# SPEC CPU®2017 Integer Speed Result

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## New H3C Technologies Co., Ltd.

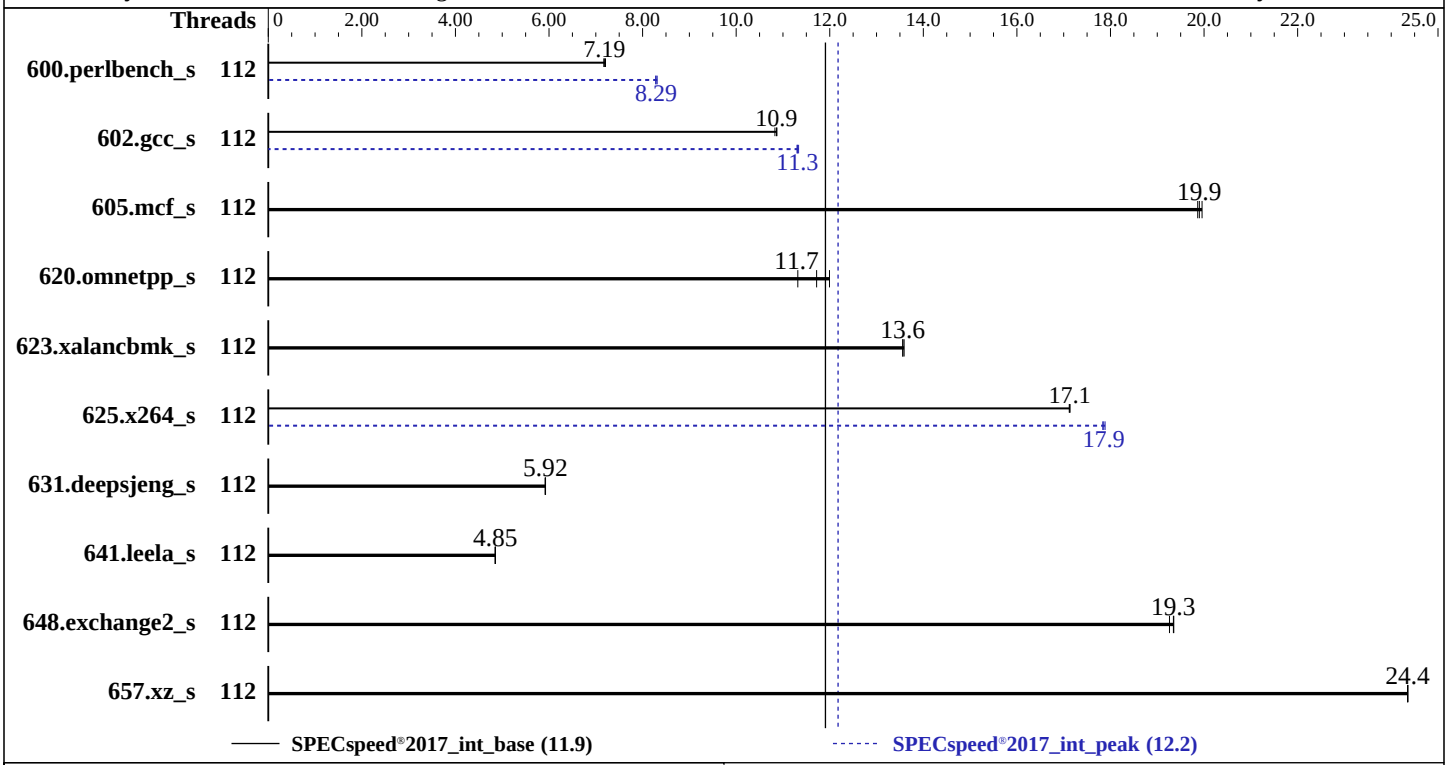
## H3C UniServer R4300 G5 (Intel Xeon Gold 6348)

