SPEC CPU®2017 Integer Rate Result

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New H3C Technologies Co., Ltd.

H3C UniServer R4700 G6 (Intel Xeon Gold 6538N)

$SPECrate^{®}2017\_int\_base =$ **576**

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

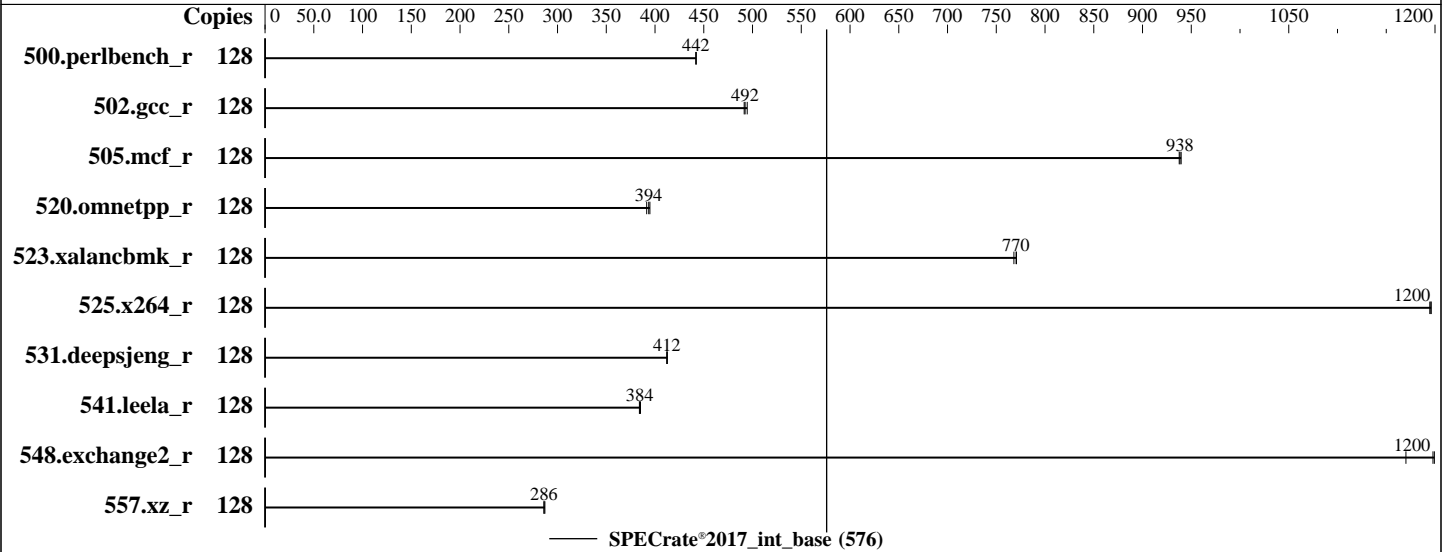|	
CPU2017 License: 9066	**Test Date:** Aug-2024
Test Sponsor: New H3C Technologies Co., Ltd.	**Hardware Availability:** Oct-2023
Tested by: New H3C Technologies Co., Ltd.	**Software Availability:** Mar-2024

Copies scale: 0 50.0 100 150 200 250 300 350 400 450 500 550 600 650 700 750 800 850 900 950 1050 1200

- 500.perlbench_r 128 442
- 502.gcc_r 128 492
- 505.mcf_r 128 938
- 520.omnetpp_r 128 394
- 523.xalancbmk_r 128 770
- 525.x264_r 128 1200
- 531.deepsjeng_r 128 412
- 541.leela_r 128 384
- 548.exchange2_r 128 1200
- 557.xz_r 128 286

—— SPECrate®2017_int_base (576)

Hardware

CPU Name: Intel Xeon Gold 6538N
 Max MHz: 4100
 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: 60 MB I+D on chip per chip
 Other: None
Memory: 1 TB (16 x 64 GB 2Rx4 PC5-6400B-R, running at 5200)
Storage: 1 x 3.2 TB NVME SSD
Other: CPU Cooling: Air

Software

OS: SUSE Linux Enterprise Server 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 6.10.43 released Jul-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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Results Table

Benchmark	Base						Peak						
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
500.perlbench_r	128	461	442	**461**	**442**	461	442							
502.gcc_r	128	369	491	**368**	**492**	366	495							
505.mcf_r	128	221	938	220	940	**220**	**938**							
520.omnetpp_r	128	**427**	**394**	425	395	429	391							
523.xalancbmk_r	128	176	768	175	771	**175**	**770**							
525.x264_r	128	188	1190	**187**	**1200**	187	1200							
531.deepsjeng_r	128	356	412	356	413	**356**	**412**							
541.leela_r	128	**552**	**384**	552	384	550	385							
548.exchange2_r	128	280	1200	**280**	**1200**	287	1170							
557.xz_r	128	482	287	**483**	**286**	483	286							

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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.

