## SPEC CPU®2017 Floating Point Speed Result

New H3C Technologies Co., Ltd.
(Test Sponsor: New H3C Technologies Co., Ltd.)

**H3C UniServer B5700 G5 (Intel Xeon Silver 4310)**

SPECspeed®2017_fp_base = 117

SPECspeed®2017_fp_peak = 119

### Hardware

<table>
<thead>
<tr>
<th>Test Date:</th>
<th>Jul-2021</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Sponsor:</td>
<td>New H3C Technologies Co., Ltd.</td>
</tr>
<tr>
<td>Tested by:</td>
<td>New H3C Technologies Co., Ltd.</td>
</tr>
<tr>
<td>CPU2017 License:</td>
<td>9066</td>
</tr>
<tr>
<td>CPU Name:</td>
<td>Intel Xeon Silver 4310</td>
</tr>
<tr>
<td>Max MHz:</td>
<td>3300</td>
</tr>
<tr>
<td>Nominal:</td>
<td>2100</td>
</tr>
<tr>
<td>Enabled:</td>
<td>24 cores, 2 chips</td>
</tr>
<tr>
<td>Orderable:</td>
<td>1.2 Chips</td>
</tr>
<tr>
<td>Cache L1:</td>
<td>32 KB I + 48 KB D on chip per core</td>
</tr>
<tr>
<td>L2:</td>
<td>1.25 MB I+D on chip per core</td>
</tr>
<tr>
<td>L3:</td>
<td>18 MB I+D on chip per chip</td>
</tr>
<tr>
<td>Other:</td>
<td>None</td>
</tr>
<tr>
<td>Memory:</td>
<td>1 TB (16 x 64 GB 2Rx4 PC4-3200AA-R, running at 2666)</td>
</tr>
<tr>
<td>Storage:</td>
<td>6.4 TB SSD NVME</td>
</tr>
<tr>
<td>Other:</td>
<td>None</td>
</tr>
</tbody>
</table>

### 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: | Yes |
| Firmware: | Version 5.23 released Apr-2021BIOS |
| 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 |

### Performance Results

<table>
<thead>
<tr>
<th>Program</th>
<th>SPECspeed®2017_fp_base</th>
<th>SPECspeed®2017_fp_peak</th>
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<tbody>
<tr>
<td>603.bwaves_s</td>
<td>117</td>
<td>119</td>
</tr>
<tr>
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<td>116</td>
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<tr>
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<tr>
<td>628.pop2_s</td>
<td>163</td>
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</tr>
<tr>
<td>638.imagick_s</td>
<td>92.2</td>
<td>92.2</td>
</tr>
<tr>
<td>644.nab_s</td>
<td>119</td>
<td>119</td>
</tr>
<tr>
<td>649.fotonik3d_s</td>
<td>91.7</td>
<td>91.7</td>
</tr>
<tr>
<td>654.roms_s</td>
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### Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
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<td>619.lbm_s</td>
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<td>120</td>
<td>132</td>
</tr>
</tbody>
</table>

### 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,compact"
- 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)
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H3C UniServer B5700 G5 (Intel Xeon Silver 4310)

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| SPECspeed®2017_fp_peak = 119 |

CPUT2017 License: 9066
Test Sponsor: New H3C Technologies Co., Ltd.
Tested by: New H3C Technologies Co., Ltd.

Test Date: Jul-2021
Hardware Availability: Apr-2021
Software Availability: Dec-2020

General Notes (Continued)


Platform Notes

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

Sysinfo program /home/speccpu/bin/sysinfo
Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16aca6c46d
running on localhost.localdomain Mon Jul  5 02:50:45 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: 2839.847
CPU max MHz: 3300.000
CPU min MHz: 800.000
BogoMIPS: 4200.00

(Continued on next page)
Spec CPU®2017 Floating Point Speed Result
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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 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 xtrr 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_13 invpcid_single ssbd mba ibrs ibpb stibp ibrs_enhanced tpr_shadow vmmi flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 ertms invpcid rtm cqm rdt_a avx512f avx512dq rdseed adx smap avx512ifma clflushopt clwb intel_pt avx512cd sha ni avx512bw avx512vl xsaveopt xsavec xgetbv1 xsave vcmovq lcmov vrcoret vmoav xsaveopt xsavec xgetbv1 xsave

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: 515427 MB
node 0 free: 512738 MB
node 1 cpus: 12 13 14 15 16 17 18 19 20 21 22 23
node 1 size: 516062 MB
node 1 free: 510039 MB
node distances:
node 0 1
0:  10  20
1:  20  10

From /proc/meminfo
MemTotal: 1056246172 kB
HugePages_Total: 0
Hugepagesize: 2048 kB

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

(Continued on next page)
**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="8.2 (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/swaps 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 Jul 4 22:31 last=5

SPEC is set to: /home/spec

From /sys/devices/virtual/dmi/id

<table>
<thead>
<tr>
<th>Vendor</th>
<th>New H3C Technologies Co., Ltd.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product</td>
<td>B5700 G5</td>
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</tbody>
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Platform Notes (Continued)

