SPEC CPU®2017 Integer Rate Result

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New H3C Technologies Co., Ltd.

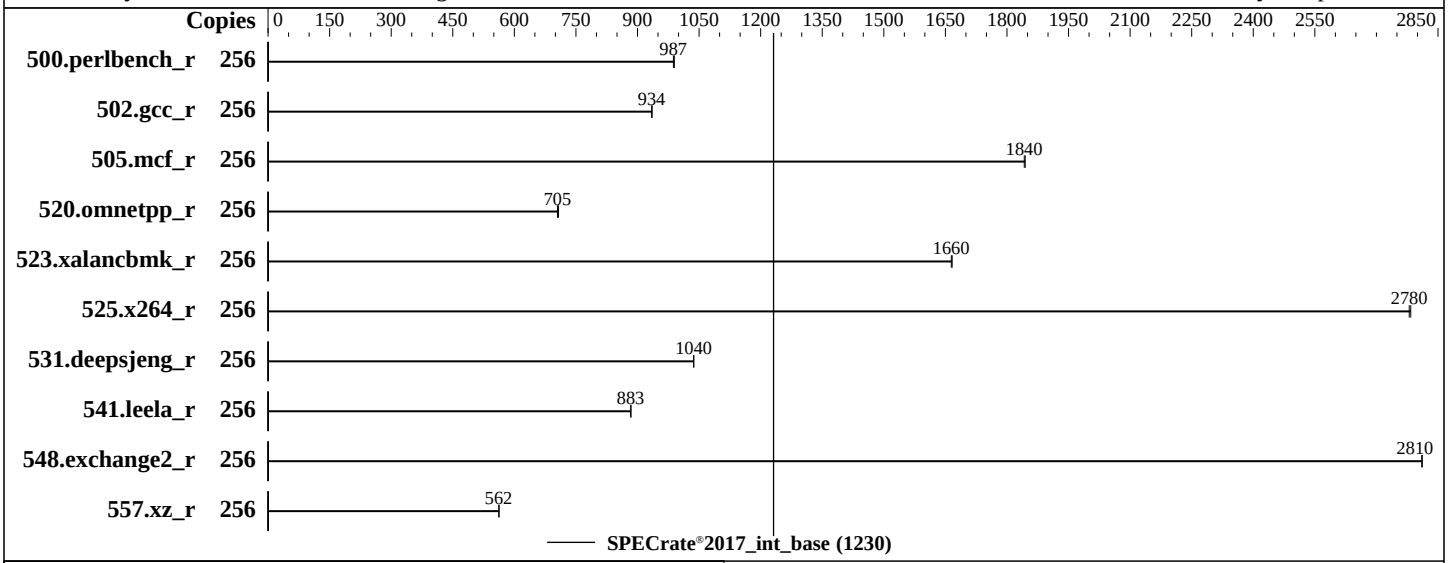
H3C UniServer R3900 G7 (Intel Xeon 6980P)

SPECrate®2017_int_base = 1230

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: Jan-2025
Software Availability: Apr-2024



Hardware

CPU Name:	Intel Xeon 6980P
Max MHz:	3900
Nominal:	2000
Enabled:	128 cores, 1 chip, 2 threads/core
Orderable:	1 chip
Cache L1:	64 KB I + 48 KB D on chip per core
L2:	2 MB I+D on chip per core
L3:	504 MB I+D on chip per chip
Other:	None
Memory:	768 GB (12 x 64 GB 4Rx8 PC5-12800B-R, running at 8800)
Storage:	1 x 3.84 TB NVME SSD
Other:	CPU Cooling: Air

Software

OS:	Red Hat Enterprise Linux 9.4 (Plow) 5.14.0-427.13.1.el9_4.x86_64
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 7.10.04 released Oct-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	256	412	990	**413**	**987**									
502.gcc_r	256	**388**	**934**	387	936									
505.mcf_r	256	224	1840	**225**	**1840**									
520.omnetpp_r	256	**476**	**705**	475	708									
523.xalancbmk_r	256	162	1670	**162**	**1660**									
525.x264_r	256	**161**	**2780**	161	2780									
531.deepsjeng_r	256	**283**	**1040**	283	1040									
541.leela_r	256	**480**	**883**	479	884									
548.exchange2_r	256	**239**	**2810**	239	2810									
557.xz_r	256	491	563	**492**	**562**									

SPECrate®2017_int_base = 1230

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.
```

Platform Notes

```
BIOS Settings:
 SNC = Enabled
 Package C State = C0/C1 state
BMC Settings:
 Fan mode = powerful mode

 Sysinfo program /home/speccpu/bin/sysinfo
 Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197
 running on localhost.localdomain Sat Nov 30 08:38:34 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 252 (252-32.el9_4)
 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.localdomain 5.14.0-427.13.1.el9_4.x86_64 #1 SMP PREEMPT_DYNAMIC Wed Apr 10 10:29:16 EDT
   2024 x86_64 x86_64 x86_64 GNU/Linux

