SPEC CPU®2017 Integer Rate Result

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New H3C Technologies Co., Ltd.

H3C UniServer R4700 G6 (Intel Xeon Gold 6530)

$SPECrate^{®}2017\_int\_base =$ **556**

$SPECrate^{®}2017\_int\_peak =$ Not Run

CPU2017 License: 9066	**Test Date:** Aug-2024
Test Sponsor: New H3C Technologies Co., Ltd.	**Hardware Availability:** Oct-2023
Tested by: New H3C Technologies Co., Ltd.	**Software Availability:** Mar-2024

Copies — scale: 0 50.0 100 150 200 250 300 350 400 450 500 550 600 650 700 750 800 850 900 950 1000 1150

Benchmark	Copies	Result
500.perlbench_r	128	438
502.gcc_r	128	526
505.mcf_r	128	908
520.omnetpp_r	128	404
523.xalancbmk_r	128	760
525.x264_r	128	1080
531.deepsjeng_r	128	370
541.leela_r	128	358
548.exchange2_r	128	1110
557.xz_r	128	280

—— $SPECrate^{®}2017\_int\_base$ (556)

Hardware

CPU Name: Intel Xeon Gold 6530
 Max MHz: 4000
 Nominal: 2100
Enabled: 64 cores, 2 chips, 2 threads/core
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: 160 MB I+D on chip per chip
 Other: None
Memory: 1 TB (16 x 64 GB 2Rx4 PC5-6400B-R, running at 4800)
Storage: 1 x 3.2 TB NVME SSD
Other: CPU Cooling: Air

Software

OS: SUSE Linux Enterprise High Performance Computing 15 SP5
5.14.21-150500.53-default

Compiler: C/C++: Version 2024.1 of Intel oneAPI DPC++/C++ Compiler for Linux;
Fortran: Version 2024.1 of Intel Fortran Compiler for Linux;

Parallel: No
Firmware: Version 6.10.38P60 released Apr-2024 BIOS
File System: xfs
System State: Run level 3 (multi-user)
Base Pointers: 64-bit
Peak Pointers: Not Applicable
Other: None
Power Management: BIOS and OS set to prefer performance at the cost of
additional power usage.

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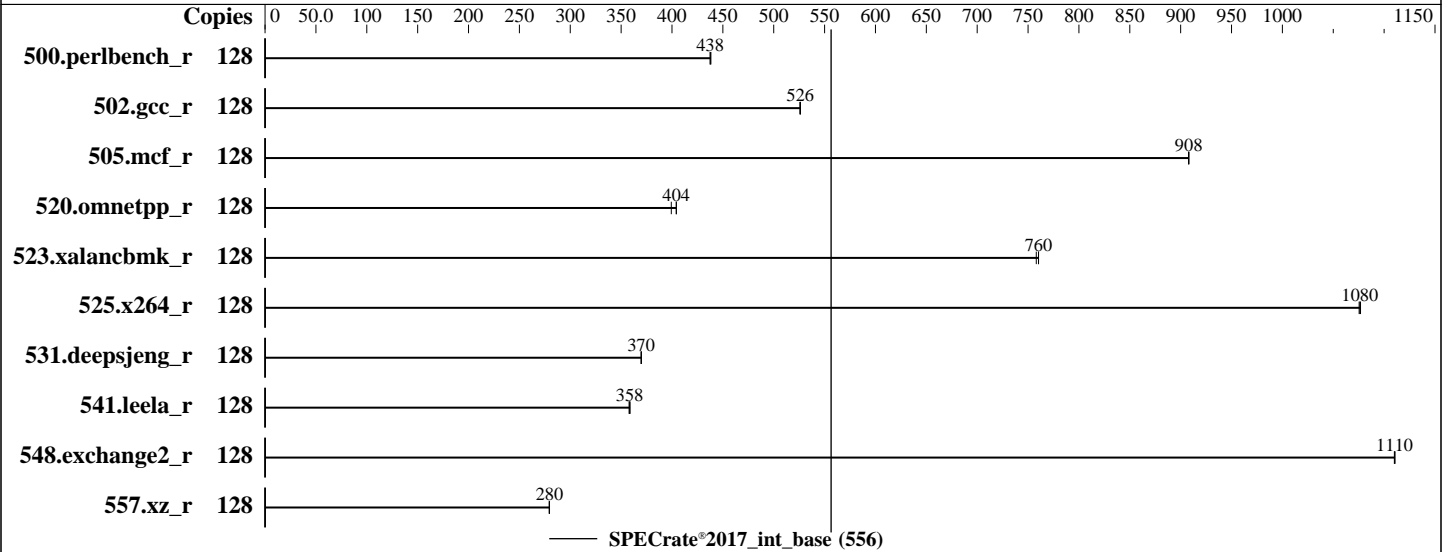
SPECrate®2017_int_peak = Not Run

