



SPEC CPU®2017 Integer Rate Result

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New H3C Technologies Co., Ltd.

H3C UniServer R6900 G6 (Intel Xeon Gold 6448H)

SPECrate®2017_int_base = 1090

SPECrate®2017_int_peak = Not Run

CPU2017 License: 9066

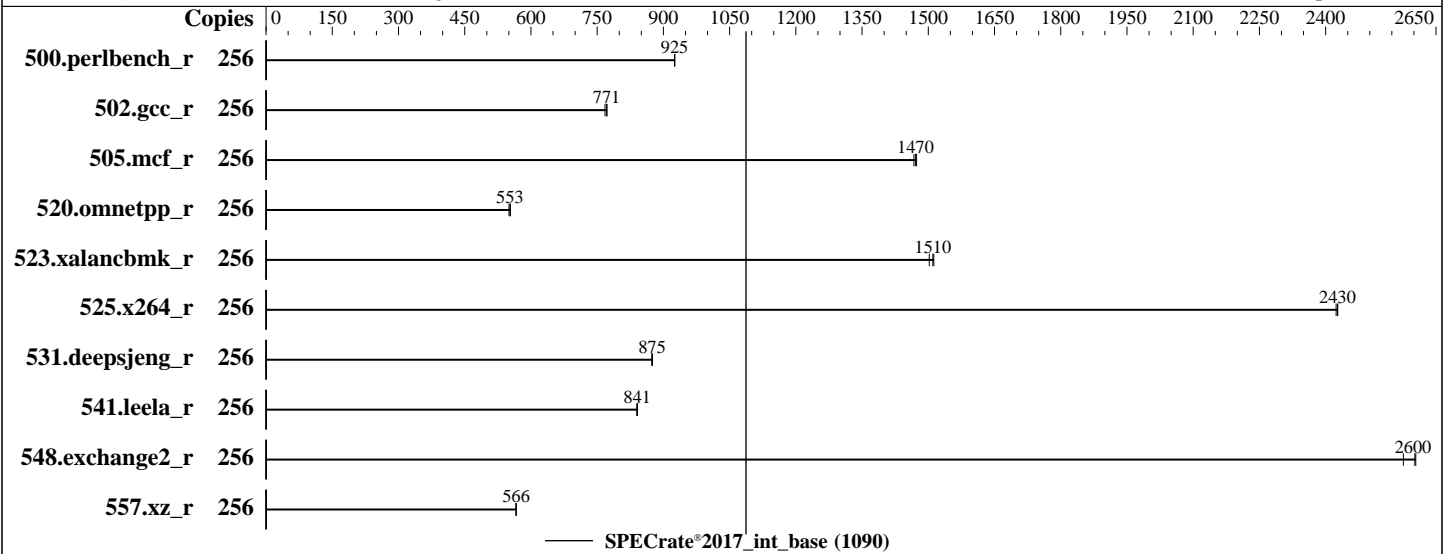
Test Sponsor: New H3C Technologies Co., Ltd.

Tested by: New H3C Technologies Co., Ltd.

Test Date: Mar-2025

Hardware Availability: Oct-2023

Software Availability: Apr-2024



Hardware

CPU Name: Intel Xeon Gold 6448H
 Max MHz: 4100
 Nominal: 2400
 Enabled: 128 cores, 4 chips, 2 threads/core
 Orderable: 1,2,4 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 PC5-5600B-R, running at 4800)
 Storage: 1 x 960 GB SATA 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 6.10.43P65 released Jan-2025 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	440	925	440	926	440	925							
502.gcc_r	256	469	772	470	771	472	768							
505.mcf_r	256	281	1470	282	1470	281	1470							
520.omnetpp_r	256	608	553	610	550	607	553							
523.xalancbmk_r	256	179	1510	179	1510	180	1500							
525.x264_r	256	185	2420	185	2430	185	2430							
531.deepsjeng_r	256	336	874	335	875	335	875							
541.leela_r	256	504	841	505	840	504	841							
548.exchange2_r	256	258	2600	258	2600	260	2580							
557.xz_r	256	488	566	488	566	488	566							

