New H3C Technologies Co., Ltd.
H3C UniServer R4900 G5 (Intel Xeon Gold 5318N)

SPEC CPU®2017 Integer Rate Result

SPECRate®2017_int_base = 321
SPECRate®2017_int_peak = 333

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

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Copies</th>
<th>SPECrate®2017_int_base</th>
<th>SPECrate®2017_int_peak</th>
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<tbody>
<tr>
<td>perlbench_r</td>
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<tr>
<td>gcc_r</td>
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<tr>
<td>mcf_r</td>
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<td>omnetpp_r</td>
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<td>xalancbmk_r</td>
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<td>x264_r</td>
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<td>deepsjeng_r</td>
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<td>leela_r</td>
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<td>exchange2_r</td>
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</tr>
<tr>
<td>xz_r</td>
<td>96</td>
<td>181</td>
<td>657</td>
</tr>
</tbody>
</table>

Hardware

- CPU Name: Intel Xeon Gold 5318N
- Max MHz: 3400
- Nominal: 2100
- Enabled: 48 cores, 2 chips, 2 threads/core
- Orderable: 1.2 chips
- Cache L1: 32 KB I + 48 KB D on chip per core
- L2: 1.25 MB I+D on chip per core
- L3: 36 MB I+D on chip per chip
- Other: None
- Memory: 512 GB (16 x 32 GB 2Rx4 PC4-3200AA-R, running at 2666)
- Storage: 1 x 480GB 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: No
- Firmware: Version 5.39 released Nov-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 and OS set to prefer performance at the cost of additional power usage.
## Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Copies</th>
<th>Seconds</th>
<th>Ratio</th>
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<td>177</td>
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<td>177</td>
<td>584</td>
<td>177</td>
</tr>
</tbody>
</table>

Results appear in the order in which they were run. Bold underlined text indicates a median measurement.

## 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"
MALLOC_CONF = "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.
New H3C Technologies Co., Ltd. | SPECrate®2017_int_base = 321
H3C UniServer R4900 G5 (Intel Xeon Gold 5318N) | SPECrate®2017_int_peak = 333

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

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
Filesystem 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 (Sub NUMA) to Enabled
Set Power Performance Tuning to BIOS Controls EPB
Set Energy Performance BIAS to Performance
Set XPT Prefetch to Enabled
Sysinfo program /home/speccpu/bin/sysinfo
Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16acafc64d
running on localhost.localdomain Fri Dec 3 17:47:39 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 5318N CPU @ 2.10GHz
  2 "physical id"s (chips)
  96 "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 : 24
siblings : 48
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
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

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): 96
On-line CPU(s) list: 0-95
Thread(s) per core: 2

(Continued on next page)
## Platform Notes (Continued)

- **Core(s) per socket:** 24
- **Socket(s):** 2
- **NUMA node(s):** 4
- **Vendor ID:** GenuineIntel
- **CPU family:** 6
- **Model:** 106
- **Model name:** Intel(R) Xeon(R) Gold 5318N CPU @ 2.10GHz
- **Stepping:** 6
- **CPU MHz:** 2700.000
- **CPU max MHz:** 3400.0000
- **CPU min MHz:** 800.0000
- **BogoMIPS:** 4200.00
- **Virtualization:** VT-x
- **L1d cache:** 48K
- **L1i cache:** 32K
- **L2 cache:** 1280K
- **L3 cache:** 36864K
- **NUMA node0 CPU(s):** 0-11,48-59
- **NUMA node1 CPU(s):** 12-23,60-71
- **NUMA node2 CPU(s):** 24-35,72-83
- **NUMA node3 CPU(s):** 36-47,84-95
- **Flags:**
  - fpu vme de pse tsc msr pae mce cmov pat pse36 clflush dts acpi mmx fxsr sse sse2 ss ht tm pbe syscall nx pdpe1gb rdtsscp 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 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 invpccache ssbd mbx ibrs ibpb stibp ibrsenhanced tpr_shadow vnmi flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid rtm cqm rdt_a avx512f avx512dq rdseed adx smap avx512ifma clflushopt clwb intel_pt avx512cd sha ni avx512bw avx512vl xsaveopt xsavec xSAVE{x} xsave xsvlan cqm_llc cqm_occup_llc cqm_mbb_total cqm_mbb_local wbnoinvd dtherm ida arat pln pts hwp hwp_act_window hwp_epp hwp_pkg_req avx512vmbi umip pku ospke avx512_vmbmi2 gfn i vaes vpclmulqdq avx512_vnni avx512_vbitalg tme avx512_vpopcntdq la57 rdpid md_clear pconf config flush_lid arch_capabilities

```
/proc/cpuinfo cache data
  cache size : 36864 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 20 21 22 23 60 61 62 63 64 65 66 67 68 69 70 71
- **node 0 size:** 128353 MB
- **node 0 free:** 127183 MB
- **node 1 cpus:** 12 13 14 15 16 17 18 19 20 21 22 23 60 61 62 63 64 65 66 67 68 69 70 71
- **node 1 size:** 128991 MB
New H3C Technologies Co., Ltd. H3C UniServer R4900 G5 (Intel Xeon Gold 5318N)

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**Test Date:** Dec-2021  
**Hardware Availability:** Jun-2021  
**Software Availability:** Dec-2020

**Platform Notes (Continued)**

