



# SPEC CPU®2017 Integer Rate Result

Copyright 2017-2024 Standard Performance Evaluation Corporation

New H3C Technologies Co., Ltd.

SPECrate®2017\_int\_base = 1740

H3C UniServer R4950 G6 (AMD EPYC 9654)

SPECrate®2017\_int\_peak = 1870

CPU2017 License: 9066

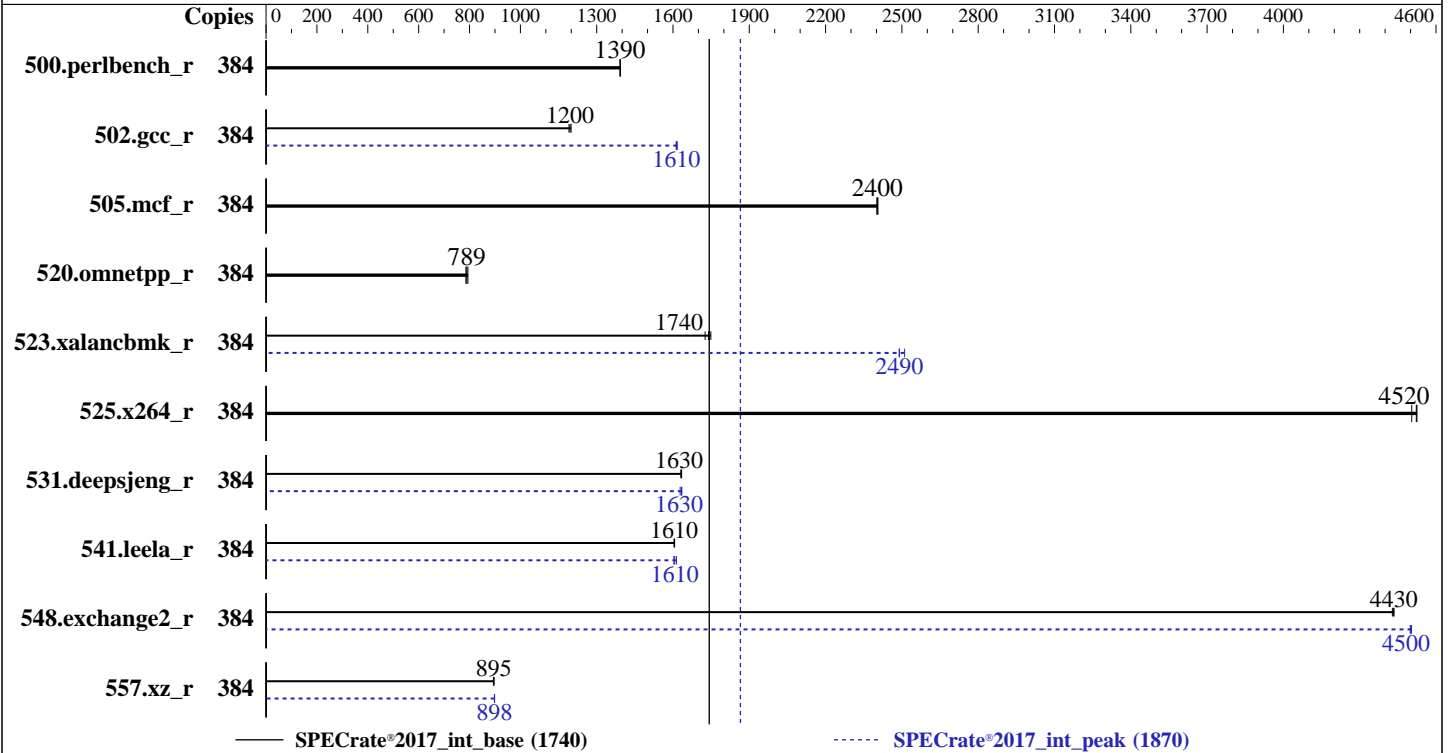
Test Sponsor: New H3C Technologies Co., Ltd.

Tested by: New H3C Technologies Co., Ltd.

