SPEC CPU®2017 Integer Rate Result

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

SPECrate®2017_int_base = 172
SPECrate®2017_int_peak = 176

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

<table>
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Hardware

CPU Name: Intel Xeon Silver 4310
Max MHz: 3300
Nominal: 2100
Enabled: 24 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: 18 MB I+D on chip per chip
Other: None
Memory: 1 TB (16 x 64 GB 2Rx4 PC4-32000AA-R, running at 2666)
Storage: 6.4 TB SSD NVME
Other: None

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: No
Firmware: Version 5.23 released Apr-2021BIOS
File System: xfs
System State: Run level 3 (multi-user)
Base Pointers: 64-bit
Peak Pointers: 32/64-bit
Other: jemalloc memory allocator V5.0.1
Power Management: BIOS set to prefer performance at the cost of additional power usage
New H3C Technologies Co., Ltd.  
H3C UniServer B5700 G5 (Intel Xeon Silver 4310)

Results Table

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<th>Base Ratio</th>
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<td>48</td>
<td>557</td>
<td>93.1</td>
<td>556</td>
</tr>
</tbody>
</table>

Results appear in the order in which they were run. Bold underlined text indicates a median measurement.

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/lib/ia32:/home/speccpu/je5.0.1-32"

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:
sync; echo 3>/proc/sys/vm/drop_caches
runcpu command invoked through numactl i.e.:

(Continued on next page)
General Notes (Continued)

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 982a61ec0915b55891ef0e16acaafc64d running on localhost.localdomain Sat Jul  3 17:31:49 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
Core(s) per socket: 12
Socket(s): 2

(Continued on next page)
Platform Notes (Continued)

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: 2699.766
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| mcr| sep| mtrr| pae| mce| cx8| apic| sep| mtrr| pae| cmov| l1c| tsc| arch_perfmon| pebs| bts| rep_good| nop| xt| nonstop_tsc| c| puid| aperf| perf| pni| pclmulqdq| dtes64| monitor| ds_cpl| vmx| smx| est| tm| sse3| sdbg| fma| cx16| xtr| pdcm| pcid| dca| sse| 4| sse| 2| x2apic| movbe| popcnt| tsc| deadline| timer| aes| xsave| avx| f16c| rdrand| lahf| l| ab| 3dnowprefetch| cpu| fault| epb| cat| 13| invpcid| single| ssbd| mba| ibrs| ibpb| stibp| ibrs| enhanced| tpr| shadow| vmm| flexpriority| ept| vpid| fsgsbase| tsc| adjust| bmi1| hle| avx2| smep| bmi2| erms| invpcid| rtm| cmq| rdt| a| avx512f| avx512dq| rdseed| adx| smap| avx512ifma| clflushopt| clwb| intel| pt| avx512cd| sha| ni| avx512bw| avx512vl| xsaveopt| xsave| x save| xsavec| cmq| llc| cmq| occup| llc| cmq| mbm| total| cmq| mbm| local| w| bw| dtherm| id| ar| at| pl| nt| hwp| hwp| act| window| hwp| epp| hwp| pkg| req| avx512v bmi| umip| pku| ospke| avx512v bmi| 2| gfn| va| vpclmulqdq| avx512v| v| vni| avx512v| bitalg| tme| avx512v| vpopcnt| dq| 1a57| rdp| md| clear| pconfig| flush| lidd| 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 24 25 26 27 28 29
    node 0 size: 257397 MB
    node 0 free: 256709 MB
    node 1 cpus: 6 7 8 9 10 11 30 31 32 33 34 35
    node 1 size: 258044 MB
    node 1 free: 257399 MB
    node 2 cpus: 12 13 14 15 16 17 36 37 38 39 40 41

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

H3C UniServer B5700 G5 (Intel Xeon Silver 4310)

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Copyright 2017-2021 Standard Performance Evaluation Corporation

SPECrate®2017_int_base = 172
SPECrate®2017_int_peak = 176

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Test Sponsor: New H3C Technologies Co., Ltd.
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Test Date: Jul-2021
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Platform Notes (Continued)

node 2 size: 258044 MB
node 2 free: 257537 MB
node 3 cpus: 18 19 20 21 22 23 42 43 44 45 46 47
node 3 size: 258015 MB
node 3 free: 257718 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
Microarchitectural Data Sampling: Not affected
CVE-2017-5754 (Meltdown): Not affected

(Continued on next page)
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Platform Notes (Continued)

