# SPEC CPU®2017 Integer Rate Result

## New H3C Technologies Co., Ltd.

### H3C UniServer R4900 G3 (Intel Xeon Gold 5218N)

**SPECrate®2017_int_base = 195**

**SPECrate®2017_int_peak = 201**

| Copies | 0 | 20 | 40 | 60 | 80 | 100 | 120 | 140 | 160 | 180 | 200 | 220 | 240 | 260 | 280 | 300 | 320 | 340 | 360 | 380 | 400 | 415 |
|--------|---|----|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 500.perlbench_r | 64 |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     | 153 | 155 |
| 502.gcc_r | 64 |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     | 175 |
| 505.mcf_r | 64 |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     | 323 |
| 520.omnetpp_r | 64 |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     | 128 |
| 523.xalancbmk_r | 64 |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     | 251 |
| 525.x264_r | 64 |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     | 398 |
| 531.deepsjeng_r | 64 |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     | 413 |
| 541.leela_r | 64 |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     | 149 |
| 548.exchange2_r | 64 |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     | 148 |
| 557.xz_r | 64 |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     | 363 |

### Hardware

- **CPU Name**: Intel Xeon Gold 5218N
- **Max MHz**: 3700
- **Nominal**: 2300
- **Enabled**: 32 cores, 2 chips, 2 threads/core
- **Orderable**: 1.2 chips
- **Cache L1**: 32 KB I + 32 KB D on chip per core
- **L2**: 1 MB I+D on chip per core
- **L3**: 22 MB I+D on chip per chip
- **Other**: None
- **Memory**: 384 GB (12 x 32 GB 2Rx8 PC4-2933Y-R, running at 2666)
- **Storage**: 1 x 1.6 TB SSD NVME
- **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**: No
- **Firmware**: Version 2.00.49 released Apr-2021 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
New H3C Technologies Co., Ltd.  
H3C UniServer R4900 G3 (Intel Xeon Gold 5218N)

**SPEC CPU®2017 Integer Rate Result**

**Copyright 2017-2021 Standard Performance Evaluation Corporation**

**SPECrate®2017_int_base = 195**  
**SPECrate®2017_int_peak = 201**

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**Results Table**

<table>
<thead>
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</table>

**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"

MALLOCONF = "retain:true"

---

**General Notes**

Binaries compiled on a system with 1x Intel Core i9-7980XE CPU + 64GB RAM memory using Red Hat Enterprise Linux 8.1

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.
General Notes (Continued)

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
Filesyststem page cache synced and cleared with:
    sync; echo 3>/proc/sys/vm/drop_caches
runcpu command invoked through numactl i.e.:
    numactl --interleave=all runcpu <etc>
jemalloc, a general purpose malloc implementation
built with the RedHat Enterprise 7.5, and the system compiler gcc 4.8.5

Platform Notes

BIOS settings:
Set SNC to Enabled
Set IMC Interleaving to 1-way Interleave
Set Patrol Scrub to Disabled
Set XPT Prefetcher to Enabled

Sysinfo program /home/speccpu/bin/sysinfo
Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16acafc64d
running on localhost.localdomain Tue Aug 17 04:11:03 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 5218N CPU @ 2.30GHz
    2 "physical id"s (chips)
    64 "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 : 16
    siblings  : 32
    physical 0: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
    physical 1: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

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): 64
    On-line CPU(s) list: 0-63
    Thread(s) per core: 2

(Continued on next page)
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New H3C Technologies Co., Ltd.
H3C UniServer R4900 G3 (Intel Xeon Gold 5218N)

SPECrate®2017_int_base = 195
SPECrate®2017_int_peak = 201

CPU2017 License: 9066
Test Sponsor: New H3C Technologies Co., Ltd.
Tested by: New H3C Technologies Co., Ltd.
Test Date: Aug-2021
Hardware Availability: Jun-2019
Software Availability: Dec-2020

Platform Notes (Continued)

Core(s) per socket: 16
Socket(s): 2
NUMA node(s): 4
Vendor ID: GenuineIntel
CPU family: 6
Model: 85
Model name: Intel(R) Xeon(R) Gold 5218N CPU @ 2.30GHz
Stepping: 6
CPU MHz: 2900.629
CPU max MHz: 3900.0000
CPU min MHz: 1000.0000
BogoMIPS: 4600.00
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 22528K
NUMA node0 CPU(s): 0-3,8-11,32-35,40-43
NUMA node1 CPU(s): 4-7,12-15,36-39,44-47
NUMA node2 CPU(s): 16-19,24-27,48-51,56-59
NUMA node3 CPU(s): 20-23,28-31,52-55,60-63
Flags: fpu vme de pse tsc msr pae mce cmov pat pse36 clflush dts acp1 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 ds_cpl vmx smx est tm2 ssse3 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 cdp_l3 invpcid_single intel_pppin ssbd mba ibrs ibpb stibp ibrs_enhanced tpr_shadow vni flexpriority ept vpid fsgsbase ts_cadjust tm lsignum intel_pnni_ftr stibp ts adxl smt avx2 smep bmi2 erms invpcid rtm cqm mpx rdr_dtl aavx512f aavx512dq rdseed adx smap clflushopt clwb intel_pt avx512cd avx512bw avx512vl xsaves opt xsavec xgetbv1 xsaves cqm_llc cqm_occup_llc cqm_mbm_total cqm_mbm_local dtherm ida arat pln pts hwp hwp_act_window hwp_epp hwp_pkg_req pku ospke avx512_vnni md_clear flush lbarch_capabilities