Test Date: Aug-2024

Hardware Availability: Feb-2024

Software Availability: Nov-2023



## Hardware

CPU Name: AMD EPYC 9654  
 Max MHz: 3700  
 Nominal: 2400  
 Enabled: 192 cores, 2 chips, 2 threads/core  
 Orderable: 1,2 chips  
 Cache L1: 32 KB I + 32 KB D on chip per core  
 L2: 1 MB I+D on chip per core  
 L3: 384 MB I+D on chip per chip, 32 MB shared / 8 cores  
 Other: None  
 Memory: 1536 GB (24 x 64 GB 2Rx4 PC5-4800B-R)  
 Storage: 1 x 256GB NVME  
 Other: CPU Cooling: Air

## Software

OS: Red Hat Enterprise Linux release 9.3 (Plow)  
 5.14.0-362.8.1.el9\_3.x86\_64  
 Compiler: C/C++/Fortran: Version 4.0.0 of AOCC  
 Parallel: No  
 Firmware: Version 6.30.28 released Feb-2024  
 File System: xfs  
 System State: Run level 3 (multi-user)  
 Base Pointers: 64-bit  
 Peak Pointers: 32/64-bit  
 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	384	<b>439</b>	<b>1390</b>	439	1390	439	1390	384	<b>439</b>	<b>1390</b>	439	1390	439	1390
502.gcc_r	384	453	1200	456	1190	<b>455</b>	<b>1200</b>	384	337	1610	<b>337</b>	<b>1610</b>	336	1620
505.mcf_r	384	<b>258</b>	<b>2400</b>	258	2410	258	2400	384	<b>258</b>	<b>2400</b>	258	2410	258	2400
520.omnetpp_r	384	635	794	641	786	<b>638</b>	<b>789</b>	384	635	794	641	786	<b>638</b>	<b>789</b>
523.xalancbmk_r	384	235	1730	<b>233</b>	<b>1740</b>	232	1750	384	163	2490	<b>163</b>	<b>2490</b>	162	2510
525.x264_r	384	<b>149</b>	<b>4520</b>	149	4500	149	4530	384	<b>149</b>	<b>4520</b>	149	4500	149	4530
531.deepsjeng_r	384	270	1630	<b>270</b>	<b>1630</b>	269	1630	384	<b>269</b>	<b>1630</b>	270	1630	269	1630
541.leela_r	384	396	1610	396	1600	<b>396</b>	<b>1610</b>	384	<b>396</b>	<b>1610</b>	397	1600	394	1610
548.exchange2_r	384	227	4430	227	4430	<b>227</b>	<b>4430</b>	384	<b>224</b>	<b>4500</b>	223	4500	224	4500
557.xz_r	384	464	894	463	897	<b>463</b>	<b>895</b>	384	462	898	<b>462</b>	<b>898</b>	462	899

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Results appear in the order in which they were run. Bold underlined text indicates a median measurement.

## Compiler Notes

The AMD64 AOCC Compiler Suite is available at <http://developer.amd.com/amd-aocc/>

## Submit Notes

The config file option 'submit' was used.  
'numactl' was used to bind copies to the cores.  
See the configuration file for details.

## Operating System Notes

'ulimit -s unlimited' was used to set environment stack size limit  
'ulimit -l 2097152' was used to set environment locked pages in memory limit

runccpu command invoked through numactl i.e.:  
numactl --interleave=all runccpu <etc>

To limit dirty cache to 8% of memory, 'sysctl -w vm.dirty\_ratio=8' run as root.  
To limit swap usage to minimum necessary, 'sysctl -w vm.swappiness=1' run as root.  
To free node-local memory and avoid remote memory usage,  
'sysctl -w vm.zone\_reclaim\_mode=1' run as root.  
To clear filesystem caches, 'sync; sysctl -w vm.drop\_caches=3' run as root.  
To disable address space layout randomization (ASLR) to reduce run-to-run  
variability, 'sysctl -w kernel.randomize\_va\_space=0' run as root.

To enable Transparent Hugepages (THP) for all allocations:  
'echo always > /sys/kernel/mm/transparent\_hugepage/enabled' and  
'echo always > /sys/kernel/mm/transparent\_hugepage/defrag' run as root.



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## Environment Variables Notes

Environment variables set by runcpu before the start of the run:

```
LD_LIBRARY_PATH =
"/home/119/amd_rate_aocc400_znver4_A_lib/lib:/home/119/amd_rate_aocc400_znver4_A_lib/lib32:"
MALLOCONF = "retain:true"
```

Environment variables set by runcpu during the 523.xalancbmk\_r peak run:

```
MALLOCONF = "thp:never"
```

## General Notes

Binaries were compiled on a system with 2x AMD EPYC 9174F CPU + 1.5TiB Memory using RHEL 8.6

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:

cTDP Control: Manual

cTDP: 400

PPT Control: Manual

PPT: 400

Determinism Slider set to Power

NUMA nodes per socket: NPS4

IOMMU: Auto

SVM Mode: Disabled

Sysinfo program /home/119/bin/sysinfo

Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197

running on localhost.localdomain Mon Aug 21 20:02:54 2023

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 (252-18.e19)
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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## Platform Notes (Continued)

