SPEC CPU®2017 Integer Rate Result

New H3C Technologies Co., Ltd.

H3C UniServer R4900 G6 (Intel Xeon Platinum 8562Y+)

$SPECrate^{®}2017\_int\_base =$ **716**

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

CPU2017 License: 9066

Test Sponsor: New H3C Technologies Co., Ltd.

Tested by: New H3C Technologies Co., Ltd.

Test Date: Nov-2024

Hardware Availability: Oct-2023

Software Availability: Mar-2024

Copies	Result
500.perlbench_r 128	576
502.gcc_r 128	575
505.mcf_r 128	1150
520.omnetpp_r 128	441
523.xalancbmk_r 128	971
525.x264_r 128	1540
531.deepsjeng_r 128	534
541.leela_r 128	499
548.exchange2_r 128	1560
557.xz_r 128	335

SPECrate®2017_int_base (716)

Hardware

CPU Name: Intel Xeon Platinum 8562Y+
 Max MHz: 4100
 Nominal: 2800
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 5600)
Storage: 1 x 4.8 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 6.10.45 released Aug-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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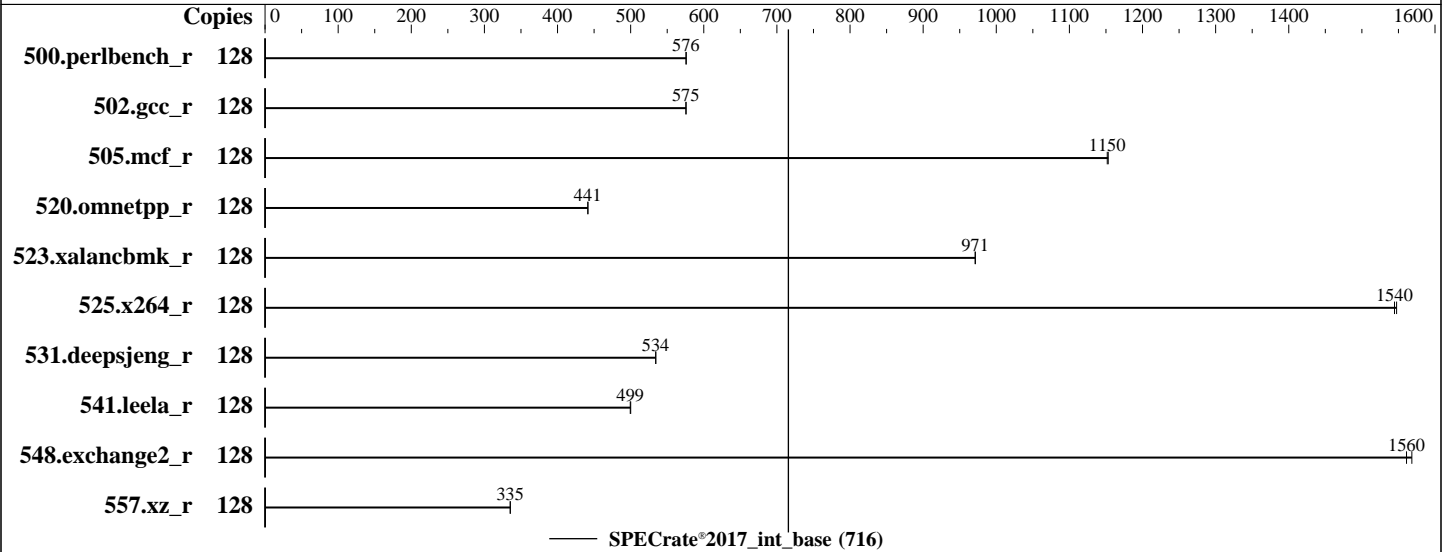
SPECrate®2017_int_peak = Not Run