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Results Table

Benchmark	Base							Peak						
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
500.perlbench_r	128	**466**	**438**	465	438	466	438							
502.gcc_r	128	**344**	**526**	344	526	345	526							
505.mcf_r	128	**228**	**908**	228	908	228	908							
520.omnetpp_r	128	**415**	**404**	421	399	415	404							
523.xalancbmk_r	128	178	760	178	758	**178**	**760**							
525.x264_r	128	208	1080	208	1080	**208**	**1080**							
531.deepsjeng_r	128	397	370	**397**	**370**	397	370							
541.leela_r	128	591	359	592	358	**592**	**358**							
548.exchange2_r	128	**302**	**1110**	302	1110	302	1110							
557.xz_r	128	**495**	**280**	495	279	494	280							
SPECrate®2017_int_base =		**556**												
SPECrate®2017_int_peak =		**Not Run**												

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/speccpunew/lib/intel64:/home/speccpunew/lib/ia32:/home/speccpunew/je5.0.1-32"
MALLOC_CONF = "retain:true"
```

General Notes

```
Binaries compiled on a system with 2x Intel Xeon Platinum 8280M CPU + 384GB RAM
memory using Red Hat Enterprise Linux 8.4
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.:
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.
```

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Platform Notes

```
 BIOS Settings:
 SNC = Enable SNC2 (2-clusters)
 Power Performance Tuning = BIOS Controls EPB
 ENERGY_PERF_BIAS_CFG mode = Performance

 Sysinfo program /home/speccpunew/bin/sysinfo
 Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197
 running on localhost Sun Aug  4 12:04:42 2024

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

 ------------------------------------------------------------
 Table of contents
 ------------------------------------------------------------
  1. uname -a
  2. w
  3. Username
  4. ulimit -a
  5. sysinfo process ancestry
  6. /proc/cpuinfo
  7. lscpu
  8. numactl --hardware
  9. /proc/meminfo
 10. who -r
 11. Systemd service manager version: systemd 249 (249.16+suse.171.gdad0071f15)
 12. Services, from systemctl list-unit-files
 13. Linux kernel boot-time arguments, from /proc/cmdline
 14. cpupower frequency-info
 15. tuned-adm active
 16. sysctl
 17. /sys/kernel/mm/transparent_hugepage
 18. /sys/kernel/mm/transparent_hugepage/khugepaged
 19. OS release
 20. Disk information
 21. /sys/devices/virtual/dmi/id
 22. dmidecode
 23. BIOS
 ------------------------------------------------------------


 ------------------------------------------------------------
 1. uname -a
   Linux localhost 5.14.21-150500.53-default #1 SMP PREEMPT_DYNAMIC Wed May 10 07:56:26 UTC 2023 (b630043/lp)
   x86_64 x86_64 x86_64 GNU/Linux


 ------------------------------------------------------------
 2. w
    12:04:42 up 5 min,  2 users,  load average: 0.08, 0.16, 0.09
   USER     TTY       FROM             LOGIN@   IDLE   JCPU   PCPU WHAT
   root     tty1      -                12:04   18.00s  0.82s  0.00s sh intrate.sh
   root     pts/0     172.16.27.225    12:03   34.00s  0.20s  0.00s sh 6530.sh


 ------------------------------------------------------------
 3. Username
   From environment variable $USER:  root


 ------------------------------------------------------------
 4. ulimit -a
   core file size          (blocks, -c) unlimited
   data seg size           (kbytes, -d) unlimited
   scheduling priority             (-e) 0
```

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Platform Notes (Continued)

```
  file size             (blocks, -f) unlimited
  pending signals               (-i) 4124621
  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) 4124621
  virtual memory        (kbytes, -v) unlimited
  file locks                    (-x) unlimited


