# SPEC CPU®2017 Floating Point Speed Result

## New H3C Technologies Co., Ltd.

H3C UniServer R6900 G5 (Intel Xeon Gold 5320H)

<table>
<thead>
<tr>
<th>SPECspeed®2017_fp_base</th>
<th>SPECspeed®2017_fp_peak</th>
</tr>
</thead>
<tbody>
<tr>
<td>201</td>
<td>204</td>
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</table>

**CPU2017 License:** 9066  
**Test Date:** Apr-2021  
**Test Sponsor:** New H3C Technologies Co., Ltd.  
**Hardware Availability:** Sep-2020  
**Tested by:** New H3C Technologies Co., Ltd.  
**Software Availability:** Dec-2020

### Hardware

- **CPU Name:** Intel Xeon Gold 5320H  
- **Max MHz:** 4200  
- **Nominal:** 2400  
- **Enabled:** 80 cores, 4 chips  
- **Orderable:** 1,2,3,4 chips  
- **Cache L1:** 32 KB I + 32 KB D on chip per core  
- **Cache L2:** 1 MB I+D on chip per core  
- **Cache L3:** 27.5 MB I+D on chip per chip  
- **Memory:** 768 GB (48 x 16 GB 2Rx8 PC4-3200V-R, running at 2666)  
- **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.
New H3C Technologies Co., Ltd.

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<table>
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<th>Ratio</th>
<th>Base</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Peak</th>
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<th>Peak</th>
<th>Seconds</th>
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<td>240</td>
<td>65.7</td>
<td>240</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)
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H3C UniServer R6900 G5 (Intel Xeon Gold 5320H)

SPECspeed®2017_fp_base = 201
SPECspeed®2017_fp_peak = 204

CPU2017 License: 9066
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Test Date: Apr-2021
Hardware Availability: Sep-2020
Tested by: New H3C Technologies Co., Ltd.
Software Availability: Dec-2020

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 Apr 23 19:46:47 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 5320H CPU @ 2.40GHz
  4 "physical id"s (chips)
  80 "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 : 20
          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): 80
On-line CPU(s) list: 0-79
Thread(s) per core: 1
Core(s) per socket: 20
Socket(s): 4
NUMA node(s): 4
Vendor ID: GenuineIntel
CPU family: 6
Model: 85
Model name: Intel(R) Xeon(R) Gold 5320H CPU @ 2.40GHz
Stepping: 11
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### Platform Notes (Continued)

- **CPU MHz:** 3366.803  
- **CPU max MHz:** 4200.000  
- **CPU min MHz:** 1000.000  
- **BogoMIPS:** 4800.00  
- **Virtualization:** VT-x  
- **L1d cache:** 32K  
- **L1i cache:** 32K  
- **L2 cache:** 1024K  
- **L3 cache:** 28160K  
- **NUMA node0 CPU(s):** 0-19  
- **NUMA node1 CPU(s):** 20-39  
- **NUMA node2 CPU(s):** 40-59  
- **NUMA node3 CPU(s):** 60-79  
- **Flags:** fpu vme de pse tsc msr pae mce cmov pat pse36 clflush dtc acpi mmx fxsr sse sse2 ss ht tm pbe syscall nx pdflush rdtscp lm constant_tsc art arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc cpuid aperfmpref perf 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 3nowprefetch cpuid_fault epb cat_l3 cdp_l3 invpcid_single intel_pppin ssbd mba ibrs ibpb stibp ibrs_enhanced tpr_shadow vnmi flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid rtm cqm mpx rdts_a avx512f avx512dq rdseed adx map lflushopt clwb intel_pt avx512cd avx512bw avx512vl xsaveopt xsaves xgetbv1 xsavec qcm_llc qcm_occup LLC qcm_mbm_total qcm_mbm_local avx512_bf16 dtherm ida arat pin 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 : 28160 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  
**node 0 size:** 191856 MB  
**node 0 free:** 184541 MB  
**node 1 cpus:** 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39  
**node 1 size:** 193503 MB  
**node 1 free:** 193042 MB  
**node 2 cpus:** 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59  
**node 2 size:** 193531 MB  
**node 2 free:** 193330 MB  
**node 3 cpus:** 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79  
**node 3 size:** 193530 MB  
**node 3 free:** 193170 MB  
**node distances:**  
**node 0:** 0 1 2 3  
**node 1:** 0 10 20 30  
**node 2:** 0 10 20 30  
**node 3:** 0 10 20 30

(Continued on next page)
Platform Notes (Continued)

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

From /proc/meminfo
   MemTotal:       790960636 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 Apr 23 15:54

SPEC is set to: /home/speccpu
Filesystem        Type  Size  Used Avail Use% Mounted on
/dev/mapper/rhel-home xfs   876G  263G  614G  30% /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, configured at 2666

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
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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
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<th>Program</th>
<th>SPECspeed</th>
<th>Time (CPU)</th>
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**Compiler Version Notes (Continued)**

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**Base Compiler Invocation**

C benchmarks:

```plaintext
icc
```

Fortran benchmarks:

```plaintext
ifort
```

Benchmarks using both Fortran and C:

```plaintext
ifort icc
```

Benchmarks using Fortran, C, and C++:

```plaintext
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:

```plaintext
-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
```

(Continued on next page)
New H3C Technologies Co., Ltd. | SPECspeed®2017 fp_base = 201
H3C UniServer R6900 G5 (Intel Xeon Gold 5320H) | SPECspeed®2017 fp_peak = 204

CPU2017 License: 9066 | Test Date: Apr-2021
Test Sponsor: New H3C Technologies Co., Ltd. | Hardware Availability: Sep-2020
Tested by: New H3C Technologies Co., Ltd. | Software Availability: Dec-2020

**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
New H3C Technologies Co., Ltd.

H3C UniServer R6900 G5 (Intel Xeon Gold 5320H)

SPECspeed®2017_fp_base = 201
SPECspeed®2017_fp_peak = 204

CPU2017 License: 9066
Test Sponsor: New H3C Technologies Co., Ltd.
Test Date: Apr-2021
Tested by: New H3C Technologies Co., Ltd.
Hardware Availability: Sep-2020
Software Availability: Dec-2020

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
-fito -mfmath=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
-03 -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 -03 -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 Gold 5320H)

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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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