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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/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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General Notes (Continued)

Submitted_by: Zhoushinan <zhou.shinan@h3c.com>
Submitted: Tue Mar 25 00:08:47 EDT 2025
Submission: cpu2017-20250325-47250.sub

Platform Notes

BIOS Settings:
SNC = Enable SNC2 (2-clusters)
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.localdomain Tue Mar 18 22:02:42 2025

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

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3. Username
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5. sysinfo process ancestry
6. /proc/cpuinfo
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9. /proc/meminfo
10. who -r
11. Systemd service manager version: systemd 252 (252-32.e19_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
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18. /sys/kernel/mm/transparent_hugepage/khugepaged
19. OS release
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21. /sys/devices/virtual/dmi/id
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1. uname -a
Linux localhost.localdomain 5.14.0-427.13.1.e19_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
22:02:42 up 10 min, 1 user, load average: 0.04, 0.02, 0.00
USER TTY LOGIN@ IDLE JCPU PCPU WHAT
root tty1 21:52 42.00s 4.02s 0.11s sh rate.sh

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Platform Notes (Continued)

3. Username

From environment variable \$USER: root

4. ulimit -a

```
real-time non-blocking time (microseconds, -R) unlimited
core file size (blocks, -c) 0
data seg size (kbytes, -d) unlimited
scheduling priority (-e) 0
file size (blocks, -f) unlimited
pending signals (-i) 4124182
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) 4124182
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 rate.sh
runcpu --nobuild --action validate --define default-platform-flags --define numcopies=256 -c
ic2024.1-lin-sapphirerapids-rate-20240308.cfg --define smt-on --define cores=128 --define physicalfirst
--define invoke_with_interleave --define drop_caches --tune base -o all intrate
runcpu --nobuild --action validate --define default-platform-flags --define numcopies=256 --configfile
ic2024.1-lin-sapphirerapids-rate-20240308.cfg --define smt-on --define cores=128 --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/speccpu
```

6. /proc/cpuinfo

```
model name      : Intel(R) Xeon(R) Gold 6448H
vendor_id       : GenuineIntel
cpu family      : 6
model           : 143
stepping        : 8
microcode       : 0x2b000571
bugs             : spectre_v1 spectre_v2 spec_store_bypass swapgs eibrs_pbrsb
cpu cores       : 32
siblings        : 64
4 physical ids (chips)
256 processors (hardware threads)
physical id 0: core ids 0-31
physical id 1: core ids 0-31
physical id 2: core ids 0-31
physical id 3: core ids 0-31
physical id 0: apicids 0-63
physical id 1: apicids 128-191
physical id 2: apicids 256-319
```

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Platform Notes (Continued)

physical id 3: apicids 384-447

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
On-line CPU(s) list:        0-255
Vendor ID:                   GenuineIntel
BIOS Vendor ID:             Intel(R) Corporation
Model name:                  Intel(R) Xeon(R) Gold 6448H
BIOS Model name:            Intel(R) Xeon(R) Gold 6448H
CPU family:                  6
Model:                      143
Thread(s) per core:         2
Core(s) per socket:         32
Socket(s):                   4
Stepping:                    8
CPU(s) scaling MHz:         100%
CPU max MHz:                 4100.0000
CPU min MHz:                 800.0000
BogoMIPS:                   4800.00
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 intel_ppin cdp_l2 ssbd mba ibrs ibpb stibp ibrs_enhanced
                             tpr_shadow flexpriority ept vpid ept_ad 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 hfi vnmi
                             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

