## SPEC CPU®2017 Floating Point Speed Result

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

**H3C UniServer R4900 G6 (Intel Xeon Silver 4410Y)**

**SPECspeed®2017_fp_base = 181**

**SPECspeed®2017_fp_peak = 181**

### Hardware

- **CPU Name:** Intel Xeon Silver 4410Y  
  **Max MHz:** 3900  
  **Nominal:** 2000  
  **Enabled:** 24 cores, 2 chips  
  **Orderable:** 1.2 chips  
  **Cache L1:** 32 KB I + 48 KB D on chip per core  
  **L2:** 2 MB I+D on chip per core  
  **L3:** 30 MB I+D on chip per chip  
  **Other:** None  
  **Memory:** 1 TB (16 x 64 GB 2Rx8 PC5-4800B-R, running at 4000)  
  **Storage:** 1 x 960GB SATA SSD  
  **Other:** None

### Software

- **OS:** Red Hat Enterprise Linux 9.0 (Plow)  
  **Version:** 5.14.0-70.22.1.el9_0.x86_64  
  **Compiler:** C/C++: Version 2022.1 of Intel oneAPI DPC++/C++ Compiler for Linux; Fortran: Version 2022.1 of Intel Fortran Compiler for Linux;  
  **Parallel:** Yes  
  **Firmware:** Version 5.29 released Dec-2022 BIOS  
  **File System:** xfs  
  **System State:** Run level 3 (multi-user)  
  **Base Pointers:** 64-bit  
  **Peak Pointers:** Not Applicable  
  **Other:** jemalloc memory allocator V5.0.1  
  **Power Management:** BIOS and OS set to prefer performance at the cost of additional power usage.

---

### SPEC benchmark results

<table>
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<th>SPECspeed®2017_fp_peak</th>
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<tbody>
<tr>
<td>bwaves</td>
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<td>239</td>
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<td>cactuBSSN</td>
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<td>lbm</td>
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<td>wrf</td>
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<td>cam4</td>
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<td>76.3</td>
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<tr>
<td>pop2</td>
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<td>fotoni3d</td>
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<tr>
<td>roms</td>
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---

**CPU2017 License:** 9066  
**Test Date:** Mar-2023  
**Hardware Availability:** Jan-2023

**Test Sponsor:** New H3C Technologies Co., Ltd.  
**Software Availability:** Aug-2022  
**Tested by:** New H3C Technologies Co., Ltd.
SPEC CPU®2017 Floating Point Speed Result

New H3C Technologies Co., Ltd.  
H3C UniServer R4900 G6 (Intel Xeon Silver 4410Y)

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Results Table

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<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
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<tbody>
<tr>
<td>603.bwaves_s</td>
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<td>90.4</td>
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<tr>
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<td>638.imagick_s</td>
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<tr>
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<td>86.7</td>
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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"
tuned-adm profile was set to Throughput-Performance using "tuned-adm profile throughput-performance"

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 2x Intel Xeon Platinum 8280M CPU + 384GB 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

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General Notes (Continued)

built with the RedHat Enterprise 7.5, and the system compiler gcc 4.8.5  

Platform Notes

BIOS Settings:  
Set Enable LP [Global] to Single LP  
Set Patrol Scrub to Disabled  
Set Power Performance Tuning to BIOS Controls EFB  
Set ENERGY_PERF_BIAS_CFG_mode to Performance

Sysinfo program /home/speccpu/bin/sysinfo  
Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197  
running on localhost.localdomain Fri Mar 3 03:08:17 2023

SUT (System Under Test) info as seen by some common utilities.

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9. /proc/meminfo
10. who -r
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12. Services, from systemctl list-unit-files
13. Linux kernel boot-time arguments, from /proc/cmdline
14. cpupower frequency-info
15. sysctl
16. /sys/kernel/mm/transparent_hugepage
17. /sys/kernel/mm/transparent_hugepage/khugepaged
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Platform Notes (Continued)

Linux localhost.localdomain 5.14.0-70.22.1.el9_0.x86_64 #1 SMP PREEMPT Tue Aug 2 10:02:12 EDT 2022 x86_64 x86_64 GNU/Linux