Product Family: Rack  
Serial: 210235A3W9H212000017

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 HMAA8GR7CJR4N-XN 64 GB 2 rank 3200, configured at 2666  
16x NO DIMM NO DIMM

BIOS:
BIOS Vendor: American Megatrends International, LLC.  
BIOS Version: 5.23  
BIOS Date: 04/23/2021  
BIOS Revision: 5.21

(End of data from sysinfo program)

Compiler Version Notes

==============================================================================
| C | 619.lbm_s(base, peak) 638.imagick_s(base, peak) 644.nab_s(base) |
|---|---|---|---|
| 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 | 644.nab_s(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 | 619.lbm_s(base, peak) 638.imagick_s(base, peak) 644.nab_s(base) |
|---|---|---|---|
| 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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==============================================================================

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

```
C               | 644.nab_s(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++, C, Fortran | 607.cactuBSSN_s(base, 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.
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.
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.
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Fortran          | 603.bwaves_s(base, peak) 649.fotonik3d_s(base, peak) 654.roms_s(base, peak)
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Fortran, C       | 621.wrf_s(base, peak) 627.cam4_s(base, peak) 628.pop2_s(base, peak)
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Base Compiler Invocation

C benchmarks:
    icc

Fortran benchmarks:
    ifort

Benchmarks using both Fortran and C:
    ifort icc

Benchmarks using Fortran, C, and C++:
    icpc icc ifort

Base Portability Flags

603.bwaves_s: -DSPEC_LP64
607.cactuBSSN_s: -DSPEC_LP64
619.lbm_s: -DSPEC_LP64
621.wrf_s: -DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian
627.cam4_s: -DSPEC_LP64 -DSPEC_CASE_FLAG
628.pop2_s: -DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian
    -assume byterecl
638.imagick_s: -DSPEC_LP64
644.nab_s: -DSPEC_LP64
649.fotonik3d_s: -DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian
    -assume byterecl
654.roms_s: -DSPEC_LP64

Base Optimization Flags

C benchmarks:
    -m64 -std=c11 -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
    -ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP
    -mbranches-within-32B-boundaries

Fortran benchmarks:
    -m64 -Wl,-z,muldefs -DSPEC_OPENMP -xCORE-AVX512 -ipo -O3
    -no-prec-div -qopt-prefetch -ffinite-math-only
    -qopt-mem-layout-trans=4 -qopenmp -nostandard-realloc-lhs
    -mbranches-within-32B-boundaries -L/usr/local/jemalloc64-5.0.1/lib
    -ljemalloc

Benchmarks using both Fortran and C:
    -m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div

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

Base Optimization Flags (Continued)

Benchmarks using both Fortran and C (continued):
- -qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp
- -DSPEC_OPENMP -mbranches-within-32B-boundaries -nostandard-realloc-lhs
- -L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

Benchmarks using Fortran, C, and C++:
- -m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div
- -qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp
- -DSPEC_OPENMP -mbranches-within-32B-boundaries -nostandard-realloc-lhs
- -L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

Peak Compiler Invocation

C benchmarks (except as noted below):
icc

644.nab_s: icx

Fortran benchmarks:
ifort

Benchmarks using both Fortran and C:
ifort icc

Benchmarks using Fortran, C, and C++:
icpc icc ifort

Peak Portability Flags

Same as Base Portability Flags

Peak Optimization Flags

C benchmarks:

619.lbm_s: basepeak = yes

638.imagick_s: basepeak = yes

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

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

**H3C UniServer B5700 G5 (Intel Xeon Silver 4310)**

<table>
<thead>
<tr>
<th>SPECspeed®2017_fp_base</th>
<th>SPECspeed®2017_fp_peak</th>
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<tr>
<td>117</td>
<td>119</td>
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</table>

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

### Peak Optimization Flags (Continued)

644.nab_s: -m64 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math  
-flto -mfpmath=sse -funroll-loops -flopenmp  
-DSPEC_OPENMP -qopt-mem-layout-trans=4  
-fimf-accuracy-bits=14:sqrt  
-mbranches-within-32B-boundaries  
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

Fortran benchmarks:

603.bwaves_s: -m64 -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2)  
-DSPEC_SUPPRESS_OPENMP -DSPEC_OPENMP -ipo -xCORE-AVX512  
-03 -no-prec-div -qopt-prefetch -ffinite-math-only  
-qopt-mem-layout-trans=4 -qopenmp -nostandard-realloc-lhs  
-mbranches-within-32B-boundaries  
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

649.fotonik3d_s: Same as 603.bwaves_s

654.roms_s: basepeak = yes

Benchmarks using both Fortran and C:

627.cam4_s: basepeak = yes

Benchmarks using Fortran, C, and C++:

607.cactuBSSN_s: basepeak = yes

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:

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-RevC.xml
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H3C UniServer B5700 G5 (Intel Xeon Silver 4310)

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