  ---------------------------------------------------------
5. sysinfo process ancestry
 /usr/lib/systemd/systemd --switched-root --system --deserialize 30
 login -- root
 -bash
 sh intrate.sh
 runcpu --nobuild --action validate --define default-platform-flags --define numcopies=128 -c
   ic2024.1-lin-sapphirerapids-rate-20240308.cfg --define smt-on --define cores=64 --define physicalfirst
   --define invoke_with_interleave --define drop_caches --tune base -o all intrate
 runcpu --nobuild --action validate --define default-platform-flags --define numcopies=128 --configfile
   ic2024.1-lin-sapphirerapids-rate-20240308.cfg --define smt-on --define cores=64 --define physicalfirst
   --define invoke_with_interleave --define drop_caches --tune base --output_format all --nopower --runmode
   rate --tune base --size refrate intrate --nopreenv --note-preenv --logfile
   $SPEC/tmp/CPU2017.001/templogs/preenv.intrate.001.0.log --lognum 001.0 --from_runcpu 2
 specperl $SPEC/bin/sysinfo
 $SPEC = /home/speccpunew


  ---------------------------------------------------------
6. /proc/cpuinfo
    model name      : INTEL(R) XEON(R) GOLD 6530
    vendor_id       : GenuineIntel
    cpu family      : 6
    model           : 207
    stepping        : 2
    microcode       : 0x21000200
    bugs            : spectre_v1 spectre_v2 spec_store_bypass swapgs eibrs_pbrsb
    cpu cores       : 32
    siblings        : 64
    2 physical ids (chips)
    128 processors (hardware threads)
    physical id 0: core ids 0-31
    physical id 1: core ids 0-31
    physical id 0: apicids 0-63
    physical id 1: apicids 128-191
  Caution: /proc/cpuinfo data regarding chips, cores, and threads is not necessarily reliable, especially for
  virtualized systems.  Use the above data carefully.


  ---------------------------------------------------------
7. lscpu

From lscpu from util-linux 2.37.4:
  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):                    128
```

(Continued on next page)

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Platform Notes (Continued)

```
  On-line CPU(s) list:        0-127
  Vendor ID:                  GenuineIntel
  Model name:                 INTEL(R) XEON(R) GOLD 6530
  CPU family:                 6
  Model:                      207
  Thread(s) per core:         2
  Core(s) per socket:         32
  Socket(s):                  2
  Stepping:                   2
  CPU max MHz:                4000.0000
  CPU min MHz:                800.0000
  BogoMIPS:                   4200.00
  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 tsc_known_freq 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 cat_l2 cdp_l3
                              invpcid_single cdp_l2 ssbd mba ibrs ibpb stibp ibrs_enhanced tpr_shadow
                              vnmi flexpriority ept vpid ept_ad fsgsbase tsc_adjust bmi1 hle avx2 smep
                              bmi2 erms invpcid rtm cqm rdt_a avx512f avx512dq rdseed adx smap
                              avx512ifma clflushopt clwb intel_pt avx512cd sha_ni avx512bw avx512vl
                              xsaveopt xsavec xgetbv1 xsaves cqm_llc cqm_occup_llc cqm_mbm_total
                              cqm_mbm_local avx_vnni avx512_bf16 wbnoinvd dtherm ida arat pln pts hwp
                              hwp_act_window hwp_epp hwp_pkg_req avx512vbmi umip pku ospke waitpkg
                              avx512_vbmi2 gfni vaes vpclmulqdq avx512_vnni avx512_bitalg tme
                              avx512_vpopcntdq la57 rdpid bus_lock_detect cldemote movdiri movdir64b
                              enqcmd fsrm md_clear serialize tsxldtrk pconfig arch_lbr avx512_fp16
                              amx_tile flush_l1d arch_capabilities
  Virtualization:             VT-x
  L1d cache:                  3 MiB (64 instances)
  L1i cache:                  2 MiB (64 instances)
  L2 cache:                   128 MiB (64 instances)
  L3 cache:                   320 MiB (2 instances)
  NUMA node(s):               4
  NUMA node0 CPU(s):          0-15,64-79
  NUMA node1 CPU(s):          16-31,80-95
  NUMA node2 CPU(s):          32-47,96-111
  NUMA node3 CPU(s):          48-63,112-127
  Vulnerability Itlb multihit: Not affected
  Vulnerability L1tf:         Not affected
  Vulnerability Mds:          Not affected
  Vulnerability Meltdown:     Not affected
  Vulnerability Mmio stale data: Not affected
  Vulnerability Retbleed:     Not affected
  Vulnerability Spec store bypass: Mitigation; Speculative Store Bypass disabled via prctl and seccomp
  Vulnerability Spectre v1:   Mitigation; usercopy/swapgs barriers and __user pointer sanitization
  Vulnerability Spectre v2:   Mitigation; Enhanced IBRS, IBPB conditional, RSB filling, PBRSB-eIBRS SW
                              sequence
  Vulnerability Srbds:        Not affected
  Vulnerability Tsx async abort: Not affected