```
node 1 free: 128678 MB
node 2 cpus: 24 25 26 27 28 29 30 31 32 33 34 35 72 73 74 75 76 77 78 79 80 81 82 83
node 2 size: 129018 MB
node 2 free: 128845 MB
node 3 cpus: 36 37 38 39 40 41 42 43 44 45 46 47 84 85 86 87 88 89 90 91 92 93 94 95
node 3 size: 129016 MB
node 3 free: 128842 MB
node distances:
   node   0   1   2   3
   0:  10  11  20  20
   1:  11  10  20  20
   2:  20  20  10  11
   3:  20  20  11  10
```

From `/proc/meminfo`

- MemTotal: 527748540 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*

```

```
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
```

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

**H3C UniServer R4900 G5 (Intel Xeon Gold 5318N)**

<table>
<thead>
<tr>
<th><strong>SPECrate®2017_int_base</strong></th>
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**Tested by:** New H3C Technologies Co., Ltd.

**Software Availability:** Dec-2020

---

**Platform Notes (Continued)**

- **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: userinfo/swapgs barriers and __user pointer sanitation
- **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):** Not affected

**run-level 3 Dec 3 17:41**

**SPEC is set to:** /home/speccpu

**Filesystem**

<table>
<thead>
<tr>
<th>Type</th>
<th>Size</th>
<th>Used</th>
<th>Avail</th>
<th>Use%</th>
<th>Mounted on</th>
</tr>
</thead>
<tbody>
<tr>
<td>xfs</td>
<td>392G</td>
<td>82G</td>
<td>310G</td>
<td>21%</td>
<td>/home</td>
</tr>
</tbody>
</table>

**From /sys/devices/virtual/dmi/id**

- **Vendor:** H3C
- **Product:** RS33M2C9S
- **Product Family:** Rack

**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 Micron 36ASF4G72PZ-3G2E7 32 GB 2 rank 3200, configured at 2666
- 16x NO DIMM NO DIMM

**BIOS:**

- **BIOS Vendor:** American Megatrends International, LLC.
- **BIOS Version:** 5.39
- **BIOS Date:** 11/17/2021
- **BIOS Revision:** 5.22

(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)

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

---

**Compiler Version Notes (Continued)**

```
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 | 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
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
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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.
```

---

(Continued on next page)
Compiler Version Notes (Continued)

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
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)
SPEC CPU®2017 Integer Rate Result
Copyright 2017-2022 Standard Performance Evaluation Corporation

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Test Date: Dec-2021
Hardware Availability: Jun-2021
Software Availability: Dec-2020

Base Compiler Invocation (Continued)

C++ benchmarks:
icpx

Fortran benchmarks:
ifort

Base Portability Flags

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,muldefs -xCORE-AVX512 -O3 -ffast-math
-fflto -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,muldefs -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,muldefs -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
New H3C Technologies Co., Ltd.  
H3C UniServer R4900 G5 (Intel Xeon Gold 5318N)

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.leetl_r: -DSPEC_LP64
548.exchange2_r: -DSPEC_LP64
557.xz_r: -DSPEC_LP64

Peak Optimization Flags

C benchmarks:


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 G5 (Intel Xeon Gold 5318N)**

| SPECrate®2017_int_base = 321 | SPECrate®2017_int_peak = 333 |

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**Test Sponsor:** New H3C Technologies Co., Ltd.  
**Tested by:** New H3C Technologies Co., Ltd.  
**Test Date:** Dec-2021  
**Hardware Availability:** Jun-2021  
**Software Availability:** Dec-2020

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### 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


**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

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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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For questions about this result, please contact the tester. For other inquiries, please contact info@spec.org.

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