- 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 5.14.0-362.8.1.el9_3.x86_64 #1 SMP PREEMPT_DYNAMIC Tue Oct 3 11:12:36 EDT 2023
x86_64 x86_64 x86_64 GNU/Linux
```

```
2. w
20:02:54 up 2 min, 1 user, load average: 1.56, 2.46, 1.13
USER TTY LOGIN@ IDLE JCPU PCPU WHAT
root tty1 20:00 14.00s 1.65s 0.16s /bin/bash ./amd_rate_aocc400_znver4_A1.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
data seg size (kbytes, -d) unlimited
scheduling priority (-e) 0
file size (blocks, -f) unlimited
pending signals (-i) 6188261
max locked memory (kbytes, -l) 2097152
max memory size (kbytes, -m) unlimited
open files (-n) 32768
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) unlimited
virtual memory (kbytes, -v) unlimited
file locks (-x) unlimited
```

```
5. sysinfo process ancestry
/usr/lib/systemd/systemd --switched-root --system --deserialize 31
login -- root
-bash
-bash
python3 ./run_amd_rate_aocc400_znver4_A1.py
/bin/bash ./amd_rate_aocc400_znver4_A1.sh
runcpu --config amd_rate_aocc400_znver4_A1.cfg --tune all --reportable --iterations 3 intrate
runcpu --configfile amd_rate_aocc400_znver4_A1.cfg --tune all --reportable --iterations 3 --nopower
--runmode rate --tune base:peak --size test:train:refrate intrate --nopreenv --note-preenv --logfile
$SPEC/tmp/CPU2017.001/temlogs/preenv.intrate.001.0.log --lognum 001.0 --from_runcpu 2
specperl $SPEC/bin/sysinfo
$SPEC = /home/119
```

(Continued on next page)



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## Platform Notes (Continued)

```

6. /proc/cpuinfo
model name      : AMD EPYC 9654 96-Core Processor
vendor_id      : AuthenticAMD
cpu family     : 25
model          : 17
stepping       : 1
microcode      : 0xa101144
bugs           : sysret_ss_attrs spectre_v1 spectre_v2 spec_store_bypass
TLB size      : 3584 4K pages
cpu cores     : 96
siblings      : 192
2 physical ids (chips)
384 processors (hardware threads)
physical id 0: core ids 0-95
physical id 1: core ids 0-95
physical id 0: apicids 0-191
physical id 1: apicids 256-447

```

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):                384
On-line CPU(s) list:  0-383
Vendor ID:              AuthenticAMD
BIOS Vendor ID:        Advanced Micro Devices, Inc.
Model name:             AMD EPYC 9654 96-Core Processor
BIOS Model name:       AMD EPYC 9654 96-Core Processor
CPU family:            25
Model:                 17
Thread(s) per core:    2
Core(s) per socket:    96
Socket(s):              2
Stepping:              1
Frequency boost:       enabled
CPU max MHz:           3707.8120
CPU min MHz:           1500.0000
BogoMIPS:              4788.82
Flags:                  fpu vme de pse tsc msr pae mce cx8 apic sep mtrr pge mca cmov pat pse36
                        clflush mmx fxsr sse sse2 ht syscall nx mmxext fxsr_opt pdpe1gb rdtscp
                        lm constant_tsc rep_good amd_lbr_v2 nopl nonstop_tsc cpuid extd_apicid
                        aperfmperf rapl pni pclmulqdq monitor ssse3 fma cx16 pcid sse4_1 sse4_2
                        x2apic movbe popcnt aes xsave avx f16c rdrand lahf_lm cmp_legacy svm
                        extapic cr8_legacy abm sse4a misalignsse 3dnowprefetch osvw ibs skinit
                        wdt tce topoext perfctr_core perfctr_nb bpext perfctr_llc mwaitx cpb
                        cat_l3 cdp_l3 invpcid_single hw_pstate ssbd mba perfmon_v2 ibrs ibpb
                        stibp ibrs_enhanced vmmcall fsgsbase bmi1 avx2 smep bmi2 erms invpcid
                        cqm rdt_a avx512f avx512dq rdseed adx smap avx512ifma clflushopt clwb
                        avx512cd sha_ni avx512bw avx512vl xsaveopt xsavec xgetbv1 xsaves
                        cqm_llc cqm_occup_llc cqm_mbm_total cqm_mbm_local avx512_bf16 clzero
                        irperf xsaveerptr rdpru wbnoinvd amd_ppin cppc arat npt lbrv svm_lock
                        nrip_save tsc_scale vmcb_clean flushbyasid decodeassists pausefilter
                        pfthreshold avic v_vmsave_vmload vgif x2avic v_spec_ctrl vnmi
                        avx512vbmi umip pku ospke avx512_vbmi2 gfni vaes vpclmulqdq avx512_vnni

