New H3C Technologies Co., Ltd. | SPECspeed®2017_fp_base = 179
H3C UniServer R5300 G5 (Intel Xeon Gold 5320) | SPECspeed®2017_fp_peak = 183

CPU2017 License: 9066
Test Sponsor: New H3C Technologies Co., Ltd.
Tested by: New H3C Technologies Co., Ltd.

<table>
<thead>
<tr>
<th>Software</th>
<th>Hardware</th>
</tr>
</thead>
<tbody>
<tr>
<td>OS: Red Hat Enterprise Linux release 8.4 (Ootpa) 4.18.0-305.el8.x86_64</td>
<td>CPU Name: Intel Xeon Gold 5320</td>
</tr>
<tr>
<td>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;</td>
<td>Max MHz: 3400</td>
</tr>
<tr>
<td>Firmware: Version 5.23 released Apr-2021 BIOS</td>
<td>Nominal: 2200</td>
</tr>
<tr>
<td>File System: xfs</td>
<td>Enabled: 52 cores, 2 chips</td>
</tr>
<tr>
<td>System State: Run level 5 (multi user mode with GUI)</td>
<td>Orderable: 1.2 Chips</td>
</tr>
<tr>
<td>Base Pointers: 64-bit</td>
<td>Cache L1: 32 KB I + 48 KB D on chip per core</td>
</tr>
<tr>
<td>Peak Pointers: 64-bit</td>
<td>L2: 1.25 MB I+D on chip per core</td>
</tr>
<tr>
<td>Other: jemalloc memory allocator V5.0.1</td>
<td>L3: 39 MB I+D on chip per chip</td>
</tr>
<tr>
<td>Power Management: BIOS and OS set to prefer performance at the cost of additional power usage</td>
<td>Other: None</td>
</tr>
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</table>

Hardware

<table>
<thead>
<tr>
<th>Test Date: Dec-2021</th>
<th>Software Availability: Apr-2021</th>
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<td>Software Availability: Jun-2021</td>
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<tr>
<th>Threads</th>
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<tr>
<td>603.bwaves_s 52</td>
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<tr>
<td>607.cactuBSSN_s 52</td>
<td>229</td>
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<tr>
<td>619.lbm_s 52</td>
<td>134</td>
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<tr>
<td>621.wrf_s 52</td>
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<tr>
<td>627.cam4_s 52</td>
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<td>628.pop2_s 52</td>
<td>76.8</td>
</tr>
<tr>
<td>638.imagick_s 52</td>
<td>164</td>
</tr>
<tr>
<td>644.nab_s 52</td>
<td>109</td>
</tr>
<tr>
<td>649.fotonik3d_s 52</td>
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<tr>
<td>654.roms_s 52</td>
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## Results Table

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<tr>
<th>Benchmark</th>
<th>Threads</th>
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<tr>
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<td>88.1</td>
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<td>47.5</td>
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<td>47.6</td>
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<tr>
<td>649.fotonik3d_s</td>
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<td>83.9</td>
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<td>83.5</td>
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<tr>
<td>654.roms_s</td>
<td>52</td>
<td>79.4</td>
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<td>79.4</td>
<td>198</td>
<td>78.1</td>
<td>202</td>
<td>77.7</td>
</tr>
</tbody>
</table>

**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

Prior to runcpu invocation

Filesystem page cache synced and cleared with:

`sync; echo 3> /proc/sys/vm/drop_caches`

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.

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.

H3C UniServer R5300 G5 (Intel Xeon Gold 5320)

| SPECspeed®2017_fp_base = 179 |
| SPECspeed®2017_fp_peak = 183 |

CPU2017 License: 9066
Test Sponsor: New H3C Technologies Co., Ltd.
Tested by: New H3C Technologies Co., Ltd.
Test Date: Dec-2021
Hardware Availability: Apr-2021
Software Availability: Jun-2021

General Notes (Continued)


Platform Notes

BIOS Settings:
Set SNC to enabled
Set Patrol Scrub to disabled
Set Hyper-Threading to disabled