CPU2017 License: 9066
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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	354	576	**354**	**576**									
502.gcc_r	128	315	576	**315**	**575**									
505.mcf_r	128	**180**	**1150**	179	1150									
520.omnetpp_r	128	**381**	**441**	380	442									
523.xalancbmk_r	128	**139**	**971**	139	971									
525.x264_r	128	145	1550	**145**	**1540**									
531.deepsjeng_r	128	274	534	**275**	**534**									
541.leela_r	128	424	500	**424**	**499**									
548.exchange2_r	128	214	1570	**215**	**1560**									
557.xz_r	128	**412**	**335**	412	335									
SPECrate®2017_int_base =		**716**												
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/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 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)
 Intel VT for Directed I/O = Disabled
 Package C State = C6(Retention) state
 BMC Settings:
 Fan mode = powerful mode

 Sysinfo program /home/speccpu/bin/sysinfo
 Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197
 running on localhost Wed Nov 20 02:04:17 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. Failed units, from systemctl list-units --state=failed
 13. Services, from systemctl list-unit-files
 14. Linux kernel boot-time arguments, from /proc/cmdline
 15. cpupower frequency-info
 16. tuned-adm active
 17. sysctl
 18. /sys/kernel/mm/transparent_hugepage
 19. /sys/kernel/mm/transparent_hugepage/khugepaged
 20. OS release
 21. Disk information
 22. /sys/devices/virtual/dmi/id
 23. dmidecode
 24. 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
    02:04:17 up 3 min,  1 user,  load average: 0.09, 0.25, 0.12
   USER      TTY      FROM              LOGIN@   IDLE   JCPU   PCPU WHAT
   root     tty1      -                 02:03   17.00s  1.11s  0.00s sh rate.sh

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

 ------------------------------------------------------------
 4. ulimit -a
   core file size          (blocks, -c) unlimited
```

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Platform Notes (Continued)

```
   data seg size            (kbytes, -d) unlimited
   scheduling priority              (-e) 0
   file size                (blocks, -f) unlimited
   pending signals                  (-i) 4124843
   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) 4124843
   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 rate.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 -n 2
 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 --iterations 2
   --nopower --runmode rate --tune base --size refrate intrate --nopreenv --note-preenv --logfile
   $SPEC/tmp/CPU2017.169/templogs/preenv.intrate.169.0.log --lognum 169.0 --from_runcpu 2
 specperl $SPEC/bin/sysinfo
$SPEC = /home/speccpu


   ----------------------------------------------------------
6. /proc/cpuinfo
   model name        : INTEL(R) XEON(R) PLATINUM 8562Y+
   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
```

(Continued on next page)

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Platform Notes (Continued)

```
     Byte Order:                     Little Endian
     CPU(s):                         128
     On-line CPU(s) list:            0-127
     Vendor ID:                      GenuineIntel
     Model name:                     INTEL(R) XEON(R) PLATINUM 8562Y+
     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:                       5600.00
     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
```

(Continued on next page)

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Platform Notes (Continued)

```
    L3         60M     120M    15 Unified       3 65536       1         64


   ---------------------------------------------------------------
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: 256765 MB
  node 1 cpus: 16-31,80-95
  node 1 size: 258039 MB
  node 1 free: 257385 MB
  node 2 cpus: 32-47,96-111
  node 2 size: 258005 MB
  node 2 free: 257359 MB
  node 3 cpus: 48-63,112-127
  node 3 size: 257596 MB
  node 3 free: 256016 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:      1055991724 kB


   ---------------------------------------------------------------
10. who -r
   run-level 3 Nov 20 02:01


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


   ---------------------------------------------------------------
12. Failed units, from systemctl list-units --state=failed
     UNIT          LOAD   ACTIVE SUB    DESCRIPTION
   * sep5.service loaded failed failed systemd script to load sep5 driver at boot time