```

(Continued on next page)



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## Platform Notes (Continued)

```

                                avx512_bitalg avx512_vpopcntdq la57 rdpid overflow_recov succor smca
                                fsm flush_llid
Virtualization:                AMD-V
L1d cache:                     6 MiB (192 instances)
L1i cache:                     6 MiB (192 instances)
L2 cache:                      192 MiB (192 instances)
L3 cache:                      768 MiB (24 instances)
NUMA node(s):                 24
NUMA node0 CPU(s):            0-7,192-199
NUMA node1 CPU(s):            8-15,200-207
NUMA node2 CPU(s):            16-23,208-215
NUMA node3 CPU(s):            24-31,216-223
NUMA node4 CPU(s):            32-39,224-231
NUMA node5 CPU(s):            40-47,232-239
NUMA node6 CPU(s):            48-55,240-247
NUMA node7 CPU(s):            56-63,248-255
NUMA node8 CPU(s):            64-71,256-263
NUMA node9 CPU(s):            72-79,264-271
NUMA node10 CPU(s):           80-87,272-279
NUMA node11 CPU(s):           88-95,280-287
NUMA node12 CPU(s):           96-103,288-295
NUMA node13 CPU(s):           104-111,296-303
NUMA node14 CPU(s):           112-119,304-311
NUMA node15 CPU(s):           120-127,312-319
NUMA node16 CPU(s):           128-135,320-327
NUMA node17 CPU(s):           136-143,328-335
NUMA node18 CPU(s):           144-151,336-343
NUMA node19 CPU(s):           152-159,344-351
NUMA node20 CPU(s):           160-167,352-359
NUMA node21 CPU(s):           168-175,360-367
NUMA node22 CPU(s):           176-183,368-375
NUMA node23 CPU(s):           184-191,376-383
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 store bypass: Mitigation; Speculative Store Bypass disabled via prctl
Vulnerability Spectre v1:       Mitigation; usercopy/swaps barriers and __user pointer sanitization
Vulnerability Spectre v2:       Mitigation; Enhanced / Automatic IBRS, IBPB conditional, STIBP
                                always-on, RSB filling, PBRSE-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	32K	6M	8	Data	1	64	1	64
L1i	32K	6M	8	Instruction	1	64	1	64
L2	1M	192M	8	Unified	2	2048	1	64
L3	32M	768M	16	Unified	3	32768	1	64

8. numactl --hardware

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

```

available: 24 nodes (0-23)
node 0 cpus: 0-7,192-199
node 0 size: 63552 MB
node 0 free: 62757 MB

```

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## Platform Notes (Continued)

```

node 1 cpus: 8-15,200-207
node 1 size: 64507 MB
node 1 free: 64080 MB
node 2 cpus: 16-23,208-215
node 2 size: 64507 MB
node 2 free: 64154 MB
node 3 cpus: 24-31,216-223
node 3 size: 64507 MB
node 3 free: 64168 MB
node 4 cpus: 32-39,224-231
node 4 size: 64507 MB
node 4 free: 64212 MB
node 5 cpus: 40-47,232-239
node 5 size: 64507 MB
node 5 free: 64234 MB
node 6 cpus: 48-55,240-247
node 6 size: 64507 MB
node 6 free: 63750 MB
node 7 cpus: 56-63,248-255
node 7 size: 64507 MB
node 7 free: 64129 MB
node 8 cpus: 64-71,256-263
node 8 size: 64507 MB
node 8 free: 63983 MB
node 9 cpus: 72-79,264-271
node 9 size: 64507 MB
node 9 free: 64249 MB
node 10 cpus: 80-87,272-279
node 10 size: 64507 MB
node 10 free: 64263 MB
node 11 cpus: 88-95,280-287
node 11 size: 64507 MB
node 11 free: 64253 MB
node 12 cpus: 96-103,288-295
node 12 size: 64454 MB
node 12 free: 63583 MB
node 13 cpus: 104-111,296-303
node 13 size: 64507 MB
node 13 free: 64152 MB
node 14 cpus: 112-119,304-311
node 14 size: 64507 MB
node 14 free: 64027 MB
node 15 cpus: 120-127,312-319
node 15 size: 64507 MB
node 15 free: 64194 MB
node 16 cpus: 128-135,320-327
node 16 size: 64507 MB
node 16 free: 64234 MB
node 17 cpus: 136-143,328-335
node 17 size: 64507 MB
node 17 free: 64253 MB
node 18 cpus: 144-151,336-343
node 18 size: 64507 MB
node 18 free: 64271 MB
node 19 cpus: 152-159,344-351
node 19 size: 64507 MB
node 19 free: 64266 MB
node 20 cpus: 160-167,352-359
node 20 size: 64507 MB
node 20 free: 64241 MB

```

(Continued on next page)





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## Platform Notes (Continued)

