# SPEC CPU®2017 Floating Point Speed Result

New H3C Technologies Co., Ltd.  
H3C UniServer R6900 G3 (Intel Xeon Gold 6250)

## SPECspeed®2017_fp_base = 156

## SPECspeed®2017_fp_peak = 157

<table>
<thead>
<tr>
<th>CPU2017 License:</th>
<th>9066</th>
</tr>
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<tbody>
<tr>
<td>Test Sponsor:</td>
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<td>New H3C Technologies Co., Ltd.</td>
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<tr>
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<tr>
<td>603.bwaves_s</td>
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<tr>
<td>607.cactuBSSN_s</td>
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<td>619.lbm_s</td>
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<td>644.nab_s</td>
<td>264</td>
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<td>649.fotonik3d_s</td>
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<td></td>
</tr>
<tr>
<td>654.roms_s</td>
<td>217</td>
<td></td>
</tr>
</tbody>
</table>

## Hardware

- **CPU Name:** Intel Xeon Gold 6250  
- **Max MHz:** 4500  
- **Nominal:** 3900  
- **Enabled:** 32 cores, 4 chips  
- **Orderable:** 1,2,3,4 chips  
- **Cache L1:** 32 KB I + 32 KB D on chip per core  
- **Cache L2:** 1 MB I+D on chip per core  
- **Cache L3:** 35.75 MB I+D on chip per chip  
- **Other:** None  
- **Memory:** 384 GB (24 x 16 GB 2Rx8 PC4-2933V-R)  
- **Storage:** 1 x 960 GB 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 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  
- **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
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Results Table

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<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
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<td>654.roms_s</td>
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<td>219</td>
<td>72.6</td>
<td>217</td>
<td>73.8</td>
<td>213</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"
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) 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
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**SPECspeed®2017_fp_base = 156**  
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Test Date: Sep-2020  
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**General Notes (Continued)**


**Platform Notes**

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

Sysinfo program /home/speccpu/bin/sysinfo  
Rev: r6365 of 2019-08-21 295195f888a3d7eddb1e6e46a485a0011  
running on localhost.localdomain Mon Sep 28 19:29:58 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 6250 CPU @ 3.90GHz  
4 "physical id"s (chips)  
32 "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 : 8  
siblings : 8  
physical 0: cores 2 6 10 12 13 21 24  
physical 1: cores 1 2 10 12 13 18 19 29  
physical 2: cores 1 2 3 12 13 18 19 29  
physical 3: cores 1 2 10 13 18 19 28 29

From lscpu:  
Architecture: x86_64  
CPU op-mode(s): 32-bit, 64-bit  
Byte Order: Little Endian  
CPU(s): 32  
On-line CPU(s) list: 0-31  
Thread(s) per core: 1  
Core(s) per socket: 8  
Socket(s): 4  
NUMA node(s): 4  
Vendor ID: GenuineIntel  
CPU family: 6  
Model: 85  
Model name: Intel(R) Xeon(R) Gold 6250 CPU @ 3.90GHz  
Stepping: 7  
CPU MHz: 1200.117

(Continued on next page)
Platform Notes (Continued)

CPU max MHz: 4500.0000
CPU min MHz: 1200.0000
BogoMIPS: 7800.00
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 36608K
NUMA node0 CPU(s): 0-7
NUMA node1 CPU(s): 8-15
NUMA node2 CPU(s): 16-23
NUMA node3 CPU(s): 24-31
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 arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc cpuid
aperfmprefl 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 cdp_l3
invpcid_single intel_pstate ssbd mba ibrs ibpb ibrs enhanced tpr_shadow vnmi
flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid rtm
cqm mpx rdt_a avx512f avx512dq rdseed adx smap clflushopt clwb intel_pt avx512cd
avx512bw avx512vl xsaveopt xsaves cqm_llc cqm_occupa llc cqm_mbb_total
cqm_mbb_local dtherm ida arat pln pts hwp act_window hwp epp hwp_pkg_req pku
ospke avx512_vni md_clear flush_lld arch_capabilities