Standard Performance Evaluation Corporation (info@spec.org)   https://www.spec.org/

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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 Fri Aug  9 09:41:41 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)
   x86_64 x86_64 x86_64 GNU/Linux


 ------------------------------------------------------------
 2. w
    09:41:41 up 38 min,  2 users,  load average: 0.00, 0.02, 0.00
   USER     TTY       FROM             LOGIN@   IDLE   JCPU   PCPU WHAT
   root     tty1      -                09:41   13.00s  0.82s  0.01s sh intrate.sh
   root     pts/0    172.16.27.225     09:40   28.00s  0.12s  0.12s -bash


 ------------------------------------------------------------
 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) 4124850
  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) 4124850
  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-20231213.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-20231213.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 6538N
    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 6538N
CPU family:                   6
Model:                        207
Thread(s) per core:           2
Core(s) per socket:           32
Socket(s):                    2
Stepping:                     2
CPU max MHz:                  4100.0000
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 hfi 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:                     120 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      60M    120M    15 Unified        3  65536     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: 257599 MB
      node 0 free: 256807 MB
      node 1 cpus: 16-31,80-95
      node 1 size: 258039 MB
      node 1 free: 257458 MB
      node 2 cpus: 32-47,96-111
      node 2 size: 258039 MB
      node 2 free: 256968 MB
      node 3 cpus: 48-63,112-127
      node 3 size: 257563 MB
      node 3 free: 256944 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:       1055992260 kB


    ----------------------------------------------------------
    10. who -r
      run-level 3 Aug 9 09:03


    ----------------------------------------------------------
    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 cron display-manager getty@ issue-generator
                      kbdsettings klog lvm2-monitor nscd nvmefc-boot-connections purge-kernels rollback rsyslog
                      smartd sshd systemd-pstore wicked wickedd-auto4 wickedd-dhcp4 wickedd-dhcp6 wickedd-nanny
      enabled-runtime systemd-remount-fs
      disabled        auditd autofs autoyast-initscripts blk-availability boot-sysctl ca-certificates
                      chrony-wait chronyd console-getty cups cups-browsed debug-shell ebtables
                      exchange-bmc-os-info fancontrol firewalld gpm grub2-once haveged haveged-switch-root ipmi
                      ipmievd irqbalance issue-add-ssh-keys kdump kdump-early kexec-load lm_sensors lunmask
                      man-db-create multipathd nfs nfs-blkmap nmb nvmf-autoconnect postfix rpcbind
                      rpmconfigcheck rsyncd serial-getty@ smartd_generate_opts smb snmpd snmptrapd sysstat
                      systemd-boot-check-no-failures systemd-network-generator systemd-sysext
                      systemd-time-wait-sync systemd-timesyncd tuned vncserver@
      indirect        pcscd wickedd


    ----------------------------------------------------------
    13. Linux kernel boot-time arguments, from /proc/cmdline
       BOOT_IMAGE=/boot/vmlinuz-5.14.21-150500.53-default
       root=UUID=befab1a9-6492-412a-9d0b-079466ad03eb
       splash=silent
       resume=/dev/disk/by-uuid/64b85326-8619-4fcb-8127-1e8683bd7471
       mitigations=auto
```

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Platform Notes (Continued)

```
  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 4.10 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             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.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


  ----------------------------------------------------------
19. OS release
```

(Continued on next page)

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Platform Notes (Continued)

```
   From /etc/*-release /etc/*-version
   os-release SUSE Linux Enterprise Server 15 SP5


   ----------------------------------------------------------
   20. Disk information
   SPEC is set to: /home/speccpunew
     Filesystem     Type  Size  Used Avail Use% Mounted on
     /dev/nvme0n1p5 xfs   522G  352G  171G  68% /home


   ----------------------------------------------------------
   21. /sys/devices/virtual/dmi/id
      Vendor:         H3C
      Product:        H3C UniServer R4700 G6
      Product Family: Rack
      Serial:         210235A4FYH242000010


   ----------------------------------------------------------
   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 HMCG94AHBRA480N 64 GB 2 rank 6400, configured at 5200


   ----------------------------------------------------------
   23. BIOS
   (This section combines info from /sys/devices and dmidecode.)
     BIOS Vendor:      American Megatrends International, LLC.
     BIOS Version:     6.10.43
     BIOS Date:        07/27/2024
     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
```

SPEC CPU®2017 Integer Rate Result

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New H3C Technologies Co., Ltd.

H3C UniServer R4700 G6 (Intel Xeon Gold 6538N)

SPECrate®2017_int_base =   576

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

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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