Virtualization:              VT-x
L1d cache:                   6 MiB (128 instances)
L1i cache:                   4 MiB (128 instances)
L2 cache:                    256 MiB (128 instances)
L3 cache:                    240 MiB (4 instances)
NUMA node(s):                8
NUMA node0 CPU(s):           0-15,128-143
NUMA node1 CPU(s):           16-31,144-159
NUMA node2 CPU(s):           32-47,160-175
NUMA node3 CPU(s):           48-63,176-191
NUMA node4 CPU(s):           64-79,192-207
NUMA node5 CPU(s):           80-95,208-223
NUMA node6 CPU(s):           96-111,224-239

```

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Platform Notes (Continued)

```

NUMA node7 CPU(s):          112-127,240-255
Vulnerability Gather data sampling: Not affected
Vulnerability Itlb multihit: Not affected
Vulnerability Lltf:         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,
                              PBRSE-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	6M	12	Data	1	64	1	64
L1i	32K	4M	8	Instruction	1	64	1	64
L2	2M	256M	16	Unified	2	2048	1	64
L3	60M	240M	15	Unified	3	65536	1	64

8. numactl --hardware

NOTE: a numactl 'node' might or might not correspond to a physical chip.

```

available: 8 nodes (0-7)
node 0 cpus: 0-15,128-143
node 0 size: 128034 MB
node 0 free: 120834 MB
node 1 cpus: 16-31,144-159
node 1 size: 129015 MB
node 1 free: 128590 MB
node 2 cpus: 32-47,160-175
node 2 size: 129015 MB
node 2 free: 120155 MB
node 3 cpus: 48-63,176-191
node 3 size: 128974 MB
node 3 free: 128571 MB
node 4 cpus: 64-79,192-207
node 4 size: 129015 MB
node 4 free: 122054 MB
node 5 cpus: 80-95,208-223
node 5 size: 129015 MB
node 5 free: 128584 MB
node 6 cpus: 96-111,224-239
node 6 size: 129015 MB
node 6 free: 128555 MB
node 7 cpus: 112-127,240-255
node 7 size: 129000 MB
node 7 free: 128558 MB
node distances:
node   0   1   2   3   4   5   6   7
0:    10  12  21  21  21  21  21  21
1:    12  10  21  21  21  21  21  21
2:    21  21  10  12  21  21  21  21
3:    21  21  12  10  21  21  21  21
4:    21  21  21  21  10  12  21  21
5:    21  21  21  21  12  10  21  21
6:    21  21  21  21  21  21  10  12

```

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Platform Notes (Continued)

7: 21 21 21 21 21 21 21 12 10

9. /proc/meminfo

MemTotal: 1055834556 kB

10. who -r

run-level 3 Mar 18 21:52

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 nvme-fc-boot-connections rhsmcertd rsyslog
rtkit-daemon selinux-autorelabel-mark smartd sshd sssd 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 cni-dhcp console-getty
cpupower debug-shell dnf-system-upgrade fancontrol iprdump iprprint iprupdate ipsec
iscsi-init iscsid iscsiui kpatch kvm_stat ledmon man-db-restart-cache-update
netavark-dhcp-proxy netavark-firewalld-reload nftables nvme-autoconnect pesign podman
podman-auto-update podman-clean-transient podman-kube@ podman-restart 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
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 169:

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

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Platform Notes (Continued)

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+madvice [madvice] never
enabled         [always] madvice 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
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   819G  102G  718G  13% /home
-----
21. /sys/devices/virtual/dmi/id
Vendor:          New H3C Technologies Co., Ltd.
Product:         H3C UniServer R6900 G6
Product Family:  Rack
Serial:          210235A4J7H24A000016

```

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Platform Notes (Continued)

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:

16x Hynix HMC94AGBRA179N 64 GB 2 rank 5600, configured at 4800

23. BIOS

(This section combines info from /sys/devices and dmidecode.)

BIOS Vendor: American Megatrends International, LLC.
BIOS Version: 6.10.43P65
BIOS Date: 01/02/2025
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.

Base Compiler Invocation

C benchmarks:

icx

C++ benchmarks:

icpx

Fortran benchmarks:

ifx



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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
```

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

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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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