## SPEC CPU®2017 Integer Speed Result

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

### New H3C Technologies Co., Ltd.

**H3C UniServer R5300 G5 (Intel Xeon Silver 4310)**

<table>
<thead>
<tr>
<th>SPECspeed®2017_int_base</th>
<th>SPECspeed®2017_int_peak</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.7</td>
<td>10.9</td>
</tr>
</tbody>
</table>

#### CPU2017 License: 9066

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

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

#### Test Date: Aug-2021

#### Hardware Availability: Jun-2021

#### Software Availability: Dec-2020

<table>
<thead>
<tr>
<th>Threads</th>
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<th>SPECspeed®2017_int_peak (10.9)</th>
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<tr>
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<tr>
<td>602.gcc_s</td>
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<td>8.04</td>
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<td>16.5</td>
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<td>5.61</td>
<td>4.58</td>
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### Software

**OS:** Red Hat Enterprise Linux release 8.3 (Ootpa) 4.18.0-240.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 5.27 released Jun-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

### Hardware

**CPU Name:** Intel Xeon Silver 4310

**Max MHz:** 3300

**Nominal:** 2100

**Enabled:** 24 cores, 2 chips

**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:** 18 MB I+D on chip per chip

**Other:** None

**Memory:** 512 GB (16 x 32 GB 2Rx4 PC4-3200AA-R, running at 2666)

**Storage:** 1.6 TB SSD NVME

**Other:** None
### Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Threads</th>
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<td>313</td>
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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"
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
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
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)
### General Notes (Continued)


### Platform Notes

**BIOS Settings:**
- Set Hyper-Threading to disabled
- Set Patrol Scrub to disabled

Sysinfo program /home/spec/cpu/bin/sysinfo
Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16acafc644
running on localhost.localdomain Thu Aug 19 23:20:12 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) Silver 4310 CPU @ 2.10GHz`
- `2 "physical id"s (chips)`
- `24 "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 : 12`
  - `siblings : 12`
  - `physical 0: cores 0 1 2 3 4 5 6 7 8 9 10 11`
  - `physical 1: cores 0 1 2 3 4 5 6 7 8 9 10 11`

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): 24`
- `On-line CPU(s) list: 0-23`
- `Thread(s) per core: 1`
- `Core(s) per socket: 12`
- `Socket(s): 2`
- `NUMA node(s): 2`
- `Vendor ID: GenuineIntel`
- `CPU family: 6`
- `Model: 106`
- `Model name: Intel(R) Xeon(R) Silver 4310 CPU @ 2.10GHz`
- `Stepping: 6`
- `CPU MHz: 1461.700`
- `CPU max MHz: 3300.0000`
- `CPU min MHz: 800.0000`
- `BogoMIPS: 4200.00`

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

H3C UniServer R5300 G5 (Intel Xeon Silver 4310)

**SPEC CPU®2017 Integer Speed Result**

**SPECspeed®2017_int_base = 10.7**

**SPECspeed®2017_int_peak = 10.9**

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**Platform Notes (Continued)**

