New H3C Technologies Co., Ltd.

H3C UniServer R4900 G3 (Intel Xeon Gold 5222)

SPECspeed\textsuperscript{®2017\_int\_base} = 9.94

SPECspeed\textsuperscript{®2017\_int\_peak} = 10.2

CPU2017 License: 9066

Test Date: Sep-2020

Test Sponsor: New H3C Technologies Co., Ltd.

Hardware Availability: Mar-2019

Tested by: New H3C Technologies Co., Ltd.

Software Availability: Apr-2020

---

**Hardware**

- **CPU Name:** Intel Xeon Gold 5222
- **Max MHz:** 3900
- **Nominal:** 3800
- **Enabled:** 8 cores, 2 chips
- **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:** 16.5 MB I+D on chip per chip
- **Memory:** 384 GB (12 x 32 GB 2Rx4 PC4-2933V-R)
- **Storage:** 2 x 600 GB SAS HDD,10k RPM,RAID 1

**Software**

- **OS:** Red Hat Enterprise Linux release 8.2 (Ootpa) 4.18.0-193.el8.x86_64
- **Compiler:** C/C++: Version 19.1.1.217 of Intel C/C++ Compiler Build 20200306 for Linux;
  Fortran: Version 19.1.1.217 of Intel Fortran Compiler Build 20200306 for Linux
- **Parallel:** Yes
- **Firmware:** Version 2.00.33 released Aug-2019 BIOS
- **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
**SPEC CPU®2017 Integer Speed Result**

New H3C Technologies Co., Ltd.  
H3C UniServer R4900 G3 (Intel Xeon Gold 5222)

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
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<td>600.perlbench_s</td>
<td>8</td>
<td>272</td>
<td>6.52</td>
<td>274</td>
<td>6.49</td>
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<td>602.gcc_s</td>
<td>8</td>
<td>416</td>
<td>9.58</td>
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<td>417</td>
<td>9.55</td>
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<td>605.mcf_s</td>
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<td>113</td>
<td>15.6</td>
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<td>631.deepsjeng_s</td>
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<td>250</td>
<td>5.73</td>
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<td>648.exchange2_s</td>
<td>8</td>
<td>179</td>
<td>16.4</td>
<td>181</td>
<td>16.3</td>
<td>179</td>
<td>16.4</td>
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<td>657.xz_s</td>
<td>8</td>
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<td>13.7</td>
<td>453</td>
<td>13.6</td>
<td>452</td>
<td>13.7</td>
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</tbody>
</table>

**Compiler Notes**

The inconsistent Compiler version information under Compiler Version section is due to a discrepancy in Intel Compiler.  
The correct version of C/C++ compiler is: Version 19.1.1.217 Build 20200306 Compiler for Linux  
The correct version of Fortran compiler is: Version 19.1.1.217 Build 20200306 Compiler for Linux

**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,scatter"  
LD_LIBRARY_PATH = "/home/speccpu/lib/intel64:/home/speccpu/je5.0.1-64"  
MALLOCONF = "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)
New H3C Technologies Co., Ltd.  
H3C UniServer R4900 G3 (Intel Xeon Gold 5222)  

SPECspeed®2017_int_base = 9.94  
SPECspeed®2017_int_peak = 10.2

CPU2017 License: 9066  
Test Date: Sep-2020  
Test Sponsor: New H3C Technologies Co., Ltd.  
Hardware Availability: Mar-2019  
Hardware Used: New H3C Technologies Co., Ltd.  
Software Availability: Apr-2020

General Notes (Continued)

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  

Platform Notes

BIOS Settings:  
Set Hyper Threading to Disabled  
Set XPT Prefetch to Auto  
Set Patrol Scrub to Disabled  
Set IMC Interleaving to 2-way Interleave  

Sysinfo program /home/spec/cpu/bin/sysinfo  
Rev: r6365 of 2019-08-21 295195f888a3d7ed1e6e46a485a0011  
running on localhost.localdomain Sun Sep 13 11:23:34 2020

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 5222 CPU @ 3.80GHz  
2 "physical id"s (chips)  
8 "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 : 4  
siblings : 4  
physical 0: cores 0 5 9 13  
physical 1: cores 0 2 11 13

From lscpu:  
Architecture: x86_64  
CPU op-mode(s): 32-bit, 64-bit  
Byte Order: Little Endian  
CPU(s): 8  
On-line CPU(s) list: 0-7  
Thread(s) per core: 1  
Core(s) per socket: 4  
Socket(s): 2  
NUMA node(s): 2

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

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

Platform Notes (Continued)