  From lscpu --cache:
      NAME ONE-SIZE ALL-SIZE WAYS TYPE          LEVEL    SETS PHY-LINE COHERENCY-SIZE
      L1d       48K       3M   12 Data              1      64        1             64
      L1i       32K       2M    8 Instruction       1      64        1             64
      L2         2M     128M   16 Unified           2    2048        1             64
      L3       160M     320M   20 Unified           3  131072        1             64
```

(Continued on next page)

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Platform Notes (Continued)

```
     ----------------------------------------------------------
     8. numactl --hardware
     NOTE: a numactl 'node' might or might not correspond to a physical chip.
       available: 4 nodes (0-3)
       node 0 cpus: 0-15,64-79
       node 0 size: 257543 MB
       node 0 free: 256919 MB
       node 1 cpus: 16-31,80-95
       node 1 size: 258039 MB
       node 1 free: 256677 MB
       node 2 cpus: 32-47,96-111
       node 2 size: 258005 MB
       node 2 free: 257328 MB
       node 3 cpus: 48-63,112-127
       node 3 size: 257597 MB
       node 3 free: 256951 MB
       node distances:
       node   0   1   2   3
         0:  10  12  21  21
         1:  12  10  21  21
         2:  21  21  10  12
         3:  21  21  12  10


     ----------------------------------------------------------
     9. /proc/meminfo
        MemTotal:      1055934788 kB


     ----------------------------------------------------------
     10. who -r
        run-level 3 Aug 4 12:00


     ----------------------------------------------------------
     11. Systemd service manager version: systemd 249 (249.16+suse.171.gdad0071f15)
        Default Target  Status
        multi-user      running


     ----------------------------------------------------------
     12. Services, from systemctl list-unit-files
        STATE           UNIT FILES
        enabled         YaST2-Firstboot YaST2-Second-Stage apparmor auditd cron display-manager firewalld getty@
                        irqbalance issue-generator kbdsettings kdump kdump-early klog lvm2-monitor nscd
                        nvmefc-boot-connections postfix purge-kernels rollback rsyslog smartd sshd systemd-pstore
                        wicked wickedd-auto4 wickedd-dhcp4 wickedd-dhcp6 wickedd-nanny
        enabled-runtime systemd-remount-fs
        disabled        autofs autoyast-initscripts blk-availability boot-sysctl ca-certificates chrony-wait
                        chronyd console-getty cups cups-browsed debug-shell dmraid-activation ebtables
                        exchange-bmc-os-info gpm grub2-once haveged haveged-switch-root ipmi ipmievd irqbindall
                        issue-add-ssh-keys kexec-load ksm kvm_stat lunmask man-db-create multipathd nfs nfs-blkmap
                        nvmf-autoconnect rpcbind rpmconfigcheck rsyncd serial-getty@ set_kthread_prio
                        smartd_generate_opts snmpd snmptrapd systemd-boot-check-no-failures
                        systemd-network-generator systemd-sysext systemd-time-wait-sync systemd-timesyncd tuned
                        udisks2 vncserver@
        indirect        wickedd


     ----------------------------------------------------------
     13. Linux kernel boot-time arguments, from /proc/cmdline
        BOOT_IMAGE=/boot/vmlinuz-5.14.21-150500.53-default
        root=UUID=4607dbe1-932d-4bea-b43c-6701598385ba
        splash=silent
        resume=/dev/disk/by-uuid/2ccfd1c4-5b7d-4cdb-9370-aca95a4f79b6
```

(Continued on next page)

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Platform Notes (Continued)

```
   mitigations=auto
   quiet
   security=apparmor
   crashkernel=403M,high
   crashkernel=72M,low


  ----------------------------------------------------------
 14. cpupower frequency-info
   analyzing CPU 0:
     current policy: frequency should be within 800 MHz and 4.00 GHz.
                     The governor "performance" may decide which speed to use
                     within this range.
     boost state support:
       Supported: yes
       Active: yes


  ----------------------------------------------------------
 15. tuned-adm active
   Current active profile: throughput-performance


  ----------------------------------------------------------
 16. sysctl
   kernel.numa_balancing             0
   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.extfrag_threshold             500
   vm.min_unmapped_ratio              1
   vm.nr_hugepages                    0
   vm.nr_hugepages_mempolicy          0
   vm.nr_overcommit_hugepages         0
   vm.swappiness                     10
   vm.watermark_boost_factor      15000
   vm.watermark_scale_factor         10
   vm.zone_reclaim_mode               0

