**New H3C Technologies Co., Ltd.**

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

<table>
<thead>
<tr>
<th>Software</th>
<th>SPECrate&lt;sup&gt;®&lt;/sup&gt;2017_fp_base</th>
<th>SPECrate&lt;sup&gt;®&lt;/sup&gt;2017_fp_peak</th>
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### Hardware

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<td>System State:</td>
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New H3C Technologies Co., Ltd. | SPECrate®2017_fp_base = 205
H3C UniServer B5700 G5 (Intel Xeon Silver 4310) | SPECrate®2017_fp_peak = 207

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</table>

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/je5.0.1-64"
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
Transparent Huge Pages enabled by default
Prior to runcpu invocation
Filesystem page cache synced and cleared with:

(Continued on next page)
General Notes (Continued)

sync; echo 3> /proc/sys/vm/drop_caches
runcpu command invoked through numactl i.e.:
numactl --interleave=all runcpu <etc>

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.


Platform Notes

BIOS Settings:
Set SNC to enabled
Set Patrol Scrub to disabled
Set XPT Prefetch to enabled

Sysinfo program /home/speccpu/bin/sysinfo
Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16aca64d4d
running on localhost.localdomain Sun Jul  4 01:06:50 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)
  48 "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 : 24
  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):           48
On-line CPU(s) list: 0-47
Thread(s) per core: 2

(Continued on next page)
New H3C Technologies Co., Ltd.  
H3C UniServer B5700 G5 (Intel Xeon Silver 4310)  

**SPEC CPU®2017 Floating Point Rate Result**

**SPECrate®2017_fp_base = 205**  
**SPECrate®2017_fp_peak = 207**

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<td>Software Availability:</td>
<td>Dec-2020</td>
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</table>

**Platform Notes (Continued)**

- **Core(s) per socket:** 12  
- **Socket(s):** 2  
- **NUMA node(s):** 4  
- **Vendor ID:** GenuineIntel  
- **CPU family:** 6  
- **Model:** 106  
- **Model name:** Intel(R) Xeon(R) Silver 4310 CPU @ 2.10GHz  
- **Stepping:** 6  
- **CPU MHz:** 2699.814  
- **CPU max MHz:** 3300.0000  
- **CPU min MHz:** 800.0000  
- **BogoMIPS:** 4200.00  
- **Virtualization:** VT-x  
- **L1d cache:** 48K  
- **L1i cache:** 32K  
- **L2 cache:** 1280K  
- **L3 cache:** 18432K  
- **NUMA node0 CPU(s):** 0-5,24-29  
- **NUMA node1 CPU(s):** 6-11,30-35  
- **NUMA node2 CPU(s):** 12-17,36-41  
- **NUMA node3 CPU(s):** 18-23,42-47  
- **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 xtprud pmc dca dcm cmp cmov pmovusb pmovuse pmovuo pmovmswb pku pmovmskpd

```
From numactl --hardware
WARNING: a numactl 'node' might or might not correspond to a physical chip.
available: 4 nodes (0-3)
ode 0 cpus: 0 1 2 3 4 5 24 25 26 27 28 29
node 0 size: 257379 MB
node 0 free: 248622 MB
node 1 cpus: 6 7 8 9 10 11 30 31 32 33 34 35
node 1 size: 258044 MB
```

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

node 1 free: 251654 MB
node 2 cpus: 12 13 14 15 16 17 36 37 38 39 40 41
node 2 size: 258044 MB
node 2 free: 251835 MB
node 3 cpus: 18 19 20 21 22 23 43 44 45 46 47
node 3 size: 258015 MB
node 3 free: 251870 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: 1056240412 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*
  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
New H3C Technologies Co., Ltd.
H3C UniServer B5700 G5 (Intel Xeon Silver 4310)

**SPECrate®2017_fp_base = 205**

**SPECrate®2017_fp_peak = 207**

### 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
- Mitigation: usercopy/swaps barriers and __user pointer sanitization

**CVE-2017-5753 (Spectre variant 1):**

**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 3 17:28 last=5**

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

---

**Filesystem**

- **/dev/mapper/rhel-home**
  - Type: xfs
  - Size: 5.8T
  - Used: 131G
  - Avail: 5.7T
  - Use%: 3%
  - Mounted on: /home