SPECspeed®2017_int_base = 11.9

SPECspeed®2017_int_peak = 12.2

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

**Test Date:** Nov-2021
**Hardware Availability:** Sep-2020
**Software Availability:** Jan-2021




## Hardware

| | |
|---|---|
| CPU Name: | Intel Xeon Gold 6348 |
| Max MHz: | 3500 |
| Nominal: | 2600 |
| Enabled: | 56 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: | 42 MB I+D on chip per chip |
| Other: | None |
| Memory: | 1 TB (16 x 64 GB 2Rx4 PC4-3200V-R) |
| Storage: | 1 x 600GB 10000RPM SAS HDD |
| Other: | None |

## Software

| | |
|---|---|
| OS: | Red Hat Enterprise Linux release 8.2 (Ootpa)<br>4.18.0-193.el8.x86_64 |
| Compiler: | C/C++: Version 2021.1 of Intel oneAPI DPC++/C++ Compiler Build 20201113 for Linux;<br>Fortran: Version 2021.1 of Intel Fortran Compiler Classic Build 20201112 for Linux;<br>C/C++: Version 2021.1 of Intel C/C++ Compiler Classic Build 20201112 for Linux |
| Parallel: | Yes |
| Firmware: | Version 5.34 released Sep-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 and OS set to prefer performance at the cost of<br>additional power usage. |

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## Results Table

| Benchmark | Base | | | | | | | Peak | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Threads | Seconds | Ratio | Seconds | Ratio | Seconds | Ratio | Threads | Seconds | Ratio | Seconds | Ratio | Seconds | Ratio |
| 600.perlbench_s | 112 | **247** | **7.19** | 246 | 7.21 | 248 | 7.17 | 112 | 214 | 8.31 | 214 | 8.28 | **214** | **8.29** |
| 602.gcc_s | 112 | 366 | 10.9 | 368 | 10.8 | **367** | **10.9** | 112 | 352 | 11.3 | 351 | 11.3 | **352** | **11.3** |
| 605.mcf_s | 112 | 237 | 20.0 | 238 | 19.9 | **237** | **19.9** | 112 | 237 | 20.0 | 238 | 19.9 | **237** | **19.9** |
| 620.omnetpp_s | 112 | 144 | 11.3 | 136 | 12.0 | **139** | **11.7** | 112 | 144 | 11.3 | 136 | 12.0 | **139** | **11.7** |
| 623.xalancbmk_s | 112 | 104 | 13.6 | **104** | **13.6** | 104 | 13.6 | 112 | 104 | 13.6 | **104** | **13.6** | 104 | 13.6 |
| 625.x264_s | 112 | **103** | **17.1** | 103 | 17.1 | 103 | 17.1 | 112 | 98.6 | 17.9 | 98.9 | 17.8 | **98.8** | **17.9** |
| 631.deepsjeng_s | 112 | **242** | **5.92** | 242 | 5.93 | 242 | 5.92 | 112 | **242** | **5.92** | 242 | 5.93 | 242 | 5.92 |
| 641.leela_s | 112 | **351** | **4.85** | 352 | 4.85 | 351 | 4.85 | 112 | **351** | **4.85** | 352 | 4.85 | 351 | 4.85 |
| 648.exchange2_s | 112 | **152** | **19.3** | 152 | 19.4 | 153 | 19.3 | 112 | **152** | **19.3** | 152 | 19.4 | 153 | 19.3 |
| 657.xz_s | 112 | 254 | 24.4 | **254** | **24.4** | 254 | 24.3 | 112 | 254 | 24.4 | **254** | **24.4** | 254 | 24.3 |

**SPECspeed®2017_int_base = 11.9**

**SPECspeed®2017_int_peak = 12.2**

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,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
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)**

## General Notes (Continued)

sources available from jemalloc.net or https://github.com/jemalloc/jemalloc/releases