  ----------------------------------------------------------
 17. /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


  ----------------------------------------------------------
 18. /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

  ----------------------------------------------------------
```

(Continued on next page)

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Platform Notes (Continued)

```
  19. OS release
    From /etc/*-release /etc/*-version
    os-release SUSE Linux Enterprise High Performance Computing 15 SP5

  ------------------------------------------------------------
  20. Disk information
  SPEC is set to: /home/speccpunew
    Filesystem     Type  Size  Used Avail Use% Mounted on
    /dev/nvme0n1p3 xfs   1.0T  343G  681G  34% /home

  ------------------------------------------------------------
  21. /sys/devices/virtual/dmi/id
      Vendor:         H3C
      Product:        H3C UniServer R4700 G6
      Product Family: Rack
      Serial:         210235A4FYH242000006

  ------------------------------------------------------------
  22. dmidecode
    Additional information from dmidecode 3.4 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 HMCG94AHBRA487N 64 GB 2 rank 6400, configured at 4800


  ------------------------------------------------------------
  23. BIOS
  (This section combines info from /sys/devices and dmidecode.)
    BIOS Vendor:      American Megatrends International, LLC.
    BIOS Version:     6.10.38P60
    BIOS Date:        04/03/2024
    BIOS Revision:    5.32
```

Compiler Version Notes

```
==============================================================================
C      | 500.perlbench_r(base) 502.gcc_r(base) 505.mcf_r(base) 525.x264_r(base) 557.xz_r(base)
------------------------------------------------------------------------------
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2024.1.0 Build 20240308
Copyright (C) 1985-2024 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------


==============================================================================
C++    | 520.omnetpp_r(base) 523.xalancbmk_r(base) 531.deepsjeng_r(base) 541.leela_r(base)
------------------------------------------------------------------------------
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2024.1.0 Build 20240308
Copyright (C) 1985-2024 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------


==============================================================================
Fortran | 548.exchange2_r(base)
------------------------------------------------------------------------------
Intel(R) Fortran Compiler for applications running on Intel(R) 64, Version 2024.1.0 Build 20240308
Copyright (C) 1985-2024 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------
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Base Compiler Invocation

C benchmarks:
`icx`

C++ benchmarks:
`icpx`

Fortran benchmarks:
`ifx`

Base Portability Flags

500.perlbench_r: `-DSPEC_LP64 -DSPEC_LINUX_X64`
502.gcc_r: `-DSPEC_LP64`
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`

Base Optimization Flags

C benchmarks:
`-w -std=c11 -m64 -Wl,-z,muldefs -xsapphirerapids -O3 -ffast-math`
`-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4`
`-L/opt/intel/oneapi/compiler/2024.1/lib -lqkmalloc`

C++ benchmarks:
`-w -std=c++14 -m64 -Wl,-z,muldefs -xsapphirerapids -O3 -ffast-math`
`-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4`
`-L/opt/intel/oneapi/compiler/2024.1/lib -lqkmalloc`

Fortran benchmarks:
`-w -m64 -Wl,-z,muldefs -xsapphirerapids -O3 -ffast-math -flto`
`-mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4`
`-nostandard-realloc-lhs -align array32byte -auto`
`-L/opt/intel/oneapi/compiler/2024.1/lib -lqkmalloc`

Standard Performance Evaluation Corporation (info@spec.org)

https://www.spec.org/

SPEC CPU®2017 Integer Rate Result

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New H3C Technologies Co., Ltd.

H3C UniServer R4700 G6 (Intel Xeon Gold 6530)

SPECrate®2017_int_base =   556

SPECrate®2017_int_peak = Not Run

CPU2017 License: 9066

Test Sponsor: New H3C Technologies Co., Ltd.

Tested by: New H3C Technologies Co., Ltd.

Test Date: Aug-2024

Hardware Availability: Oct-2023

Software Availability: Mar-2024

The flags files that were used to format this result can be browsed at

http://www.spec.org/cpu2017/flags/Intel-ic2024-official-linux64.html
http://www.spec.org/cpu2017/flags/New_H3C-Platform-Settings-V1.0-SPR-RevE.html

You can also download the XML flags sources by saving the following links:

http://www.spec.org/cpu2017/flags/Intel-ic2024-official-linux64.xml
http://www.spec.org/cpu2017/flags/New_H3C-Platform-Settings-V1.0-SPR-RevE.xml

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

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