/proc/cpuinfo cache data

cache size : 22528 KB

From numactl --hardware
WARNING: a numacl 'node' might or might not correspond to a physical chip.
available: 4 nodes (0-3)
node 0 cpus: 0 1 2 3 8 9 10 11 32 33 34 35 40 41 42 43
node 0 size: 95091 MB
node 0 free: 94629 MB
node 1 cpus: 4 5 6 7 12 13 14 15 36 37 38 39 44 45 46 47
node 1 size: 96764 MB
node 1 free: 95801 MB
node 2 cpus: 16 17 18 19 24 25 26 27 48 49 50 51 56 57 58 59

(Continued on next page)
Platform Notes (Continued)

node 2 size: 96736 MB
node 2 free: 96480 MB
node 3 cpus: 20 21 22 23 28 29 30 31 52 53 54 55 60 61 62 63
node 3 size: 96763 MB
node 3 free: 96477 MB
node distances:
node 0 1 2 3
  0: 10 11 21 21
  1: 11 10 21 21
  2: 21 21 10 11
  3: 21 21 11 10

From /proc/meminfo
MemTotal: 394605200 kB
HugePages_Total: 0
Hugepagesize: 2048 kB

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

/sys/devices/system/cpu/cpu*/cpufreq/scaling_governor has performance

From /etc/*release* /etc/*version*
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): KVM: Mitigation: Split huge pages
CVE-2018-3620 (L1 Terminal Fault): Not affected
Microarchitectural Data Sampling: Not affected
CVE-2017-5754 (Meltdown): Not affected

(Continued on next page)
Platform Notes (Continued)

CVE-2018-3639 (Speculative Store Bypass):
Mitigation: Speculative Store Bypass disabled via prctl and seccomp

CVE-2017-5753 (Spectre variant 1):
Mitigation: usercopy/swapgs 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): No status reported

CVE-2019-11135 (TSX Asynchronous Abort):
Mitigation: Clear CPU buffers; SMT vulnerable

SPEC is set to: /home/speccpu

Filesystem            Type  Size  Used Avail Use% Mounted on
/dev/mapper/rhel-home xfs   1.5T  138G  1.3T  10% /home

From /sys/devices/virtual/dmi/id
Vendor:         New H3C Technologies Co., Ltd.
Product:        UniServer R4900 G3
Product Family: Rack
Serial:         210235A3TKH193000008

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:
12x Micron 18ASF4G72PDZ-2G9E1 32 GB 2 rank 2933, configured at 2666
12x NO DIMM NO DIMM

BIOS:
BIOS Vendor:       American Megatrends Inc.
BIOS Version:      2.00.49
BIOS Date:         04/16/2021
BIOS Revision:     5.14

(End of data from sysinfo program)

Compiler Version Notes

==============================================================================
C       | 500.perlbench_r(peak) 557.xz_r(peak)
==============================================================================

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

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

H3C UniServer R4900 G3 (Intel Xeon Gold 5218N)

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<th>SPECrate\textsuperscript{®}2017_int_base</th>
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<tr>
<td>SPECrate\textsuperscript{®}2017_int_peak</td>
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### Compiler Version Notes (Continued)

Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

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<tr>
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| C | 500.perlbench\_r(base) 502.gcc\_r(base) 505.mcf\_r(base, peak) 525.x264\_r(base, peak) 557.xz\_r(base) |
|---------------------------------------------|
| 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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| C | 500.perlbench\_r(peak) 557.xz\_r(peak) |
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| C | 500.perlbench\_r(peak) 557.xz\_r(peak) |
|----------------------------------------|

(Continued on next page)
## 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 | 502.gcc_r(peak)

Intel(R) oneAPI DPC++/C++ Compiler for applications running on IA-32, Version 2021.1 Build 20201113
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

C | 500.perlbench_r(base) 502.gcc_r(base) 505.mcf_r(base, peak) 525.x264_r(base, peak) 557.xz_r(base)

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++ | 520.omnetpp_r(base, peak) 523.xalancbmk_r(base, peak) 531.deepsjeng_r(base, peak) 541.leela_r(base, 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.