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

- **Vendor:** New H3C Technologies Co., Ltd.
- **Product:** B5700 G5
- **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          519.lbm_r(base, peak) 538.imagick_r(base, peak)
           544.nab_r(base, peak)
```

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

H3C UniServer B5700 G5 (Intel Xeon Silver 4310)

SPECrate®2017_fp_base = 205
SPECrate®2017_fp_peak = 207

Compiler Version Notes (Continued)

Intel® oneAPI DPC++/C++ Compiler for applications running on Intel® 64,
Version 2021.1 Build 20201113
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==============================================================================
C++             | 508.namd_r(base, peak) 510.parest_r(base, peak)
==============================================================================

Intel® oneAPI DPC++/C++ Compiler for applications running on Intel® 64,
Version 2021.1 Build 20201113
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

==============================================================================
C++, C          | 511.povray_r(peak)
==============================================================================

Intel® C++ Intel® 64 Compiler Classic for applications running on
Intel® 64, Version 2021.1 Build 20201112_000000
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
Intel® C Intel® 64 Compiler Classic for applications running on Intel®
64, Version 2021.1 Build 20201112_000000
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

==============================================================================
C++, C          | 511.povray_r(base) 526.blender_r(base, peak)
==============================================================================

Intel® oneAPI DPC++/C++ Compiler for applications running on Intel® 64,
Version 2021.1 Build 20201113
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==============================================================================
C++, C          | 511.povray_r(peak)
==============================================================================

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Intel® C Intel® 64 Compiler Classic for applications running on Intel®
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Test Date: Jul-2021
Hardware Availability: Apr-2021
Software Availability: Dec-2020

Compiler Version Notes (Continued)

==============================================================================
C++, C          | 511.povray_r(base) 526.blender_r(base, peak)
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,
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Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,
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==============================================================================
C++, C, Fortran | 507.cactuBSSN_r(base, peak)
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Intel(R) C Intel(R) 64 Compiler Classic for applications running on Intel(R)
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Fortran, C      | 521.wrf_r(base) 527.cam4_r(base, peak)
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Software Availability: Dec-2020

Compiler Version Notes (Continued)

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| Intel(R) Fortran Intel(R) 64 Compiler Classic for applications running on |
| Intel(R) 64, Version 2021.1 Build 20201112_000000 |
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| 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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---------------------------------------------------------------------------------------------
<table>
<thead>
<tr>
<th>Fortran, C</th>
<th>521.wrf_r(base) 527.cam4_r(base, peak)</th>
</tr>
</thead>
</table>
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| 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. |
| Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, |
| Version 2021.1 Build 20201113 |
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Base Compiler Invocation

C benchmarks:
icx

C++ benchmarks:
icpx

Fortran benchmarks:
ifort

Benchmarks using both Fortran and C:
ifort icx

(Continued on next page)
New H3C Technologies Co., Ltd.
H3C UniServer B5700 G5 (Intel Xeon Silver 4310)

<table>
<thead>
<tr>
<th>SPECrate®2017_fp_base = 205</th>
<th>SPECrate®2017_fp_peak = 207</th>
</tr>
</thead>
</table>

CPU2017 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

**Base Compiler Invocation (Continued)**

Benchmarks using both C and C++:

icpx icx

Benchmarks using Fortran, C, and C++:

icpx icx ifort

**Base Portability Flags**

<table>
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<tr>
<th>Benchmark</th>
<th>Flags</th>
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</thead>
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<td>503.bwaves_r</td>
<td>-DSPEC_LP64</td>
</tr>
<tr>
<td>507.cactuBSSN_r</td>
<td>-DSPEC_LP64</td>
</tr>
<tr>
<td>508.namd_r</td>
<td>-DSPEC_LP64</td>
</tr>
<tr>
<td>510.parest_r</td>
<td>-DSPEC_LP64</td>
</tr>
<tr>
<td>511.povray_r</td>
<td>-DSPEC_LP64</td>
</tr>
<tr>
<td>519.lbm_r</td>
<td>-DSPEC_LP64</td>
</tr>
<tr>
<td>521.wrf_r</td>
<td>-DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian</td>
</tr>
<tr>
<td>526.blender_r</td>
<td>-DSPEC_LP64 -DSPEC_LINUX -funsigned-char</td>
</tr>
<tr>
<td>527.cam4_r</td>
<td>-DSPEC_LP64 -DSPEC_CASE_FLAG</td>
</tr>
<tr>
<td>538.imagick_r</td>
<td>-DSPEC_LP64</td>
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<tr>
<td>544.nab_r</td>
<td>-DSPEC_LP64</td>
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<tr>
<td>549.fotonik3d_r</td>
<td>-DSPEC_LP64</td>
</tr>
<tr>
<td>554.roms_r</td>
<td>-DSPEC_LP64</td>
</tr>
</tbody>
</table>

**Base Optimization Flags**

C benchmarks:

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

C++ benchmarks:

-`w` -`m64` -`Wl,-z,muldefs` -`xCORE-AVX512` -`Ofast` -`ffast-math` -`flto` -`mfpmath=sse` -`funroll-loops` -`qopt-mem-layout-trans=4` -`mbranches-within-32B-boundaries` -`ljemalloc`
-`L/usr/local/jemalloc64-5.0.1/lib`

Fortran benchmarks:


(Continued on next page)
**Base Optimization Flags (Continued)**

Fortran benchmarks (continued):