   ---------------------------------------------------------------
13. Services, from systemctl list-unit-files
   STATE           UNIT FILES
   enabled         ModemManager YaST2-Firstboot YaST2-Second-Stage apparmor appstream-sync-cache auditd
                   bluetooth cron display-manager firewalld getty@ irqbalance issue-generator kbdsettings
                   kdump kdump-early klog lvm2-monitor nscd nvmefc-boot-connections postfix purge-kernels
                   rollback rsyslog sep5 smartd sshd systemd-pstore wicked wickedd-auto4 wickedd-dhcp4
                   wickedd-dhcp6 wickedd-nanny wpa_supplicant
   enabled-runtime systemd-remount-fs
   disabled        NetworkManager NetworkManager-dispatcher NetworkManager-wait-online accounts-daemon autofs
                   autoyast-initscripts blk-availability bluetooth-mesh boot-sysctl ca-certificates
                   chrony-wait chronyd console-getty cups cups-browsed debug-shell dmraid-activation dnsmasq
                   ebtables exchange-bmc-os-info fancontrol gpm grub2-once haveged haveged-switch-root ipmi
                   ipmievd irqbindall issue-add-ssh-keys kexec-load ksm kvm_stat lm_sensors lunmask
                   man-db-create multipathd nfs nfs-blkmap nmb nvmf-autoconnect openvpn@ ostree-remount
                   rpcbind rpmconfigcheck rsyncd rtkit-daemon serial-getty@ set_kthread_prio
                   smartd_generate_opts smb snmpd snmptrapd speech-dispatcherd systemd-boot-check-no-failures
```

(Continued on next page)

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Platform Notes (Continued)

```
                systemd-network-generator systemd-sysext systemd-time-wait-sync systemd-timesyncd tuned
                udisks2 update-system-flatpaks upower vncserver@ wpa_supplicant@
  indirect      pcscd saned@ wickedd

----------------------------------------------------------------
14. Linux kernel boot-time arguments, from /proc/cmdline
  BOOT_IMAGE=/boot/vmlinuz-5.14.21-150500.53-default
  root=UUID=a88cec4e-8c93-48e1-b1c1-5874d40c9a64
  splash=silent
  resume=/dev/disk/by-uuid/88c758ac-d10b-493d-b755-89620eeac1b1
  mitigations=auto
  quiet
  security=apparmor
  crashkernel=404M,high
  crashkernel=72M,low

----------------------------------------------------------------
15. 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

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

----------------------------------------------------------------
17. 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

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

```
 19. /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


 ----------------------------------------------------------
 20. OS release
   From /etc/*-release /etc/*-version
   os-release SUSE Linux Enterprise Server 15 SP5


 ----------------------------------------------------------
 21. Disk information
 SPEC is set to: /home/speccpu
   Filesystem     Type  Size  Used Avail Use% Mounted on
   /dev/nvme0n1p3 xfs   4.8T  379G  4.5T   8% /home


 ----------------------------------------------------------
 22. /sys/devices/virtual/dmi/id
   Vendor:         New H3C Technologies Co., Ltd.
   Product:        H3C UniServer R4900 G6
   Product Family: Rack
   Serial:         210235A4HEH242000021


 ----------------------------------------------------------
 23. 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 5600


 ----------------------------------------------------------
 24. BIOS
 (This section combines info from /sys/devices and dmidecode.)
   BIOS Vendor:       American Megatrends International, LLC.
   BIOS Version:      6.10.45
   BIOS Date:         08/23/2024
   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.
```

(Continued on next page)

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Compiler Version Notes (Continued)

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

==============================================================================
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.
------------------------------------------------------------------------------
```

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`

(Continued on next page)

New H3C Technologies Co., Ltd.

H3C UniServer R4900 G6 (Intel Xeon Platinum 8562Y+)

SPECrate®2017_int_base = 716

SPECrate®2017_int_peak = Not Run

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

Base Optimization Flags (Continued)

C++ benchmarks (continued):
```
-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
```

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-intel-RevB.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-intel-RevB.xml
```

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

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