 ------------------------------------------------------------
 2. w
    08:38:34 up 14:51,  1 user,  load average: 0.07, 0.02, 0.00
   USER     TTY        LOGIN@   IDLE   JCPU   PCPU WHAT
   root     tty1      Fri17   18.00s  1.11s  0.01s sh
   reportable-ic2024.1-lin-core-avx512-rate-smt-on-20240308.sh

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

 ------------------------------------------------------------
 4. ulimit -a
   real-time non-blocking time  (microseconds, -R) unlimited
   core file size              (blocks, -c) 0
```

(Continued on next page)

Platform Notes (Continued)

```
  data seg size               (kbytes, -d) unlimited
  scheduling priority                 (-e) 0
  file size                   (blocks, -f) unlimited
  pending signals                     (-i) 3091877
  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) 3091877
  virtual memory              (kbytes, -v) unlimited
  file locks                          (-x) unlimited

------------------------------------------------------------
5. sysinfo process ancestry
 /usr/lib/systemd/systemd rhgb --switched-root --system --deserialize 31
 login -- root
 -bash
 sh reportable-ic2024.1-lin-core-avx512-rate-smt-on-20240308.sh
 runcpu --nobuild --action validate --define default-platform-flags --define numcopies=256 -c
   ic2024.1-lin-core-avx512-rate-20240308.cfg --define smt-on --define cores=128 --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=256 --configfile
   ic2024.1-lin-core-avx512-rate-20240308.cfg --define smt-on --define cores=128 --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/CPU2017.039/templogs/preenv.intrate.039.0.log --lognum 039.0 --from_runcpu 2
 specperl $SPEC/bin/sysinfo
$SPEC = /home/speccpu

------------------------------------------------------------
6. /proc/cpuinfo
    model name      : Intel(R) Xeon(R) 6980P
    vendor_id       : GenuineIntel
    cpu family      : 6
    model           : 173
    stepping        : 1
    microcode       : 0x810002e0
    bugs            : spectre_v1 spectre_v2 spec_store_bypass swapgs
    cpu cores       : 128
    siblings        : 256
    1 physical ids (chips)
    256 processors (hardware threads)
    physical id 0: core ids 0-41,64-106,128-170
    physical id 0: apicids 0-83,128-213,256-341
  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):                             256
```

(Continued on next page)

Platform Notes (Continued)

```
   On-line CPU(s) list:                0-255
   Vendor ID:                          GenuineIntel
   BIOS Vendor ID:                     Intel(R) Corporation
   Model name:                         Intel(R) Xeon(R) 6980P
   BIOS Model name:                    Intel(R) Xeon(R) 6980P
   CPU family:                         6
   Model:                              173
   Thread(s) per core:                 2
   Core(s) per socket:                 128
   Socket(s):                          1
   Stepping:                           1
   CPU(s) scaling MHz:                 82%
   CPU max MHz:                        3900.0000
   CPU min MHz:                        800.0000
   BogoMIPS:                           4000.00
   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 ds_cpl 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 cdp_l2
                                       ssbd mba ibrs ibpb stibp ibrs_enhanced fsgsbase tsc_adjust bmi1 avx2
                                       smep bmi2 erms invpcid 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 split_lock_detect 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 ibt amx_bf16 avx512_fp16 amx_tile amx_int8 flush_l1d
                                       arch_capabilities
   L1d cache:                          6 MiB (128 instances)
   L1i cache:                          8 MiB (128 instances)
   L2 cache:                           256 MiB (128 instances)
   L3 cache:                           504 MiB (1 instance)
   NUMA node(s):                       3
   NUMA node0 CPU(s):                  0-41,128-169
   NUMA node1 CPU(s):                  42-84,170-212
   NUMA node2 CPU(s):                  85-127,213-255
   Vulnerability Gather data sampling: Not affected
   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 rstack overflow: Not affected
   Vulnerability Spec store bypass:    Mitigation; Speculative Store Bypass disabled via prctl
   Vulnerability Spectre v1:           Mitigation; usercopy/swapgs barriers and __user pointer sanitization
   Vulnerability Spectre v2:           Mitigation; Enhanced / Automatic IBRS, IBPB conditional, RSB filling,
                                       PBRSB-eIBRS Not affected
   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       6M   12 Data            1     64        1             64
      L1i       64K       8M   16 Instruction     1     64        1             64
```

(Continued on next page)

Platform Notes (Continued)

```
     L2         2M     256M   16 Unified         2   2048        1            64
     L3       504M     504M   16 Unified         3 516096        1            64