Vendor ID: GenuineIntel
CPU family: 6
Model: 85
Model name: Intel(R) Xeon(R) Gold 5222 CPU @ 3.80GHz
Stepping: 7
CPU MHz: 1961.152
CPU max MHz: 3900.0000
CPU min MHz: 1200.0000
BogoMIPS: 7600.00
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 16896K
NUMA node0 CPU(s): 0–3
NUMA node1 CPU(s): 4–7
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 aes xsave
avx f16c rdrand lahf_lm abm 3dnowprefetch cpuid_fault epb cat_l3 cdp_l3
invpcid_single intel_pdpin ssbd mba ibrs ibpb ibrs_enhanced tpr_shadow vnmi
defxprecie ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid rtm
cqm mxpx rdt_a avx512f avx512dq rdseed adx smap clflushopt clwb intel_pt avx512cd
avx512bw avx512vl xsaveopt xsavec xSAVE xSaves cqm_llc cqm_occmap_llc cqm_mbb_total

cqm_mbb_local dtherm ida arat pln pts hwp hwp_act_window hwp_epp hwp_pkg_req pku
ospke avx512_vnni md_clear flush_l1d arch_capabilities

/cache data
cache size: 16896 KB

From /proc/cpuinfo

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

From numactl --hardware

(Continued on next page)
New H3C Technologies Co., Ltd.  
H3C UniServer R4900 G3 (Intel Xeon Gold 5222)

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

**SPECspeed®2017_int_base = 9.94**  
**SPECspeed®2017_int_peak = 10.2**

Platform Notes (Continued)

MemTotal: 395569252 kB  
HugePages_Total: 0  
Hugepagesize: 2048 kB

From /etc/*release* /etc/*version*

```plaintext
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:

- **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
- **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
- **tsx_async_abort:** Mitigation: Clear CPU buffers; SMT disabled

run-level 3 Sep 13 11:19

SPEC is set to: /home/speccpu

```
Filesystem Type Size Used Avail Use% Mounted on
/dev/mapper/rhel-home xfs 504G 58G 446G 12% /home
```

From /sysdevices/virtual/dmi/id

**BIOS:** American Megatrends Inc. 2.00.33 08/22/2019
**Vendor:** H3C
**Product:** RS33M2C9S
**Product Family:** Rack

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

New H3C Technologies Co., Ltd. H3C UniServer R4900 G3 (Intel Xeon Gold 5222)

SPECspeed®2017_int_base = 9.94
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CPU2017 License: 9066
Test Sponsor: New H3C Technologies Co., Ltd.
Tested by: New H3C Technologies Co., Ltd.

Platform Notes (Continued)

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:
12x NO DIMM NO DIMM
1x Samsung M393A4K40CB2-CVF 32 GB 2 rank 2933
11x Samsung M393A4K40DB2-CVF 32 GB 2 rank 2933

(End of data from sysinfo program)

Compiler Version Notes

==============================================================================
| C       | 600.perlbench_s(base) 602.gcc_s(base, peak) 605.mcf_s(base, peak) 625.x264_s(base, peak) 657.xz_s(base, peak) |
|---------------------------|
| Intel(R) C Compiler for applications running on Intel(R) 64, Version 2021.1 NextGen Build 20200304 |
| Copyright (C) 1985-2020 Intel Corporation. All rights reserved. |
==============================================================================

==============================================================================
| C       | 600.perlbench_s(peak) |
|---------------------------|
| Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64, Version 19.1.1.217 Build 20200306 |
| Copyright (C) 1985-2020 Intel Corporation. All rights reserved. |
==============================================================================

==============================================================================
| C       | 600.perlbench_s(base) 602.gcc_s(base, peak) 605.mcf_s(base, peak) 625.x264_s(base, peak) 657.xz_s(base, peak) |
|---------------------------|
| Intel(R) C Compiler for applications running on Intel(R) 64, Version 2021.1 NextGen Build 20200304 |
| Copyright (C) 1985-2020 Intel Corporation. All rights reserved. |
==============================================================================

==============================================================================
| C       | 600.perlbench_s(peak) |
|---------------------------|
| Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64, Version 19.1.1.217 Build 20200306 |
| Copyright (C) 1985-2020 Intel Corporation. All rights reserved. |
==============================================================================

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

H3C UniServer R4900 G3 (Intel Xeon Gold 5222)

| SPECspeed®2017_int_base = 9.94 |
| SPECspeed®2017_int_peak = 10.2 |

**Compiler Version Notes (Continued)**

```plaintext
C++     | 620.omnetpp_s(base, peak) 623.xalancbmk_s(base, peak)
        | 631.deepsjeng_s(base, peak) 641.leela_s(base, peak)
-----------------------------
Intel(R) C++ Compiler for applications running on Intel(R) 64, Version 2021.1
NextGen Build 20200304
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
-----------------------------
Fortran | 648.exchange2_s(base, peak)
-----------------------------
Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R) 64, Version 19.1.1.217 Build 20200306
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
-----------------------------
```

**Base Compiler Invocation**

- C benchmarks: icc
- C++ benchmarks: icpc
- Fortran benchmarks: ifort

**Base Portability Flags**