## Platform Notes

```
BIOS Settings:
 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: r6622 of 2021-04-07 982a61ec0915b55891ef0e16acafc64d
 running on localhost.localdomain Fri Nov  5 18:33:05 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 6348 CPU @ 2.60GHz
       2  "physical id"s (chips)
       112 "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 : 28
       siblings  : 56
       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 24
       25 26 27
       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 24
       25 26 27

 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):              112
      On-line CPU(s) list: 0-111
      Thread(s) per core:  2
      Core(s) per socket:  28
      Socket(s):           2
      NUMA node(s):        2
      Vendor ID:           GenuineIntel
      CPU family:          6
      Model:               106
      Model name:          Intel(R) Xeon(R) Gold 6348 CPU @ 2.60GHz
      Stepping:            6
      CPU MHz:             2850.067
```

**(Continued on next page)**

## Platform Notes (Continued)

```
      CPU max MHz:           3500.0000
      CPU min MHz:           800.0000
      BogoMIPS:              5200.00
      Virtualization:        VT-x
      L1d cache:             48K
      L1i cache:             32K
      L2 cache:              1280K
      L3 cache:              43008K
      NUMA node0 CPU(s):     0-27,56-83
      NUMA node1 CPU(s):     28-55,84-111
      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 cpuid
      aperfmperf 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 3dnowprefetch cpuid_fault epb cat_l3 invpcid_single 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 rdt_a avx512f avx512dq
      rdseed adx smap avx512ifma clflushopt clwb intel_pt avx512cd sha_ni avx512bw
      avx512vl xsaveopt xsavec xgetbv1 xsaves cqm_llc cqm_occup_llc cqm_mbm_total
      cqm_mbm_local wbnoinvd dtherm ida arat pln pts hwp hwp_act_window hwp_epp
      hwp_pkg_req avx512vbmi umip pku ospke avx512_vbmi2 gfni vaes vpclmulqdq avx512_vnni
      avx512_bitalg tme avx512_vpopcntdq la57 rdpid md_clear pconfig flush_l1d
      arch_capabilities

  /proc/cpuinfo cache data
     cache size : 43008 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 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27
    56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83
    node 0 size: 515232 MB
    node 0 free: 498408 MB
    node 1 cpus: 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52
    53 54 55 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100 101 102 103 104 105 106
    107 108 109 110 111
    node 1 size: 516081 MB
    node 1 free: 513740 MB
    node distances:
    node   0   1
      0:  10  20
      1:  20  10

  From /proc/meminfo
     MemTotal:       1056065352 kB
```


**(Continued on next page)**

## Platform Notes (Continued)

```
   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/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):                 Not affected

 run-level 3 Nov 5 18:23 last=5

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

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## Platform Notes (Continued)

```
    Filesystem            Type  Size  Used Avail Use% Mounted on
    /dev/mapper/rhel-home xfs   504G   19G  485G   4% /home

 From /sys/devices/virtual/dmi/id
     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 Hynix HMAA8GR7AJR4N-XN 64 GB 2 rank 3200
     16x NO DIMM NO DIMM

 BIOS:
    BIOS Vendor:       American Megatrends International, LLC.
    BIOS Version:      5.34
    BIOS Date:         09/11/2021
    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)
------------------------------------------------------------------------------
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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## Compiler Version Notes (Continued)

```
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++     | 620.omnetpp_s(base, peak) 623.xalancbmk_s(base, peak)
        | 631.deepsjeng_s(base, peak) 641.leela_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.
------------------------------------------------------------------------------

==============================================================================
Fortran | 648.exchange2_s(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

C++ benchmarks:
icpx

Fortran benchmarks:
ifort

## Base Portability Flags

600.perlbench_s: -DSPEC_LP64 -DSPEC_LINUX_X64


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## Base Portability Flags (Continued)

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`

## Base Optimization Flags

C benchmarks:
`-DSPEC_OPENMP -std=c11 -m64 -fiopenmp -Wl,-z,muldefs -xCORE-AVX512 -O3 -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 -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:
`-m64 -xCORE-AVX512 -O3 -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`

## 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

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

http://www.spec.org/cpu2017/flags/Intel-ic2021-official-linux64_revA.html
http://www.spec.org/cpu2017/flags/New_H3C-Platform-Settings-V1.0-CPX-RevD.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-V1.0-CPX-RevD.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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