.Sysinfo program /home/speccpu/bin/sysinfo
Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16acaf64d
running on localhost.localdomain Fri Dec 31 04:55:29 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) Gold 5320 CPU @ 2.20GHz
  2 "physical id"s (chips)
  52 "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  : 26
  siblings  : 26
  physical 0: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25
  physical 1: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25

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): 52
  On-line CPU(s) list: 0-51
  Thread(s) per core: 1
  Core(s) per socket: 26
  Socket(s): 2
  NUMA node(s): 2
  Vendor ID: GenuineIntel
  BIOS Vendor ID: Intel(R) Corporation
  CPU family: 6
  Model: 106
  Model name: Intel(R) Xeon(R) Gold 5320 CPU @ 2.20GHz
  BIOS Model name: Intel(R) Xeon(R) Gold 5320 CPU @ 2.20GHz

(Continued on next page)
### SPEC CPU®2017 Floating Point Speed Result

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

**H3C UniServer R5300 G5 (Intel Xeon Gold 5320)**

<table>
<thead>
<tr>
<th>SPECspeed®2017_fp_base</th>
<th>179</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECspeed®2017_fp_peak</td>
<td>183</td>
</tr>
</tbody>
</table>

**CPU2017 License:** 9066

**Test Sponsor:** New H3C Technologies Co., Ltd.

**Tested by:** New H3C Technologies Co., Ltd.

**Test Date:** Dec-2021

**Hardware Availability:** Apr-2021

**Software Availability:** Jun-2021

### Platform Notes (Continued)

- Stepping: 6
- CPU MHz: 2470.771
- CPU max MHz: 3400.0000
- CPU min MHz: 800.0000
- BogoMIPS: 4400.00
- Virtualization: VT-x
- L1d cache: 48K
- L1i cache: 32K
- L2 cache: 1280K
- L3 cache: 39396K
- NUMA node0 CPU(s): 0-25
- NUMA node1 CPU(s): 26-51
- 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 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 abm 3dnowprefetch cpuid_fault epb cat_l3 invpcid_single intel_ppn ssbd mba ibrs ibpb ibrs_enhanced tpr_shadow vmmx flexpriority ect vpid ept_ad fsgsbase tsc_adjust bm1i hle avx2 smep bmi2 erms invpcid cmp rdt_a avx512f avx512dq rdseed adx smap avx512ifma clflushopt clwb intel_pt avx512cd sha ni avx512bw avx512vl xsaveopt xsavec xsaveopt xsaves cqm_llc cqm_occphys_llc cqm_mbm_total cqm_mbm_local split_lock_detect wbnoinvd dtherm ida arat pln pts hwp act_window hwp_epp hwp_pkg_req avx512vl umip pku ospke avx512 vbmi2 gfnl vaes vpclmulqdq avx512_vnni avx512_bitalg tme avx512_vpopcntdq la57 rdpid fsrcmd md_clear pconfreg flush_l1d arch_capabilities

/proc/cpuinfo cache data

```plaintext
  cache size : 39396 KB
```

From numactl --hardware

**WARNING:** a numactl 'node' might or might not correspond to a physical chip.

- available: 2 nodes (0-1)
  - 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 24 25
  - node 0 size: 515678 MB
  - node 0 free: 514735 MB
  - node 1 cpus: 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51
  - node 1 size: 516050 MB
  - node 1 free: 514162 MB
- node distances:
  - node 0 1
    - 0: 10 20
    - 1: 20 10

From /proc/meminfo

```plaintext
  MemTotal: 1056490464 KB
```

(Continued on next page)
SPEC CPU®2017 Floating Point Speed Result

New H3C Technologies Co., Ltd.
H3C UniServer R5300 G5 (Intel Xeon Gold 5320)

SPECspeed®2017_fp_base = 179
SPECspeed®2017_fp_peak = 183

CPU2017 License: 9066
Test Sponsor: New H3C Technologies Co., Ltd.
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Test Date: Dec-2021
Hardware Availability: Apr-2021
Software Availability: Jun-2021

Platform Notes (Continued)