```plaintext
600.perlbench_s: -DSPEC_LP64 -DSPEC_LINUX_X64
602.gcc_s: -DSPEC_LP64
605.mcf_s: -DSPEC_LP64
620.omnetpp_s: -DSPEC_LP64
623.xalancbmk_s: -DSPEC_LP64 -DSPEC_LINUX
625.x264_s: -DSPEC_LP64
631.deepsjeng_s: -DSPEC_LP64
641.leela_s: -DSPEC_LP64
648.exchange2_s: -DSPEC_LP64
657.xz_s: -DSPEC_LP64
```
New H3C Technologies Co., Ltd.
H3C UniServer R4900 G3 (Intel Xeon Gold 5222)

SPECspeed®2017_int_base = 9.94
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Test Sponsor: New H3C Technologies Co., Ltd.
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Test Date: Sep-2020
Hardware Availability: Mar-2019
Software Availability: Apr-2020

Base Optimization Flags

C benchmarks:
-m64 -qnextgen -std=c11
-Wl,-plugin-opt=-x86-branches-within-32B-boundaries -Wl,-z,muldefs
-xCORE-AVX512 -O3 -ffast-math -flto -mfpmath=sse -funroll-loops
-fuse-ld=gold -qopt-mem-layout-trans=4 -fopenmp -DSPEC_OPENMP
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

C++ benchmarks:
-m64 -qnextgen -Wl,-plugin-opt=-x86-branches-within-32B-boundaries
-Wl,-z,muldefs -xCORE-AVX512 -O3 -ffast-math -flto -mfpmath=sse
-funroll-loops -fuse-ld=gold -qopt-mem-layout-trans=4
-L/usr/local/IntelCompiler19/compilers_and_libraries_2020.1.217/linux/compiler/lib/intel64_lin
-lqkmalloc

Fortran benchmarks:
-m64 -Wl,-plugin-opt=-x86-branches-within-32B-boundaries -xCORE-AVX512
-O3 -ipo -no-prec-div -qopt-mem-layout-trans=4
-nostandard-realloc-lhs -align array32byte
-mbranches-within-32B-boundaries

Peak Compiler Invocation

C benchmarks:
icc

C++ benchmarks:
icpc

Fortran benchmarks:
ifort

Peak Portability Flags

600.perlbench_s: -DSPEC_LP64 -DSPEC_LINUX_X64
602.gcc_s: -DSPEC_LP64(*) -DSPEC_LP64
605.mcf_s: -DSPEC_LP64
620.omnetpp_s: -DSPEC_LP64
623.xalancbmk_s: -DSPEC_LP64 -DSPEC_LINUX
625.x264_s: -DSPEC_LP64
631.deepsjeng_s: -DSPEC_LP64
641.leela_s: -DSPEC_LP64

(Continued on next page)
New H3C Technologies Co., Ltd. | SPECspeed®2017_int_base = 9.94
H3C UniServer R4900 G3 (Intel Xeon Gold 5222) | SPECspeed®2017_int_peak = 10.2

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<th>9066</th>
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<th>Sep-2020</th>
</tr>
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<td>Hardware Availability:</td>
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<tr>
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<td>New H3C Technologies Co., Ltd.</td>
<td>Software Availability:</td>
<td>Apr-2020</td>
</tr>
</tbody>
</table>

Peak Portability Flags (Continued)

648.exchange2_s: -DSPEC_LP64
657.xz_s: -DSPEC_LP64

(*) Indicates a portability flag that was found in a non-portability variable.

Peak Optimization Flags

C benchmarks:

600.perlbench_s: -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/usr/local/jemalloc64-5.0.1/lib -ljemalloc

602.gcc_s: -m64 -qnextgen -std=c11 -fuse-ld=gold
-Wl,-plugin-opt=-x86-branches-within-32B-boundaries
-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
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

605.mcf_s: basepeak = yes

625.x264_s: -m64 -qnextgen -std=c11
-Wl,-plugin-opt=-x86-branches-within-32B-boundaries
-Wl,-z,muldefs -xCORE-AVX512 -flto -O3 -ffast-math
-fuse-ld=gold -qopt-mem-layout-trans=4 -fno-alias
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

657.xz_s: basepeak = yes

C++ benchmarks:

620.omnetpp_s: basepeak = yes

623.xalancbmk_s: basepeak = yes

631.deepsjeng_s: basepeak = yes

641.leela_s: basepeak = yes

Fortran benchmarks:

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

**New H3C Technologies Co., Ltd.**  
**H3C UniServer R4900 G3 (Intel Xeon Gold 5222)**

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<td>Tested by: New H3C Technologies Co., Ltd.</td>
<td>Software Availability: Apr-2020</td>
</tr>
</tbody>
</table>

## Peak Optimization Flags (Continued)

648.exchange2_s: 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-ic19.1u1-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.

Tested with SPEC CPU®2017 v1.1.0 on 2020-09-12 23:23:34-0400.
Originally published on 2020-09-29.