```

node 21 cpus: 168-175,360-367
node 21 size: 64507 MB
node 21 free: 64210 MB
node 22 cpus: 176-183,368-375
node 22 size: 64507 MB
node 22 free: 64166 MB
node 23 cpus: 184-191,376-383
node 23 size: 64434 MB
node 23 free: 64159 MB
node distances:
node  0  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23
0: 10 11 11 12 12 12 12 12 12 12 12 12 22 22 22 22 22 22 22 22 22 22 22
1: 11 10 11 12 12 12 12 12 12 12 12 12 22 22 22 22 22 22 22 22 22 22 22
2: 11 11 10 12 12 12 12 12 12 12 12 12 22 22 22 22 22 22 22 22 22 22 22
3: 12 12 12 10 11 11 12 12 12 12 12 12 22 22 22 22 22 22 22 22 22 22 22
4: 12 12 12 11 10 11 12 12 12 12 12 12 22 22 22 22 22 22 22 22 22 22 22
5: 12 12 12 11 11 10 12 12 12 12 12 12 22 22 22 22 22 22 22 22 22 22 22
6: 12 12 12 12 12 12 12 10 11 11 12 12 22 22 22 22 22 22 22 22 22 22 22
7: 12 12 12 12 12 12 11 10 11 12 12 12 22 22 22 22 22 22 22 22 22 22 22
8: 12 12 12 12 12 12 11 11 10 12 12 12 22 22 22 22 22 22 22 22 22 22 22
9: 12 12 12 12 12 12 12 12 12 10 11 11 22 22 22 22 22 22 22 22 22 22 22
10: 12 12 12 12 12 12 12 12 12 11 10 11 22 22 22 22 22 22 22 22 22 22 22
11: 12 12 12 12 12 12 12 12 12 11 11 10 22 22 22 22 22 22 22 22 22 22 22
12: 22 22 22 22 22 22 22 22 22 22 22 22 10 11 11 12 12 12 12 12 12 12 12
13: 22 22 22 22 22 22 22 22 22 22 22 22 11 10 11 12 12 12 12 12 12 12 12
14: 22 22 22 22 22 22 22 22 22 22 22 22 11 11 10 12 12 12 12 12 12 12 12
15: 22 22 22 22 22 22 22 22 22 22 22 22 12 12 12 10 11 11 12 12 12 12 12
16: 22 22 22 22 22 22 22 22 22 22 22 22 12 12 12 11 10 11 12 12 12 12 12
17: 22 22 22 22 22 22 22 22 22 22 22 22 12 12 12 11 11 10 12 12 12 12 12
18: 22 22 22 22 22 22 22 22 22 22 22 22 12 12 12 12 12 12 10 11 11 12 12
19: 22 22 22 22 22 22 22 22 22 22 22 22 12 12 12 12 12 11 10 11 12 12 12
20: 22 22 22 22 22 22 22 22 22 22 22 22 12 12 12 12 12 11 11 10 12 12 12
21: 22 22 22 22 22 22 22 22 22 22 22 22 12 12 12 12 12 12 10 11 12 12 11
22: 22 22 22 22 22 22 22 22 22 22 22 22 12 12 12 12 12 12 12 11 10 11 11
23: 22 22 22 22 22 22 22 22 22 22 22 22 12 12 12 12 12 12 12 11 11 10 10

```

```

9. /proc/meminfo
MemTotal: 1584238512 kB

```

```

10. who -r
run-level 3 Aug 21 20:00

```

```

11. Systemd service manager version: systemd 252 (252-18.el9)
Default Target Status
multi-user      running

```

```

12. Services, from systemctl list-unit-files
STATE UNIT FILES
enabled NetworkManager NetworkManager-dispatcher NetworkManager-wait-online auditd chronyd crond
dbus-broker getty@ insights-client-boot irqbalance kdump lvm2-monitor mdmonitor microcode
nis-domainname nvme-fc-boot-connections rhsmcertd rsyslog selinux-autorelabel-mark sshd
sssd systemd-boot-update systemd-network-generator tuned udisks2
enabled-runtime systemd-remount-fs
disabled blk-availability chrony-wait console-getty cpupower debug-shell dnf-system-upgrade
firewalld hwloc-dump-hwdata kvm_stat man-db-restart-cache-update nftables nvme-autoconnect
rdisc rhcd rhsm rhsm-facts rpmdb-rebuild selinux-check-proper-disable serial-getty@

```

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## Platform Notes (Continued)