2. w
   03:08:17 up 1:14, 2 users, load average: 0.00, 0.12, 2.89
   USER TTY LOGIN@ IDLE JCPU PCPU WHAT
   root tty1 01:54   14.00s  0.84s  0.00s -bash
   h3c pts/0 02:48   25.00s  0.02s  0.01s sshd: h3c [priv]

3. Username
   From environment variable $USER: root

4. ulimit -a
   real-time non-blocking time (microseconds, -R) unlimited
   core file size (blocks, -c) 0
   data seg size (kbytes, -d) unlimited
   scheduling priority (-e) 0
   file size (blocks, -f) unlimited
   pending signals (-i) 4124814
   max locked memory (kbytes, -l) 64
   max memory size (kbytes, -m) unlimited
   open files (-n) 1024
   pipe size (512 bytes, -p) 8
   POSIX message queues (bytes, -q) 819200
   real-time priority (-r) 0
   stack size (kbytes, -s) unlimited
   cpu time (seconds, -t) unlimited
   max user processes (-u) 4124814
   virtual memory (kbytes, -v) unlimited
   file locks (-x) unlimited

5. sysinfo process ancestry
   /usr/lib/systemd/systemd rhgb --switched-root --system --deserialize 31
   login -- root
   -bash
   -bash
   runcpu --nobuild --action validate --define default-platform-flags -c
   ic2022.1-lin-core-avx512-speed-20220316.cfg --define cores=24 --tune base,peak -o all --define drop_caches fpspeed
   runcpu --nobuild --action validate --define default-platform-flags --configfile
   ic2022.1-lin-core-avx512-speed-20220316.cfg --define cores=24 --tune base,peak --output_format all
   --define drop_caches --nopower --runmode speed --tune base:peak --size refspeed fpspeed --nopreenv
   --note-preenv --logfile $SPEC/tmp/CPU2017.001/templslogs/preenv.fpspeed.001.0.log --lognum 001.0

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</table>

## Platform Notes (Continued)

```bash
--from_runcpu 2
specperl $SPEC/bin/sysinfo
$SPEC = /home/speccpu
```

### 6. /proc/cpuinfo

```
model name : Intel(R) Xeon(R) Silver 4410Y
vendor_id : GenuineIntel
cpu family : 6
model : 143
stepping : 7
microcode : 0x2b000111
bugs : spectre_v1 spectre_v2 spec_store_bypass swapgs
cpu cores : 12
siblings : 12
2 physical ids (chips)
24 processors (hardware threads)
physical id 0: core ids 0-11
physical id 1: core ids 0-11
physical id 0: apicids 0,2,4,6,8,10,12,14,16,18,20,22
physical id 1: apicids 128,130,132,134,136,138,140,142,144,146,148,150
```

Caution: /proc/cpuinfo data regarding chips, cores, and threads is not necessarily reliable, especially for virtualized systems. Use the above data carefully.

---

### 7. lscpu

```
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Address sizes: 52 bits physical, 57 bits virtual
Byte Order: Little Endian
CPU(s): 24
On-line CPU(s) list: 0-23
Vendor ID: GenuineIntel
BIOS Vendor ID: Intel(R) Corporation
Model name: Intel(R) Xeon(R) Silver 4410Y
BIOS Model name: Intel(R) Xeon(R) Silver 4410Y
CPU family: 6
Model: 143
Thread(s) per core: 1
Core(s) per socket: 12
Socket(s): 2
Stepping: 7
CPU max MHz: 3900.0000
CPU min MHz: 800.0000
BogoMIPS: 4000.00
```

(Continued on next page)
New H3C Technologies Co., Ltd.  
H3C UniServer R4900 G6 (Intel Xeon Silver 4140Y)  

**SPEC** speed® 2017 Floating Point Speed Result  

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New H3C Technologies Co., Ltd.  
H3C UniServer R4900 G6 (Intel Xeon Silver 4140Y)  

**SPEC** speed® 2017 fp_base = 181  
**SPEC** speed® 2017 fp_peak = 181  

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<tr>
<th>Specification</th>
<th>Value</th>
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</tr>
</tbody>
</table>

