SPEC CPU®2017 Integer Rate Result

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New H3C Technologies Co., Ltd.

H3C UniServer R4900 G6 Ultra (Intel Xeon Platinum 8558)

$SPECrate^{®}2017\_int\_base =$ 874

$SPECrate^{®}2017\_int\_peak =$ 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

Copies	Benchmark	Result
192	500.perlbench_r	699
192	502.gcc_r	745
192	505.mcf_r	1370
192	520.omnetpp_r	566
192	523.xalancbmk_r	1220
192	525.x264_r	1770
192	531.deepsjeng_r	614
192	541.leela_r	595
192	548.exchange2_r	1840
192	557.xz_r	449

SPECrate®2017_int_base (874)

Hardware

CPU Name: Intel Xeon Platinum 8558
 Max MHz: 4000
 Nominal: 2100
Enabled: 96 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: 260 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.

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

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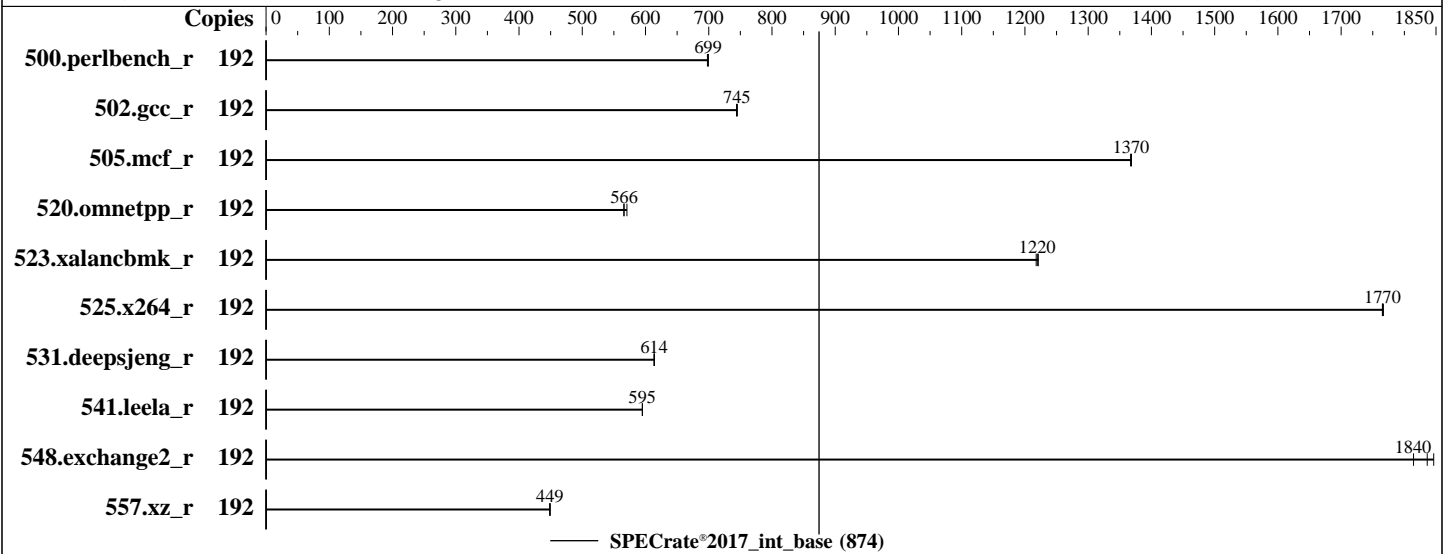
SPECrate®2017_int_peak = Not Run

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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	192	438	698	**437**	**699**	437	699							
502.gcc_r	192	**365**	**745**	365	745	365	744							
505.mcf_r	192	227	1370	227	1370	**227**	**1370**							
520.omnetpp_r	192	**445**	**566**	445	566	441	571							
523.xalancbmk_r	192	**166**	**1220**	166	1220	166	1220							
525.x264_r	192	**190**	**1770**	190	1770	190	1770							
531.deepsjeng_r	192	359	614	358	614	**359**	**614**							
541.leela_r	192	534	595	534	595	**534**	**595**							
548.exchange2_r	192	272	1850	**274**	**1840**	277	1810							
557.xz_r	192	462	449	**462**	**449**	462	448							
SPECrate®2017_int_base =		**874**												
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 Thu Aug 29 05:04:08 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
    05:04:08 up  6:27,  3 users,  load average: 0.14, 18.13, 33.63
   USER      TTY       FROM             LOGIN@   IDLE   JCPU   PCPU WHAT
   root     tty1      -                04:41   22:16   0.01s  0.01s -bash
   root     pts/0    172.16.27.225    22:40    8.00s  1.09s  0.01s sh intrate.sh
   root     pts/1    172.16.27.225    04:46   15.00s  0.10s  0.00s sh 8558.sh

