cpus: 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53
 node 2 size: 193531 MB
 node 2 free: 186232 MB
 node 3 cpus: 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71
 node 3 size: 193531 MB
 node 3 free: 193066 MB
 node distances:
 node   0   1   2   3
 0: 10 10 10 10
 /proc/cpuinfo --hardware

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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: 790962744 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/swapps 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

SPEC is set to: /home/speccpu

Filesystem Type Size Used Avail Use% Mounted on  
/dev/mapper/rhel-home xfs 876G 251G 625G 29% /home

From /sys/devices/virtual/dmi/id

**Product Family:** SYSTEM_FAMILY

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:  
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**  
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Compiler Version Notes (Continued)  

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  
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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 Intel(R) 64, Version 2021.1 Build 20201112_000000  
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Intel(R) C Intel(R) 64 Compiler Classic for applications running on Intel(R) 64, Version 2021.1 Build 20201112_000000  
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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  
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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  
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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)

64, Version 2021.1 Build 20201112_000000
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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
    -mbranches-within-32B-boundaries

Fortran benchmarks:
    -m64 -Wl,-z,muldefs -DSPEC_OPENMP -xCORE-AVX512 -ipo -O3

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### Base Optimization Flags (Continued)

Fortran benchmarks (continued):
- `-no-prec-div` `-qopt-prefetch` `-ffinite-math-only`
- `-qopt-mem-layout-trans=4` `-gopenmp` `-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` `-gopenmp`
- `-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` `-gopenmp`
- `-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
New H3C Technologies Co., Ltd.

H3C UniServer R6900 G5 (Intel Xeon Platinum 8353H)

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
            -flto -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.cactusBSSN_s: basepeak = yes
## SPEC CPU®2017 Floating Point Speed Result

### New H3C Technologies Co., Ltd.

**H3C UniServer R6900 G5 (Intel Xeon Platinum 8353H)**

<table>
<thead>
<tr>
<th>SPECspeed®2017_fp_peak</th>
<th>SPECspeed®2017_fp_base</th>
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<td>194</td>
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**CPU2017 License:** 9066  
**Test Sponsor:** New H3C Technologies Co., Ltd.  
**Tested by:** New H3C Technologies Co., Ltd.  
**Test Date:** Mar-2021  
**Hardware Availability:** Sep-2020  
**Software Availability:** Dec-2020

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


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


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