**Platform Notes (Continued)**

Flags:  
fpu vme de pse tsc msr pae mce cx8 apic sep mtrr pge mca cmov pat pse36  
ciflush dts acpi mmx fxsr sse sse2 ss ht tm pbe syscall nx pdpe1gb rdosp  
lm constant_tsc art arch_perfmon pebs bts rep_good nopl xtopology  
nonstop_tsc cpuid aperfmperf tsc_known_freq pni pclmulqdq dtes64 monitor  
ds_cpl vmx smx est tm2 sse3 sdbg fma cx16 xtrr pdcm pclid 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 cat_12 cdp_13  
invpclid_single intel_pni cdp_12 ssbd mba ibrs ibp bts ibrs enhanced  
trp_shadow vmmi flexpriority ept vpid ept_ad fsgsbase tsc_adjust bmi1 avx2  
smep bmi2 erms invpcid cmqm rdt_a avx512f avx512dq rdseed adx smap  
avx512sfma ciflushopt clwb intel_pt avx512cd sha ni avx512bw avx512vl  
xsavesopt xsaves vxsetbv1 xsaves cmqm llc cmqm_local cmqm_mbb_total  
cmqm_mbb_local split_lock_detect avx_vnni avx512_bf16 wbnoinvd dtchild  
arat pin pts hwp hwp_act_window hwp_epp hwp_pkg_req avx512vbm avx512vl  
opsk paddtg padiq paddtgk avx512_vbmi2 gfi vaes vpclmulqdq avx512_vnni  
avx512_bitalg tme avx512_vpopcntdq ia57 rdpid bus_lock_detect cidemote movdir64b  
enqcmd fasm md_clear serialize tsxidtrk pconfi arch_lbr avx512_fp16  
amx_tile flush_l1d arch_capabilities  

**Virtualization:**  
VT-x  

**L1d cache:**  
1.1 MiB (24 instances)  

**L1i cache:**  
768 KiB (24 instances)  

**L2 cache:**  
48 MiB (24 instances)  

**L3 cache:**  
60 MiB (2 instances)  

**NUMA node(s):**  
2  

**NUMA node0 CPU(s):**  
0-11  

**NUMA node1 CPU(s):**  
12-23  

**Vulnerability I1tb multihit:**  
Not affected  

**Vulnerability L1tf:**  
Not affected  

**Vulnerability Mds:**  
Not affected  

**Vulnerability Meltdown:**  
Not affected  

**Vulnerability Spec store bypass:**  
Mitigation; Speculative Store Bypass disabled via prctl  

**Vulnerability Spectre v1:**  
Mitigation; usercopy/swapgs barriers and __user pointer sanitization  

**Vulnerability Spectre v2:**  
Mitigation; Enhanced IBRS, IBFB conditional, RSB filling  

**Vulnerability Srbd:**  
Not affected  

**Vulnerability Tsy async abort:**  
Not affected  

From lscpu --cache:  

<table>
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<tr>
<th>NAME</th>
<th>ONE-SIZE</th>
<th>ALL-SIZE</th>
<th>WAYS</th>
<th>TYPE</th>
<th>LEVEL</th>
<th>SETS</th>
<th>PHY-LINE</th>
<th>COHERENCY-SIZE</th>
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<tbody>
<tr>
<td>L1d</td>
<td>48K</td>
<td>1.1M</td>
<td>12</td>
<td>Data</td>
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<td>768K</td>
<td>8</td>
<td>Instruction</td>
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<td>64</td>
<td>1</td>
<td>64</td>
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<tr>
<td>L2</td>
<td>2M</td>
<td>48M</td>
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<td>2048</td>
<td>1</td>
<td>64</td>
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<tr>
<td>L3</td>
<td>30M</td>
<td>60M</td>
<td>15</td>
<td>Unified</td>
<td>3</td>
<td>32768</td>
<td>1</td>
<td>64</td>
</tr>
</tbody>
</table>

8. numactl --hardware  
NOTE: a numactl 'node' might or might not correspond to a physical chip.  
available: 2 nodes (0-1)  

(Continued on next page)
Platform Notes (Continued)

node 0 cpus: 0-11
node 0 size: 515181 MB
node 0 free: 509606 MB
node 1 cpus: 12-23
node 1 size: 516082 MB
node 1 free: 515219 MB
node distances:
node 0 1
 0: 10 21
 1: 21 10