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


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

(Continued on next page)

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Platform Notes (Continued)

```
   scheduling priority            (-e) 0
   file size            (blocks, -f) unlimited
   pending signals                (-i) 4126687
   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) 4126687
   virtual memory        (kbytes, -v) unlimited
   file locks                     (-x) unlimited


 ----------------------------------------------------------
 5. sysinfo process ancestry
 /usr/lib/systemd/systemd --switched-root --system --deserialize 30
 sshd: /usr/sbin/sshd -D [listener] 0 of 10-100 startups
 sshd: root@pts/0
 -bash
 sh intrate.sh
 runcpu --nobuild --action validate --define default-platform-flags --define numcopies=192 -c
   ic2024.1-lin-sapphirerapids-rate-20231213.cfg --define smt-on --define cores=96 --define physicalfirst
   --define invoke_with_interleave --define drop_caches --tune base -o all intrate
 runcpu --nobuild --action validate --define default-platform-flags --define numcopies=192 --configfile
   ic2024.1-lin-sapphirerapids-rate-20231213.cfg --define smt-on --define cores=96 --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/CPU2017.017/templogs/preenv.intrate.017.0.log --lognum 017.0 --from_runcpu 2
 specperl $SPEC/bin/sysinfo
 $SPEC = /home/speccpunew


 ----------------------------------------------------------
 6. /proc/cpuinfo
   model name        : INTEL(R) XEON(R) PLATINUM 8558
   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         : 48
   siblings          : 96
   2 physical ids (chips)
   192 processors (hardware threads)
   physical id 0: core ids 0-47
   physical id 1: core ids 0-47
   physical id 0: apicids 0-95
   physical id 1: apicids 128-223
  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):                         192
On-line CPU(s) list:            0-191
Vendor ID:                      GenuineIntel
Model name:                     INTEL(R) XEON(R) PLATINUM 8558
CPU family:                     6
Model:                          207
Thread(s) per core:             2
Core(s) per socket:             48
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:                      4.5 MiB (96 instances)
L1i cache:                      3 MiB (96 instances)
L2 cache:                       192 MiB (96 instances)
L3 cache:                       520 MiB (2 instances)
NUMA node(s):                   4
NUMA node0 CPU(s):              0-23,96-119
NUMA node1 CPU(s):              24-47,120-143
NUMA node2 CPU(s):              48-71,144-167
NUMA node3 CPU(s):              72-95,168-191
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     4.5M   12 Data            1     64        1             64
    L1i       32K       3M    8 Instruction     1     64        1             64
    L2         2M     192M   16 Unified         2   2048        1             64
```

(Continued on next page)

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Platform Notes (Continued)

```
    L3         260M      520M     20 Unified         3 212992        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: 0-23,96-119
  node 0 size: 257667 MB
  node 0 free: 246083 MB
  node 1 cpus: 24-47,120-143
  node 1 size: 258001 MB
  node 1 free: 247185 MB
  node 2 cpus: 48-71,144-167
  node 2 size: 258035 MB
  node 2 free: 247899 MB
  node 3 cpus: 72-95,168-191
  node 3 size: 257997 MB
  node 3 free: 248134 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:      1056462504 kB


  ----------------------------------------------------------
10. who -r
  run-level 3 Aug 28 22:37


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

(Continued on next page)

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Platform Notes (Continued)

```
      resume=/dev/disk/by-uuid/64b85326-8619-4fcb-8127-1e8683bd7471
      mitigations=auto
      quiet
      splash=silent
      mitigations=auto


    ----------------------------------------------------------
    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
      It seems that tuned daemon is not running, preset profile is not activated.
      Preset 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                    60
      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
```

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Platform Notes (Continued)

```
        ----------------------------------------------------------
        19. OS release
          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  463G   60G  89% /home


        ----------------------------------------------------------
        21. /sys/devices/virtual/dmi/id
            Vendor:         New H3C Technologies Co., Ltd.
            Product:        H3C UniServer R4900 G6 Ultra
            Product Family: Rack
            Serial:         210235A4CHH244000018


        ----------------------------------------------------------
        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 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 R4900 G6 Ultra (Intel Xeon Platinum 8558)

SPECrate®2017_int_base =   874

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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