------------------------------------------------------------
8. numactl --hardware
NOTE: a numactl 'node' might or might not correspond to a physical chip.
  available: 3 nodes (0-2)
  node 0 cpus: 0-41,128-169
  node 0 size: 257017 MB
  node 0 free: 221928 MB
  node 1 cpus: 42-84,170-212
  node 1 size: 258026 MB
  node 1 free: 224803 MB
  node 2 cpus: 85-127,213-255
  node 2 size: 257967 MB
  node 2 free: 224640 MB
  node distances:
  node   0   1   2
    0:  10  12  12
    1:  12  10  12
    2:  12  12  10

------------------------------------------------------------
9. /proc/meminfo
   MemTotal:       791564192 kB

------------------------------------------------------------
10. who -r
  run-level 3 Nov 29 17:47

------------------------------------------------------------
11. Systemd service manager version: systemd 252 (252-32.el9_4)
  Default Target  Status
  multi-user      running

------------------------------------------------------------
12. Services, from systemctl list-unit-files
  STATE            UNIT FILES
  enabled          NetworkManager NetworkManager-dispatcher NetworkManager-wait-online atd auditd bluetooth
                   chronyd crond dbus-broker firewalld getty@ insights-client-boot irqbalance iscsi-onboot
                   iscsi-starter kdump libstoragemgmt lm_sensors low-memory-monitor lvm2-monitor mcelog
                   mdmonitor microcode multipathd nis-domainname nvmefc-boot-connections rhsmcertd rsyslog
                   rtkit-daemon selinux-autorelabel-mark smartd sshd sssd sysstat systemd-boot-update
                   systemd-network-generator tuned udisks2 upower
  enabled-runtime  systemd-remount-fs
  disabled         arp-ethers blk-availability canberra-system-bootup canberra-system-shutdown
                   canberra-system-shutdown-reboot chrony-wait chronyd-restricted console-getty cpupower
                   debug-shell dnf-system-upgrade fancontrol ipmi iprdump iprinit iprupdate ipsec iscsi-init
                   iscsid iscsiuio kpatch kvm_stat ledmon man-db-restart-cache-update nftables
                   nvmf-autoconnect pesign psacct rdisc rhcd rhsm rhsm-facts rpmdb-rebuild
                   selinux-check-proper-disable serial-getty@ sshd-keygen@ systemd-boot-check-no-failures
                   systemd-pstore systemd-sysext
  indirect         iscsi sssd-autofs sssd-kcm sssd-nss sssd-pac sssd-pam sssd-ssh sssd-sudo systemd-sysupdate
                   systemd-sysupdate-reboot

------------------------------------------------------------
13. Linux kernel boot-time arguments, from /proc/cmdline
  BOOT_IMAGE=(hd0,gpt2)/vmlinuz-5.14.0-427.13.1.el9_4.x86_64
  root=/dev/mapper/rhel-root
  ro
```

(Continued on next page)

Platform Notes (Continued)

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

------------------------------------------------------------
14. cpupower frequency-info
  analyzing CPU 191:
    current policy: frequency should be within 800 MHz and 3.90 GHz.
                    The governor "performance" may decide which speed to use
                    within this range.
    boost state support:
      Supported: yes
      Active: yes

------------------------------------------------------------
15. 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                    40
  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
```

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Platform Notes (Continued)

```
------------------------------------------------------------
19. OS release
  From /etc/*-release /etc/*-version
  os-release     Red Hat Enterprise Linux 9.4 (Plow)
  redhat-release Red Hat Enterprise Linux release 9.4 (Plow)
  system-release Red Hat Enterprise Linux release 9.4 (Plow)

------------------------------------------------------------
20. Disk information
SPEC is set to: /home/speccpu
  Filesystem            Type  Size  Used Avail Use% Mounted on
  /dev/mapper/rhel-home xfs   3.5T  188G  3.3T   6% /home

------------------------------------------------------------
21. /sys/devices/virtual/dmi/id
    Vendor:         New H3C Technologies Co., Ltd.
    Product:        H3C UniServer R3900 G7
    Serial:         210235A526H249000010

------------------------------------------------------------
22. dmidecode
  Additional information from dmidecode 3.5 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:
    12x Hynix HMCG98BDJHA381N 64 GB 4 rank 12800, configured at 8800


------------------------------------------------------------
23. BIOS
(This section combines info from /sys/devices and dmidecode.)
   BIOS Vendor:       American Megatrends International, LLC.
   BIOS Version:      7.10.04
   BIOS Date:         10/18/2024
   BIOS Revision:     5.35
   Firmware Revision: 1.16
```

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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Compiler Version Notes (Continued)

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 -xCORE-AVX512 -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 -xCORE-AVX512 -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 -xCORE-AVX512 -O3 -ffast-math -flto
-mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-nostandard-realloc-lhs -align array32byte -auto

(Continued on next page)

Base Optimization Flags (Continued)

Fortran benchmarks (continued):
-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-BHS-RevA.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-BHS-RevA.xml

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

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