9. /proc/meminfo
MemTotal: 1056014512 kB

10. who -r
run-level 3 Mar 3 01:53

11. Systemd service manager version: systemd 250 (250-6.el9_0)
Default Target Status
multi-user running

12. Services, from systemctl list-unit-files
STATE UNIT FILES
enabled ModemManager NetworkManager NetworkManager-dispatcher NetworkManager-wait-online accounts-daemon atd auditd avahi-daemon bluetooth chrony crond cups dbus-broker firewalld gdm getty@ insights-client-boot irqbalance i scsi iscsi-onboot ldrcr mnode mdmonitor microcode multipathd nis-domainname nvme-fc-boot-connections ostree-remount power-profiles-daemon qemu-guest-agent rhsmd rsyslog rtkit-daemon selinux-autorelabel-mark smartd sshd sssd swithceroo-control systemd-network-generator udisks2 upower vgauthd vmtoolsd
enabled-runtime systemd-remount-fs
indirect spice-vagentd sssd-autofs sssd-kcm sssd-nss sssd-pac sssd-pam sssd-ssh sssd-sudo

13. Linux kernel boot-time arguments, from /proc/cmdline
BOOT_IMAGE=(hd0,gpt2)/vmunix5-5.14.0-70.22.1.el19_0.86_64

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Platform Notes (Continued)

```
root=/dev/mapper/rhel-root
ro
crashkernel=1G-4G:192M,4G-64G:256M,64G-:512M
resume=/dev/mapper/rhel-swap
rd.lvm.lv=rhel/root
rd.lvm.lv=rhel/swap
rhgb
quiet
```

```
14. cpupower frequency-info
analyzing CPU 0:
current policy: frequency should be within 800 MHz and 3.90 GHz.
The governor "performance" may decide which speed to use within this range.
boost state support:
Supported: yes
Active: yes
```

```
15. sysctl
kernel.numa_balancing               1
kernel.randomize_va_space           2
vm.compaction_proactiveness         20
vm.dirty_background_bytes           0
vm.dirty_background_ratio          10
vm.dirty_bytes                      0
vm.dirty_expire_centisecs          3000
vm.dirty_ratio                     20
vm.dirty_writeback_centisecs       500
vm.dirtytime_expire_seconds       43200
vm.extrfrag_threshold              500
vm.min_unmapped_ratio              1
vm.nr_hugepages                    0
vm.nr_hugepages_mempolicy          0
vm.nr_overcommit_hugepages         0
vm.swappiness                       60
vm.watermark_boost_factor          15000
vm.watermark_scale_factor          10
vm.zone_reclaim_mode               0
```

```
16. /sys/kernel/mm/transparent_hugepage
defrag          always defer defer+madvise [madvise] never
enabled          [always] madvise never
hpage_pmd_size   2097152
shmem_enabled    always within_size advise [never] deny force
```

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Platform Notes (Continued)

17. /sys/kernel/mm/transparent_hugepage/khugepaged
   alloc_sleep_millisecs   60000
   defrag                 1
   max_ptes_none          511
   max_ptes_shared        256
   max_ptes_swap          64
   pages_to_scan          4096
   scan_sleep_millisecs   10000

18. OS release
   From /etc/*-release /etc/*-version
   os-release     Red Hat Enterprise Linux 9.0 (Plow)
   redhat-release Red Hat Enterprise Linux release 9.0 (Plow)
   system-release Red Hat Enterprise Linux release 9.0 (Plow)

19. Disk information
   SPEC is set to: /home/speccpu
   Filesystem            Type  Size  Used Avail Use% Mounted on
   /dev/mapper/rhel-home  xfs   819G   25G  795G   3% /home

20. /sys/devices/virtual/dmi/id
   Vendor: New H3C Technologies Co., Ltd.
   Product: H3C UniServer R4900 G6 Ultra
   Product Family: Rack
   Serial: 210235A4CJ4900060001

21. dmidecode
   Additional information from dmidecode 3.3 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:
   14x Hynix HMCG94AEBRA102N 64 GB 2 rank 4800, configured at 4000
   2x Hynix HMCG94AEBRA109N 64 GB 2 rank 4800, configured at 4000

22. BIOS
   (This section combines info from /sys/devices and dmidecode.)
   BIOS Vendor: American Megatrends International, LLC.
   BIOS Version: 6.00.08