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
   node 0 size: 95072 MB
   node 0 free: 94564 MB
   node 1 cpus: 8 9 10 11 12 13 14 15
   node 1 size: 96765 MB
   node 1 free: 95570 MB
   node 2 cpus: 16 17 18 19 20 21 22 23
   node 2 size: 96738 MB
   node 2 free: 96418 MB
   node 3 cpus: 24 25 26 27 28 29 30 31
   node 3 size: 96765 MB
   node 3 free: 90313 MB
   node distances:
      node 0 1 2 3
      0: 10 21 21 21
      1: 21 10 21 21

(Continued on next page)
Platform Notes (Continued)

2:  21  21  10  21
3:  21  21  21  10

From /proc/meminfo
MemTotal:       394590420 kB
HugePages_Total:       0
Hugepagesize:       2048 kB

From /etc/*release* /etc/*version*
s=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 28 15:44

SPEC is set to: /home/speccpu

Filesystem  Type    Size  Used  Avail Capacity Mounted on
/dev/mapper/rhel-home xfs   839G  145G  695G   18%  /home

From /sys/devices/virtual/dmi/id

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Platform Notes (Continued)

BIOS: American Megatrends Inc. 2.00.33 08/22/2019
Vendor: New H3C Technologies Co., Ltd.
Product: H3C UniServer R6900 G3
Product Family: Rack
Serial: 210235A3T0H204000004

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:
24x Micron 18ASF2G72PDZ-2G9E1 16 GB 2 rank 2933
24x NO DIMM NO DIMM

(End of data from sysinfo program)

Compiler Version Notes

==============================================================================
C               | 619.lbm_s(base, peak) 638.imagick_s(base, peak)
| 644.nab_s(base, 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++, C, Fortran | 607.cactuBSSN_s(base, 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.
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.
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.
-----------------------------------------------------------------------------
Fortran         | 603.bwaves_s(base, peak) 649.fotonik3d_s(base, peak)
| 654.roms_s(base, peak)
-----------------------------------------------------------------------------
Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)

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

64, Version 19.1.1.217 Build 20200306
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

Fortran, C
621.wrf_s(base, peak) 627.cam4_s(base, peak)
628.pop2_s(base, peak)

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 byte recl
638.imagick_s: -DSPEC_LP64
644.nab_s: -DSPEC_LP64
649.fotonik3d_s: -DSPEC_LP64
654.roms_s: -DSPEC_LP64
SPEC CPU®2017 Floating Point Speed Result

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**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 -gopenmp -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 -gopenmp -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`
- `qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4 -gopenmp`
- `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 -gopenmp`
- `DSPEC_OPENMP -mbranches-within-32B-boundaries -nostandard-realloc-lhs`
- `-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc`

**Peak 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`

**Peak Portability Flags**

Same as Base Portability Flags
## Peak Optimization Flags

### C benchmarks:

- **619.lbm_s**: `basepeak = yes`
- **638.imagick_s**: `basepeak = yes`
- **644.nab_s**:
  - `-m64`
  - `-Wl,-z,muldefs`
  - `-xCORE-AVX512`
  - `-ipo -O3`
  - `-no-prec-div`
  - `-qopt-prefetch`
  - `-ffinite-math-only`
  - `-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`
  - `-O3`
  - `-no-prec-div`
  - `-qopt-prefetch`
  - `-ffinite-math-only`
  - `-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:

- **621.wrf_s**:
  - `-m64`
  - `-Wl,-z,muldefs`
  - `-prof-gen(pass 1) -prof-use(pass 2)`
  - `-DSPEC_SUPPRESS_OPENMP`
  - `-DSPEC_OPENMP`
  - `-ipo -xCORE-AVX512`
  - `-O3`
  - `-no-prec-div`
  - `-qopt-prefetch`
  - `-ffinite-math-only`
  - `-mbranches-within-32B-boundaries`
  - `-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc`
- **627.cam4_s**: `basepeak = yes`
- **628.pop2_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:

- [http://www.spec.org/cpu2017/flags/New_H3C-Platform-Settings-V1.4-CLX-RevB.html](http://www.spec.org/cpu2017/flags/New_H3C-Platform-Settings-V1.4-CLX-RevB.html)
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You can also download the XML flags sources by saving the following links:

- 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.

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