```
-L/usr/local/jemalloc64-5.0.1/lib
```

Benchmarks using both Fortran and C:

```
-w -m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math
-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4 -O3 -ipo
-no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-multiple-gather-scatter-by-shuffles
-mbranches-within-32B-boundaries -nostandard-realloc-lhs
-align array32byte -auto -ljemalloc -L/usr/local/jemalloc64-5.0.1/lib
```

Benchmarks using both C and C++:

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

Benchmarks using Fortran, C, and C++:

```
-w -m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math
-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4 -O3
-no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-multiple-gather-scatter-by-shuffles
-mbranches-within-32B-boundaries -nostandard-realloc-lhs
-align array32byte -auto -ljemalloc -L/usr/local/jemalloc64-5.0.1/lib
```

**Peak Compiler Invocation**

C benchmarks:

```
icx
```

C++ benchmarks:

```
icpx
```

Fortran benchmarks:

```
ifort
```

Benchmarks using both Fortran and C:

```
521.wrf_r: ifort icc
527.cam4_r: ifort icx
```

Benchmarks using both C and C++:

(Continued on next page)
New H3C Technologies Co., Ltd.
H3C UniServer B5700 G5 (Intel Xeon Silver 4310)

SPECrater®2017_fp_base = 205
SPECrater®2017_fp_peak = 207

CPU2017 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

Peak Compiler Invocation (Continued)

511.povray_r: icpc icc
526.blender_r: icpx icx

Benchmarks using Fortran, C, and C++:
icpx icx ifort

Peak Portability Flags

Same as Base Portability Flags

Peak Optimization Flags

C benchmarks:

519.lbm_r: basepeak = yes
538.imagick_r: basepeak = yes
544.nab_r: -w -std=c11 -m64 -Wl,-z,muldefs -xCORE-AVX512 -flto
-Ofast -qopt-mem-layout-trans=4
-fimf-accuracy-bits=14:sqrt
-mbranches-within-32B-boundaries -ljemalloc
-L/usr/local/jemalloc64-5.0.1/lib

C++ benchmarks:

508.namd_r: basepeak = yes
510.parest_r: -w -m64 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math
-flto -mfpmath=sse -funroll-loops
-qopt-mem-layout-trans=4 -mbranches-within-32B-boundaries
-ljemalloc -L/usr/local/jemalloc64-5.0.1/lib

Fortran benchmarks:

503.bwaves_r: -w -m64 -Wl,-z,muldefs -xCORE-AVX512 -O3 -ipo
-no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-multiple-gather-scatter-by-shuffles
-qopt-mem-layout-trans=4 -nostandard-realloc-lhs
-align array32byte -auto -mbranches-within-32B-boundaries
-ljemalloc -L/usr/local/jemalloc64-5.0.1/lib
New H3C Technologies Co., Ltd. | SPECrate®2017_fp_base = 205
H3C UniServer B5700 G5 (Intel Xeon Silver 4310) | SPECrate®2017_fp_peak = 207

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

Peak Optimization Flags (Continued)

549.fotonik3d_r.basepeak = yes
554.roms_r: Same as 503.bwaves_r

Benchmarks using both Fortran and C:

521.wrf_r: -prof-gen(pass 1) -prof-use(pass 2) -xCORE-AVX512 -O3
-ipo -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-multiple-gather-scatter-by-shuffles
-qopt-mem-layout-trans=4 -mbranches-within-32B-boundaries
-nostandard-realloc-lhs -align array32byte -auto
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

527.cam4_r.basepeak = yes

Benchmarks using both C and C++:

511.povray_r: -prof-gen(pass 1) -prof-use(pass 2) -xCORE-AVX512 -O3
-ipo -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-multiple-gather-scatter-by-shuffles
-qopt-mem-layout-trans=4 -mbranches-within-32B-boundaries
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

526.blender_r.basepeak = yes

Benchmarks using Fortran, C, and C++:

507.cactuBSSN_r.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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