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 Jul 3 17:28 last=5

SPEC is set to: /home/speccpu

Filesystem            Type  Size  Used Avail Use% Mounted on
/dev/mapper/rhel-home xfs   5.8T  129G  5.7T   3% /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       | 500.perlbench_r(peak) 557.xz_r(peak)
------------------------------------------------------------------------------
Intel(R) C Intel(R) 64 Compiler Classic for applications running on Intel(R) 64, Version 2021.1 Build 20201112_000000

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

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SPECrater®2017_int_base = 172
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Compiler Version Notes (Continued)

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==============================================================================
C       | 502.gcc_r(peak)
Intel(R) oneAPI DPC++/C++ Compiler for applications running on IA-32, Version 2021.1 Build 20201113
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

==============================================================================
C       | 500.perlbench_r(base) 502.gcc_r(base) 505.mcf_r(base, peak) 525.x264_r(base, peak) 557.xz_r(base)
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2021.1 Build 20201113
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C       | 500.perlbench_r(peak) 557.xz_r(peak)
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==============================================================================
C       | 500.perlbench_r(peak) 557.xz_r(peak)

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### Compiler Version Notes (Continued)

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<th>548.exchange2_r(base, peak)</th>
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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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### Base Compiler Invocation

C benchmarks:  
`icx`

(Continued on next page)
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### Base Compiler Invocation (Continued)

C++ benchmarks:
- icpx

Fortran benchmarks:
- ifort

### Base Portability Flags

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</tr>
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</table>

### Base Optimization Flags

#### C benchmarks:
- `-w -std=c11 -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`

#### C++ benchmarks:
- `-w -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:
- `-w -m64 -Wl,-z,muldefs -xCORE-AVX512 -O3 -ipo -no-prec-div`
- `-qopt-mem-layout-trans=4 -nostandard-realloc-lhs -align array32byte`
- `-auto -mbranches-within-32B-boundaries`
- `-L/opt/intel/oneapi/compiler/2021.1.1/linux/compiler/lib/intel64_lin`
- `-lqkmalloc`
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Peak Compiler Invocation

C benchmarks (except as noted below):
- icx
- 500.perlbench_r: icc
- 557.xz_r: icc

C++ benchmarks:
- icpx

Fortran benchmarks:
- ifort

Peak Portability Flags

500.perlbench_r: -DSPEC_LP64 -DSPEC_LINUX_X64
502.gcc_r: -D_FILE_OFFSET_BITS=64
505.mcf_r: -DSPEC_LP64
520.omnetpp_r: -DSPEC_LP64
523.xalancbmk_r: -DSPEC_LP64 -DSPEC_LINUX
525.x264_r: -DSPEC_LP64
531.deepsjeng_r: -DSPEC_LP64
541.leela_r: -DSPEC_LP64
548.exchange2_r: -DSPEC_LP64
557.xz_r: -DSPEC_LP64

Peak Optimization Flags

C benchmarks:
- 500.perlbench_r: -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/opt/intel/oneapi/compiler/2021.1.1/linux/compiler/lib/intel64_lin
- -lqkmalloc

- 502.gcc_r: -m32
- -L/opt/intel/oneapi/compiler/2021.1.1/linux/compiler/lib/ia32_lin
- -std=gnu89 -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

(Continued on next page)
SPEC CPU®2017 Integer Rate Result

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

SPECrate®2017_int_base = 172  
SPECrate®2017_int_peak = 176

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<th>Test Date: Jul-2021</th>
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<tr>
<td>Tested by: New H3C Technologies Co., Ltd.</td>
<td>Software Availability: Dec-2020</td>
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</tbody>
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Peak Optimization Flags (Continued)

502.gcc_r (continued):
- mbranches-within-32B-boundaries
- L/usr/local/jemalloc32-5.0.1/lib -ljemalloc

505.mcf_r: basepeak = yes

525.x264_r: -w -std=c11 -m64 -Wl,-z,muldefs -xCORE-AVX512 -flto
- O3 -ffast-math -qopt-mem-layout-trans=4 -fno-alias
- mbranches-within-32B-boundaries
- L/opt/intel/oneapi/compiler/2021.1.1/linux/compiler/lib/intel64_lin
  -lqkmalloc

557.xz_r: -Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div
- qopt-mem-layout-trans=4 -mbranches-within-32B-boundaries
- L/opt/intel/oneapi/compiler/2021.1.1/linux/compiler/lib/intel64_lin
  -lqkmalloc

C++ benchmarks:

520.omnetpp_r: basepeak = yes

523.xalancbmk_r: basepeak = yes

531.deepsjeng_r: basepeak = yes

541.leela_r: basepeak = yes

Fortran benchmarks:

548.exchange2_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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For questions about this result, please contact the tester. For other inquiries, please contact info@spec.org.

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