```

indirect          sshd-keygen@ systemd-boot-check-no-failures systemd-pstore systemd-sysext
                  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-5.14.0-362.8.1.el9_3.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

```

```

-----
14. cpupower frequency-info
analyzing CPU 0:
  current policy: frequency should be within 1.50 GHz and 2.40 GHz.
                  The governor "performance" may decide which speed to use
                  within this range.

  boost state support:
    Supported: yes
    Active: yes
    Boost States: 0
    Total States: 3
    Pstate-P0: 2400MHz

```

```

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

```

```

-----
16. sysctl
kernel.numa_balancing          0
kernel.randomize_va_space     0
vm.compaction_proactiveness    20
vm.dirty_background_bytes      0
vm.dirty_background_ratio      40
vm.dirty_bytes                 0
vm.dirty_expire_centisecs     3000
vm.dirty_ratio                 8
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                   1
vm.watermark_boost_factor      15000
vm.watermark_scale_factor      10
vm.zone_reclaim_mode           1

```

```

-----
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

```

(Continued on next page)



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H3C UniServer R4950 G6 (AMD EPYC 9654)

SPECrate®2017\_int\_peak = 1870

CPU2017 License: 9066

Test Sponsor: New H3C Technologies Co., Ltd.

Tested by: New H3C Technologies Co., Ltd.

Test Date: Aug-2024

Hardware Availability: Feb-2024

Software Availability: Nov-2023

## Platform Notes (Continued)

### 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 50000

```

### 19. OS release

```

From /etc/*-release /etc/*-version
os-release Red Hat Enterprise Linux 9.3 (Plow)
redhat-release Red Hat Enterprise Linux release 9.3 (Plow)
system-release Red Hat Enterprise Linux release 9.3 (Plow)

```

### 20. Disk information

SPEC is set to: /home/119

Filesystem	Type	Size	Used	Avail	Use%	Mounted on
/dev/mapper/rhel-home	xfs	163G	5.2G	158G	4%	/home

### 21. /sys/devices/virtual/dmi/id

```

Vendor: H3C
Product: RS33M2C9S
Product Family: Rack
Serial: N/A

```

### 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:

```

1x SK Hynix HMC94AEBRA102N 64 GB 2 rank 4800
17x SK Hynix HMC94AEBRA109N 64 GB 2 rank 4800
4x SK Hynix HMC94AEBRA123N 64 GB 2 rank 4800
2x SK Hynix HMC94MEBRA109N 64 GB 2 rank 4800

```

### 23. BIOS

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

```

BIOS Vendor: American Megatrends International, LLC.
BIOS Version: 6.30.28
BIOS Date: 02/27/2024
BIOS Revision: 5.27

```

## Compiler Version Notes

C | 502.gcc\_r(peak)

```

AMD clang version 14.0.6 (CLANG: AOCC_4.0.0-Build#434 2022_10_28) (based on LLVM Mirror.Version.14.0.6)
Target: i386-unknown-linux-gnu
Thread model: posix

```

(Continued on next page)



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## Compiler Version Notes (Continued)

InstalledDir: /opt/AMD/aocc/aocc-compiler-4.0.0/bin

C | 500.perlbench\_r(base, peak) 502.gcc\_r(base) 505.mcf\_r(base, peak) 525.x264\_r(base, peak) 557.xz\_r(base, peak)

AMD clang version 14.0.6 (CLANG: AOCC\_4.0.0-Build#434 2022\_10\_28) (based on LLVM Mirror.Version.14.0.6)
Target: x86\_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-4.0.0/bin

C | 502.gcc\_r(peak)

AMD clang version 14.0.6 (CLANG: AOCC\_4.0.0-Build#434 2022\_10\_28) (based on LLVM Mirror.Version.14.0.6)
Target: i386-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-4.0.0/bin

C | 500.perlbench\_r(base, peak) 502.gcc\_r(base) 505.mcf\_r(base, peak) 525.x264\_r(base, peak) 557.xz\_r(base, peak)

AMD clang version 14.0.6 (CLANG: AOCC\_4.0.0-Build#434 2022\_10\_28) (based on LLVM Mirror.Version.14.0.6)
Target: x86\_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-4.0.0/bin

C++ | 523.xalancbmk\_r(peak)

AMD clang version 14.0.6 (CLANG: AOCC\_4.0.0-Build#434 2022\_10\_28) (based on LLVM Mirror.Version.14.0.6)
Target: i386-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-4.0.0/bin