(Continued on next page)
New H3C Technologies Co., Ltd.
H3C UniServer R4900 G6 (Intel Xeon Silver 4410Y)

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

Test Date: Mar-2023
Hardware Availability: Jan-2023
Software Availability: Aug-2022

Platform Notes (Continued)

BIOS Date: 01/09/2023
BIOS Revision: 5.29

Compiler Version Notes

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

Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,
Version 2022.1.0 Build 20220316
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==============================================================================
C++, C, Fortran | 607.cactuBSSN_s(base, peak)
==============================================================================

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Intel(R) Fortran Compiler for applications running on Intel(R) 64, Version
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==============================================================================
Fortran
| 603.bwaves_s(base, peak) 649.fotonik3d_s(base, peak) 654.roms_s(base, peak)
==============================================================================

Intel(R) Fortran Compiler for applications running on Intel(R) 64, Version
2022.1.0 Build 20220316
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==============================================================================
Fortran, C
| 621.wrf_s(base, peak) 627.cam4_s(base, peak) 628.pop2_s(base, peak)
==============================================================================

Intel(R) Fortran Compiler for applications running on Intel(R) 64, Version
2022.1.0 Build 20220316
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Version 2022.1.0 Build 20220316

(Continued on next page)
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Software Availability: Aug-2022

Compiler Version Notes (Continued)

C benchmarks:
icx

Fortran benchmarks:
ifx

Benchmarks using both Fortran and C:
ifx icx

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

Base Compiler Invocation

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
654.roms_s: -DSPEC_LP64

Base Optimization Flags

C benchmarks:
-m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math -flto
-mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4 -fiopenmp
-DSPEC_OPENMP -L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

Fortran benchmarks:
-m64 -Wl,-z,muldefs -DSPEC_OPENMP -xCORE-AVX512 -Ofast -ffast-math
-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4 -fiopenmp

(Continued on next page)
New H3C Technologies Co., Ltd.  
H3C UniServer R4900 G6 (Intel Xeon Silver 4410Y)

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<td>Software Availability: Aug-2022</td>
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### Base Optimization Flags (Continued)

Fortran benchmarks (continued):
- nostandard-realloc-lhs -align array32byte -auto
- L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

Benchmarks using both Fortran and C:
- m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math -flto
- mfpmath=ssse -funroll-loops -qopt-mem-layout-trans=4 -fiopenmp
- DSPEC_OPENMP -nostandard-realloc-lhs -align array32byte -auto
- L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

Benchmarks using Fortran, C, and C++:
- m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math -flto
- mfpmath=ssse -funroll-loops -qopt-mem-layout-trans=4 -fiopenmp
- DSPEC_OPENMP -nostandard-realloc-lhs -align array32byte -auto
- L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

### Peak Compiler Invocation

C benchmarks:
- icx

Fortran benchmarks:
- ifx

Benchmarks using both Fortran and C:
- ifx icx

Benchmarks using Fortran, C, and C++:
- icpx icx ifx

### Peak Portability Flags

Same as Base Portability Flags

### Peak Optimization Flags

C benchmarks:

619.lbm_s: basepeak = yes

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

H3C UniServer R4900 G6 (Intel Xeon Silver 4410Y)

SPECspeed®2017_fp_base = 181

SPECspeed®2017_fp_peak = 181

CPU2017 License: 9066
Test Sponsor: New H3C Technologies Co., Ltd.
Test Date: Mar-2023
Tested by: New H3C Technologies Co., Ltd.
Hardware Availability: Jan-2023
Software Availability: Aug-2022

Peak Optimization Flags (Continued)

638.imagick_s: basepeak = yes

644.nab_s: basepeak = yes

Fortran benchmarks:


649.fotonik3d_s: basepeak = yes

654.roms_s: basepeak = yes

Benchmarks using both Fortran and C:

621.wrf_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

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2017/flags/New_H3C-Platform-Settings-V1.0-SPR-RevA.xml
## SPEC CPU®2017 Floating Point Speed Result

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### Details:

- **CPU2017 License**: 9066
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Tested with SPEC CPU®2017 v1.1.9 on 2023-03-03 03:08:16-0500.
Report generated on 2023-03-29 00:34:10 by CPU2017 PDF formatter v6442.
Originally published on 2023-03-28.