Fortran | 548.exchange2_r(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.
```

## Base Compiler Invocation

C benchmarks:
- icx

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

<table>
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<tr>
<th>H3C UniServer R4900 G3 (Intel Xeon Gold 5218N)</th>
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| CPU2017 License: | 9066 |
| Test Sponsor: | New H3C Technologies Co., Ltd. |
| Tested by: | New H3C Technologies Co., Ltd. |

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## Base CompilerInvocation (Continued)

### C++ benchmarks:
- icpx

### Fortran benchmarks:
- ifort

---

## Base Portability Flags

```plaintext
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
541.leela_r: -DSPEC LP64
548.exchange2_r: -DSPEC LP64
557.xz_r: -DSPEC LP64
```

---

## Base Optimization Flags

### C benchmarks:
- `-w` `-std=c11` `-m64` `-Wl, -z, multidefs` `-xCORE-AVX512` `-O3` `-ffast-math`
- `-flto` `-mfpmath=sse` `-funroll-loops` `-qopt-mem-layout-trans=4`
- `-mbranches-within-32B-boundaries`
- `-L/opt/intel/oneapi/compiler/2021.1.1/linux/compiler/lib/intel64_lin`
- `-lqkmalloc`

### C++ benchmarks:
- `-w` `-m64` `-Wl, -z, multidefs` `-xCORE-AVX512` `-O3` `-ffast-math` `-flto`
- `-mfpmath=sse` `-funroll-loops` `-qopt-mem-layout-trans=4`
- `-mbranches-within-32B-boundaries`
- `-L/opt/intel/oneapi/compiler/2021.1.1/linux/compiler/lib/intel64_lin`
- `-lqkmalloc`

### Fortran benchmarks:
- `-w` `-m64` `-Wl, -z, multidefs` `-xCORE-AVX512` `-O3` `-ipo` `-no-prec-div`
- `-qopt-mem-layout-trans=4` `-nostandard-realloc-lhs` `-align array32byte`
- `-auto` `-mbranches-within-32B-boundaries`
- `-L/opt/intel/oneapi/compiler/2021.1.1/linux/compiler/lib/intel64_lin`
- `-lqkmalloc`
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**CPU2017 License:** 9066

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

**Test Date:** Aug-2021

**Hardware Availability:** Jun-2019

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

**Software Availability:** Dec-2020

---

## Peak Compiler Invocation

C benchmarks (except as noted below):
- icx

500.perlbench_r:icc

557.xz_r:icc

C++ benchmarks:
- icpx

Fortran benchmarks:
- ifort

---

## 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: -DSPEC_LP64 -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: -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2)
  -xCORE-AVX512 -ipo -O3 -no-prec-div
  -qopt-mem-layout-trans=4 -fno-strict-overflow
  -mbranches-within-32B-boundaries
  -L/opt/intel/oneapi/compiler/2021.1.1/linux/compiler/lib/intel64_lin
  -lqkmalloc

- 502.gcc_r: -m32
  -L/opt/intel/oneapi/compiler/2021.1.1/linux/compiler/lib/ia32_lin
  -std=gnu89 -Wl,-z,muldefs -fprofile-generate(pass 1)
  -fprofile-use=default.profdata(pass 2) -xCORE-AVX512 -flto
  -Ofast(pass 1) -O3 -ffast-math -qopt-mem-layout-trans=4

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New H3C Technologies Co., Ltd.

H3C UniServer R4900 G3 (Intel Xeon Gold 5218N)

| SPECrate®2017_int_base = 195 |
| SPECrate®2017_int_peak = 201 |

**CPU2017 License:** 9066

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**Hardware Availability:** Jun-2019

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

**Software Availability:** Dec-2020

### Peak Optimization Flags (Continued)

502.gcc_r (continued):
- -mbranches-within-32B-boundaries
- -L/usr/local/jemalloc32-5.0.1/lib -ljemalloc

505.mcf_r: basepeak = yes

525.x264_r: -w --std=c11 -m64 -Wl, -z, muldefs -xCORE-AVX512 -flto
- -O3 -ffast-math -qopt-mem-layout-trans=4 -fno-alias
- -mbranches-within-32B-boundaries
- -L/opt/intel/oneapi/compiler/2021.1.1/linux/compiler/lib/intel64_lin
- -ljmalloc

557.xz_r: -Wl, -z, muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div
- -qopt-mem-layout-trans=4 -mbranches-within-32B-boundaries
- -L/opt/intel/oneapi/compiler/2021.1.1/linux/compiler/lib/intel64_lin
- -ljmalloc

C++ benchmarks:

520.omnetpp_r: basepeak = yes

523.xalancbmk_r: basepeak = yes

531.deepsjeng_r: basepeak = yes

541.leela_r: basepeak = yes

Fortran benchmarks:

548.exchange2_r: basepeak = yes

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


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-ic2021-official-linux64_revA.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.

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