C++ | 520.omnetpp\_r(base, peak) 523.xalancbmk\_r(base) 531.deepsjeng\_r(base, peak) 541.leela\_r(base, peak)

AMD clang version 14.0.6 (CLANG: AOCC\_4.0.0-Build#434 2022\_10\_28) (based on LLVM Mirror.Version.14.0.6)
Target: x86\_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-4.0.0/bin

C++ | 523.xalancbmk\_r(peak)

AMD clang version 14.0.6 (CLANG: AOCC\_4.0.0-Build#434 2022\_10\_28) (based on LLVM Mirror.Version.14.0.6)
Target: i386-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-4.0.0/bin

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## Compiler Version Notes (Continued)

C++ | 520.omnetpp\_r(base, peak) 523.xalancbmk\_r(base) 531.deepsjeng\_r(base, peak) 541.leela\_r(base, peak)

AMD clang version 14.0.6 (CLANG: AOCC\_4.0.0-Build#434 2022\_10\_28) (based on LLVM Mirror.Version.14.0.6)  
Target: x86\_64-unknown-linux-gnu  
Thread model: posix  
InstalledDir: /opt/AMD/aocc/aocc-compiler-4.0.0/bin

Fortran | 548.exchange2\_r(base, peak)

AMD clang version 14.0.6 (CLANG: AOCC\_4.0.0-Build#434 2022\_10\_28) (based on LLVM Mirror.Version.14.0.6)  
Target: x86\_64-unknown-linux-gnu  
Thread model: posix  
InstalledDir: /opt/AMD/aocc/aocc-compiler-4.0.0/bin

## Base Compiler Invocation

C benchmarks:

clang

C++ benchmarks:

clang++

Fortran benchmarks:

flang

## Base Portability Flags

500.perlbench\_r: -DSPEC\_LINUX\_X64 -DSPEC\_LP64  
502.gcc\_r: -DSPEC\_LP64  
505.mcf\_r: -DSPEC\_LP64  
520.omnetpp\_r: -DSPEC\_LP64  
523.xalancbmk\_r: -DSPEC\_LINUX -DSPEC\_LP64  
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



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**CPU2017 License:** 9066

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**Tested by:** New H3C Technologies Co., Ltd.

**Test Date:** Aug-2024

**Hardware Availability:** Feb-2024

**Software Availability:** Nov-2023

## Base Optimization Flags

C benchmarks:

```
-m64 -flto -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-ldist-scalar-expand -fenable-aggressive-gather
-z muldefs -O3 -march=znver4 -fveclib=AMDLIBM -ffast-math
-fstruct-layout=7 -mllvm -unroll-threshold=50
-mllvm -inline-threshold=1000 -fremap-arrays -fstrip-mining
-mllvm -reduce-array-computations=3 -zopt -lamdlibm -lflang
-lamdalloc
```

C++ benchmarks:

```
-m64 -flto -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3 -z muldefs -O3
-march=znver4 -fveclib=AMDLIBM -ffast-math
-mllvm -unroll-threshold=100 -finline-aggressive
-mllvm -loop-unswitch-threshold=200000
-mllvm -reduce-array-computations=3 -zopt
-fvirtual-function-elimination -fvisibility=hidden -lamdlibm -lflang
-lamdalloc-ext
```

Fortran benchmarks:

```
-m64 -flto -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-inline-recursion=4 -Wl,-mllvm -Wl,-lsr-in-nested-loop
-Wl,-mllvm -Wl,-enable-iv-split -z muldefs -O3 -march=znver4
-fveclib=AMDLIBM -ffast-math -fepilog-vectorization-of-inductions
-mllvm -optimize-strided-mem-cost -floop-transform
-mllvm -unroll-aggressive -mllvm -unroll-threshold=500 -lamdlibm
-lflang -lamdalloc
```

## Base Other Flags

C benchmarks:

```
-Wno-unused-command-line-argument
```

C++ benchmarks:

```
-Wno-unused-command-line-argument
```

Fortran benchmarks:

```
-Wno-unused-command-line-argument
```



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Tested by: New H3C Technologies Co., Ltd.