Virtualization: VT-x
L1d cache: 48K
L1i cache: 32K
L2 cache: 1280K
L3 cache: 18432K
NUMA node0 CPU(s): 0-11
NUMA node1 CPU(s): 12-23
Flags: fpu vme de pse tsc msr pae 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 xtrhopdcm 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 _13 invpcid_single intel_pnni sbbd mba ibpb stibp ibrs_enhanced tpr_shadow vnmi flexpriority ept vpid ept_ad fsgsbase tsc_adjust bni hle avx2 smep bmi2 erms invpcid cqm rdt_a avx512f avx512dq rdseed adx smap avx512ifma clflushopt clwb intel_pt avx512cd sha ni avx512bw avx512vl xsavesvc xgetbv1 xsaves cqm_llc cqm_occup_llc cqm_mbml_total cqm_mbml_ local split_lock_detect wbnoinvd dtherm ida arat pln pts hwp hwp _act_window hwp _epp hwp _pkg _req avx512vmbi umpk pku ospke avx512_vmni2 gfini vaes vpclmulqdq avx512_vnni avx512_bitalg tme avx512_vpopcntdq la57 rdpid md_clear pconfig flush_l1d

```
/proc/cpuinfo cache data
  cache size : 18432 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
  node 0 size: 254321 MB
  node 0 free: 256598 MB
  node 1 cpus: 12 13 14 15 16 17 18 19 20 21 22 23
  node 1 size: 254612 MB
  node 1 free: 257301 MB
  node distances:
    node 0 1
      0: 10 20
      1: 20 10

From /proc/meminfo
MemTotal: 528015720 kB
HugePages_Total: 0
Hugepagesize: 2048 kB

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

(Continued on next page)
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Platform Notes (Continued)

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

From /etc/*release* /etc/*version*
   os-release:
     NAME="Red Hat Enterprise Linux"
     VERSION="8.3 (Ootpa)"
     ID="rhel"
     ID_LIKE="fedora"
     VERSION_ID="8.3"
     PLATFORM_ID="platform:el8"
     PRETTY_NAME="Red Hat Enterprise Linux 8.3 (Ootpa)"
     ANSI_COLOR="0;31"
redhat-release: Red Hat Enterprise Linux release 8.3 (Ootpa)
system-release: Red Hat Enterprise Linux release 8.3 (Ootpa)
system-release-cpe: cpe:/o:redhat:enterprise_linux:8.3:ga

uname -a:
    Linux localhost.localdomain 4.18.0-240.el8.x86_64 #1 SMP Wed Sep 23 05:13:10 EDT 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/swapsgs 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

SPEC is set to: /home/speccpu
Filesystem            Type  Size  Used Avail Use% Mounted on
/dev/mapper/rhel-home xfs   1.4T   28G  1.4T   2% /home

From /sys/devices/virtual/dmi/id
Vendor:         New H3C Technologies Co., Ltd.
Product:        H3C UniServer R5300 G5
Product Family: Rack

(Continued on next page)
Platform Notes (Continued)

Serial: 210235A3WGH213000011

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 HMA84GR7DJR4N-XN 32 GB 2 rank 3200, configured at 2666
16x NO DIMM NO DIMM

BIOS:
BIOS Vendor: American Megatrends International, LLC.
BIOS Version: 5.27
BIOS Date: 06/07/2021
BIOS Revision: 5.22

(End of data from sysinfo program)

Compiler Version Notes

*******************************************************************************
C       | 600.perlbench_s(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       | 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) 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       | 600.perlbench_s(peak)
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</tr>
<tr>
<td>Fortran</td>
<td>648.exchange2_s(base, peak)</td>
</tr>
</tbody>
</table>

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**Base Compiler Invocation**

- **C benchmarks:** icx
- **C++ benchmarks:** icpx
- **Fortran benchmarks:** ifort

---

**Base Portability Flags**

- 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

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SPECspeed®2017_int_base = 10.7
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Base Portability Flags (Continued)

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

Base Optimization Flags

C benchmarks:
-DSPEC_OPENMP -std=c11 -m64 -fopenmp -Wl,-z,muldefs -xCORE-AVX512
-03 -ffast-math -flto -mfpmath=sse -funroll-loops
-qopt-mem-layout-trans=4 -mbranches-within-32B-boundaries
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

C++ benchmarks:
-DSPEC_OPENMP -m64 -Wl,-z,muldefs -xCORE-AVX512 -03 -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:
-m64 -xCORE-AVX512 -03 -ipo -no-prec-div -qopt-mem-layout-trans=4
-nostandard-realloc-lhs -align array32byte -auto
-mbranches-within-32B-boundaries

Peak Compiler Invocation

C benchmarks (except as noted below):
icx

600.perlbench_s: icc

C++ benchmarks:
icpx

Fortran benchmarks:
ifort
New H3C Technologies Co., Ltd.
H3C UniServer R5300 G5 (Intel Xeon Silver 4310)

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Peak Portability Flags

Same as Base Portability Flags

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 -std=c11 -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
-mbranches-within-32B-boundaries
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

605.mcf_s: basepeak = yes

625.x264_s: -DSPEC_OPENMP -fiopenmp -std=c11 -m64 -Wl,-z, muldefs
-xCORE-AVX512 -flto -O3 -ffast-math
-qopt-mem-layout-trans=4 -fno-alias
-mbranches-within-32B-boundaries
-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:

648.exchange2_s: basepeak = yes
## SPEC CPU®2017 Integer Speed Result

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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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Tested with SPEC CPU®2017 v1.1.8 on 2021-08-19 23:20:12-0400.  
Report generated on 2021-09-14 19:14:51 by CPU2017 PDF formatter v6442.  
Originally published on 2021-09-14.