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="8.4 (Ootpa)"
ID="rhel"
ID_LIKE="fedora"
VERSION_ID="8.4"
PLATFORM_ID="platform:el8"
PRETTY_NAME="Red Hat Enterprise Linux 8.4 (Ootpa)"
ANSI_COLOR="0;31"
redhat-release: Red Hat Enterprise Linux release 8.4 (Ootpa)
system-release: Red Hat Enterprise Linux release 8.4 (Ootpa)
system-release-cpe: cpe:/o:redhat:enterprise_linux:8.4:ga
uname -a:
Linux localhost.localdomain 4.18.0-305.el8.x86_64 #1 SMP Thu Apr 29 08:54:30 EDT 2021
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
CVE-2020-0543 (Special Register Buffer Data Sampling): Not affected
CVE-2019-11135 (TSX Asynchronous Abort): Not affected
run-level 5 Dec 31 04:53
SPEC is set to: /home/speccpu

(Continued on next page)
**New H3C Technologies Co., Ltd.**

**H3C UniServer R5300 G5 (Intel Xeon Gold 5320)**

| SPECspeed\textsuperscript{®}2017\_fp\_base | 179 |
| SPECspeed\textsuperscript{®}2017\_fp\_peak | 183 |

---

**Platform Notes (Continued)**

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<thead>
<tr>
<th>Filesystem</th>
<th>Type</th>
<th>Size</th>
<th>Used</th>
<th>Avail</th>
<th>Use%</th>
<th>Mounted on</th>
</tr>
</thead>
<tbody>
<tr>
<td>/dev/mapper/rhel-home</td>
<td>xfs</td>
<td>1.1T</td>
<td>124G</td>
<td>919G</td>
<td>12%</td>
<td>/home</td>
</tr>
</tbody>
</table>

From /sys/devices/virtual/dmi/id

- **Vendor:** New H3C Technologies Co., Ltd.
- **Product:** UniServer R5300 G5
- **Product Family:** Rack
- **Serial:** 210235A3WGH213000015

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:**
16x Hynix HMAA8GR7CJR4N-XN 64 GB 2 rank 3200, configured at 2933

**BIOS:**
- **BIOS Vendor:** American Megatrends International, LLC.
- **BIOS Version:** 5.23
- **BIOS Date:** 04/23/2021
- **BIOS Revision:** 5.21

(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.

```
C | 619.lbm_s(base, peak) 638.imagick_s(base, peak) 644.nab_s(base)
```

(Continued on next page)
New H3C Technologies Co., Ltd.

H3C UniServer R5300 G5 (Intel Xeon Gold 5320)

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Tested by: New H3C Technologies Co., Ltd.
Software Availability: Jun-2021

Compiler Version Notes (Continued)

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

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

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.

Fortran

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

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.
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Test Date: Dec-2021
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Compiler Version Notes (Continued)

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
-mbraches-within-32B-boundaries

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

(Continued on next page)
## SPEC CPU®2017 Floating Point Speed Result

New H3C Technologies Co., Ltd. | SPECspeed®2017_fp_base = 179
H3C UniServer R5300 G5 (Intel Xeon Gold 5320) | SPECspeed®2017_fp_peak = 183

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<tr>
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</tr>
</tbody>
</table>

### Base Optimization Flags (Continued)

Fortran benchmarks (continued):
- `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-transforms=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-transforms=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

### Peak Optimization Flags

C benchmarks:

(Continued on next page)
New H3C Technologies Co., Ltd.
H3C UniServer R5300 G5 (Intel Xeon Gold 5320)

CPU2017 License: 9066
Test Sponsor: New H3C Technologies Co., Ltd.
Tested by: New H3C Technologies Co., Ltd.

Peak Optimization Flags (Continued)

619.ibm_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 -fopenmp
-DSPEC_OPENMP -qopt-mem-layout-trans=4
-flto-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

The flags files that were used to format this result can be browsed at
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<tr>
<th>New H3C Technologies Co., Ltd.</th>
<th>SPECspeed®2017_fp_base = 179</th>
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<tr>
<td><strong>H3C UniServer R5300 G5 (Intel Xeon Gold 5320)</strong></td>
<td><strong>SPECspeed®2017_fp_peak = 183</strong></td>
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