Test Date: Aug-2024

Hardware Availability: Feb-2024

Software Availability: Nov-2023

## Peak Compiler Invocation

C benchmarks:

clang

C++ benchmarks:

clang++

Fortran benchmarks:

flang

## Peak Portability Flags

```
500.perlbench_r: -DSPEC_LINUX_X64 -DSPEC_LP64
502.gcc_r: -D_FILE_OFFSET_BITS=64
505.mcf_r: -DSPEC_LP64
520.omnetpp_r: -DSPEC_LP64
523.xalancbmk_r: -DSPEC_LINUX -DSPEC_LP64
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
```

## Peak Optimization Flags

C benchmarks:

```
500.perlbench_r: basepeak = yes
```

```
502.gcc_r: -m32 -flto -z muldefs -Ofast -march=znver4
-fveclib=AMDLIBM -ffast-math -fstruct-layout=7
-mllvm -unroll-threshold=50 -fremap-arrays -fstrip-mining
-mllvm -inline-threshold=1000
-mllvm -reduce-array-computations=3 -zopt -fgnu89-inline
-lamdalloc
```

```
505.mcf_r: basepeak = yes
```

```
525.x264_r: basepeak = yes
```

```
557.xz_r: -m64 -flto -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3 -Ofast
-march=znver4 -fveclib=AMDLIBM -ffast-math
```

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## Peak Optimization Flags (Continued)

557.xz\_r (continued):

```
-fstruct-layout=7 -mllvm -unroll-threshold=50
-freemap-arrays -fstrip-mining
-mllvm -inline-threshold=1000
-mllvm -reduce-array-computations=3 -zopt -lamdlibm
-lflang -lamdalloc
```

C++ benchmarks:

520.omnetpp\_r: basepeak = yes

```
523.xalancbmk_r: -m32 -flto -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-do-block-reorder=aggressive
-fno-loop-reroll -Ofast -march=znver4 -fveclib=AMDLIBM
-ffast-math -finline-aggressive
-mllvm -unroll-threshold=100
-mllvm -reduce-array-computations=3 -zopt
-mllvm -do-block-reorder=aggressive
-fvirtual-function-elimination -fvisibility=hidden
-lamdalloc-ext
```

```
531.deepsjeng_r: -m64 -flto -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3 -O3
-march=znver4 -fveclib=AMDLIBM -ffast-math
-mllvm -unroll-threshold=100 -finline-aggressive
-mllvm -loop-unswitch-threshold=200000
-mllvm -reduce-array-computations=3 -zopt
-fvirtual-function-elimination -fvisibility=hidden
-lamdlibm -lamdalloc-ext
```

```
541.leela_r: -m64 -flto -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3 -Ofast
-march=znver4 -fveclib=AMDLIBM -ffast-math
-finline-aggressive -mllvm -unroll-threshold=100
-mllvm -reduce-array-computations=3 -zopt
-fvirtual-function-elimination -fvisibility=hidden
-lamdlibm -lflang -lamdalloc-ext
```

Fortran benchmarks:

```
-m64 -flto -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-inline-recursion=4 -Wl,-mllvm -Wl,-lsr-in-nested-loop
-Wl,-mllvm -Wl,-enable-iv-split -O3 -march=znver4 -fveclib=AMDLIBM
-ffast-math -fepilog-vectorization-of-inductions
-mllvm -optimize-strided-mem-cost -floop-transform
```

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## Peak Optimization Flags (Continued)

Fortran benchmarks (continued):

-mllvm -unroll-aggressive -mllvm -unroll-threshold=500 -lamdlibm  
-lflang -lamdalloc

## Peak Other Flags

C benchmarks (except as noted below):

-Wno-unused-command-line-argument

502.gcc\_r: -L/usr/lib32 -Wno-unused-command-line-argument

-L/home/work/cpu2017/v119/aocc4/znver4/rate/amd\_rate\_aocc400\_znver4\_A\_lib/lib32

C++ benchmarks (except as noted below):

-Wno-unused-command-line-argument

523.xalancbmk\_r: -L/usr/lib32 -Wno-unused-command-line-argument

-L/home/work/cpu2017/v119/aocc4/znver4/rate/amd\_rate\_aocc400\_znver4\_A\_lib/lib32

Fortran benchmarks:

-Wno-unused-command-line-argument

The flags files that were used to format this result can be browsed at

[http://www.spec.org/cpu2017/flags/New\\_H3C-Platform-AMD-Settings-V1.4-Genoa.html](http://www.spec.org/cpu2017/flags/New_H3C-Platform-AMD-Settings-V1.4-Genoa.html)

<http://www.spec.org/cpu2017/flags/aocc400-flags.html>

You can also download the XML flags sources by saving the following links:

[http://www.spec.org/cpu2017/flags/New\\_H3C-Platform-AMD-Settings-V1.4-Genoa.xml](http://www.spec.org/cpu2017/flags/New_H3C-Platform-AMD-Settings-V1.4-Genoa.xml)

<http://www.spec.org/cpu2017/flags/aocc400-flags.xml>

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